

# IDOL Education

Software Version 12.10

## User and Programming Guide



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# Part I: Getting Started

This section introduces Education and the basic concepts for its use.

- [Introduction](#)
- [Install Education](#)

# Chapter 1: Introduction

This section introduces Micro Focus Education.

- [About Education](#) ..... 12
- [Education Concepts](#) ..... 13
- [Education Architecture](#) ..... 16
- [Decide Which Education Product to Use](#) ..... 18

## About Education

Micro Focus IDOL Education identifies and extracts *entities* from text. An entity is a word, phrase, or block of information, such as a person's name, an address, a date, or a telephone number.

Education includes a comprehensive set of predefined entities, for many languages and geographical locations, so that you can extract names, credit card numbers, addresses, and so on. You can also extend Education by defining your own entities.

You can use Education to:

- extract entities from documents and add them to metadata fields before you add the documents to your IDOL index.

For example, you might extract company names from your document content and tag the documents with these names. Your front-end application can then use these tags to present a list of companies to your users as search filters.

- identify personally identifiable information (PII) in your data, so that you can manage this data and conform to regulation such as the General Data Protection Regulation (GDPR).

**TIP:** Micro Focus provides an additional PII grammar package for this purpose. For more information, refer to the *IDOL PII Package Technical Note*.

- perform sentiment analysis. Sentiment analysis identifies positive and negative sentiment in text. For example, you can extract positive and negative comments from product reviews. See [Sentiment Analysis, on page 75](#).
- redact sensitive information in text or IDOL documents, so that you can conform to data protection standards and use your records for multiple purposes.

Micro Focus IDOL allows you to use Education in several ways:

- **CFS and NiFi Ingest.** You can use Education to enrich documents during the ingestion process, before you add them to the IDOL index. For example, you can extract entities and tag the documents so that is easier to find documents related to a specific person, place, or subject.

To run Education as part of the ingestion process, use either Connector Framework Server (CFS) or IDOL NiFi Ingest. For more information, refer to the *Connector Framework Server Administration Guide*, or the *IDOL NiFi Ingest Getting Started Guide*.

- **Education Server.** You can use the Education Server to extract entities, redact information, and perform sentiment analysis on plain text. See [Use Education Server, on page 33](#).
- **Build a custom application using the Education SDK.** Micro Focus provides Education SDKs for C, .NET, and Java, so that you can include Education in your own applications. See [Deploy Education SDK, on page 23](#).

For more information about which method to use, see [Decide Which Education Product to Use, on page 18](#).

## Education Concepts

This section introduces some of the Education concepts and terminology used throughout this guide.

• <a href="#">Grammar Files</a> .....	13
• <a href="#">Sentiment Analysis</a> .....	14
• <a href="#">Components</a> .....	15
• <a href="#">Extraction</a> .....	15

## Grammar Files

A *grammar file* defines one or more entities that you want to extract.

- **Standard grammars.** Education includes a collection of grammar files covering common entities such as names, social security numbers, postal addresses, telephone numbers, and so on. For a complete list of standard grammars, see [Standard Grammars, on page 108](#).

Standard grammar files are licensed by category and by language, so that you can have a license for any combination of category (for example, sentiment, place, or person) and language.

- **User grammars.** You can extend the capabilities of Education by writing your own grammar files, either from scratch or by referencing existing entities.

**NOTE:** To reference the standard grammars in your own grammar files, you must have an appropriate license.

You might want to extend or write a grammar if you have specialist entities or values that the standard grammars do not match. These might be new values, or you can create grammars that combine standard entities into more complicated matches.

**TIP:** Before you extend a grammar, raise the issue with your Micro Focus support contact. The entity that you want to detect might be supported in an upcoming release, or Micro Focus

might be able to add support in future. Using an official grammar means you do not have to maintain it.

Grammar files are created in XML format, and can be compiled into the proprietary *ECR* format. Compiling a grammar file into the ECR format makes it much faster to load at runtime.

Most of the standard grammar files are available only in ECR format. However, the Education package also includes several XML source grammars to allow you to easily extend the standard grammars (see [Standard Grammar – Source, on page 281](#)). You can compile these, and your custom user grammars by using the `edktool` command-line tool.

**NOTE:** In Education version 12.7 and later, the standard grammars are in compressed ECR format, and `edktool` compiles grammars to compressed ECR format. You can still use existing uncompressed grammars from previous versions.

**NOTE:** Education can also use XML grammar files directly (that is, without compiling them to ECR files). However, in most cases Micro Focus recommends that you compile your grammars to improve performance.

There are two main ways to define entities:

- Use a dictionary of possible matches, for example to extract names of people or places.
- Use *regular expressions* (regex) to specify what a match looks like without having to list each possibility, for example to extract dates and times, or telephone numbers, which conform to a known pattern.

You can define entities recursively, and rules can refer to entities in other grammar files. This allows you to create more complicated entities that match data such as URLs or postal addresses.

### Related Topics

- [Extend Grammars, on page 82](#)
- [Custom Grammar Guidelines, on page 63](#)
- [Compile and Test Grammars, on page 88](#)
- [Standard Grammars, on page 108](#)

## Sentiment Analysis

Education *Sentiment Analysis* allows you to find whether text has positive, negative, or neutral sentiment. For example, you can use it to determine whether users of a particular product or service are satisfied or not, based on an automated analysis of reviews.

The sentiment analysis grammar files contain dictionaries of types of words (such as positive adjectives, negative nouns, and so on), and patterns that describe how to combine these dictionaries into positive and negative phrases.

Education has sentiment analysis grammar files available in the following languages:

- Arabic
- Chinese
- Czech
- Dutch
- English
- French
- German
- Italian
- Portuguese
- Russian
- Spanish
- Turkish

For more information, see [Sentiment Analysis, on page 75](#).

## Components

Some of the standard grammar files contain *components*, which extract attributes from matched phrases, such as topic, subject, and positive or negative sentiments. These attributes are called components because they are the components of a single match.

For example, if you use sentiment analysis to match the phrase *Their service is fantastic* as conveying positive sentiment, you can then use components to identify *service* as the subject matter, and *fantastic* as the adjective that describes the subject (note that the sentiment is not necessarily an adjective in all cases).

You can also set up components when you write your own custom grammar files.

For more information on how to configure and define components in your grammar files, and when to use them, see [Components, on page 61](#).

## Extraction

Education *extraction* is the process of matching and retrieving entities from text, according to the rules in your grammars.

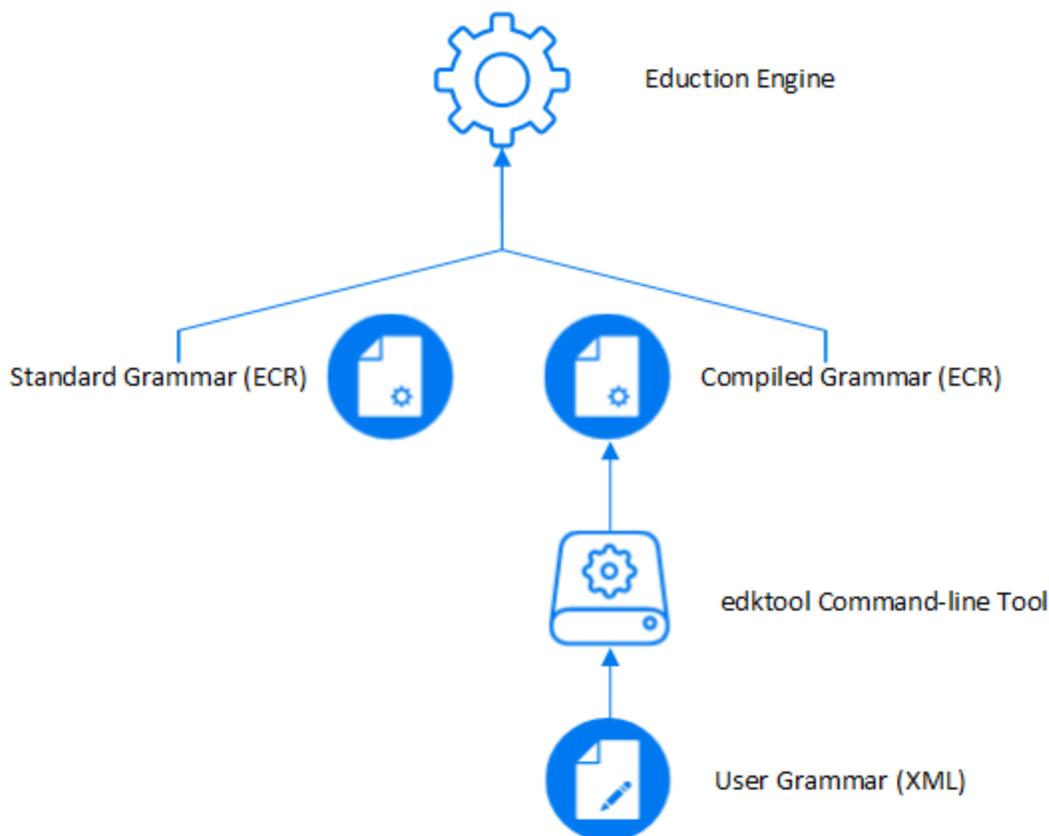
To run Education, you send a text file, or the raw text, to the Education engine (you can do this in several ways, see [Education Architecture, on the next page](#)). You use the Education configuration to specify the grammars and entities that you want to match. Education identifies each instance of the requested entity, and returns an XML list of matches.

By default, Education returns the matched entity, with some additional information about the match, such as a confidence score for the accuracy of the match. It can also identify any configured components of the entity match, such as the parts of a social security number or phone number (see [Components, above](#)).

## Education Architecture

You run Education by using an *Education engine*. This engine uses the Education grammars to process text and return the matched entities.

The following diagram shows the use of grammars in an Education engine.



The standard grammar files are a wide range of ECR files that Micro Focus provides in your Education installation (see [Standard Grammar – Compiled, on page 109](#)). You can use these files as they are, or extend them by creating a grammar XML file that includes them. You can also create your own user grammar files from scratch.

You compile XML grammar files into ECR by using the edktool command-line tool. For more information see [Compile and Test Grammars, on page 88](#).

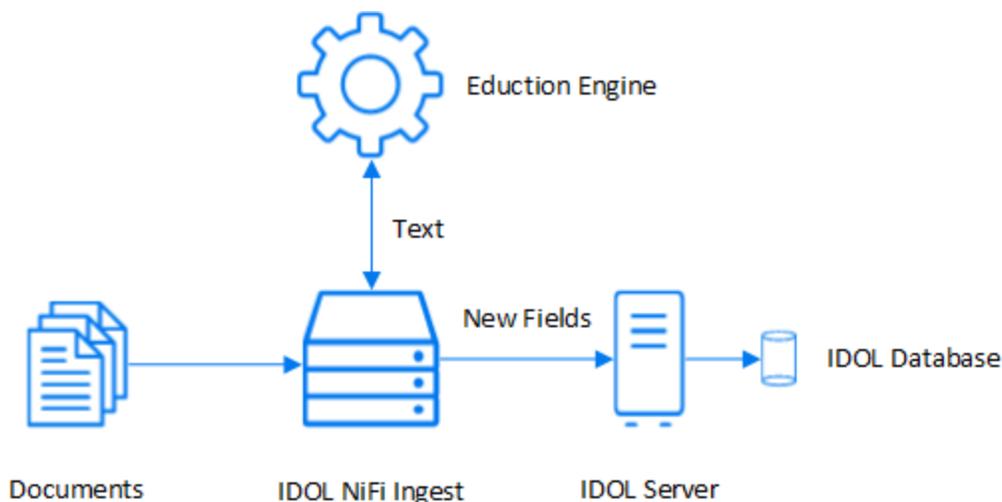
**NOTE:** Education can also use XML grammar files directly (that is, without compiling them to ECR files). However, in most cases Micro Focus recommends that you compile your grammars to improve performance.

How you use the Education engine depends on the way you call Education. For example, you can:

- Use Education as part of an IDOL ingestion process.

In this case, you use IDOL Connectors to retrieve documents from your repositories and send them to IDOL NiFi Ingest. IDOL NiFi Ingest performs any processing on the documents, including sending text to the Education engine. The Education engine sends back the entity matches, which IDOL NiFi can add to new fields in your IDOL documents. For more information, refer to the *IDOL NiFi Ingest Getting Started Guide*.

The following diagram shows this process.



**TIP:** This process is similar if you use Connector Framework Server (CFS) to ingest your documents.

- Use Education Server to run Education.

In this case, you send your text in ACI actions (from a front-end application or Web browser) to the Education Server, which runs the Education engine that processes the text and returns the matched entities. See [Use Education Server, on page 33](#).

- Call Education directly by using the Education SDK.

In this case, your custom application sends text directly to the Education engine, which then returns the matched entities. For more information, see [Deploy Education SDK, on page 23](#).

You can also run Education by using the `edktool` command-line tool. This method can be useful for testing your grammars or entities when you make modifications (see [Compile and Test Grammars, on page 88](#)). However, Micro Focus recommends that you do not use `edktool` as part of a production system.

**TIP:** If you do not know which Education package is best for your use case, see [Decide Which Education Product to Use, on the next page](#).

## Decide Which Education Product to Use

Micro Focus provides three main ways for you to use Education: Education in ingest, the Education SDK, and Education Server. The one you use depends on your use case, and your preference.

### Education as Part of an Ingestion Process

The IDOL ingestion components, IDOL NiFi Ingest and Connector Framework Server (CFS), allow you to incorporate Education as part of a document retrieval process. You can use connectors to retrieve documents from your repositories, and perform Education alongside any other document processing.

This method is very useful if you want to automate the process of retrieving and tagging documents. In particular, if you use IDOL NiFi Ingest and CFS to index into IDOL, you can use Education to add extra fields to your IDOL documents to make it easier to search for the entity values that you extract.

However, this method is not appropriate if you want to provide text directly to Education as part of an application.

### Education SDK or Education Server

The Education SDK provides APIs to allow you to run Education directly. This option is most suitable for OEM environments, where you want to embed Education into an application that you distribute to your users.

The Education ACI Server also allows you to use Education as part of an application. In this case, you must host the server (and a license server), which makes it less suitable for OEM environments. It might be the most suitable option if you want to use Education in a web application, particularly if you want to use other IDOL services.

In other cases, you can use either option, depending on your personal preference. When you choose, you might want to consider the following points:

- The Education SDK has a larger initial learning requirement as you start using the SDK.  
Education Server accepts HTTP requests and returns XML, so it might be a quicker method to get started with. In particular, if you already use the ACI API in other applications, you do not need to learn how to use additional APIs to run Education.
- The Education SDK is available only for C, .NET and Java. If you want to create an application in a different language, you might not be able to use the SDK without using additional methods to call out to shared libraries.

**NOTE:** To use Education Server, you can use any method for making HTTP requests and parsing XML. There are also IDOL SDKs available in C, .NET, and Java.

- To run Education, both Education Server and the Education SDK must have access to the required grammar files.

In the case of the Education SDK, the easiest way to include the grammars is to install them with your applications. You can also embed the grammars in your application. Installing or embedding the grammars increases the size of your application.

For Education Server, you include the grammars with the web server, so this does not add any overhead for your end users.

For more information, see [Education SDK, on page 22](#) and [Education ACI Server, on page 32](#).

# Chapter 2: Install Education

This section describes the Education packages and components available.

- [Education Packages](#) .....20
- [Licenses](#) .....21

## Education Packages

Micro Focus provides the following Education ZIP packages:

- [Education SDK](#). The Education SDK, which you can use to create applications that use an Education engine directly. This package includes:
  - Libraries and API reference documentation for the C, .NET, and Java APIs.
  - The edktool command-line tool and example configuration file, which you can use to compile and test your custom grammars. See [Compile and Test Grammars, on page 88](#).
- [Education ACI Server](#). The Education ACI Server, which allows you to run Education by using ACI actions from a Web browser or front-end application.
- [Education Grammars](#). This package contains Education resource files (grammar files and associated [post-processing](#) scripts, [pre-filter](#) configuration files, and pre-filter dictionaries). The grammar files that you can use depend on your license.
  - PII grammars find Personally Identifiable Information (PII) in your data, so that you can manage this data and conform to regulations such as the General Data Protection Regulation (GDPR). For more information, refer to the *IDOL PII Package Technical Note*.
  - PHI grammars find Protected Healthcare Information (PHI) in your data, to ensure compliance with regulations such as the *Standards of Privacy of Individually Identifiable Health Information* implemented as part of the Health Insurance Portability and Accountability Act (HIPAA). For more information, refer to the *IDOL PHI Package Technical Note*.
  - PCI grammars find Payment Card Industry (PCI) information in your data, to ensure compliance with financial regulations. For more information, refer to the *IDOL PCI Package Technical Note*.
  - GOV grammars find governmental document markings and other information in your data, to help you comply with data management restrictions. For more information, refer to the *IDOL Government Education Package Technical Note*.
  - General grammars. Standard Education grammar files, including some XML source files for you to use to extend the grammars. See [Standard Grammars, on page 108](#).

Education is also included as part of the Micro Focus IDOL ingestion components, Connector Framework Server, and IDOL NiFi Ingest. For more information, refer to the *Connector Framework Server Administration Guide*, and the *IDOL NiFi Ingest Getting Started Guide*.

**TIP:** If you do not know which Education product is best for your use case, see [Decide Which Education Product to Use, on page 18](#).

## Licenses

To run Education, you must have a valid license, which you obtain from Micro Focus Support.

Standard grammar files are licensed by category and by language, so that you can have a license for any combination of category (for example, sentiment, place, or person) and language. The IDOL PII Package also has an additional license to allow you to use the PII grammar files.

The Education SDK requires an OEM license key (`licensekey.dat`) file, which you provide to the API.

Education Server uses an IDOL license, which you access by using the IDOL License Server. See [Use Education Server, on page 33](#).

IDOL NiFi Ingest and CFS also require an IDOL license (and License Server) to run Education.

# Part II: Eduction SDK

This section describes how to set up and use the Eduction SDK.

- [Deploy Eduction SDK](#)
- [API Reference](#)

# Chapter 3: Deploy Eduction SDK

This chapter describes the files in the Eduction SDK and how to deploy the SDK.

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• <a href="#">C API Component</a> .....	24
• <a href="#">.NET API Component</a> .....	24
• <a href="#">Java API Component</a> .....	25

## Eduction SDK Package

The Eduction SDK package includes:

- Standard collection of grammar files covering a range of commonly used entities
- edktool command-line tool used for compiling Eduction XML source grammar files into compiled run-time ECR files
- C API
- .NET API
- Java API

The Eduction SDK includes reference documentation for the C, .NET, and Java APIs. To view the documentation, open `c_api/help/index.html`, `dotnet_api/help/index.html`, or `java_api/help/index.html` in a web browser.

## Additional Requirements

The Eduction SDK might require additional runtime libraries on your operating system.

### Windows Libraries

To run Eduction version 12.10 on the Microsoft Windows operating system, you might need to install Microsoft Visual C++ Redistributable packages. The Eduction SDK and Eduction Server stand-alone zip packages include the required redistributable files for Microsoft Visual C++ 2017. You can also update your packages by using the latest version at: <http://support.microsoft.com/kb/2019667>.

### UNIX Libraries

To run Eduction version 12.10 on UNIX platforms, the server must have the following minimum versions of libraries:

- GLIBC\_2.3.2
- GLIBCXX\_3.4.21
- GCC\_4.8.0

**NOTE:** The Education SDK and Education Server stand-alone zip packages provide these libraries in the `libgcc_s` and `libstdc++` shared libraries.

You might need to set the `LD_LIBRARY_PATH` to include the `InstalLDir/bin` directory, to ensure that Education can access the installed shared libraries.

You can also copy the shared libraries to the component working directory.

## Compilers

You must have an appropriate compiler to compile code against the SDK. For example:

- `gcc` and `make` for the C API.
- `openjdk` and `ant` for the Java API.

The .NET SDK has the following compiler requirements:

- .NET CORE SDK 1.0+ or .NET Framework Dev Package 4.5+ (requires .NET Standard 1.1+).

## C API Component

The C API component of the Education SDK includes:

- The Education header file (`edk.h`).
- The Education SDK library on Windows (`edk.dll`) or shared object on UNIX (`libedk.so`).
- (Windows only) The Education SDK library linker file (`edk.lib`).
- Several sample C programs that demonstrate various SDK features.

The C sample programs are provided with a `CMakeLists.txt` file, to allow you to generate build files for different environments (such as Visual Studio 2017 or UNIX Makefile). For more information about how to build the sample programs, refer to the `README.md` file in the `samples` directory.

**NOTE:** You might also need additional runtime libraries to run the Education SDK. See [Education SDK Package, on the previous page](#).

To use the Education SDK in C, include the `edk.h` header file from your C source code and link with the SDK library. For details of how to compile and link against the SDK, refer to the sample programs.

On Windows, you must specify the Education library in the `PATH` environment variable. On UNIX, the shared object must be in the library search path.

## .NET API Component

The .NET API component of the Education SDK is available on Microsoft Windows and Linux platforms. It includes:

- The Education .NET library (EducationDotNet.dll) and the Education C SDK library (edk.dll on Windows, or libedk.so on Linux).
- Several .NET code samples that you can compile and execute by using the Education SDK.

The .NET Education SDK package includes versions of the EducationDotNet.dll that target .NET Standard 1.1 (netstandard 1.1) and .NET Standard 2.0 (netstandard 2.0).

For a list of compatible .NET implementations, refer to the Microsoft documentation: <https://docs.microsoft.com/en-us/dotnet/standard/net-standard>.

You must specify the EducationDotNet.dll, and edk.dll or libedk.so libraries in the PATH environment variable.

## Java API Component

The Java API component of the Education SDK includes:

- The Education library on Windows (edkjni.dll) or shared object on UNIX (libedkjni.so).

**NOTE:** You might also need additional runtime libraries to run the Education SDK. See [Education SDK Package, on page 23](#).

- The Java JAR file (edk.jar).
- Java code samples that you can compile and execute by using the Education SDK.

The Java sample programs are provided with a Maven pom.xml file for building. For information on how to compile and run the sample files, refer to the README.md file in the samples directory.

# Chapter 4: API Reference

This section describes the C, .NET, and Java APIs for Education SDK.

- [C API Concepts](#) ..... 26
- [C API Examples](#) ..... 28
- [.NET API Concepts](#) ..... 28
- [.NET API Examples](#) ..... 29
- [Java API Concepts](#) ..... 29
- [Java API Examples](#) ..... 31

## C API Concepts

This section describes concepts required to implement C language applications for Education SDK.

### Include Files

The Education SDK C API uses the `edk.h` include file. This include file contains the core APIs for the Education SDK engine.

### Naming Conventions

The types, functions, and macros specific to Education SDK are prefixed with the string `Edk`.

### Concurrency Control

Concurrency in Education is handled using *sessions*.

You initialize an instance of an `EDKEngine` with corresponding grammars for entity extraction. You can associate each such engine with one or more sessions. All the sessions in the engine share the same grammars. You must configure the engine fully before you create any sessions.

After you create a session, Education throws an `EdkError` if you change the engine settings. However, each individual session can process many documents or streams. Each session maintains its state independent of others.

Each engine must be associated with at least one session by default.

## Standalone API Usage

The Education Software Development Kit (SDK) C API allows C developers to interact directly with the Education engine.

The Education engine is the core of the Education API. In an application, the first call of the API must create the engine. You then perform data processing in an Education session.

This section describes the basic structure of a stand-alone application using the API. For an example of this process, see the source code in the example files (see [C API Examples, on the next page](#)).

Typically, your application takes the following actions:

1. Include `edk.h`.
2. Instantiate the engine and obtain an engine handle. You can call `EdkEngineCreateFromConfigFile` to create an engine from an appropriate configuration file and license. In this case, go to step 3.

Alternatively, you can create the engine without a configuration. In this case, you must then also:

- a. Set the license key.
- b. Configure the engine to:
  - set optional parameters.
  - load the grammar files to use for matching.
  - add specific entities from grammars to use for matching.
3. Create a session associated with the engine, and obtain a session handle. You can create and run concurrent sessions in a multithreaded application. Each session uses the same grammars, but maintains its own state. See [Concurrency Control, on the previous page](#).
4. Send UTF-8 encoded text to the session.
5. Call `EdkGetNextMatch` to obtain an entity match. You can call this method repeatedly to obtain all matches.

**NOTE:** If you create your engine from a configuration file that includes post-processing tasks, the post-processing tasks automatically run as part of `EdkGetNextMatch` and you do not need to run them separately.

6. If required, call `EdkGetRedactedText` to produce redacted output.
7. For each match, get details and properties of the match.
8. To process multiple documents, repeat Step 4 to Step 7.
9. Release resources when done. You must destroy all session handles before you destroy the engine handle.

## C API Examples

You can find the C API sample programs in your Education SDK zip package, in the samples directory.

The following sample programs are available:

- `compile`. Compiles an XML grammar file into an ECR file.
- `education_from_config`. Extracts entities from a plain text input file, using settings read from a configuration file.
- `education_from_settings`. Extracts entities from a plain text input file, using settings created by calling explicit API functions.
- `redaction`. Redacts entities in a plain text input file.

For more information about these examples, refer to the `README.md` file in the samples directory.

## .NET API Concepts

The Education SDK provides a .NET API that enables your application to create an extraction engine and perform entity extractions.

This section describes the concepts used to write .NET applications with the Education EDK.

The .NET SDK consists of:

- `EducationDotNet.dll`, which contains the Education .NET class library.
- `edk.dll` (Windows) or `libedk.so` (Linux), which performs the Education functionality.

**NOTE:** You might also need additional runtime libraries to run the Education SDK. See [Education SDK Package, on page 23](#).

## Concurrency Control

Concurrency in Education is handled using *sessions*, represented by an `ITextExtractionSession` object.

You initialize an instance of an `ITextExtractionEngine` object with a configuration file that describes the grammars and settings that you want to use for entity extraction. You can create multiple `ITextExtractionSession` objects from this engine, each of which use the same grammars and settings as the parent engine. Each session maintains its state independent of others.

## Character Encoding

The underlying `edk.dll` and grammars assume that all your input is UTF-8 encoded. The Education .NET SDK functions that accept `System.string` automatically handle conversion from UTF-16 to UTF-8. However, functions that accept a `System.IO.Stream` (for example `Education.ITextExtractionSession.SetInputStream`) require the byte data in the stream to be UTF-8.

Some of the available metadata that the SDK returns represent byte counts or offsets. These values are correct for the UTF-8 representation of the matched texts. Character counts and offsets are independent of the encoding.

## Standalone API Usage

This section describes the basic structure of a standalone application using the API. See the source referenced in [.NET API Examples, below](#). Typically, your application takes the following actions:

1. Create an `EDKFactory` instance and use `GetTextExtractionEngine` to construct an `ITextExtractionEngine`.
2. Use the engine `GetSession()` method to create an `ITextExtractionSession`.
3. Add UTF-8 encoded data to the session, for example by using `SetInputStream` or `AddInputText`.
4. Iterate over the session to obtain `IExtractionMatch` results.

## .NET API Examples

You can find the .NET API sample programs in your Education SDK zip package, in the `samples` directory.

The following sample programs are available:

- `compile`. Compiles an XML grammar file into an ECR file.
- `education_from_config`. Extracts entities from a plain text input file, using settings read from a configuration file.
- `redaction`. Redacts entities in a plain text input file.

For more information about these examples, refer to the `README.md` file in the `samples` directory.

## Java API Concepts

Education SDK provides a Java API that enables your application to create an extraction engine and perform entity extractions.

This section describes the concepts used to write Java applications with the Education SDK.

The Java SDK consists of:

- a JAR file, `edk.jar`, which contains the Education Java class library and the interface to the Education Java Native Interface (JNI).
- a DLL (Windows) or shared object (UNIX/Linux), `edkjni.dll` or `edkjni.so`, which implements the Education JNI library and performs the Education functionality.

Java developers can use either the Education JNI, the class library, or both. The JNI provides functionality almost identical to that of the Education C API. The class library encapsulates related JNI methods, implements exception handling, and provides return values from method calls that simplify application programming.

**NOTE:** You might also need additional runtime libraries to run the Education SDK. See [Education SDK Package, on page 23](#).

## Naming Conventions

The main JNI class that provides access to native functionality is `EDKJNI`. Support classes for the JNI are prefixed with `EDKJNI`, for example `EDKJNIVersion`.

The Education class library classes are prefixed with `EDK`, for example `EDKEngine`.

## Concurrency Control

Concurrency in Education is handled using *sessions*, represented by an `EDKSession` object.

You initialize an instance of an `EDKEngine` object with corresponding grammars for entity extraction. You can associate each such engine with one or more sessions. All the sessions in the engine share the same grammars. You must configure the engine fully before you create any sessions.

After you create a session, the engine throws an exception if you try to change the engine settings. However, each individual session can process many documents or streams. Each session maintains its state independent of others.

Each engine must be associated with at least one session by default.

## Standalone API Usage

This section describes the basic structure of a standalone application using the API. See the source referenced in [Java API Examples, on the next page](#). Typically, your application takes the following actions:

1. Instantiate an `EDKEngine` object.

**TIP:** Micro Focus recommends that you program against the `TextExtractionEngine` interface to instantiate `EDKEngine`.

You can create an engine from an appropriate configuration file and go to step 2.

Alternatively, you can create the engine without a configuration. In this case you must then also:

- a. Set the license key.
  - b. Configure the engine, load the grammars, and select entities.
2. Instantiate an `EDKSession` object and associate it with the engine.

**TIP:** Micro Focus recommends that you program against the `TextExtractionSession` interface to instantiate `EDKSession`.

3. Send UTF-8 encoded text to the session or pass the session a stream it can read.
4. Execute a `for` each loop to obtain an `EDKMatch` object for each match in a session.

**NOTE:** If you create your `EDKEngine` from a configuration file that includes post-processing tasks, the post-processing tasks automatically run as part of `EDKMatch` and you do not need to run them separately.

5. Get the properties of the match.
6. Release resources when done.

## Java API Examples

The Education Java API includes sample programs that illustrate basic Education Java API usage. You can find these sample programs in the `samples` directory of the Education SDK zip package. The samples have inline documentation, and are also described in the HTML documentation.

The following sample programs are available:

- `compile`. Compiles an XML grammar file into an ECR file.
- `education_from_config`. Extracts entities from a plain text input file, using settings read from a configuration file.
- `education_from_settings`. Extracts entities from a plain text input file, using settings created by calling explicit API functions.
- `redaction`. Redacts entities in a plain text input file.

For information on how to build and run the sample programs, refer to the `README.md` file in the `samples` directory.

# Part III: Education ACI Server

This section describes how to set up and use Education Server.

- [Use Education Server](#)
- [Run Education in Education Server](#)

# Chapter 5: Use Eduction Server

This section describes the Eduction ACI Server and how to configure and send actions.

- [Introduction to Eduction Server](#) .....33
- [Licenses](#) .....33
- [Start and Stop Eduction Server](#) .....38
- [Configure Eduction Server](#) .....40
- [Send Actions to Eduction](#) .....45
- [IDOL Admin](#) .....48

## Introduction to Eduction Server

The Eduction ACI Server is a stand-alone server that uses the IDOL ACI infrastructure. It is one of the available options that you can use to run Eduction.

**NOTE:** Eduction Server is not included in the Eduction SDK package. You must download the Eduction Server package instead. See [Eduction Packages, on page 20](#).

With an ACI server, you can make Eduction requests from a web browser or ACI client. Browsers can make requests to process small amounts of text by using an HTTP GET request, or larger amounts by using an HTTP POST request.

The Eduction Server processes UTF-8 encoded text, matching upon entities defined in Eduction grammars. It returns results as XML, with tags in the ACI hierarchy.

You use the ACI configuration file (`educationserver.cfg` by default) to configure the grammars to load, and the entities to match on. Each time you send a request, the server creates a new Eduction engine with the configured grammars and entities.

You can also override the configuration settings for individual actions. See [Select Entities at Runtime, on page 50](#).

## Licenses

To use IDOL solutions, you must have a running License Server, and a valid license key file for the products that you want to use. Contact Micro Focus Big Data Support to request a license file for your installation.

License Server controls the IDOL licenses, and assigns them to running components. License Server must run on a machine with a static, known IP address, MAC address, or host name. The license key file is tied to the IP address and ACI port of your License Server and cannot be transferred between

machines. For more information about installing License Server and managing licenses, see the *License Server Administration Guide*.

When you start Education, it requests a license from the configured License Server. You must configure the host and port of your License Server in the Education configuration file.

You can revoke the license from a product at any time, for example, if you want to change the client IP address or reallocate the license.

**CAUTION:** Taking any of the following actions causes the licensed module to become inoperable.

You **must not**:

- Change the IP address of the machine on which a licensed module runs (if you use an IP address to lock your license).
- Change the service port of a module without first revoking the license.
- Replace the network card of a client without first revoking the license.
- Remove the contents of the `license` and `uid` directories.

All modules produce a `license.log` and a `service.log` file. If a product fails to start, check the contents of these files for common license errors. See [Troubleshoot License Errors, on page 36](#).

## Display License Information

You can verify which modules you have licensed either by using the IDOL Admin interface, or by sending the `LicenseInfo` action from a web browser.

### To display license information in IDOL Admin

- In the **Control** menu of the IDOL Admin interface for your License Server, click **Licenses**.

The **Summary** tab displays summary information for each licensed component, including:

- The component name.
- The number of seats that the component is using.
- The total number of available seats for the component.
- (Content component only) The number of documents that are currently used across all instances of the component.
- (Content component only) The maximum number of documents that you can have across all instances of the component.

The **Seats** tab displays details of individual licensed seats, and allows you to revoke licenses.

### To display license information by sending the `LicenseInfo` action

- Send the following action from a web browser to the running License Server.

`http://LicenseServerHost:Port/action=LicenseInfo`

where:

*LicenseServerHost* is the IP address of the machine where License Server resides.

*Port* is the ACI port of License Server (specified by the Port parameter in the [Server] section of the License Server configuration file).

In response, License Server returns the requested license information. This example describes a license to run four instances of IDOL Server.

```
<?xml version="1.0" encoding="UTF-8" ?>
<autnresponse xmlns:autn="http://schemas.autonomy.com/aci/">
  <action>LICENSEINFO</action>
  <response>SUCCESS</response>
  <responsedata>
    <LicenseDiSH>
      <LICENSEINFO>
        <autn:Product>
          <autn:ProductType>IDOLSERVER</autn:ProductType>
          <autn:TotalSeats>4</autn:TotalSeats>
          <autn:SeatsInUse>0</autn:SeatsInUse>
        </autn:Product>
      </LICENSEINFO>
    </LicenseDiSH>
  </responsedata>
</autnresponse>
```

## Configure the License Server Host and Port

Education is licensed through License Server. In the Education configuration file, specify the information required to connect to the License Server.

### To specify the license server host and port

1. Open your configuration file in a text editor.
2. In the [License] section, modify the following parameters to point to your License Server.

*LicenseServerHost*      The host name or IP address of your License Server.

*LicenseServerACIPort*    The ACI port of your License Server.

For example:

```
[License]
LicenseServerHost=licenses
LicenseServerACIPort=20000
```

3. Save and close the configuration file.

## Revoke a Client License

After you set up licensing, you can revoke licenses at any time, for example, if you want to change the client configuration or reallocate the license. The following procedure revokes the license from a component.

### To revoke a license

1. Stop the IDOL solution that uses the license.
2. At the command prompt, run the following command:

```
InstallDir/ExecutableName[.exe] -revokelicense -configfile cfgFilename
```

This command returns the license to the License Server.

You can send the LicenseInfo action from a web browser to the running License Server to check for free licenses. In this sample output from the action, one IDOL Server license is available for allocation to a client.

```
<autn:Product>  
  <autn:ProductType>IDOLSERVER</autn:ProductType>  
  <autn:Client>  
    <autn:IP>192.123.51.23</autn:IP>  
    <autn:ServicePort>1823</autn:ServicePort>  
    <autn:IssueDate>1063192283</autn:IssueDate>  
    <autn:IssueDateText>10/09/2003 12:11:23</autn:IssueDateText>  
  </autn:Client>  
  <autn:TotalSeats>2</autn:TotalSeats>  
  <autn:SeatsInUse>1</autn:SeatsInUse>  
</autn:Product>
```

## Troubleshoot License Errors

The table contains explanations for typical licensing-related error messages.

### License-related error messages

Error message	Explanation
<b>Error: Failed to update license from the license server. Your license cache details do not match the current service configuration. Shutting the service down.</b>	The configuration of the service has been altered. Verify that the service port and IP address have not changed since the service started.
<b>Error: License for <i>ProductName</i> is invalid. Exiting.</b>	The license returned from the License Server is invalid. Ensure that the license has not expired.
<b>Error: Failed to connect to license server</b>	Cannot communicate with the License Server.

License-related error messages, continued

Error message	Explanation
<b>using cached licensed details.</b>	The product still runs for a limited period; however, you should verify whether your License Server is still available.
<b>Error: Failed to connect to license server. Error code is SERVICE: <i>ErrorCode</i></b>	Failed to retrieve a license from the License Server or from the backup cache. Ensure that your License Server can be contacted.
<b>Error: Failed to decrypt license keys. Please contact Autonomy support. Error code is SERVICE:<i>ErrorCode</i></b>	Provide Micro Focus Big Data Support with the exact error message and your license file.
<b>Error: Failed to update the license from the license server. Shutting down</b>	Failed to retrieve a license from the License Server or from the backup cache. Ensure that your License Server can be contacted.
<b>Error: Your license keys are invalid. Please contact Autonomy support. Error code is SERVICE:<i>ErrorCode</i></b>	Your license keys appear to be out of sync. Provide Micro Focus Big Data Support with the exact error message and your license file.
<b>Failed to revoke license: No license to revoke from server.</b>	The License Server cannot find a license to revoke.
<b>Failed to revoke license from server <i>LicenseServer Host:LicenseServerPort</i>. Error code is <i>ErrorCode</i></b>	Failed to revoke a license from the License Server. Provide Micro Focus Big Data Support with the exact error message.
<b>Failed to revoke license from server. An instance of this application is already running. Please stop the other instance first.</b>	You cannot revoke a license from a running service. Stop the service and try again.
<b>Failed to revoke license. Error code is SERVICE:<i>ErrorCode</i></b>	Failed to revoke a license from the License Server. Provide Micro Focus Big Data Support with the exact error message.
<b>Your license keys are invalid. Please contact Autonomy Support. Error code is ACISERVER:<i>ErrorCode</i></b>	Failed to retrieve a license from the License Server. Provide Micro Focus Big Data Support with the exact error message and your license file.
<b>Your product ID does not match the generated ID.</b>	Your installation appears to be out of sync. Forcibly revoke the license from the License Server and rename the <code>license</code> and <code>uid</code> directories.
<b>Your product ID does not match this configuration.</b>	The service port for the module or the IP address for the machine appears to have changed. Check your configuration file.

# Start and Stop Education Server

This section describes how to start and stop Education Server.

## Start Education

**NOTE:** Your License Server must be running before you start Education.

### To start Education

- Start Education from the command line using the following command:  

```
educationserver.exe -configfile configname.cfg
```

where the optional `-configfile` argument specifies the path of a configuration file to use.
- On Windows, if you have installed Education as a service, start the service from the Windows Services dialog box.
- On UNIX, if you have installed Education as a service, use one of the following commands:
  - On machines that use `systemd`:  

```
systemctl start educationserver
```
  - On machines that use `system V`:  

```
service educationserver start
```

**TIP:** On both Windows and UNIX platforms, you can configure services to start automatically when you start the machine.

## Command-Line Options

This section describes additional parameters that you can use when you start Education Server from the command-line.

**NOTE:** Options are case sensitive.

Usage: `educationserver [options]`

Options	Description
<code>-version</code>	Displays the program version. This option must be the only argument. The program ends after the version information is displayed.
<code>directory</code>	Sets the working directory. The Education ACI server starts from this directory. All other arguments used in the command line are relative to this directory.

Options	Description
<code>-configfile file</code>	Sets the configuration file name. This option overrides the default configuration file name of <code>educationserver.cfg</code> .
<code>-revokelicense</code>	Revokes a lock on the Education license from the License Server.
<code>-install</code>	Installs Education as a service (Windows only). Syntax:  <code>-install [-start auto manual disabled] [-username username] [-password password]</code>  The <code>-start</code> option allows you to specify the startup mode. By default, it is automatic. If you do not supply a user name and password, Education runs under a local account.
<code>-uninstall</code>	Uninstalls the Education service.

**NOTE:** On Linux, the ACI server requires the C++ library, `libstdc++.so`. To ensure the server can locate the required library, set the Library Path:

```
setenv LD_LIBRARY_PATH bin:$LD_LIBRARY_PATH
```

## Stop Education

You can stop Education by using one of the following procedures.

### To stop Education

- Send the Stop service action to the service port.

```
http://host:ServicePort/action=Stop
```

where:

*host* is the host name or IP address of the machine where Education is installed.

*ServicePort* is the Education service port (specified in the [Service] section of the configuration file).

- On Windows platforms, if Education is running as a service, stop Education from the Windows Services dialog box.
- On UNIX platforms, if Education is running as a service, use one of the following commands:
  - On machines that use `systemd`:

```
systemctl stop educationserver
```

- On machines that use system V:  
`service educationserver stop`

## Configure Education Server

You configure Education Server by modifying the Education Server configuration file.

The Education Server configuration file contains settings required for the server to run, and specifies settings to use when performing Education.

The default configuration file is named `educationserver.cfg`, and is included in your Education Server package. You can start Education Server using a different configuration file by using the `-configfile` command-line option (see [Command-Line Options, on page 38](#)).

This section describes how to modify the Education Server configuration file.

## Modify Configuration Parameter Values

You modify Education configuration parameters by directly editing the parameters in the configuration file. When you set configuration parameter values, you must use UTF-8.

**CAUTION:** You must stop and restart Education for new configuration settings to take effect.

This section describes how to enter parameter values in the configuration file.

### Enter Boolean Values

The following settings for Boolean parameters are interchangeable:

TRUE = true = ON = on = Y = y = 1

FALSE = false = OFF = off = N = n = 0

### Enter String Values

To enter a comma-separated list of strings when one of the strings contains a comma, you can indicate the start and the end of the string with quotation marks, for example:

`ParameterName=cat,dog,bird,"wing,beak",turtle`

Alternatively, you can escape the comma with a backslash:

`ParameterName=cat,dog,bird,wing\,beak,turtle`

If any string in a comma-separated list contains quotation marks, you must put this string into quotation marks and escape each quotation mark in the string by inserting a backslash before it. For example:

`ParameterName="<font face=\"arial\" size=\"+1\"><b>","<p>"`

Here, quotation marks indicate the beginning and end of the string. All quotation marks that are contained in the string are escaped.

## Include an External Configuration File

You can share configuration sections or parameters between ACI server configuration files. The following sections describe different ways to include content from an external configuration file.

You can include a configuration file in its entirety, specified configuration sections, or a single parameter.

When you include content from an external configuration file, the `GetConfig` and `ValidateConfig` actions operate on the combined configuration, after any external content is merged in.

In the procedures in the following sections, you can specify external configuration file locations by using absolute paths, relative paths, and network locations. For example:

```
../sharedconfig.cfg  
K:\sharedconfig\sharedsettings.cfg  
\\example.com\shared\idol.cfg  
file://example.com/shared/idol.cfg
```

Relative paths are relative to the primary configuration file.

**NOTE:** You can use nested inclusions, for example, you can refer to a shared configuration file that references a third file. However, the external configuration files must not refer back to your original configuration file. These circular references result in an error, and Education does not start.

Similarly, you cannot use any of these methods to refer to a different section in your primary configuration file.

## Include the Whole External Configuration File

This method allows you to import the whole external configuration file at a specified point in your configuration file.

### To include the whole external configuration file

1. Open your configuration file in a text editor.
2. Find the place in the configuration file where you want to add the external configuration file.
3. On a new line, type a left angle bracket (<), followed by the path to and name of the external configuration file, in quotation marks (""). You can use relative paths and network locations. For example:

```
< "K:\sharedconfig\sharedsettings.cfg"
```

4. Save and close the configuration file.

## Include Sections of an External Configuration File

This method allows you to import one or more configuration sections (including the section headings) from an external configuration file at a specified point in your configuration file. You can include a whole configuration section in this way, but the configuration section name in the external file must exactly

match what you want to use in your file. If you want to use a configuration section from the external file with a different name, see [Merge a Section from an External Configuration File, on the next page](#).

### To include sections of an external configuration file

1. Open your configuration file in a text editor.
2. Find the place in the configuration file where you want to add the external configuration file section.
3. On a new line, type a left angle bracket (<), followed by the path of the external configuration file, in quotation marks (""). You can use relative paths and network locations. After the configuration file path, add the configuration section name that you want to include. For example:

```
< "K:\sharedconfig\extrasettings.cfg" [License]
```

**NOTE:** You cannot include a section that already exists in your configuration file.

4. Save and close the configuration file.

### Include Parameters from an External Configuration File

This method allows you to import one or more parameters from an external configuration file at a specified point in your configuration file. You can import a single parameter or use wildcards to specify multiple parameters. The parameter values in the external file must match what you want to use in your file. This method does not import the section heading, such as [License] in the following examples.

### To include parameters from an external configuration file

1. Open your configuration file in a text editor.
2. Find the place in the configuration file where you want to add the parameters from the external configuration file.
3. On a new line, type a left angle bracket (<), followed by the path of the external configuration file, in quotation marks (""). You can use relative paths and network locations. After the configuration file path, add the name of the section that contains the parameter, followed by the parameter name. For example:

```
< "license.cfg" [License] LicenseServerHost
```

To specify a default value for the parameter, in case it does not exist in the external configuration file, specify the configuration section, parameter name, and then an equals sign (=) followed by the default value. For example:

```
< "license.cfg" [License] LicenseServerHost=localhost
```

You can use wildcards to import multiple parameters, but this method does not support default values. The \* wildcard matches zero or more characters. The ? wildcard matches any single character. Use the pipe character | as a separator between wildcard strings. For example:

```
< "license.cfg" [License] LicenseServer*
```

4. Save and close the configuration file.

## Merge a Section from an External Configuration File

This method allows you to include a configuration section from an external configuration file as part of your Education configuration file. For example, you might want to specify a standard SSL configuration section in an external file and share it between several servers. You can use this method if the configuration section that you want to import has a different name to the one you want to use.

### To merge a configuration section from an external configuration file

1. Open your configuration file in a text editor.
2. Find or create the configuration section that you want to include from an external file. For example:

```
[SSLOptions1]
```

3. After the configuration section name, type a left angle bracket (<), followed by the path to and name of the external configuration file, in quotation marks (""). You can use relative paths and network locations. For example:

```
[SSLOptions1] < "../sharedconfig/ssloptions.cfg"
```

If the configuration section name in the external configuration file does not match the name that you want to use in your configuration file, specify the section to import after the configuration file name. For example:

```
[SSLOptions1] < "../sharedconfig/ssloptions.cfg" [SharedSSLOptions]
```

In this example, Education uses the values in the [SharedSSLOptions] section of the external configuration file as the values in the [SSLOptions1] section of the Education configuration file.

**NOTE:** You can include additional configuration parameters in the section in your file. If these parameters also exist in the imported external configuration file, Education uses the values in the local configuration file. For example:

```
[SSLOptions1] < "ssloptions.cfg" [SharedSSLOptions]  
SSLCACertificatesPath=C:\IDOL\HTTPConnector\CACERTS\
```

4. Save and close the configuration file.

## Configure Client Authorization

You can configure Education to authorize different operations for different connections.

Authorization roles define a set of operations for a set of users. You define the operations by using the `StandardRoles` configuration parameter, or by explicitly defining a list of allowed actions in the `Actions` and `ServiceActions` parameters. You define the authorized users by using a client IP address, SSL identities, and GSS principals, depending on your security and system configuration.

For more information about the available parameters, see the *Education Reference*.

**IMPORTANT:** To ensure that Education allows only the options that you configure in

[AuthorizationRoles], make sure that you delete any deprecated *RoLeClients* parameters from your configuration (where *RoLe* corresponds to a standard role name, for example *AdminClients*).

### To configure authorization roles

1. Open your configuration file in a text editor.
2. Find the [AuthorizationRoles] section, or create one if it does not exist.
3. In the [AuthorizationRoles] section, list the user authorization roles that you want to create. For example:

```
[AuthorizationRoles]
0=AdminRole
1=UserRole
```

4. Create a section for each authorization role that you listed. The section name must match the name that you set in the [AuthorizationRoles] list. For example:

```
[AdminRole]
```

5. In the section for each role, define the operations that you want the role to be able to perform. You can set *StandardRoles* to a list of appropriate values, or specify an explicit list of allowed actions by using *Actions*, and *ServiceActions*. For example:

```
[AdminRole]
StandardRoles=Admin,ServiceControl,ServiceStatus
```

```
[UserRole]
Actions=GetVersion
ServiceActions=GetStatus
```

**NOTE:** The standard roles do not overlap. If you want a particular role to be able to perform all actions, you must include all the standard roles, or ensure that the clients, SSL identities, and so on, are assigned to all relevant roles.

6. In the section for each role, define the access permissions for the role, by setting *Clients*, *SSLIdentities*, and *GSSPrincipals*, as appropriate. If an incoming connection matches one of the allowed clients, principals, or SSL identities, the user has permission to perform the operations allowed by the role. For example:

```
[AdminRole]
StandardRoles=Admin,ServiceControl,ServiceStatus
Clients=localhost
SSLIdentities=admin.example.com
```

7. Save and close the configuration file.
8. Restart Education for your changes to take effect.

**IMPORTANT:** If you do not provide any authorization roles for a standard role, Education uses the default client authorization for the role (localhost for *Admin* and *ServiceControl*, all clients for *Query* and *ServiceStatus*). If you define authorization only by actions, Micro Focus recommends

that you configure an authorization role that disallows all users for all roles by default. For example:

```
[ForbidAllRoles]  
StandardRoles=*  
Clients=""
```

This configuration ensures that Education uses only your action-based authorizations.

## Send Actions to Education

You can make requests to Education by using either GET or POST HTTP request methods.

- A GET request sends parameter-value pairs in the request URL. GET requests are appropriate for sending actions that retrieve information from Education, such as the `GetStatus` action. For more information, see [Send Actions by Using a GET Method, below](#).
- A POST request sends parameter-value pairs in the HTTP message body of the request. POST requests are appropriate for sending data to Education. In particular, you must use POST requests to upload and send files to Education. For more information, see [Send Data by Using a POST Method, on the next page](#).

**NOTE:** The `MaxInputString` and `MaxFileUploadSize` configuration parameters set a limit on the maximum size of HTTP strings and the maximum size of files that you can upload. The default values for these parameters allow HTTP strings that contain a maximum of 64,000 characters, and uploaded files with a maximum size of 10,000,000 bytes.

## Send Actions by Using a GET Method

You can use GET requests to send actions that retrieve information from Education.

When you send an action using a GET method, you use a URL of the form:

```
http://host:port/?action=action&parameters
```

where:

- |                   |                                                                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>host</i>       | is the IP address or name of the machine where Education is installed.                                                                                                            |
| <i>port</i>       | is the Education ACI port.                                                                                                                                                        |
| <i>action</i>     | is the name of the action that you want to run. The <code>action</code> (or a) parameter must be the first parameter in the URL string, directly after the host and port details. |
| <i>parameters</i> | are the required and optional parameters for the action. These parameters can follow the <code>action</code> parameter in any order.                                              |

You must:

- Separate each parameter from its value with an equals symbol (=).
- Separate multiple values with a comma (,).
- Separate each parameter-value pair with an ampersand (&).

For more information about the actions that you can use with Education, refer to the *Education Reference*.

GET requests can send only limited amounts of data and cannot send files directly. However, you can set a parameter to a file path if the file is on a file system that Education can access. Education must also be able to read the file.

## Send Data by Using a POST Method

You can send files and binary data directly to Education using a POST request. One possible way to send a POST request over a socket to Education is using the cURL command-line tool.

The data that you send in a POST request must adhere to specific formatting requirements. You can send only the following content types in a POST request to Education:

- `application/x-www-form-urlencoded`
- `multipart/form-data`

**TIP:** Education rejects POST requests larger than the size specified by the configuration parameter `MaxFileUploadSize`.

### Application/x-www-form-urlencoded

The `application/x-www-form-urlencoded` content type describes form data that is sent in a single block in the HTTP message body. Unlike the query part of the URL in a GET request, the length of the data is unrestricted. However, Education rejects requests that exceed the size specified by the configuration parameter `MaxFileUploadSize`.

This content type is inefficient for sending large quantities of binary data or text containing non-ASCII characters, and does not allow you to upload files. For these purposes, Micro Focus recommends sending data as `multipart/form-data` (see [Multipart/form-data, on the next page](#)).

In the request:

- Separate each parameter from its value with an equals symbol (=).
- Separate multiple values with a comma (,).
- Separate each parameter-value pair with an ampersand (&).
- Base-64 encode any binary data.
- URL encode all non-alphanumeric characters, including those in base-64 encoded data.

## Multipart/form-data

In the `multipart/form-data` content type, the HTTP message body is divided into parts, each containing a discrete section of data.

Each message part requires a header containing information about the data in the part. Each part can contain a different content type; for example, `text/plain`, `image/png`, `image/gif`, or `multipart/mixed`. If a parameter specifies multiple files, you must specify the `multipart/mixed` content type in the part header.

Encoding is optional for each message part. The message part header must specify any encoding other than the default (7BIT).

Multipart/form-data is ideal for sending non-ASCII or binary data, and is the only content type that allows you to upload files. For more information about form data, see <http://www.w3.org/TR/html401/interact/forms.html>.

**NOTE:** In cURL, you specify each message part using the `-F` (or `--form`) option. To upload a file in a message part, prefix the file name with the `@` symbol. For more information on cURL syntax, see the cURL documentation.

## GetStatus

You can use the `GetStatus` service action to verify the Education is running. For example:

```
http://Host:ServicePort/action=GetStatus
```

**NOTE:** You can send the `GetStatus` action to the ACI port instead of the service port. The `GetStatus` ACI action returns information about the Education setup.

## GetLicenseInfo

You can send a `GetLicenseInfo` action to Education to return information about your license. This action checks whether your license is valid and returns the operations that your license includes.

Send the `GetLicenseInfo` action to the Education ACI port. For example:

```
http://Host:ACIport/action=GetLicenseInfo
```

The following result indicates that your license is valid.

```
<autn:license>  
  <autn:validlicense>true</autn:validlicense>  
</autn:license>
```

As an alternative to submitting the `GetLicenseInfo` action, you can view information about your license, and about licensed and unlicensed actions, on the **License** tab in the Status section of IDOL Admin.

# IDOL Admin

IDOL Admin is an administration interface for performing ACI server administration tasks, such as gathering status information, monitoring performance, and controlling the service. IDOL Admin provides an alternative to constructing actions and sending them from your web browser.

## Prerequisites

Education includes the `admin.dat` file that is required to run IDOL Admin.

IDOL Admin supports the following browsers:

- Edge
- Chrome (latest version)
- Firefox (latest version)

## Install IDOL Admin

You must install IDOL Admin on the same host that the ACI server or component is installed on. To set up a component to use IDOL Admin, you must configure the location of the `admin.dat` file and enable Cross Origin Resource Sharing.

### To install IDOL Admin

1. Stop the ACI server.
2. Save the `admin.dat` file to any directory on the host.
3. Using a text editor, open the ACI server or component configuration file. For the location of the configuration file, see the ACI server documentation.
4. In the `[Paths]` section of the configuration file, set the `AdminFile` parameter to the location of the `admin.dat` file. If you do not set this parameter, the ACI server attempts to find the `admin.dat` file in its working directory when you call the IDOL Admin interface.
5. Enable Cross Origin Resource Sharing.
6. In the `[Service]` section, add the `Access-Control-Allow-Origin` parameter and set its value to the URLs that you want to use to access the interface.

Each URL must include:

- the `http://` or `https://` prefix

**NOTE:** URLs can contain the `https://` prefix if the ACI server or component has SSL enabled.

- The host that IDOL Admin is installed on
- The ACI port of the component that you are using IDOL Admin for

Separate multiple URLs with spaces.

For example, you could specify different URLs for the local host and remote hosts:

```
Access-Control-Allow-Origin=http://localhost:9010  
http://Computer1.Company.com:9010
```

Alternatively, you can set `Access-Control-Allow-Origin=*`, which allows you to access IDOL Admin using any valid URL (for example, `localhost`, direct IP address, or the host name). The wildcard character (\*) is supported only if no other entries are specified.

If you do not set the `Access-Control-Allow-Origin` parameter, IDOL Admin can communicate only with the server's ACI port, and not the index or service ports.

7. Start the ACI server.

You can now access IDOL Admin (see [Access IDOL Admin, below](#)).

## Access IDOL Admin

You access IDOL Admin from a web browser. You can access the interface only through URLs that are set in the `Access-Control-Allow-Origin` parameter in the ACI server or component configuration file. For more information about configuring URL access, see [Install IDOL Admin, on the previous page](#).

### To access IDOL Admin

- Type the following URL into the address bar of your web browser:

```
http://host:port/action=admin
```

where:

*host* is the host name or IP address of the machine where the IDOL component is installed.

*port* is the ACI port of the IDOL component you want to administer.

# Chapter 6: Run Education in Education Server

This section describes how to run an Education matching operation with Education Server.

- [Server Actions](#) ..... 50
- [Select Entities at Runtime](#) ..... 50

## Server Actions

The Education ACI server provides the following actions (case insensitive):

GetStatus	Returns the status of the Education Server, including version information and entities selected for matching. See <a href="#">GetStatus, on page 47</a> .
EduceFromFile	Performs Education on text (read from a file) and returns the matches.
EduceFromText	Performs Education on text (provided in the request) and returns the matches.
RedactFromFile	Performs Education on text (read from a file) and redacts the matches to return the redacted text.
RedactFromText	Performs Education on text (provided in the request) and redacts the matches to return the redacted text.

For more information about these actions, and example responses, refer to the *Education Server Reference*.

For details of how to send an action, see [Send Actions to Education, on page 45](#).

## Select Entities at Runtime

In Education Server, you can specify many configuration settings as query parameters in the ACI request, which allows you to customize the extraction behavior for an individual action.

For example:

```
http://localhost:13000/?action=EduceFromFile&MatchCase=True&Grammars=place_
albal.ecr
```

When you set a parameter as part of an action, it overrides the corresponding parameter value in the configuration file.

For information about all the actions and action parameters that are available with Education Server, refer to the *Education Server Reference*.

## Change the Grammars and Entities

You can use the `Grammars` and `Entities` action parameters to specify a subset of your configured grammars or entities.

- `Grammars`. This action parameter corresponds to the `ResourceFiles` configuration parameter. You set `Grammars` to a comma-separated list of grammar files to load, and Education uses all the entities in the selected grammar files, including entities not set in your configuration file. The grammar files must already exist in your configuration file.

```
Grammars=GrammarFile[,GrammarFile2]
```

- `Entities`. You set `Entities` to a comma-separated list of entities. In this case, Education uses only the specified entities. The entities and corresponding grammar files must already exist in your configuration file.

**NOTE:** If you set both `Entities` and `Grammars`, Education ignores the `Grammars` parameter and uses only the specified entities.

You can use wildcard expressions in the `Grammars` or `Entities` parameters. You can use the `*` wildcard to match any number of characters, or the `?` wildcard to match a single character. For example:

```
action=EduceFromText&Text=I thought it was a bad idea. Es ist nicht  
gut.&Grammars=sentiment_*.ecr
```

This example uses all the available sentiment grammars for the extraction.

# Part IV: Use Education

This section describes how to use Education matching, and how to improve your results.

- [Improve Education Matches](#)
- [Sentiment Analysis](#)
- [Create and Modify Education Grammars](#)
- [Compile and Test Grammars](#)
- [Post-Processing](#)

# Chapter 7: Improve Education Matches

This section describes some different areas that you might want to adjust to improve your match results and performance.

• <a href="#">Case Sensitive Matches</a> .....	53
• <a href="#">Match Special Characters</a> .....	55
• <a href="#">Extract Entities from Tables</a> .....	57
• <a href="#">Select Matches</a> .....	60
• <a href="#">Components</a> .....	61
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## Case Sensitive Matches

By default, Education matches characters case sensitively, which has better performance than case insensitive matching. When you require case insensitive matching, there are several ways to configure it:

- configure `MatchCase`.
- configure individual grammars, entities, and entries with case sensitivity options, in a custom grammar file.
- use case normalization.

Micro Focus recommends that you always create and use Education grammars that allow you to do case sensitive matching, because it has better performance. Most of the standard grammars come with entities using common and appropriate case styles. Some also have different entities for different case styles. If your data uses a consistent case, it is unlikely that you need to use case insensitive matching.

## Configure MatchCase

The simplest way to turn off case sensitivity is to set the `MatchCase` configuration parameter to `False` in the configuration file.

If you run Education with `MatchCase=False`, entities are optimized for case-insensitive matching when they are loaded. This can increase the time required to initialize Education, so if you regularly use a grammar file with `MatchCase=False` you can optimize the entities for case-insensitive matching at compile time instead. See [Optimize Case-Insensitive Matching, on page 89](#).

MatchCase applies to all matches, so it can have a significant performance impact. In general, Micro Focus recommends that you use one of the other options to enable case insensitive matching. For the best performance, write a grammar file using only upper or lower case and then normalize your input (see [Case Normalization, below](#)).

## Configure Custom Grammars

When you create your own custom XML grammar files, you can configure individual grammars, entities, and entries individually to be case sensitive or insensitive.

When you configure case sensitivity at a lower level, it overrides the higher level settings. Additionally, if you reference the entity in another entity, it maintains its own case sensitivity setting.

Most entities in the standard grammars do not have case sensitivity set explicitly, giving you the flexibility to use case sensitivity as required in your grammars.

**NOTE:** If you design an entity for case insensitive matching, it is important that entries in the entity have a consistent case style to ensure that all matches are extracted correctly. You should use all lower case, all upper case, or all initial capitals, but not a mixture.

Education uses an optimization technique for case insensitive matching that might not extract every possible match if you do not define the entity consistently.

## Case Normalization

Case sensitive matching generally has better performance than case insensitive matching. When you require case insensitive matching, you can use case normalization to give the same performance as case-sensitive matching.

When you want to use case normalization:

- Do not set case sensitivity explicitly in grammars and entities.
- Set the MatchCase configuration parameter to **True**.
- Create all entries in your entities in either all lower case, or all upper case.
- Set CaseNormalization to:
  - **LOWER** if all your entities are lower case.
  - **UPPER** if all your entities are upper case.

Education normalizes the input data accordingly before the (case sensitive) matching. This process means that both your input and grammars are all in the same case, so the matching is effectively case insensitive, with the performance benefits of case sensitive matching.

For more information about these configuration parameters, see [CaseNormalization, on page 322](#) and [MatchCase, on page 339](#).

## Match Special Characters

By default, Education matches whole words; that is, all matches start at the beginning of a word and stop at the end of a word. Any pattern that corresponds to a substring of a word does not match the substring. For example, the pattern *rain* does not match the word *raining*.

Additionally, by default Education treats all punctuation as a word boundary, so you cannot match punctuation at the start of a word.

You can change this Education matching behavior if the default settings do not allow you to extract the information you want from your data.

### Match Part of a Word

In normal use, it usually makes sense to match only whole words with entities. If you do need to allow partial matches, you can set the `MatchWholeWord` configuration parameter to `False` (see [MatchWholeWord, on page 340](#)).

**NOTE:** This change has a small performance impact.

When you set `MatchWholeWord` to `False`, Education does not consider the difference between words and word boundaries. This might mean it matches a word boundary at the start of the match. However, if you explicitly want to match punctuation at the start of a match, Micro Focus recommends that you use `TangibleCharacters` instead of `MatchWholeWord` (see [Match Punctuation at the Start of a Match, below](#) and [TangibleCharacters, on page 354](#)).

**IMPORTANT:** If you set `MatchWholeWord` to `False`, `TangibleCharacters` has no effect.

### Match Punctuation at the Start of a Match

By default, Education treats all punctuation as a word boundary. When Education *parses* and *tokenizes* the input data, it ignores all word boundaries at the start of a word (such as spaces). To match punctuation characters at the start of a match, you can set the punctuation as a tangible character (see [TangibleCharacters, on page 354](#)).

For example:

- To match UK phone numbers with area codes, such as (01223) 448000, you can set `TangibleCharacters` to ( to include the opening parenthesis as part of the match.
- To match negative numbers, such as Bob's account shows -455 pounds, you can set `TangibleCharacters` to - to specify that - is part of the word that you want to extract. By default, Education extracts 455 instead of -455, even if the - character is part of the pattern in your Education grammar file.

You can also configure all punctuation marks as tangible characters, by enabling `TokenWithPunctuation` (see [TokenWithPunctuation, on page 355](#)).

**NOTE:** Punctuation in this case refers to punctuation in the ASCII character set.

Punctuation marks regarded as characters from Chinese, Japanese, or Korean (CJK) languages are treated in the same way as other CJK text (see [Match CJK Text, on the next page](#)).

When you set tangible characters, Education treats those characters as part of the word you want to match, rather than as word boundaries. For this reason, the pattern in your grammar file must explicitly include any characters you have set as tangible.

For example, if your grammar file contains an entity to match the pattern bob, by default Education returns a match for the phrase One day "bob" walked in to town.

However, if you set `TangibleCharacters` to "", the same pattern does not retrieve a match for this phrase. In this case, Education treats "" as part of the word that it has to match, so bob is not the same as "bob", and it does not match. You must include the "" character in your grammar pattern to retrieve a match for "bob".

Education tries to match whole words inside word boundaries. If you set up a grammar rule that includes punctuation characters that you want to match, but you do not include those characters as tangible characters, the results might not be what you expect. For example:

- Education ignores boundary characters if the next set of characters in the data matches a defined pattern.

For example, if `TangibleCharacters` does not include !, the grammar pattern `[!"bo]*` (match ! or " or b or o, zero or many times) returns a match for bob when a document contains the text `!bob`.

- Education does not return a match for boundary characters that appear on their own in documents.
- Education returns a match for boundary characters if they are included in the pattern and are embedded in another match.

For example, the grammar pattern `[!"bo]*` returns a match for `b"o!b` if a document contains the text `b"o!b`. If you did not include " or ! in the grammar pattern, Education would treat them as boundary characters and would not return a match.

## Examples

The following table shows some examples of the difference in Education matches when `TangibleCharacters` includes !, " and # and when it does not.

These examples use the grammar rule `[A-Za-z!"#]+@com` (match all uppercase or all lowercase letters or ! or " or #, followed by the string @com).

Document text	Returns ( <code>TangibleCharacters</code> does not include !, " and #)	Returns ( <code>TangibleCharacters</code> includes !, " and #)
<code>!Chris@com</code> went to town to pick up some fruit	<code>Chris@com</code>	<code>!Chris@com</code>
<code>Ch!ris@com</code> went to town to pick up some melons	<code>Ch!ris@com</code>	<code>Ch!ris@com</code>

Document text	Returns (TangibleCharacters does not include !, " and #)	Returns (TangibleCharacters includes !, " and #)
"Chris@com" went to town to get some tea	Chris@com	"Chris@com"
!@com went to town to get nothing	No match returned	!@com

You must determine your use of `TangibleCharacters` by what you are trying to achieve, and the type of content you are working with. For example, it is likely to be less helpful if you are working with continuous strings of information, where punctuation characters separate possible Education matches.

## Match CJK Text

All input data and grammars for Education must be encoded in UTF-8.

For characters in Chinese, Japanese, and Korean (CJK) languages, the data is tokenized character by character, with a word boundary on both sides of each character. This process ensures that when Education processes data that includes CJK characters, it can match the logical word unit in the data without disabling `MatchWholeWord`.

## Extract Entities from Tables

Education Table mode allows you to extract entities from a table, according to the values in the header of that table. This process allows you to target extraction on likely values in structured data, rather than extracting every possible entity value from a table. It can also improve the confidence that an ambiguous entity value corresponds to a particular type of data.

In standard extraction, Education searches text for a value that matches a particular entity. In many cases the entity values are distinctive, and so you can be reasonably confident that matches are relevant. For example, a string that matches an address entity is unlikely to be anything else.

Many other entity values are potentially ambiguous. For example, a number might match several entity types, and a date might be a date or birth or an event date. Without further information, it is difficult to determine whether these values are useful.

For unstructured text, you can use *landmarks* to find relevant information. Landmarks are values that identify a particular entity, without being a part of the entity value. For example, the phrase *Date of Birth* is a landmark. When a document contains the value `Date of Birth: 06/07/80`, it is highly likely that the date is a date of birth, and you can treat the data accordingly.

**NOTE:** The IDOL PII Package, IDOL PHI Package, and IDOL PCI Package, provide landmark entities in most grammars. To extract entities from tables with the Education standard grammar files, you might need to create your own landmark entities.

For structured data, it is less likely that the landmark occurs next to the entity. You might have the value Date of Birth in a table heading, and the actual date values in the rows below. In this case, you can use table extraction to extract the values that correspond to the landmark.

## Configure Table Extraction

In table extraction, you define an entity or entities that you want to detect in the header row, and entities that you want to detect in the cells under that header. When Eduction matches one of these entities in the header row of a table, it attempts to extract the corresponding cell entities from the cells in that column.

To configure these, you use the [HeaderEntityN, on page 336](#) and [CellEntityN, on page 324](#) configuration parameters.

For example:

```
[Eduction]
HeaderEntity0=pii/date/dob/landmark/all
CellEntity0=pii/date/nocontext/all
```

This example matches date of birth landmark values in the header, and for all subsequent rows in that column, it extracts any date values.

**NOTE:** You can specify multiple entities, either by providing a comma-separated list, or by using wildcard characters. In this case, if the table header matches any of the configured header entities, Eduction matches the cell content against any of the configured cell entities.

This option might be useful if you want to match a particular entity in multiple languages, or if you want to include a custom entity in addition to a standard one.

To use table extraction with Connector Framework Server (CFS) or IDOL NiFi Ingest, you can also add the [EntityFieldN, on page 330](#) parameter. This parameter specifies the field that CFS or NiFi write the extracted entities to in your documents.

In this case, if you do not set [EntityFieldN, on page 330](#), Eduction uses the value of [CellEntityN, on page 324](#) to create a default field name (the capitalized entity name, with / \* and ? characters replaced with underscores).

```
[Eduction]
HeaderEntity0=pii/date/dob/landmark/all
CellEntity0=pii/date/nocontext/all
EntityField0=DATE_OF_BIRTH
```

**NOTE:** You cannot specify [EntityFieldN, on page 330](#) for only some of your [CellEntityN, on page 324](#) values; you must either use the default value for all, or set [EntityFieldN, on page 330](#) for all.

These parameters are the same for extracting entities from CSV or TSV table files, and for structured table data in XML, such as the output from Media Server OCR. For structured XML tables, there is an additional parameter, `TableCellPath`, for CFS and IDOL NiFi Ingest. `TableCellPath` describes the structure of the XML to allow Eduction to find the cells. For more information, refer to the Connector Framework Server or NiFi Ingest documentation.

For the Education SDK, you do not need to configure `TableCellPath`, because you use functions to locate the cells.

**NOTE:** You cannot extract entities from structured XML data in Education Server or `edktool`. In these cases you must use a CSV or TSV table file.

## Run Table Extraction

After you configure table extraction, you can run Education as normal, with a CSV or TSV table file as input.

- In the Education SDK:
  - C: You provide a table file by using the `AddInputText` or `SetInputStream` functions. You can use the `EdkGetMatchTablePosition` function to retrieve the row and column details of a match.

For structured XML, call `EdkAddTableCell` to add table cell data to the session. You can optionally also populate an `EdkOffset` struct with offset information, and pass in a pointer to this as part of the `EdkAddTableCell` call. This option allows you to generate matches with offsets that reflect the global position of the cell. By default, the produced matches have offsets relative to the start of the cell.

When a row is complete, call `EdkEndTableRow`. For the last row of the table, set the `bFinalRow` argument to `true`.

- Java: You provide the table file by using the `addInputText` or `setInputStream` functions. You can use `public EDKMatch.TablePosition getTablePosition()` to return an object with two public members, `row` and `column`.

For structured XML, call `addTableCell` to add table cell data to the session. To generate matches with offsets that reflect the global position of the cell, call the version that accepts `offsetBytes` and `offsetCodepoints` as arguments. The other version produces matches with offsets that are relative to the start of the cell.

When a row is complete, call `endTableRow`. For the last row of the table, set the `finalRow` argument to `true`.

- .NET: You provide the table file by using `AddInputText` or `SetInputStream` functions. You can use the readonly property `public IExtractionMatchTablePosition TablePosition` to return an object that has the readonly properties `Row` and `Column`.

For structured XML, call `AddTableCell` to add table cell data to the session. To generate matches with offsets that reflect the global position of the cell, call the version that accepts the `TextOffset` parameter, which is a simple struct that contains the offsets in bytes and Unicode characters, of the start of the cell data in the global input stream. The other version produces matches with offsets that are relative to the start of the cell.

When a row is complete, call `EndTableRow`. For the last row of the table, set the `final_row` argument to `true`.

**NOTE:** To use Table Extraction with the Education SDK, you must create an Education engine

with a configuration file. See the Standalone API Usage section for your language in [API Reference, on page 26](#).

- In Education Server and the edktool command-line tool, you provide the table file as plain input text. Education returns the matches in the response.
- In CFS and NiFi, the ingestion process sends the table file to the Education engine. CFS and NiFi add the match details to the output documents.

## Select Matches

By default, Education does not return all possible matches. For example, it does not return matches that overlap a previous match:

- If you have patterns for *fox jumps* and *jumps over*, the text "*The quick brown fox jumps over the lazy dog*" returns only the first match, because the second match overlaps it.

Education returns the longest possible match at the same position. For example:

- If you have a pattern for *brown fox*, and one for *brown fox jumps*, only the second match returns.

Education has configuration parameters to allow you to modify this and other matching behavior.

## Return the Smallest Match

When Education finds two matches that start at the same position, it returns only one match unless you enable overlaps. By default, Education returns the longer match.

You can configure it to use the shorter match by enabling `NonGreedyMatch` (see [NonGreedyMatch, on page 343](#)). However, always consider whether you need to use this option, or whether you could redefine your Education grammar to be more precise instead.

Generally, Micro Focus recommends that you make your Education grammar definition as precise as possible, which reduces the chance of getting two matches at the same position. A precise Education grammar is also more efficient during extraction.

## Overlapping and Duplicate Matches

You can return overlapping matches by enabling the `AllowOverlaps` parameter (see [AllowOverlaps, on page 319](#)).

When the same string occurs at more than one position in the input data, by default Education returns only the first match. You can allow duplicates (for example, if you need to find the positions of all occurrences) by setting the `AllowMultipleResults` parameter (see [AllowMultipleResults, on page 317](#)).

If you want to return only unique matches in each document, set `EnableUniqueMatches` to `True` (see [EnableUniqueMatches, on page 327](#)). Education returns only a single occurrence of a particular value (the first match), even if the matches occur for different entities.

## Return Multiple Results for a Single Match

In some instances, you might want to get multiple results for a single match. For example, if a word can occur in different contexts, you might want to tag a document according to the occurrence of the word.

```
<entity name="IT_industry">
  <entry headword="software">
    <synonym>CompanyA</synonym>
    <synonym>HP</synonym>
  </entry>
  <entry headword="hardware">
    <synonym>CompanyB</synonym>
    <synonym>HP</synonym>
  </entry>
</entity>
```

With this entity, CompanyA returns software, while CompanyB returns hardware. A match of HP might return either software or hardware. If you want to use this entity to return both software and hardware for HP, set the `AllowMultipleResults` configuration parameter to `True` (see [AllowMultipleResults, on page 317](#)).

## Match Validity

Education assesses the validity of a match in the following order:

1. If the match is found outside of the required zones, discard it.
2. If the match does not meet the minimum score requirement, discard it.
3. If duplicates are allowed:
  - If the instance of the match is allowable, count this instance and return the match.
  - Otherwise, count this instance and discard it.
4. If duplicates are not allowed for the entity field:
  - If the matched text has been found before, discard it.
  - Otherwise, if the instance of the match is allowable, count this instance and return the matched text.
  - If the instance of the match is not allowable, count this instance and discard it.

## Components

Education *components* allow you to extract attributes from a single match. The attributes are called components because they are the components of a match.

For example, sentiment analysis can match the phrase *Their service is fantastic* as conveying positive sentiment. Components can then break this phrase down to identify *service* as the subject matter, and *fantastic* as the adjective that describes the subject.

Education does not extract components by default.

To use components, you must include components in the grammar that you want to use, and turn on components at run time. You must also configure some additional parameters. See [Configure Components, below](#).

## When to Use Components

The English Education sentiment analysis grammar defines components for TOPIC, SENTIMENT, POSITIVE, and NEGATIVE. You can use these components by configuring Education accordingly.

Components are useful when the information that you want to match has an underlying pattern that you want to preserve.

For example, you might use components to extract data from tables and return it in a suitable format. For an example, see [EntityComponentFieldN, on page 329](#).

**NOTE:** Most of the standard grammars do not define components, because these grammars are mainly dictionaries or basic patterns that you can use to build more complex patterns. You might want to define components when you reference these basic entities in your patterns for custom grammars.

## Configure Components

To use the components defined in the Education grammar, you must configure Education with:

- OutputSimpleMatchInfo set to `False`. See [OutputSimpleMatchInfo, on page 344](#).
- EnableComponents set to `True`. See [EnableComponents, on page 326](#).
- the `EntityComponentField` for the entity. See [EntityComponentFieldN, on page 329](#).

## Define the Components

In the Education grammar, you define components by using the extension operator (`?A=ComponentName:Pattern`) (see [Regular Expressions, on page 295](#)). Consider the following example entity:

```
<entity name=test>  
  <pattern>(?A=SUBJECT:(?A^noun)) is (?A=SENTIMENT:(?A^adjective))</pattern>  
</entity>
```

In this example, an earlier part of the grammar might define the noun entity to match nouns such as *service* and *facility*, and the adjective entity to match descriptions such as *fantastic* and *appalling*. This test entity then matches the phrase *service is fantastic*, and returns the SUBJECT component with the text *service*, and the SENTIMENT component with the text *fantastic*.

## Results Relevance

Education returns entities based on the extraction rules from the grammars and dictionaries.

The edktool command-line tool includes a test mode to measure the *precision* and *recall* of your extraction, to determine the result relevance. This mode allows you to check how well your grammar works on your text data.

Precision and recall are statistical measures that compare the results that a human marks and results that the engine returns. The following terms describe result relevance as used in Education.

- **True Positives (TP)**. Results that are identified by both a human and the engine. That is, the engine returns an entity that is confirmed as true by the person marking the document.
- **False Positives (FP)**. Results that are identified by the engine, and are not marked by a human. That is, the engine returns an entity that is not confirmed by the person marking the document.
- **True Negatives (TN)**. Results that are not marked by either the person marking the document, or the engine.
- **False Negatives (FN)**. Results that are marked by a human, and are not marked by the engine. That is, the engine does not return an entity that has been marked as true by the person marking the document.

From these relevance terms, you can determine precision and recall as follows:

- Recall is the percentage of true relevant entities that are extracted by a rule:

$$TP / (TP + FN) * 100$$

- Precision is the percentage of extracted entities that are true entities:

$$TP / (TP + FP) * 100$$

For more information about edktool, see [Compile and Test Grammars, on page 88](#).

## Custom Grammar Guidelines

This section describes some guidelines that you can use when you create custom grammars.

Education is generally very fast at grammar compilation and entity extraction. However, some expressions in the grammar patterns can increase the extraction and compilation times significantly.

The grammar files that are included in the Education packages are designed to be as fast as possible. The following section describes some ways to ensure that your user-created Education grammars also work quickly.

In general, the more concise a grammar is, the faster it returns matches. For the best performance, use the simplest entity possible that matches what you need to match. Use additional features only if you need them.

**TIP:** Before you create a custom grammar, check the standard grammars to see whether the entity you want is already supported. If it is not, contact Micro Focus support. The entity you want to detect might be supported in an upcoming release. Alternatively, Micro Focus might be able to add support in future, if other customers want it too.

Using an official grammar means you do not have to maintain it.

It is also generally easier to extend an existing grammar by using a user extension file than to create a completely new grammar.

The following sections describe the most efficient use of specific features, and how you might be able to avoid using slow features in some cases.

For details of the grammar syntax, see [Grammar Format Reference, on page 287](#). In particular, for details of the regular expression syntax used in these examples, see [Regular Expressions, on page 295](#).

**NOTE:** Some configuration settings affect extraction speed, for example [MatchCase, on page 339](#), [MatchWholeWord, on page 340](#), [AllowOverlaps, on page 319](#), and [NonGreedyMatch, on page 343](#).

For a tutorial that gives an example of how to create a custom grammar, refer to *IDOL Expert*.

## Exclusions and Negations

Always try to describe the value that you want to match, rather than a value to exclude.

For example, you can exclude a match by using a score of zero (`score="0"` in the pattern definition). However, this option can significantly increase processing time. Micro Focus recommends that you define your patterns such that your entities do not match the values you want to exclude.

For example, to extract mobile phone numbers that do not end in 25:

```
<pattern>07[0-9]{7}[013-9][0-9]</pattern>  
<pattern>07[0-9]{7}[0-9][0-46-9]</pattern>
```

is faster than

```
<pattern>07[0-9]{9}</pattern>  
<pattern score="0">07[0-9]{7}25</pattern>
```

**TIP:** You can also use a Lua script to filter out the exclusions in post-processing. This option might be preferable when you want to define more general patterns.

Similarly, Micro Focus recommends that you describe the values to match rather than using the negation operator. For example, to avoid matching the digit 0, use `[1-9]` rather than `[^0]`. The negation operator can increase compilation and processing times.

## Case Sensitivity

See Also: [Case Sensitive Matches, on page 53](#).

Wherever possible, use case sensitive matching. After exclusions, case insensitive matching is the slowest feature in Education. In particular, avoid using the `case="insensitive"` tag in entities or patterns. When case sensitivity is essential, consider using one of the following options:

- Use alternate casing in a regular expression pattern. For example, to match the word *Paul* case insensitively, you might use the pattern `[Pp][Aa][Uu][Ll]`.

**NOTE:** Extensive use of this format can greatly increase grammar compilation times, and compiled ECR file size.

- Use text normalization. The Education process can normalize text before matching, to convert the input to all lower- or all uppercase. You can define your entities in one case, and normalize the input text the same way.

This approach might be unsuitable if you need to match capitalized words in certain places.

## Reference or Copy Entities

When you create a custom grammar, you can match a previously defined entity and either:

- copy it to the new entity by using the syntax `(?A:`
- reference it in the new entity by using the syntax `(?A^`

For large or complex Education grammars, copying entities results in a very large grammar file, which can take an extremely long time to compile. In addition, the resulting file can take longer to load and scan than the equivalent file created by using references.

For example, if an entity matches a static list of several thousand names, always use the reference operator to include it in other patterns. Similarly, reference an entity if it contains patterns that can match a wide variety of expressions.

For very simple grammar files, it might be faster to copy entities, because this method creates an ECR with more efficient instructions for extraction.

In general, Micro Focus recommends that you use references in all cases, unless your grammar file is very simple, and extraction speed is critical.

## Merge Entities

When you know what entities you want to use for extraction in advance, you can improve performance by creating a single public entity that includes each of these entities. It is quicker for Education to process a single large entity definition than for it to use several smaller definitions. Similarly, extraction is faster because it needs to check only one entity for a match.

For example, the following public entity merges the entities `animal`, `vegetable`, and `mineral`:

```
<entity name="my_entity" type="public">
  <pattern>(?A^animal)</pattern>
  <pattern>(?A^vegetable)</pattern>
  <pattern>(?A^mineral)</pattern>
</entity>
```

In your Education configuration, you can use this merged entity rather than the individual ones.

**TIP:** You can use merged entities to improve performance even if you only use entities from Micro Focus grammar files.

Micro Focus recommends that you merge any entities that you can, unless merging them alters what the grammar can match.

## Include Grammars

When you include another grammar in your custom grammar, use the ECR form rather than the XML. When you use an XML inclusion, compiling your grammar requires in-memory compilation of the included grammar file, which might in turn require the same for any further inclusions.

It is always quicker to compile a grammar that includes ECR files.

## Use Common Forms of Matches

Where possible, use only the most common match cases for your grammar. Additional forms for acceptable matches can result in increased processing times, particularly for complex forms. Consider your matches carefully and only add additional forms if it is necessary.

## Quantifiers

The syntax *expression*{*n*,*m*} matches at least *n*, but at most *m* consecutive occurrences of the specified *expression*. When *m* is large, it can result in a large ECR file and slow extraction.

In this situation, Micro Focus recommends that you use {*n*, } unless the upper bound *m* is important.

## Reduce the Number of Ways to Match

When there are many ways to match a particular entity, Education must try many methods to determine whether an input string matches, and to attempt to find the longest match. Where possible, make sure that there are as few ways to match your entity as possible. In particular, avoid using the {*n*,*m*} operator for entities that can match a wide variety of tokens.

For example, the following entity matches a five letter word that occurs between one and three times. This five letter word must occur between two matches of an entity called *name*.

```
<entity name="myentity">  
  <pattern>(A:name) ([A-Za-z]{5}){1,3} (A:name)</pattern>  
</entity>
```

The example name entity might also include five-letter names, such as Chris, James, or Alice, that also match the regex pattern. When Education processes text, it tries every combination that might lead to a match. In this case there might be a very large number of options, which could be very slow.

## Lua Post-Processing

You can use a Lua Script for more advanced matching, which might improve processing speed in complex cases. You can use Lua scripts in many ways, from checksum validation to checking match proximity (if you use the en masse matching mode).

The match proximity check might be useful for complex entities. That is, if matches from a certain set of entity names are close together, you can consider them to form a single, complex entity. This approach is also useful in cases where the major elements of an entity are separated by filler or unknown content.

## Optional Phrases

Try to start your entities with a required entity or phrase. An entity that starts with one or more optional phrases can be very slow during extraction. For example, the following type of pattern might be very slow:

```
<pattern>(A^animal)?(A^vegetable)*(A^mineral)?(A^name)</pattern>
```

In this case, the entity name is required, while animal, vegetable, and mineral are optional. When extracting, Education must check each word for matches in the animal entity, then check whether it matches vegetable, mineral, and then name. If the word matches animal, Education must then check whether the following word matches vegetable, mineral, or name, and so on.

This process can be time-consuming, particularly if each of the optional entities occurs regularly in the input text.

This issue does not occur if the pattern starts with the required phrase. For example:

```
<pattern>(A^name)(A^animal)?(A^vegetable)*(A^mineral)?</pattern>
```

In this case, Education must only check each word for matches in name, and it checks for the optional phrases only when it finds a match for name.

## Use Private Entities

Education has public and private entities. Public entities are available to match during extraction. Private entities are available to use in other entities, but you cannot extract them directly as matches.

You can use private entities to break up complicated pattern expressions into several simple patterns, which you can use in a single public entity. This process keeps your patterns simple, which makes them easier to maintain and troubleshoot.

Making an entity public unnecessarily in a grammar can result in longer processing times if you use all entities from the grammar. Micro Focus recommends that you mark all entities as private by default. You can then expose as public only the entities that represent the entirety of a match, rather than subelements.

## Output Exclusions

You can use output exclusions (the (?A! operator) for text that is useful when you identify a match, but that is not part of the match itself. For example, if you have form labels that identify a piece of information (such as *Name*, *Telephone Number*, and so on), you can use these in an entity to match the correct information, and then use an output exclusion so that the final output includes only the important content.

**NOTE:** Output exclusions can increase compilation times if you exclude complex entities.

## Patterns and Headwords

You can extract regular expressions by using patterns (the <pattern> element), or by explicitly listing each possible match as a headword (in the <entry> element).

For example, the following alternatives are equivalent:

```
<pattern>[Ee]xtract(ed|ing|s)?</pattern>
```

and

```
<entry headword="Extract"/>  
<entry headword="Extracted"/>  
<entry headword="Extracting"/>  
<entry headword="Extracts"/>  
<entry headword="extract"/>  
<entry headword="extracted"/>  
<entry headword="extracting"/>  
<entry headword="extracts"/>
```

Patterns are often faster to code, easier to maintain, and faster for extraction. However, if there are fewer than about 50 entries represented by one pattern, the compilation time is faster for headwords.

Micro Focus recommends that you use patterns in your entities, unless the pattern becomes too complex. Additionally, if the compilation time becomes too slow, you might want to consider replacing the simplest patterns with headwords.

**NOTE:** You can also provide a list of words by adding multiple <pattern> elements with a word in each, unless the word or phrase contains characters that are also valid regular expression syntax.

## Components

See Also: [Components, on page 61](#)

In some cases, including components in an Education grammar file can increase the extraction time, even if you do not enable the components during the extraction. This occurs because the ECR is less compact than the equivalent file that does not describe components. Do not include components if you do not need them.

When you do use components, Micro Focus recommends that you make the structure of the components as uniform as possible.

For example:

```
<pattern>(A=COMPONENT:(?A^entity_A) )(A^entity_B) (?A^entity_C) (?A^entity_
D)</pattern>
<pattern>(A=COMPONENT:(?A^entity_A)) (?A^entity_B)(A^entity_D) (?A^entity_
C)</pattern>
<pattern>(A=COMPONENT:(?A^entity_A) (?A^entity_B))(A^entity_C) (?A^entity_
E)</pattern>
```

might be slower than:

```
<pattern>(A=COMPONENT:(?A^entity_A) (?A^entity_B)) (?A^entity_C) (?A^entity_
D)</pattern>
<pattern>(A=COMPONENT:(?A^entity_A) (?A^entity_B)) (?A^entity_D) (?A^entity_
C)</pattern>
<pattern>(A=COMPONENT:(?A^entity_A) (?A^entity_B)) (?A^entity_C) (?A^entity_
E)</pattern>
```

## Scores

You can add scoring to your entities to indicate the relative confidence for matches. The score for a match is the product of all the scores of the patterns or entities it includes, with a default value of one.

It is up to you how you use scores in your use case. Education does not define the meaning of a score.

## Whitespace

You can define a space in grammars by using a space character, or by using the `\s` syntax. The `\s` syntax matches all types of whitespace, such as spaces, tabs, and newlines. In most practical situations, the matches you want from the input text only include spaces and it is slightly faster to use a space, rather than `\s`.

## Control Education Processing Time

Education matching is usually fast, but Micro Focus recommends that you set limits on processing so that your application can deal with a variety of input.

For example, for a large input text with a high density of matches, it can be time-consuming to retrieve all the matches. You must consider carefully whether your application requires all matches (which might number in the millions), or if it is enough to capture the first few hundred for any particular piece of input text.

You can control the number of matches to process by using the [MaxMatchesPerDoc, on page 342](#) configuration parameter.

The following configuration parameters also strongly affect the number of matches you might obtain:

- [AllowMultipleResults](#), on page 317
- [AllowOverlaps](#), on page 319

To control the amount of time that Education can spend processing data, you can set the [RequestTimeout](#), on page 351 configuration parameter.

In the Education SDK, you can use the following steps:

1. Set the [RequestTimeout](#), on page 351 configuration parameter. Alternatively:
  - For C, use `EdkSessionSetRequestTimeoutPrecise` on an individual session.
  - For .NET, use the `ITextExtractionSession::SetRequestTimeoutPrecise` method.
  - For Java, use the function `TextExtractionSession::setRequestTimeoutPrecise` to set a timeout for the session.

In each case, the argument must be in milliseconds.

2. Get the current time in epoch milliseconds, for example by using `time()` in C, `System.DateTimeOffset.Now.ToUnixTimeMilliseconds()` in .NET, or `System.currentTimeMillis()` in Java.
3. In the Education SDK, send the time in epoch milliseconds to the session by using one of the following options:
  - For C, use `EdkSessionSetStartTime`, passing in the value you obtained from step 2 as the argument.
  - For .NET, use `ITextExtractionSession::SetStartTimePrecise`, passing in the epoch milliseconds value you obtained from the previous step as the argument.
  - For Java, use `TextExtractionSession::setStartTime`, passing in the epoch milliseconds value you obtained from the previous step as the argument.
4. Obtain matches in the usual fashion, by calling `EdkGetNextMatch` in C, or by looping over the session object in .NET and Java.

**DEPRECATED:** Do not use `EdkGetNextMatchTimed` in C, which is deprecated in Education SDK version 12.8.0 and later.

5. Check for timeouts in the match loop. You can do this by calling `EdkGetMatchTimedOut` in C, or `TextExtractionSession::getTimedOut` in Java, or `ITextExtractionSession::getTimedOut` in .NET. If a timeout has occurred, you can break out of the loop, as required for your application.

You can find examples of timeout handling in the sample programs provided in the Education SDK release package.

**TIP:** If your application does significant processing before you call Education, and you want to use an overall application timeout, obtain the current time in epoch milliseconds at the very start of your application processing rather than waiting until just before you call the Education functions.

## Find Repeated Matches

A *repeated match* occurs when Education finds another match (exactly the same text), at a different location in the input (a different offset). For example, if you are searching some input text for telephone numbers, Education could find a match "564123". The same text could occur later in the document and would result in a repeated match. Repeated matches might belong to the same entity, but this is not always the case because multiple entities can match the same text.

**TIP:** Education does not return repeated matches if you configure the engine with `EnableUniqueMatches` set to `TRUE`.

Education normally returns matches in the order that they appear in the input, but you might prefer to process a match, followed by all of its repeated matches, and then return to the next unique match. In extreme cases, where the matched text is repeated many times, this provides a convenient way to stop processing and move on to the next unique match or maybe even the next document.

Each Education API provides a way to find the next repeated match. The SDK includes sample programs, in each language, that demonstrate this functionality.

**NOTE:** This feature is not supported for streaming input or in table mode.

## C API

In the C API, instead of calling `EdkGetNextMatch` you can call `EdkGetNextRepeatedMatch`.

If the input contains another match with the same text as the current match, you can then call `EdkGetRepeatedMatchByteOffset` and `EdkGetRepeatedMatchCodepointOffset` to establish the location of the repeated match.

You can call `EdkGetNextRepeatedMatch` repeatedly. If the matched text does not occur again, Education returns `EdkNoMatch` and you can proceed to the next unique match by calling `EdkGetNextMatch`.

Any repeated matches that you access using `EdkGetNextRepeatedMatch` are not returned by subsequent calls to `EdkGetNextMatch`. By using `EdkGetNextRepeatedMatch` you are changing the order in which the matches are returned.

The following code sample demonstrates how you might use these functions. For more information about these functions, refer to the API reference documentation.

```
while (EdkGetNextMatch(session) == EdkSuccess)
{
    // call match accessors and do something with the information

    while (EdkGetNextRepeatedMatch(session) == EdkSuccess)
```

```
{
    size_t nRepCodepointOffset = 0;
    size_t nRepByteOffset = 0;
    EdkGetRepeatedMatchCodepointOffset(session, &nRepCodepointOffset);
    EdkGetRepeatedMatchByteOffset(session, &nRepByteOffset);

    // do something with the offsets...
}
}
```

## Java API

The repeated matches functionality in the Java API is similar to the C API. You can iterate over repeated matches as shown in the following code sample. You can call the `getByteOffset()` and `getCodepointOffset()` methods to establish the position of a repeated match.

```
for (EDKMatch match : session)
{
    // call match accessors and do something with the information

    for (EDKRepeatedMatchOffset repeat : match)
    {
        long byteOffset = repeat.getByteOffset();
        long codepointOffset = repeat.getCodepointOffset();

        // do something with the offsets
    }
}
```

## .NET API

The repeated matches functionality in the .NET API is similar to the C API. You can iterate over repeated matches as shown in the following code sample. The properties `ByteOffset` and `CodepointOffset` provide the position of a repeated match.

```
foreach (IExtractionMatch match in session)
{
    // call match accessors and do something with the information

    foreach (IExtractionRepeatedMatch repeat in match.RepeatedMatches)
    {
```

```
    long byteOffset = repeat.ByteOffset;  
    long codepointOffset = repeat.CodepointOffset;  
  
    // do something with the offsets  
  }  
}
```



# Chapter 8: Sentiment Analysis

This section describes the sentiment analysis grammars and some information about how to optimize sentiment analysis.

For more information about the sentiment analysis grammar, see [Sentiment Grammars](#), on page 108.

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## Education Sentiment Grammar Files

Education Sentiment Analysis allows you find whether text has positive, negative, or neutral sentiment. For example, you can use it to determine whether users of a particular product or service are satisfied or not, based on an automated analysis of reviews.

The following table lists the languages that support sentiment analysis, and lists the name of the standard sentiment grammar and the user modification file. Each of these languages also support component extraction and user modification.

Language	Sentiment Grammar	User Modification File
Arabic	sentiment_ara.ecr	sentiment_user_ara.xml
Chinese	sentiment_chi.ecr	sentiment_user_chi.xml
Czech	sentiment_cze.ecr	sentiment_user_cze.xml
Dutch	sentiment_dut.ecr	sentiment_user_dutch.xml
English	sentiment_eng.ecr	sentiment_user_eng.xml
French	sentiment_fre.ecr	sentiment_user_fre.xml
German	sentiment_ger.ecr	sentiment_user_ger.xml
Italian	sentiment_ita.ecr	sentiment_user_ita.xml
Polish	sentiment_pol.ecr	sentiment_user_pol.xml
Portuguese	sentiment_por.ecr	sentiment_user_por.xml
Russian	sentiment_rus.ecr	sentiment_user_rus.xml
Spanish	sentiment_spa.ecr	sentiment_user_spa.xml
Turkish	sentiment_tur.ecr	sentiment_user_tur.xml

## The Sentiment Analysis Grammars

Eduction matches input data to patterns defined with regular expressions (grammars).

The sentiment analysis grammar first defines dictionaries with the parts of speech. There are different dictionaries for positive and negative words, and other categories that describe different effects on the sentiment, where appropriate.

These dictionaries combine to form simple phrases that convey positive or negative sentiments. Finally, these phrases are padded, usually with other phrases, to form various patterns for the final entities, which match strings from the text that express positive or negative sentiment.

The grammar files are designed to be used out of the box. You just need to load the appropriate grammar file, and optionally choose the entities (usually positive or negative) to match with.

The sentiment grammar files have *lite* versions. The lite versions are identical to the full versions in most respects, but they do not support components or user modification. They can process data up to twice as fast as the full versions, depending on language.

Micro Focus recommends that you use the lite versions except when you need to use components or modify the built-in dictionaries.

The lite grammars have the same name as the full version, with `_lite` after the language. For example, the file name of the Chinese sentiment grammar file is `sentiment_chi.ecr`, and the file name of the lite version is `sentiment_chi_lite.ecr`.

## Extend the Sentiment Analysis Grammar

The grammar files generally contain sufficient information to work with a wide range of data, from formal reports to user reviews and social media feeds. However, the recall (the percentage of matches that are actually returned, out of the total number of matches that should return in theory) can be low for some input data. Also, some examples might convey a different sentiment depending on your viewpoint. For example:

The phrase *Company A is much better than Company B* might convey a positive or negative sentiment depending on whether you are with Company A or Company B.

In these situations, you can improve the recall or adjust the sentiment analysis by extending the grammar.

You can extend the grammar by adding to the appropriate dictionaries in the sentiment grammar file. For example, if you are on the side of Company A, you can add *Company A* to the positive list.

**NOTE:** There are slight variations in the grammar files of different languages, so this does not apply to all languages.

For more information, see [Extend Grammars, on page 82](#).

## Polarity Scoring

The sentiment analysis grammars support *polarity scoring*. Polarity scoring is a number, usually between 0.50 and 1.50, that represents the strength of the sentiment in the matched phrase. For example:

- a strongly positive or negative phrase might have a score of 1.35
- a typical phrase might have a score of 1.00
- a match where the sentiment is weak or ambiguous might have a score of 0.60

You can edit the user modification files to increase the scores of words in the dictionaries. For example, add the following on a new line in the user modification file to modify the existing entry `flexible` so that it has a score of 1.23:

```
"      <entry score="1.23" headword="flexible"/>"
```

**NOTE:** `sentiment_basic_eng.ecr` does not support polarity scoring.

## Verb Sentiment Transitivity

The sentiment analysis grammar files support *verb sentiment transitivity*.

This feature enables the TOPIC components of the matches to determine what the sentiment is about with more accuracy, by using advanced contextual understanding of whether that sentiment is being expressed about the subject or object of the sentence.

For example, given two matches, `x likes y` and `x wins at y`, the grammar files can determine that the first match is a positive statement about `y`, whereas the second match is a positive statement about `x`.

## Sentiment Analysis

The sentiment analysis grammar files contain:

- dictionaries of types of word (for example, positive adjective, negative noun, neutral adverb, and so on).
- patterns that describe how to combine these dictionaries to form positive and negative phrases.

For example, you could run sentiment extraction using the English sentiment grammar file (`sentiment_eng.ecr`), with the following hotel review as the input file:

*The room was nice enough, with a plug in radiator, tv with an English news channel, hot shower, comfy bed. The receptionist we first dealt with was miserable and rude, and just grunted at us and rolled her eyes because we were too early for check in having just got off the morning train from Khabarovsk. Fortunately, a younger receptionist with a nice smile appeared, spoke to us helpfully suggesting a few cafes nearby to pass some time, and we tried to forget about the other woman. Breakfast is terrible. Unidentifiable cordials, gloomy porridge, bread rolls filled with things you don't*

*expect for breakfast, like potato, egg and dill. Don't come here for the breakfast, but for the cost of the room in a city like Vladivostok, the hotel is still decent value for money.*

The following is a sample of the output that this produces:

```
<?xml version="1.0" encoding="UTF-8"?>
<MATCHLIST>
  <DOCUMENT Type="IDOL IDX" ID="Unknown">
    <FIELD Name="DRECONTENT">
      <FIELD_INSTANCE Value="1">
        <MATCH EntityName="sentiment/positive/eng" Offset="7" OffsetLength="5"
          Score="1.05" NormalizedTextSize="17" NormalizedTextLength="17"
          OriginalTextSize="17" OriginalTextLength="17">
          <ORIGINAL_TEXT>The room was nice</ORIGINAL_TEXT>
          <NORMALIZED_TEXT>The room was nice</NORMALIZED_TEXT>
          <COMPONENTS>
            <COMPONENT Name="TOPIC" Text="The room" Offset="0"
              OffsetLength="0" TextSize="8" TextLength="8"/>
            <COMPONENT Name="SENTIMENT" Text="nice" Offset="13"
              OffsetLength="13" TextSize="4" TextLength="4"/>
          </COMPONENTS>
        </MATCH>
        <MATCH EntityName="sentiment/negative/eng" Offset="494"
          OffsetLength="492" Score="1.2" NormalizedTextSize="21"
          NormalizedTextLength="21" OriginalTextSize="21"
          OriginalTextLength="21">
          <ORIGINAL_TEXT>Breakfast is terrible</ORIGINAL_TEXT>
          <NORMALIZED_TEXT>Breakfast is terrible</NORMALIZED_TEXT>
          <COMPONENTS>
            <COMPONENT Name="TOPIC" Text="Breakfast" Offset="0"
              OffsetLength="0" TextSize="9" TextLength="9"/>
            <COMPONENT Name="SENTIMENT" Text="terrible" Offset="13"
              OffsetLength="13" TextSize="8" TextLength="8"/>
          </COMPONENTS>
        </MATCH>
      </FIELD_INSTANCE>
    </FIELD>
  </DOCUMENT>
</MATCHLIST>
```

The following example configuration shows the recommended usage:

```
[Education]
ResourceFiles=grammars/sentiment_eng.ecr
// Note: replace sentiment_eng.ecr by sentiment_user_eng.ecr if using user
modification

// standard entities for all sentiment analysis in English:
Entity0=sentiment/positive/eng
Entity1=sentiment/negative/eng
EntityField0=POSITIVE_VIBE
EntityField1=NEGATIVE_VIBE
```

```
EntityComponentField0=TOPIC,SENTIMENT
EntityComponentField1=TOPIC,SENTIMENT

// some invalid matches are given very low scores so that we can filter them out:
MinScore=0.1

// for extraction of Twitter handles, hashtags and emoticons:
TangibleCharacters=@#.;

// for displaying metadata:
OutputScores=True
OutputSimpleMatchInfo=False
EnableComponents=True
```

For more information about the sentiment analysis grammar files, see [Sentiment Grammars, on page 108](#).

## Perform Sentiment Analysis on Short Comments

The standard sentiment analysis grammars are designed for high precision. For some sources of short comment data, such as YouTube comments, no positive or negative matches are found in some documents despite sentiment clearly being expressed.

If recall with the full `sentiment_eng.ecr` grammar file is too low, and your documents are generally short comments, use `sentiment_basic_eng.ecr` to extract additional matches. This grammar contains carefully-selected lists of positive and negative terms that help determine the sentiment of a document in which `sentiment_eng.ecr` found no matches.

`sentiment_basic_eng.ecr` contains terms in title case, but research shows that for most data these impair recall, so these are given a lower score. Micro Focus recommends that you set `EntityMinScoreN` to 0.4 to filter out these terms unless you need them.

`sentiment_basic_eng.ecr` does not expose TOPIC or SENTIMENT components, and does not use scores to reflect strength or reliability of polarity. The following additional example configuration shows the recommended usage:

```
[Eduction]
ResourceFiles=grammars/sentiment_eng.ecr,grammars/sentiment_basic_eng.ecr
// optional further layer of analysis for very short documents:
Entity2=sentiment/basic_positive/eng
Entity3=sentiment/basic_negative/eng
EntityField2=BASIC_POSITIVE_VIBE
EntityField3=BASIC_NEGATIVE_VIBE
// remove this setting to include basic matches in titlecase - this is not
recommended because on most data it decreases precision:
EntityMinScore2=0.4
EntityMinScore3=0.4
```

## Financial Sentiment Analysis

The financial sentiment analysis grammar, `financial_strength.ecr`, allows you to extract sentiment information from financial news and analysis. You can use this grammar, for example, to monitor news feeds for financial sentiment concerning your company, or a list of companies that you are interested in.

This grammar relies on the `contextualize_matches.lua` postprocessing script. This script uses the configurable entities to match sections of your documents, and then recombines these entities, with the surrounding text, to return a different set of entities that represent the financial sentiment.

To use financial sentiment analysis, you must configure both the grammar and the postprocessing script. See [Post-Processing, on page 101](#).

To configure financial sentiment analysis, you include one or more of the basic entities in your Education configuration. These entities are:

- `finance/analyst`
- `finance/company/tagged/known`
- `finance/news`

Education uses these entities to find particular chunks of text that contain financial information, but it does not return the values that it finds for these entities. Instead, the postprocessing script finds text around the entity values and combines them with additional sentiment analysis processing to create a new set of entities. The new set describes positive, neutral, and negative sentiment in several contexts.

For details of the entities that the `financial_strength.ecr` and `contextualize_matches.lua` grammar and script combination creates, see the [standard grammar reference F, on page 140F, on page 140](#).

# Chapter 9: Create and Modify Education Grammars

Education uses grammar files to identify and tag entities in documents. They are written in XML in a format specific to Education. They are then compiled, using the Education command-line tool, into ECR files that Education can easily read at runtime.

Education includes a collection of standard grammar files that make it easy to identify common entities such as names and phone numbers. These are described in [Standard Grammars, on page 108](#).

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- [Extend Grammars](#) ..... 82
- [Compile Grammars](#) ..... 84
- [Example Grammar Files](#) ..... 84

## Education Grammar Structure

An Education grammar defines patterns for matching text in a document. A pattern is a combination of characters and operators. An operator is a sequence of special characters that match text by following the rules associated with the operator.

Pattern	Description	Matches
Smith John	Match either <i>Smith</i> or <i>John</i>	<i>Smith</i> <i>John</i>
[0-9]{3}	Match a sequence of three characters in the range 0 through 9	123 456

In this example, the square bracket operators `[]` are used to match on any of the characters 0 through 9 and the curly braces `{}` are used to repeat the previous pattern three times.

Grammars are described using XML. The file `edk.dtd` contains the template that defines the XML that Education understands. When writing grammars for Education, Micro Focus recommends that you reference `edk.dtd` at the start of the XML grammar file using the `include` statement, and that you use a DTD-compatible XML authoring tool to eliminate syntax errors and save time.

Here is an example of a simple Education grammar:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE grammars SYSTEM "edk.dtd">
<grammars>
  <grammar name="mygrammar">
    <entity name="name" type="public">
```

```
<pattern>Smith|John</pattern>
</entity>
<entity name="digits" type="public">
  <pattern>[0-9]{3}</pattern>
</entity>
</grammar>
</grammars>
```

This grammar defines two entities: `mygrammar/name` and `mygrammar/digits`.

For full details of the Education grammar XML syntax, and the `edk.dtd`, see [Grammar Format Reference, on page 287](#).

For a more extensive set of example Education grammar files, see [Example Grammar Files, on page 84](#).

## Extend Grammars

The Education standard grammars provide good coverage for common pieces of information that you would normally want to extract from your data. They are designed so that you can easily reference them in any custom grammars that you create.

For some data, the coverage provided might not be sufficient. In this case, you can extend the entities provided with new entries to improve the *recall* of the extraction (the percentage of matches that are actually returned, out of the total number of true matches). For more information about recall, see [Results Relevance, on page 63](#).

You cannot edit the standard grammars in place because they are provided in .ECR format. You can, however, add more entries to an existing entity in an .ECR grammar file by extending it in a custom grammar file in XML format.

## When to Extend a Grammar

You might consider extending a grammar if the recall of the existing grammar is low. In this case, you can work out what items the existing grammar does not match, and add these as new entries in the appropriate entities in your custom grammar.

You then compile the custom grammar (using `edktool`) before you use it, to allow Education to load it quicker. You can then replace the original grammar file with the new grammar file.

**TIP:** If you need to detect entities that are not supported by the Education grammars available from Micro Focus, raise the issue with your support contact. The entity you want to detect might be supported in an upcoming release. Alternatively, Micro Focus might be able to add support in future, if other customers want it too.

Using an official grammar means that you do not have to maintain it.

## Create a Reference to an Existing Entity

You can build custom grammars from scratch. However, the standard grammars provide many basic entities that you can reference in your grammars, which allows you to create new custom grammars quickly.

If you reference other entities in an entity that you create, you can use one of the following reference extensions:

- (?A^Entity) During compilation, create a link to the referenced entity from your entity.
- (?A:>Entity) During compilation, copy the compiled version of the referenced entity to your entity.

For the first option, compilation is quicker, and the resulting grammar file is a lot smaller. The second option can provide a small performance gain during extraction. Micro Focus recommends that you use the first option in most cases, unless the extraction performance is critical (see [Reference or Copy Entities, on page 65](#)).

For more information about these options, see [Regular Expressions, on page 295](#). For a tutorial that describes in more detail how to create a new grammar to extend existing entities, refer to *IDOL Expert*.

## Add More Entries to an Entity

To add more entries to an entity, create a new XML grammar file. In the new grammar file, include the .ECR file that contains the entity that you want to extend.

Ensure that your grammar file defines the same grammar and entity as the included grammar file. The full entity name, including the grammar prefix, must match for the grammar extension to work. Set the extend mode of the entity in your new grammar to **Append**, and add the extra entries in the entity.

## Replace the Current Entities

Although most of the time you would add new entries when you extend a grammar, you can sometimes choose to replace it entirely. To do this, set the extend mode of the entity in your new grammar file to **Replace**.

## Extend the Sentiment Grammars

Grammar extension is particularly useful when you use Education for sentiment analysis.

There are two main reasons why you might extend the sentiment grammar file.

- You want Education to find some of the matches it misses because the compiled grammar does not include some of the positive or negative adjectives and adverbs in your data. To do this, you simply extend the appropriate entities with the new entries.
- You want to change the sentiment for some objects. This option is currently available only for the English sentiment grammar.

For example, the phrase *Company A is much better than Company B* might be positive or negative depending on whether you are with Company A or Company B. If you are with Company A, you can make Education return a match from the sentence with a positive sentiment by adding *Company A* to an entity that lists entries that you consider good.

## Compile Grammars

After you write a grammar, compile the XML file into an ECR file using the Education command-line tool `edktool`. XML files are easy for people to read, but inefficient for computers to process. `edktool` transforms the XML file into an ECR file that is efficient for Education to use directly. An example of the `edktool` compile command is:

```
edktool c mygrammar.xml
```

This command produces the output file `mygrammar.ecr`.

For more information about `edktool`, see [Compile and Test Grammars, on page 88](#).

**NOTE:** Education version 12.7 and later compiles grammars to a compressed ECR format.

## Example Grammar Files

The following sample grammar files contains the `gram_edk_place.xml` grammar.

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- [grammar\\_include.xml](#) ..... 85
- [Example Grammar File to Match Months](#) .....86
- [Simplified Grammar File Containing a Dictionary of Place Names](#) ..... 87
- [Simplified Grammar File Containing Patterns to Match Times of Day](#) .....87

### grammar.xml

```
<?xml version="1.0" encoding="UTF-8"?>  
  
<!DOCTYPE grammars SYSTEM "../published/edk.dtd">  
<!-- Sample Education grammar file showing all elements and attributes in the DTD -->  
>  
<grammars debug="true" case="sensitive">  
  <include path="grammar_include.xml" type="private">  
    <publish name="grammar2/g2e2"/> <!-- publish previously private entity -->  
  </include>  
  <grammar name="grammar1" case="inherited" extend="disallow" debug="inherited">  
    <extern name="grammar2"/> <!-- removes the need to refer explicitly to grammar2
```

```
-->
  <entity name="entity1" type="public" case="insensitive" extend="disallow"
debug="true">
  <!-- the following entity definitions are not useful but are provided only to
illustrate the options and combinations of elements and attributes available -->
  <pattern score=".1" case="insensitive" replace="replacechars" insert_
before="prefix_" insert_after="_suffix">cat</pattern>
  <pattern score=".2">sat</pattern>
  <entry headword="mat" score=".3" case="inherited" debug="inherited">
    <synonym case="inherited">rug</synonym> <!-- will locate rug but return mat -
->
  <!-- will locate rug but return mat -->
  <synonym case="inherited"><![CDATA[carpet]]></synonym> <!-- illustrates
allowing CDATA in this element -->
  </entry>
  <entry headword="dog" score=".6"/>
  <entry>
    <headword score=".8"><![CDATA[rabbit<hi!>&abc&]]></headword>
    <synonym>bunny</synonym>
  </entry>
</entity>
<entity name="entity2" type="public">
  <pattern>(?A:g2e1)</pattern>
</entity>
</grammar>
</grammars>
```

## grammar\_include.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE grammars SYSTEM "../published/edk.dtd">
<grammars>
  <grammar name="grammar2">
    <entity name="g2e1">
      <pattern>animal</pattern> <!-- default visibility -->
    </entity>
    <entity name="g2e2" type="private"> <!-- explicitly private -->
      <pattern>mineral</pattern>
    </entity>
    <entity name="g2e3" type="public"> <!-- explicitly public -->
      <pattern>vegetable</pattern>
    </entity>
  </grammar>
</grammars>
```

## Example Grammar File to Match Months

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE grammars SYSTEM "../published/edk.dtd">

<grammars version="4.0">
  <include path="winter_names.ecr" type="private"/>
  <grammar name="example">

    <entity name="spring_month" type="private">
      <pattern>[Mm]ar(ch|\.)</pattern>
      <entry headword="April"/>
      <entry headword="april"/>
      <entry headword="Apr"/>
      <entry headword="apr"/>
      <entry headword="Apr."/>
      <entry headword="apr."/>
      <pattern replace="May">[Mm]ay\.?</pattern>
      <entry headword="June">
        <synonym>Jun</synonym>
        <synonym>Jun.</synonym>
        <synonym>june</synonym>
        <synonym>jun</synonym>
        <synonym>jun.</synonym>
      </entry>
    </entity>

    <entity name="summer_month" type="private" case="insensitive">
      <entry headword="June"/>
      <entry headword="July"/>
      <entry headword="August"/>
      <entry headword="September"/>
    </entity>

    <entity name="month" type="public">
      <pattern>(A^spring_month)</pattern>
      <pattern>(A:summer_month)</pattern>
      <entry headword="September"/>
      <entry headword="October"/>
      <entry headword="November"/>
      <entry headword="December"/>
      <pattern>(A^winter_month)</pattern>
      <!-- spelling mistakes -->
      <entry score="0.5" headword="Febuary"/>
    </entity>
  </grammar>
</grammars>
```

```
</grammar>  
</grammars>
```

## Simplified Grammar File Containing a Dictionary of Place Names

**NOTE:** The following grammar file is a simplified version provided for example purposes, rather than actual source code.

```
<entity name="city/spain" type="public">  
  <entry headword="Barcelona"/>  
  <entry headword="Ciudad Real"/>  
  <entry headword="Granada"/>  
  <entry headword="Madrid"/>  
</entity>  
<entity name="city/germany" type="headword">  
  <entry headword="Berlin"/>  
  <entry headword="Frankfurt"/>  
  <entry headword="München"/>  
  <entry headword="Leipzig"/>  
</entity>
```

## Simplified Grammar File Containing Patterns to Match Times of Day

**NOTE:** The following grammar file is a simplified version provided for example purposes, rather than actual source code.

```
<entity name="time_24_hour" type="public">  
  <pattern>[01][0-9]:[0-5][0-9]</pattern>  
  <pattern>2[0-3]:[0-5][0-9]</pattern>  
</entity>  
  
<entity name="time_all" type="public">  
  <pattern>(A:time_24_hour)</pattern>  
  <entry headword="Midnight"/>  
  <entry headword="midnight"/>  
  <pattern>([1-9]|10|11|12) ?[ap]\.?.?m\..?</pattern>  
</entity>
```

# Chapter 10: Compile and Test Grammars

This section describes how to use the `edktool` command-line tool to compile and test your custom Education grammars. It includes information about the `edktool` configuration file.

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- [Compile Grammars](#) ..... 88
- [Assess and Measure Education Grammars](#) ..... 90
- [Education Configuration File](#) ..... 95

## About the edktool Command-Line Tool

The `edktool` command-line tool for Education allows you to compile and test your grammars. You can use `edktool` to:

- compile grammars.
- list available entities in a grammar file.
- extract entities from a file based on a grammar and select entities from the grammar for extraction.
- test the accuracy of the extraction process.

**NOTE:** On Linux, `edktool` requires the C++ library, `libstdc++.so`. To ensure the tool can locate the required library, set the Library Path:

```
setenv LD_LIBRARY_PATH bin:$LD_LIBRARY_PATH
```

For a full list of the command-line options that you can use with `edktool`, see [edktool Command-Line Options, on page 303](#).

## Compile Grammars

You can use `edktool` to compile an XML file into an ECR file.

The `edktool c` (compile) command compiles a specified XML grammar into an ECR grammar file. For example:

```
edktool c mygrammar.xml
```

This command produces the output file `mygrammar.ecr`.

For more information about the compile command, see [Compile, on page 306](#).

**NOTE:** Education version 12.7 and later compiles grammars to a compressed ECR format.

## Use a Compilation Configuration File

When you compile a grammar by using `edktool`, you can add an optional JSON configuration file to specify additional options for compilation.

### Configure Character Expansions

You can configure character expansions, which detect certain characters as if they are a different character. For example, you can detect different varieties of punctuation characters to match a standard form that you use in your grammar files.

To use character expansions, you specify an `expansions` array which contains a list of your expansions. Each array item has a `src` and `dest` element:

- `src`. The source character. Education detects the destination characters as if they are this source character. In the output text, Education normalizes all the destination characters to the source character.
- `dest`. An array of destination characters that you want to detect as the source character.

The following example configuration matches the letters `b` and `c` as if they are the letter `a`:

```
{
  "expansions": [
    { "src": "a", "dest": ["b", "c"] }
  ]
}
```

When your grammar includes the following pattern:

```
<pattern>ade</pattern>
```

And your input contains the following text:

```
ade bde cde dde
```

Education matches `ade`, `bde`, and `cde`, as if they are `ade`, and produces the following normalized matches:

```
ade ade ade
```

### Optimize Case-Insensitive Matching

When you have a grammar file that contains case-sensitive entities, but you want to find matches regardless of case, you can run Education with the parameter `MatchCase=False`. When Education loads a grammar file and `MatchCase=False`, it optimizes the entities for case-insensitive matching to improve run-time performance. However, this can increase the time required to initialize Education, so if you regularly use a grammar file with `MatchCase=False` you can optimize the entities for case-insensitive matching at compile-time instead.

To optimize entities for case-insensitive matching, set the option `alternativeCaseArcs` to `true` in your compilation configuration file:

```
{ "alternativeCaseArcs": true }
```

After compiling a grammar file with this option, you can still use the `MatchCase` parameter to choose whether matching is case-sensitive.

To obtain the best case-insensitive performance, you should write a grammar file using only upper or lower case and then normalize the input by setting the `CaseNormalization` parameter. For more information, see [Case Normalization, on page 54](#). Compiling a grammar file with `alternativeCaseArcs` set to `true` is useful if you cannot easily modify your grammar file(s), but only reduces the time required to initialize Education (it does not reduce the time required for matching).

To recompile an existing grammar file with `alternativeCaseArcs` set to `true` you could include the existing grammar in a new grammar file as shown in the example below, and then compile the new grammar using `edktool`.

```
<?xml version="1.0" encoding="UTF-8"?>  
<grammars version="4.0">  
  <include path="published/grammar.ecr" type="public"/>  
</grammars>
```

## Use the Configuration File

You add a configuration file to your compilation by setting the `-c` command-line option in the compile command. For more information, see [Compile, on page 306](#).

When you compile a grammar by using the Education SDK, you can specify the path to a compilation configuration file by using one of the following options:

- C API: the `EdkLoadResourceFileWithCompileConfig` and `EdkLoadResourceBufferWithCompileConfig` functions.
- Java API: the `loadResourceFile`, `loadResourceFiles`, and `loadResourceBuffer` methods in the `TextExtractionEngine` interface.
- .NET API: the `GetCompiler` method on the `EDKFactory` class.

For more information, refer to the API documentation.

# Assess and Measure Education Grammars

There might be times when you want to check the effectiveness and performance of your `.ECR` or `.XML` grammars.

For example, you might want to check:

- how effective a particular grammar file is at extracting the entities you require from your data.
- how a change to a grammar file affects performance.

The `edktool` command-line tool has two features, *Assess* and *Measure*, that enable you to find out this kind of information easily (for a full reference for these functions, see [Assess, on page 303](#) and [Measure, on page 312](#)).

## Assess

This feature takes a list of phrases that you expect to contain matches, and checks whether they do contain a match.

Alternatively, it can take a list of phrases that you do not expect to contain matches, and check that they do not contain a match.

You can use this feature to:

- test the suitability of an Education grammar for the task you would like it to do.
- monitor the accuracy of an Education grammar while you develop it.
- ensure that further development does not introduce problems to an Education grammar that already performs well.

You can set up an assessment by using the following three-stage procedure.

### Create the Input Files

Create a *valid* file, which contains an expected match in each line. The expected match can be from either your real data, or from artificial sample data. For example:

```
My mate is Bob Smith
My name is Bob Smith
My mate is Bob Smith
Barbara smith
smith,benjamin
SMYTH, Robert
Dr Bob B. Smith Jr.
Bob SMITH lives here
(etc.)
```

You can also create a list of valid exact matches (examples of text that must be matched in their entirety).

Alternatively, you can create an *invalid* file, where each line must contain no match. For example:

```
Black Smith
Bob up and down
smith, smyth
She is called Barbara. Smith is not her surname.
Benjamins myth
(etc.)
```

You can also create a list of non-valid exact matches (examples of text that might or might not contain a match, but must not be matched in their entirety).

Alternatively, you can set up your input file so that it refers to matches by all available entities, or only by specific entities (for example, `male_name_all`).

**NOTE:** Education ignores blank lines in the input file, and lines that start with `//`.

## Update the Configuration File

You can run an extraction from the command line without a configuration file, but in most cases it is easier to use one.

You must add the assessment sections to an Education file that would otherwise run a successful extraction. Each assessment must contain either a valid input file, an invalid input file, or both. You must number multiple sections consecutively, starting from 0 (zero).

```
[assessment0]
Valid=my_valid_1.txt

[assessment1]
Valid=my_valid_2.txt
Invalid=my_invalid_1.txt
Exact=True
Entities=my_entity,my_other_entity

[assessment2]
Invalid=my_filename.txt
Exact=False
Entities=my_other_entity
```

To require exact matches, set the `Exact` parameter to `True`.

To restrict the extraction to a subset of the available entities, you can:

- set the `Entities` parameter in the assessment section to a comma-separated list of the entities you want to extract.
- set the `ResourceFiles` parameter in the standard CFG configuration file.

## Run the Assessment

To run the assessment, open a command prompt in the `edktool` directory and type:

```
edktool a -l <license> -c <config> [-o <output>] [-a]
```

Alternatively, to run a single assessment section using the command line and no configuration file type:

```
edktool a -l <license> -g <grammars> [-e <entities_for_extraction>] [-x] [-o <output>] [-a] [-m <entities_for_matching>] [-v <valid_input> | -w <invalid_input>]
```

The following table lists the command-line parameters that you can use, and their functions.

Parameter	Function
<code>-x</code>	Equivalent to setting <code>exact=True</code> in the configuration file.

Parameter	Function
-m	Equivalent to including the <code>entities=</code> parameter in the assessment section of the configuration file.
-v	Equivalent to including the <code>valid=</code> parameter in the configuration file.
-w	Equivalent to including the <code>invalid=</code> parameter in the configuration file.
-a	Includes all examples in the results, including those which passed the assessment.
-o	Sends the results to a specific file, instead of to the console by default.

## Use the Assessment Results

The assessment results contain:

- a list of all the examples that did not behave as expected.
- all relevant statistics (some statistics are relevant only if you specified both a valid file and an invalid file).

If all the tests in the assessment pass successfully, the grammar file is working as expected on the data you have given it. In practice, there are usually some failures.

Often there are common themes running through the failures. Perhaps the grammar file only matches text with certain capitalization, or where the data is written in a certain format. This can provide immediate information on how to fix the issues in cases where you have access to the XML source.

When there is a failure that you do not understand, you might find it useful to expand the valid or invalid grammar file with a selection of similar examples, perhaps with different words, formats, capitalization, or punctuation. After you rerun the consistency test with expanded data, and it might become much clearer what the problem is.

### Statistics

The results include statistics for recall (if a valid file is present) and true negative rate (if an invalid file is present). If both types of file are present in a single assessment section, it also includes statistics for accuracy, precision, and F1 score (see [Results Relevance, on page 63](#)).

The statistics depend on the data provided in the valid or invalid files. In all cases, the statistic falls in the range 0.0000 - 1.0000; a higher score represents a more successful grammar file.

After your initial assessment run, if you make modifications to the grammar file you can use these statistics to compare the performance of the old and new grammars.

**NOTE:** If you make improvements to a grammar file based on the results of your assessments, these improvements are targeted at the data provided. These statistics are likely to be over-inflated compared to the statistics for generic data.

You can use an assessment that has examples that all pass perfectly as a basis for further development. If the statistics in the assessment drop beneath 1.0000, you can identify that the development has introduced a problem to the grammar file.

## Measure

This feature compares the matches found in separate extraction runs on the same input data. You can run this feature from Education to view any differences between the two extraction runs. The results are in XML format, and include the metadata.

You can use this feature to:

- monitor the improvement of a grammar file that originally returned too many false matches.
- compare the results of extraction by different versions of a grammar file on the same data to test whether modifications are beneficial.

To set up this feature:

1. Run an extraction using one version of the grammar file. Your input data must be in plain text format.
2. Save the output.
3. (Optional) Remove any false matches from the output by deleting the three XML lines corresponding to the false match. This step is appropriate only if you want to form a benchmark output file with the aim of developing the grammar file to produce output very similar to the benchmark.

You can also modify existing matches by making them shorter or longer, or you can add entirely new matches that should be found in the input text.

**NOTE:** You must ensure that you specify the correct offset (in bytes) when you modify or add matches.

4. Run an extraction on the same plain text input as before, using the newer version of the grammar file. Save the output under a different file name.
5. At the command line, run the Measure command:

```
edktool m -e <expected_file> -a <actual_file> [-o <output_file>]
```

## Use the Measure Results

The output is an XML document which lists all the differences between the output of <expected\_file> and the output of <actual\_file>. You can use the list of differences to monitor how changes to the XML source affect the output on real data. You can then decide which changes are beneficial, and which are not.

### Statistics

The Measure results include statistics for precision and recall, although these are relevant only when the expected file is a benchmark, and the aim is to produce a grammar file whose output is as close as possible to this benchmark.

## Eduction Configuration File

You define configuration settings for edktool in an IDOL Server format CFG configuration file. For details of the settings that you can use in this file, see [Eduction Parameter Reference, on page 315](#).

The CFG configuration file consists of several sections, which you identify by using a phrase in square brackets. Each section contains parameters (name/value pairs). For example:

```
[Eduction]
ResourceFiles=C:\MyGrammar\gram1.ecr
```

### To define Eduction settings in the configuration file

1. Open the CFG configuration file in a text editor.
2. Set the Eduction parameters as required. See [Eduction Parameter Reference, on page 315](#) for more information.
3. Save and close the configuration file.

## Modify Configuration Parameter Values

This section describes how to enter parameter values in the configuration file.

### Enter Boolean Values

The following settings for Boolean parameters are interchangeable:

TRUE = true = ON = on = Y = y = 1

FALSE = false = OFF = off = N = n = 0

### Enter String Values

To enter a comma-separated list of strings when one of the strings contains a comma, you can indicate the start and the end of the string with quotation marks, for example:

```
ParameterName=cat,dog,bird,"wing,beak",turtle
```

Alternatively, you can escape the comma with a backslash:

```
ParameterName=cat,dog,bird,wing\,beak,turtle
```

If any string in a comma-separated list contains quotation marks, you must put this string into quotation marks and escape each quotation mark in the string by inserting a backslash before it. For example:

```
ParameterName="<font face=\"arial\" size=\"+1\"><b>\",<p>
```

Here, quotation marks indicate the beginning and end of the string. All quotation marks that are contained in the string are escaped.

## Sample Configuration File

The following shows the configuration for a sample Education task:

```
[Education]
ResourceFiles=C:\MyGrammar\gram1.ecr,C:\MyGrammar\gram2.ecr
ZoneStart0=<TEXT>
ZoneEnd0=</TEXT>
ZoneStart1=acknowledgements
ZoneEnd1=introduction
Entity0=common/aus_holidays
EntityField0=HOLIDAYS
EntityZone0=0
Entity1=common/us_holidays
EntityField1=HOLIDAYS
EntityZone1=0
Entity2=us/social_security_number
EntityField2=SS_NUMBER
EntityZone2=1
SearchFields=DRECONTENT

[Logging]
LogLevel=Full
```

This sample uses two grammar files. It searches for all Australian and U.S. holidays in the DRECONTENT field between the text *<Text>* and *</Text>*, adding the matches as additional fields HOLIDAYS. It also searches for a single social security number in DRECONTENT between the text *acknowledgements* and *introduction* and adds the results as a new field SS\_NUMBER.

# Chapter 11: Pre-Filter Tasks

This section describes pre-filter tasks.

- [Introduction](#) .....97
- [Configure a Pre-Filter Task](#) ..... 97
- [Dictionary ResourceFile Format](#) .....98

## Introduction

Pre-filtering allows you to narrow down the amount of input text that Education processes for a particular set of entities. With pre-filtering, Education performs an initial quick matching step that finds sections of text that contain likely matches, rather than running the full match on the whole input.

Pre-filtering text can improve performance for some entities, when there is a broad way to find a potential match without either over-matching too much of the input text, or eliminating potential valid matches.

The quick matching step can either match text by using a regular expression (regex) that you configure, or a dictionary of terms.

For example:

- To match addresses, you can use regex pre-filtering to find numbers in the text (which might correspond to house numbers or postal codes).
- To match names in CJKVT languages (where there is a regular set of surnames, and the Education grammars do not attempt to find values that are not already listed as names), you might use a dictionary pre-filter. In this case you perform a quick match to find the surnames, and then the full match finds the full name.

The pre-filtering method is less useful for entities that match a long list of possible words, when there is no simple regular expression or dictionary of terms that matches all your possible entities. For example, for English names the Education grammars attempt to match plausible names as well as recognized ones, so there is no way to pre-filter without eliminating potential matches.

## Configure a Pre-Filter Task

For each pre-filter task that you want to configure, you set:

- a regular expression that specifies how to find potential matches, or a resource file that provides a dictionary of terms to use for fast matching.
- the amount of text Education must use on either side of the potential match to find the more detailed match.

**NOTE:** Eduction runs all your configured pre-filtering tasks for all input text, so ensure that your pre-filter task applies to all your configured grammars and entities. Use a different configuration for any entities that you do not want to pre-filter.

### To configure a pre-filter task

1. In the [Eduction] section, add a `PreFilterTaskN` parameter, where *N* is a number starting from 0 for the first task. Set this parameter to the name of a configuration section where you define your pre-filter task.
2. Create the new configuration section.
3. Set one of the following parameters:
  - `Regex` to a regular expression value that finds potential matches in your text.
  - `ResourceFile` to the name of a DPF or JSON file that contains the dictionary of terms to use for pre-matching.
4. Set `WindowCharsBeforeMatch` and `WindowCharsAfterMatch` to the number of characters before and after the potential match segment to use as the match window.
5. Optionally set other parameters to exclude non-valid values or end processing early in certain conditions, such as `Exclusion`, `InvalidRegexAfterMatch`, `InvalidRegexBeforeMatch`, and `PreFilterMaxReturnedBytes`. For more information, see [Eduction Parameter Reference, on page 315](#).
6. Save and close your configuration file.

For example:

```
[Eduction]
PreFilterTask0=AddressPrefilter
```

```
[AddressPrefilter]
Regex=\d{1,7}
WindowCharsBeforeMatch=100
WindowCharsAfterMatch=100
```

For more details about these parameters, see [Eduction Parameter Reference, on page 315](#).

**TIP:** To use pre-filtering tasks through the C and Java Eduction APIs, you must create your Eduction engine from a configuration file. See [Standalone API Usage, on page 27](#) (C) or [Standalone API Usage, on page 30](#) (Java).

## Dictionary ResourceFile Format

For dictionary pre-filtering, you can either use a provided dictionary file, or create one yourself. The provided dictionary files are in binary format, and have the extension DPF. You can create custom files in JSON format, which must use the following JSON schema:

```
{
  "id": "eduction#DictionaryPrefilter",
  "$schema": "http://json-schema.org/draft-07/schema",
  "description": "Schema for eduction dictionary prefilter serialization",
  "type": "object",
  "properties": {
    "type": {
      "description": "Type of prefilter",
      "enum": [
        "dictionary"
      ]
    },
    "dictionary_words": {
      "description": "Array of words to use as the dictionary for the
prefilter",
      "type": "array",
      "items": {
        "type": "string",
        "minLength": 1
      },
      "minItems": 1,
      "uniqueItems": true
    }
  },
  "additionalProperties": false,
  "required": [
    "type",
    "dictionary_words"
  ]
}
```

For example:

```
{
  "type": "dictionary",
  "dictionary_words": [
    "Smith",
    "Jones"
  ]
}
```

This simplified example pre-filters by finding any instance of the words *Smith* or *Jones* in the text. It then creates a text window around these simple matches, which it uses to perform the full match.

**NOTE:** Dictionary terms are case-sensitive. If you want to include multiple case options, you must add them all to the dictionary.



# Chapter 12: Post-Processing

This section describes post-processing.

- [Introduction](#) ..... 101
- [Configure Post-Processing in Education Server](#) ..... 101
- [Post-Processing with the Education API](#) ..... 102
- [Write a Lua Script for Post-Processing](#) ..... 102
- [Example Scripts](#) ..... 105

## Introduction

Post-processing performs additional processing on the matches that Education finds.

A common use for post-processing is to validate matches. You can validate some entities, such as credit card numbers, by calculating a checksum. You can discard any matches with an invalid checksum, because even though it matches the correct format, it cannot be genuine. If a match has a valid checksum then you might increase its score, because it is likely to be valid.

Another common use for post-processing is to normalize the output from Education. For example, if you extract monetary values, Education might find matches that look like "£5.3 million" or "£25". You can use post-processing to normalize these values to "£5,300,000" and "£25", so that IDOL Content or another application can compare and sort the values correctly.

An Education post-processing task runs a Lua script that you configure. Education passes the matches it finds into a Lua function, either one at a time or all at once (*en masse*). See [Write a Lua Script for Post-Processing, on the next page](#).

## Configure Post-Processing in Education Server

In Education Server, you configure post-processing tasks by setting one or more `PostProcessingTaskN` parameters in the `[Education]` section of the configuration file, where *N* is a number starting from zero. For example:

```
[Education]
PostProcessingTask0=ValidateWithChecksum
PostProcessingTask1=FilterScore
```

Then, create a section for each of the tasks using the names that you defined:

```
[ValidateWithChecksum]
Type=lua
Entities=number/creditcard
```

```
Script=./scripts/checksum.lua  
ProcessEnMasse=FALSE
```

The `Entities` parameter specifies the entities to process. You can use wildcards to match multiple entities. The `Script` parameter specifies the path to the Lua script that you want to run. Eduction includes some example scripts, and you can write your own. For information about how to write a post-processing script, see [Write a Lua Script for Post-Processing](#), below.

For more information about Eduction Server configuration parameters, refer to the *Eduction Server Reference*.

## Post-Processing with the Eduction API

To perform post-processing in an application built on the Eduction API, add post-processing tasks to the Eduction engine. You can add the tasks:

- when you create the engine, if you construct the engine by supplying a configuration. When you create an Eduction engine from a configuration the configuration automatically adds any post-processing tasks in the configuration to the engine.

See `EdkEngineCreateFromConfigFile` (C API), the `EdkEngine` constructor (Java API), or `EDKFactory::GetTextExtractionEngine` (.NET API).

- after you create the engine, by calling the appropriate function:
  - `EdkEngineAddPostProcessingTask` in the C API.
  - `addPostProcessingTask` in the Java API.

The following functions allow you to specify a minimum score that a match must have for it to return in the results after all post-processing tasks have completed:

- `EdkEngineSetPostProcessingThreshold` in the C API.
- `setPostProcessingThreshold` in the Java API.

The matches returned by the `EdkGetNextMatch` function in the C API, or by iterating over the matches in the Java API, reflect any modifications made by post-processing. If a post-processing task discards a match or its score does not meet the threshold you have specified, it is not returned at all.

If you configure a post-processing task that processes matches en masse, the API does not return matches until all input has been received. This is necessary because an en masse post-processing task requires all of the matches at the same time.

The Eduction SDK includes reference documentation for the API. For more information about the SDK, see [Eduction SDK Package](#), on page 23.

## Write a Lua Script for Post-Processing

An Eduction post-processing task runs a Lua script. Eduction passes the matches into an entry function.

There are two available entry functions to use when you process single matches:

- `processmatch`. This function allows you to modify a match, change the score, or discard a non-valid match. You can use this option for most post-processing, such as checksum validation and normalization.
- `finalizematch`. This function allows you to add new matches into the Education session. For example, you might use this option to combine existing matches, and return the combined match as a result. This function can also still perform the same changes as `processmatch`.

Your script must define at least one of these functions.

**NOTE:** If you define both `processmatch` and `finalizematch`, `processmatch` takes precedence.

There are also two equivalent functions for en masse processing, `processmatches` and `finalizematches`. For more information, see [Process Matches En Masse, on the next page](#).

## Use ProcessMatch

The `processmatch` function must accept a single argument, an `edkMatch` object. Education passes matches into the script one at a time. The script must return a Boolean value: `true` to keep the match or `false` to discard it.

The following example changes the score for every match to `0.5`:

```
function processmatch(edkmatch)
    if edkmatch then
        -- change the score for the match
        edkmatch:setScore(0.5)
    end
    return true
end
```

## Use FinalizeMatch

The `finalizematch` entry function must accept two arguments: an `edkMatch` object (the current match), and a session handle. It can also optionally accept a user parameters map.

The following example modifies an entity to append the value `Esq.`, and injects the match back into the session.

```
function finalizematch(edkmatch, session)
    if edkmatch then
        local text = edkmatch:getOutputText()
        m = LuaEdkMatch:new(edkmatch:getEntityName(), text .. " Esq.",
edkmatch:getOffset())
        session:injectMatch(m)
        return true
    end
    return false
end
```

After you inject a match, the session takes ownership of it, so you cannot use the created match in any subsequent functions.

**NOTE:** You cannot perform additional post-processing on injected matches. Education skips these matches at post-processing time, to prevent infinite loops.

## Process Matches En Masse

Sometimes, you might prefer to process all the matches together. For example, you might want to increase the scores of matches that appear near other matches. It is easier to do this if you process all the matches at the same time.

To process all the matches at the same time, set the `ProcessEnMasse` parameter to `TRUE` in your Education configuration. When `ProcessEnMasse=TRUE`, Education passes all the matches it finds into the script together.

Your script for processing matches en masse must define a function either named `processmatches`, or `finalizematches`.

The `processmatches` function must take a single argument, a Lua table of `edkEnMasseMatch` objects. Each of these objects represents a single match, but you must call the `getMatch` method to obtain an `edkMatch` object. You can then use the `edkMatch` object to manipulate the match. If you want to discard a match, call the method `setOutput` on the relevant `edkEnMasseMatch` object.

The following example demonstrates how to iterate over the elements in the table and discard any match with a score that is less than 0.5:

```
function processmatches(matches)
  -- example that discards matches with score < 0.5
  for k,v in ipairs (matches) do
    local edkmatch = v:getMatch()
    if edkmatch:getScore() < 0.5 then
      v:setOutput(false)
    end
  end
end
```

The `finalizematches` function must take two arguments, a Lua table of `edkEnMasseMatch` objects (the same as for `processmatches`), and a session handle. It can also optionally accept a user parameters map.

For information about the objects and methods that you can use in your Lua post-processing scripts, see [Education Lua Methods Reference, on page 361](#).

## Pass Parameters into the Lua Script

You can pass additional parameters into post-processing tasks that you run through the Education API. To add an additional parameter (to all post-processing tasks that run during the session), call the appropriate function:

- `EdkSessionSetUserParamValue` in the C API.
- `ITextExtractionSession::SetUserParameter` in the .NET API.
- `setUserParamValue` in the Java API.

Any parameters that you set using these functions are passed into the `processmatch` or `processmatches` function of the Lua script as a table of key-value pairs. For example:

```
function processmatch(edkmatch, params)
  for k,v in pairs (params) do
    --print ("Custom parameter ", k, " has value ", v)
  end
  return true
end
```

## Example Scripts

Eduction includes the following example post-processing scripts.

### Checksum Validation

The `checksum_luhn.lua` script verifies the checksum digit of each match using the *Luhn algorithm*, and reduces the score associated with the match if the checksum is wrong. The `checksum_luhn_enmasse.lua` script performs checksum validation as an en masse processing task, discards incorrect matches, and alters the score of correct matches to equal the proportion of matches that have the correct checksum digit.

You can use these scripts with the `number_cc.ecr` and `number_sin_ca.ecr` grammar files to validate most credit card numbers.

### Spanish Identity Card Number Validation

You can use the `checksum_dni_es.lua` script with the `number_dni_es.ecr` grammar file to validate Spanish Documento Nacional de Identidad (national identity card) numbers.

### Dutch Citizen Service Number Validation

You can use the `checksum_bsn_nl.lua` script with the `number_bsn_nl.ecr` grammar file to validate Dutch Citizen Service Numbers (Burgerservicenummer, or BSNs).

### Geographical Coordinate Standardization

You can use the `lat_long.lua` script with the `place_lat_long.ecr` grammar file to convert and standardize the output of geographical coordinates.

## Date and Time Standardization

You can use the `datetime.lua` script with the `datetime_advanced_eng.ecr` grammar file to convert and standardize the output of dates and times (and ranges) in English into a standardized format in cases where there are matches on several formats. For example, you can convert both *23/11/13* and *Nov 23 2013* to *2013-11-23*.

The `datetime_advanced_eng.ecr` grammar file can understand English natural language dates, and relative dates such as *last Saturday morning*. You can provide a reference date for `<today>` in the Lua script to enable normalization of relative dates into standard formats.

For date and time range matches, this script sets the normalized text to `<start>/<end>`, and additionally adds `STARTPOINT` and `ENDPOINT` components that contain the associated dates or times. When there is a multiple date match (for example, *5th and 8th July* matches as *5th July* and *8th July*), the script returns a comma-separated list, with a `POINT` component for each date.

## Filter Matches by Case

You can use the `case_filter.lua` example script to filter out matches by case, for example in personal name grammars.

To use this option, you must set `MatchCase` to **False** for the grammar. The script filters out any match that is not one of:

- an exact match as specified in the grammar.
- an upper case match (for example, JANE SMITH).
- a title case match (for example Jane Smith).

**NOTE:** You might need to update this script to include case mappings for uncommon non-ASCII characters. The script provides sample mappings for common Latin characters with diacritics.

# Part V: Reference

This section contains reference materials for Education.

- [Standard Grammars](#)
- [Grammar Format Reference](#)
- [edktool Command-Line Options](#)
- [Education Parameter Reference](#)
- [Education Lua Methods Reference](#)

# Chapter 13: Standard Grammars

This chapter contains specific information concerning the standard grammars that come with Education.

• File Names .....	108
• Sentiment Grammars .....	108
• Place Name Disambiguation .....	109
• Standard Grammar – Compiled .....	109
• Standard Grammar – Source .....	281

## File Names

File names consist of up to four parts, separated by underscores:

- **Basic entity type.** For example, *place*, *number*, or *person*.
- **Further detail on the basic type.** For example, *malefirstname* or *ss* for Social Security number. This part is optional.
- **Language.** The three-character ISO 639-2/B code in which the grammar was written. For example, *eng* for English.
- **Country.** The two-character ISO 3166-1 code describing the country for which the grammar was written. For example: *us* for the United States. This part is optional if the grammar does not target a specific country (for example, a credit card number).

**NOTE:** Entity names follow the same four-part structure, except for the basic type. The further detail and language/country parts are separated by forward slashes. The language code and the optional country code are concatenated.

## Sentiment Grammars

Education includes standard grammars designed to identify those phrases in a passage of text that indicate positive or negative sentiment. These grammars can also identify which sentiments are expressed for which topics.

The sentiment grammar files have *lite* versions. The lite versions are identical to the full versions in most respects, but they do not support components or user modification. They can process data up to twice as fast as the full versions, depending on language.

Micro Focus recommends that you use the lite versions except when you need to use components or modify the built-in dictionaries.

The lite grammars have the same name as the full version, with `_lite` after the language. For example, the file name of the Chinese sentiment grammar file is `sentiment_chi.ecr`, and the file name of the lite version is `sentiment_chi_lite.ecr`.

All sentiment analysis grammar files except `sentiment_basic_eng.ecr` support components. You can extract the `SENTIMENT` and `TOPIC` components in most matches.

## Place Name Disambiguation

Ambiguous names in all place grammars have been given a score of 0.98 so that you can filter them out by setting `EntityMinScoreN` to **0.99**. For example, if you want to use the `place/state/engau` entity to extract Australian state names using the `place_engau.ecr` grammar file, you can set `EntityMinScoreN` to **0.99** to filter out ambiguous names such as *Victoria*.

## Standard Grammar – Compiled

The following sections list the compiled grammar files included with Education.

**NOTE:** All the Chinese grammar files support traditional Chinese.

### A

#### address\_au.ecr

Entity	Description
address/postcode/au	Australian postal codes. For example, <i>2600</i> .
address/state_postcode/au	Australia state or territory, and postal code. For example, <i>NSW 2060</i> .
address/city_state_postcode/au	Australian city, state or territory, and postal code. For example, <i>North Sydney, NSW 2060</i> .
address/au	Any Australian address. For example: <i>Shop 17, Winnellie Shopping Centre, 347 Stuart Hwy, Winnellie, NT, 0820.</i> <i>P.O.Box 27, Armadale North, Victoria, 3143, AUSTRALIA.</i> <i>121 North Seal Way, Cocos Keeling Islands, WA, 6799.</i> Education supports all common delimiters, including newlines.

### address\_ca.ecr

Entity	Description
address/postcode/ca	Canadian postal codes. For example, <i>T2P-0B4</i> , <i>T2P0B4</i> , or <i>T2P 0B4</i> .
address/region_postcode/ca	Canadian province or territory, and postal code. For example, <i>Alberta</i> , <i>T2P0B4</i> .
address/city_region_postcode/ca	Canadian city, province or territory, and postal code. For example, <i>Calgary, Alberta, T2P 0B4</i> .
address/ca	Any Canadian address. For example: <i>240 4th Avenue S.W., Suite 600, Calgary, Alberta T2P 4H4, Canada.</i> <i>124 Av de la Peine, Montreal QC, H3Z 2Y7.</i> <i>Suite 600, 222-3rd Ave S.W., Calgary Alberta, T2P 0B4.</i> Eduction supports all common delimiters, including newlines.

### address\_cn.ecr

Entity	Description
address/pc/chicn	Chinese postal code. For example, <i>266033</i> .
address/chicn	Any Chinese address. For example, <i>中国, 山东省, 青岛市 香港东路6号, 5号楼, 8号室 李小方 (先生) 收.</i>
address/engcn	A Chinese address in English. For example. <i>63 Renmin Lu, Qingdao Shi, 266033 Shandong, China.</i>
address/cn	A Chinese address in Chinese or English.

### address\_de.ecr

Entity	Description
address/postcode/de	German postal code. For example, <i>80639</i> .
address/postcode_city/de	German postal code, and city. For example, <i>80639, München</i> .
address/de	Any German address. For example: <i>Hewlett-Packard-Straße 1, 61352, Bad Homburg vor</i>

**address\_de.ecr, continued**

Entity	Description
	<p><i>der Höhe.</i></p> <p><i>Postfach 10 01 65, 32547, Bad Oeynhausen, GERMANY.</i></p> <p><i>Grüner Weg 6, 61169, Friedberg, GERMANY.</i></p> <p>Eduction supports all common delimiters, including newlines.</p>

**address\_eng.ecr**

Entity	Description
address/stnum/eng	Street numbers. For example, <i>12a</i> or <i>14-17B</i> .
address/pobox/eng	Post office box numbers. For example, <i>PO Box 26</i> .
address/pmb/eng	Private mail box number. For example, <i>Private Mail Box 26</i> .
address/pmb_or_pobox/eng	Post office box or private mail box number.
address/street_pre/eng	Special street type that prefixes street numbers. For example, <i>Highway Contract, HC</i> .
address/street_hwy/eng	Highway. For example, <i>City Route</i> .
address/street_grid/eng	Grid address. For example, <i>400W350N</i> .
address/street/eng	A street. For example, <i>Cowley Road</i> or <i>5th Street NW</i> .
address/street_corner/eng	A street corner. For example, <i>Corner King Street &amp; Queen Street</i> .
address/street_all/eng	Any street For example, <i>12a Carlisle Lane</i> .
address/suite/eng	Suite number. For example, <i>Suite 1</i> .
address/floor/eng	Floor or level number. For example, <i>3rd Floor, Second Floor, Level 8</i> .
address/floor_or_suite/eng	A floor or suite number.
address/unitshipmil/eng	A military address analogous to a street address.
address/building/eng	A building. For example, <i>Spear Tower</i> .

### address\_es.ecr

Entity	Description
address/postcode/es	Spanish postal code. For example, <i>19208</i> .
address/postcode_city/es	Spanish postal code and city. For example, <i>19208 Guadalajara</i> .
address/es	Any Spanish address. For example: <i>Av. de las Cortes de Cádiz, s/n, C. C. El Corte Inglés, 11011, Cádiz.</i> <i>Avda. Alfonso XIII, 6, Santander, España.</i> <i>Calle de la Fundición, 3, 33206, Gijón, Spain.</i> Educcion supports all common delimiters, including newlines.

### address\_fr.ecr

Entity	Description
address/postcode/fr	French postal codes. For example, <i>75008</i> .
address/postcode_city/fr	French postal code, city, and optional CEDEX. For example, <i>75008, Paris</i> .
address/fr	Any French address. For example: <i>3, Avenue Denis Semeria, Saint-Jean-Cap-Ferrat, Provence-Alpes-Côte d'Azur, 06230, France.</i> <i>950 route des Colles - BP 27, 06901 Valbonne Sophia Antipolis.</i> <i>Bât G1 147 r Oberkampf, 75011 PARIS.</i> Educcion supports all common delimiters, including newlines.

### address\_fre.ecr

Entity	Description
address/stnum/fre	A street number. For example, <i>12a</i> or <i>14-17B</i> .
address/pobox/fre	Post office box number in French. For example, <i>Boite Postale 26</i> .
address/park/fre	A business park in French. For example, <i>Technopark de Marseille</i> .

**address\_fre.ecr, continued**

Entity	Description
address/building/fre	A building. For example, <i>Château de Chambord</i> .
address/delivery_point/fre	A delivery point in French. For example, <i>BÂTIMENT 15</i> .
address/street_type/fre	A street type in French. For example, <i>Rue</i> .
address/street/fre	A street in French. For example, <i>Rue Pierre Charron</i> .
address/street_all/fre	Any street in French.
address/house_type/fre	A house type in French. For example, <i>Residence</i> .

**address\_gb.ecr**

Entity	Description
address/postcode/gb	United Kingdom postal codes. For example, <i>GY9 3UX</i> .
address/city_county_postcode/gb	UK city, optional county/country name, post code, and optional place name. For example, <i>Cambridge, CB4 0WZ</i> .
address/gb	Any United Kingdom address. For example: <i>Cambridge Business Park, Cowley Road, Cambridge, CB4 0WZ.</i>  <i>12-14 The Diamond, Londonderry, Northern Ireland, BT48 6HW.</i>  <i>105 Piccadilly, (First Floor), London, W1J 7NJ.</i>  <i>Unit D, Acom Business Park, Ling Road, Tower Park, Poole, Dorset, BH12 4NZ.</i>  <i>44 Dorset Road, Providenciales, TURKS AND CAICOS ISLANDS.</i>  Eduction supports all common delimiters, including newlines.

**address\_ger.ecr**

Entity	Description
address/stnum/ger	A street number. For example, <i>12a</i> .
address/pobox/ger	A post office box number in German. For example,

#### address\_ger.ecr, continued

Entity	Description
	<i>Postfach 26.</i>
address/street/ger	A street in German. For example, <i>12 Romanstr.</i>

#### address\_it.ecr

Entity	Description
address/postcode/it	Italian postal code. For example, <i>12345</i> or <i>IT-98765</i> .
address/postcode_city/it	Italian postal code and city. For example, <i>52100 Arezzo</i> .
address/it	Any Italian address. For example: <i>Strada del Masarone 67, 13900 Biella (MI).</i> <i>Via Balbi 3 e 40 16126 Genova.</i> <i>Via Mascarella n° 21/3, 40131 Bologna, Italia.</i> Eduction supports all common delimiters, including newlines.

#### address\_ita.ecr

Entity	Description
address/stnum/ita	Italian street number. For example, <i>12a</i> .
address/pobox/ita	A post office box number in Italian. For example, <i>Casella postale 26</i> .
address/street_type/ita	A street type in Italian. For example, <i>Via</i> or <i>Lungomare</i> .
address/street/ita	An entire street name in Italian. For example, <i>Via del Fosso de Dragoncello</i> .

#### address\_jp.ecr

Entity	Description
address/postcode/jp	Japanese postal code. For example, <i>108-0023</i> .

**address\_spa.ecr**

Entity	Description
address/stnum/spa	A street number. For example, <i>12a</i> or <i>14-17B</i> .
address/pobox/spa	A post office box number in Spanish. For example, <i>Apartado de correos 26</i> .
address/street_type/spa	A street type in Spanish or in another language spoken in Spain. For example, <i>Calle</i> or <i>Passeig</i> .
address/street_name/spa	A Spanish name that may refer to a street. For example, <i>26 de Marzo de 1824</i> or <i>Trujillo</i> . These are often used for street names in South America without a street type such as <i>Calle</i> .
address/street/spa	An entire street name in Spanish. For example, <i>Calle de La Habana</i> .
address/business_area/spa	A shopping center or business park in Spanish. For example, <i>Parque Tecnológico de Andalucía</i> .

**address\_us.ecr**

Entity	Description
address/zipcode/us	U.S. ZIP codes. For example, <i>94070-1234</i> .
address/city_state_zipcode/us	U.S. city, state, and ZIP code. For example, <i>Chicago, IL 80803</i> .
address/military/us	U.S. military address. For example, <i>Unit 45013, Box 2666, USAG J, APO AP 96338</i> .
address/us	Any U.S. address. For example: <i>30 South Wacker Drive, 22nd Floor, Chicago, IL 60606.</i> <i>P.O. Box 29, Sometown, AL 12345.</i> <i>5758 West Las Positas Blvd, Suite 100, Pleasanton, CA 94588.</i> <i>1 Market Street, Spear Tower, Suite 1900, San Francisco, CA 94105.</i> Education supports all common delimiters, including newlines.

**age\_eng.ecr**

Entity	Description
age/all/eng	An age in English.

**age\_fre.ecr**

Entity	Description
age/all/fre	An age in French.

**B**

**bank.ecr**

Entity	Description
bank/engca	Canadian banks. For example, <i>Canadian Imperial Bank of Commerce</i> .
bank/engb	UK banks. For example, <i>HSBC</i> .
bank/engus	U.S. banks. For example, <i>Morgan Stanley</i> .

**C**

**company\_chicn.ecr**

Entity	Description
company/all/chicn	Any Chinese company.

**company\_dutnl.ecr**

Entity	Description
company/top500/dutnl	Top 500 Dutch companies.
company/designator/dutnl	Dutch company identifiers.

#### company\_engau.ecr

Entity	Description
company/law/engau	Law firms in Australia.

#### company\_engca.ecr

Entity	Description
company/tsx60/engca	A Canadian TSX60 company.
company/TSXVenture50/engca	A Canadian TSX Venture 50 company.
company/all/engca	Any Canadian company. This entity includes all companies matched by the other entities in this section, as well as several hundred other significant companies.

#### company\_enggb.ecr

Entity	Description
company/LSE/enggb	A United Kingdom company listed on the London Stock Exchange.
company/law/enggb	Law firms in the United Kingdom.
company/ftse100/enggb	A FTSE 100 United Kingdom company.
company/all/enggb	Any United Kingdom company. This entity includes all companies matched by the other entities in this section, as well as dozens of other significant companies.

#### company\_engjp.ecr

Entity	Description
company/nikkei225/engjp	A Nikkei225 Japanese company.
company/all/engjp	Any Japanese company. This entity includes all companies matched by the other entities in this section, as well as several hundred other significant companies.

**company\_engus.ecr**

Entity	Description
company/fortune_1000_2008/engus	The 2008 list of Fortune 1000 companies.
company/sp500/engus	U.S. S&P 500 companies.
company/major_company/engus	Major U.S. companies.
company/law/engus	Law firms in the United States.
company/fortune_500/engus	A company that has featured in the Fortune 500 list at any time since 2011.
company/forbes_largest_private_companies2010/engus	The 2010 list of Forbes largest companies.
company/all/engus	Any U.S. company. This entity includes all companies matched by the other entities in this section, as well as several hundred other significant companies.

**company\_frefr.ecr**

Entity	Description
company/CAC_40/frefr	A French CAC 40 company.
company/CAC_40_stocksymbol/frefr	A French CAC 40 company stock symbol.
company/CAC_next_20/frefr	A French CAC Next 20 company.
company/CAC_next_20_stocksymbol/frefr	A French CAC Next 20 company stock symbol.
company/CAC_mid_60/frefr	A French CAC Mid 60 company.
company/CAC_small/frefr	A French CAC Small company.
company/SBF_120/frefr	A French SBF 120 company.
company/all/frefr	Any French company. This entity includes all companies matched by the other entities in this section.

**company\_generic\_eng.ecr**

Entity	Description
company/generic/eng	A plausible company name. This entity matches text next to a company designator such as Inc. or

**company\_generic\_eng.ecr, continued**

Entity	Description
	<p>Corporation (defined in <code>company_other_eng.ecr</code>), optionally with a comma. For example "Education Example, Inc.".</p> <p>The entity scores a match higher if it matches words that commonly occur in company names (as defined in <code>company_other_eng.ecr</code>), optionally with joiner words and characters, such as <i>and</i> or <i>&amp;</i>. For example "Education Brothers Inc." or "Education Bottling Corporation" score higher than "Education Example Inc". The entity reduces the score for longer names and names that include a number.</p>

**company\_gerde.ecr**

Entity	Description
company/dax/gerde	A German DAX company.
company/dax_stocksymbols/gerde	A German DAX company stock symbol.
company/cdax/gerde	A German CDAX company.
company/hdax/gerde	A German HDAX company.
company/mdax/gerde	A German MDAX company.
company/sdax/gerde	A German SDAX company.
company/tecdax/gerde	A German TecDAX company.
company/all/gerde	Any German company. This entity includes all companies matched by the other entities in this section.

**company\_jpnjp.ecr**

Entity	Description
company/nikkei225/jpnjp	A Japanese Nikkei 225 company.
company/all/jpnjp	Any Japanese company. This entity includes all companies matched by the other entities in this section, as well as several hundred other significant companies.

**company\_korkr.ecr**

Entity	Description
company/all/korkr	Any Korean company.

**company\_law\_eng.ecr**

Entity	Description
company/law_sgl/eng	Law firms with single-word names.
company/law_multi/eng	<p>Law firms with multiple-word names. When names include commas and ampersand characters, the entity includes up to three versions of the name:</p> <ul style="list-style-type: none"> <li>• full name</li> <li>• with commas removed</li> <li>• with commas and ampersand removed</li> </ul> <p>All suffixes are removed for data in these entities.</p>

**company\_other\_eng.ecr**

Entity	Description
company/designator/eng	A company designator. For example, <i>Corp, Inc.</i>
company/org_legal/eng	Legal practice extensions. For example, <i>LLC, PC.</i>
company/common_end_word/eng	A common company name end word. For example, <i>Partners, Bros.</i>
company/non_name/eng	A non-specific name used in a company name. For example, <i>American, National.</i>
company/business/eng	A business term in a company name. For example, <i>Resorts, Capital, Accountants.</i>

**company\_rusru.ecr**

Entity	Description
company/all/rusru	Any Russian company.

## D

### date\_chi.ecr

Entity	Description
date/season/chi	The four seasons in Chinese.
date/season_simplified/chi	The four seasons in simplified Chinese.
date/solar_term/chi	The solar terms in Chinese.
date/solar_term_simplified/chi	The solar terms in simplified Chinese.
date/yyyy/chi	The year in Chinese.
date/yyyy_simplified/chi	The year in simplified Chinese and ASCII numbers.
date/mm/chi	The month in Chinese.
date/mm_simplified/chi	The month in simplified Chinese and ASCII numbers.
date/ddd/chi	The day of the week in Chinese.
date/ddd_simplified/chi	The day of the week in simplified Chinese.
date/rel_period/chi	A period relative to the current date in Chinese.
date/rel_period_simplified/chi	A period relative to the current date in simplified Chinese.
date/period/chi	A fixed period of time in Chinese.
date/period_simplified/chi	A fixed period of time in simplified Chinese.
date/rel_day/chi	A day relative to the current date in Chinese.
date/rel_day_simplified/chi	A day relative to the current date in simplified Chinese.
date/ddd_dd/chi	The day of the week and the day of the month in Chinese.
date/ddd_dd_simplified/chi	The day of the week and the day of the month in simplified Chinese and ASCII numbers.
date/ddd_mmdd/chi	The day of the week and the month and day in Chinese.
date/ddd_mmdd_simplified	The day of the week and the month and day in simplified Chinese and ASCII numbers.
date/mmdd/chi	The month and day in Chinese.

**date\_chi.ecr, continued**

Entity	Description
date/mmdd_simplified	The month and day in simplified Chinese and ASCII numbers.
date/mmdd_ddd/chi	The month, day, and day of the week in Chinese.
date/mmdd_ddd_simplified/chi	The month, day, and day of the week in simplified Chinese and ASCII numbers.
date/yyyymmdd/chi	The year, month, and day in Chinese.
date/yyyymmdd_simplified/chi	The year, month, and day in simplified Chinese and ASCII numbers.
date/yyyymmdd_ddd/chi	The year, month, day, and day of the week in Chinese.
date/yyyymmdd_ddd_simplified/chi	The year, month, day, and day of the week in simplified Chinese and ASCII numbers.
date/lunar_mmdd/chi	The month and the day of the lunar calendar in Chinese.
date/lunar_mmdd_simplified/chi	The month and the day of the lunar calendar in simplified Chinese and ASCII numbers.
date/chi	A date in any format in Chinese.
date/simplified/chi	A date in any format in simplified Chinese and ASCII numbers.
date/day_and_time/chi	A time of day on a specific or relative date in Chinese.
date/day_and_time_simplified/chi	A time of day on a specific or relative date in simplified Chinese and ASCII numbers.

**date\_eng.ecr**

Entity	Description
date/season/eng	The four seasons in English. For example, <i>Winter</i> , <i>Spring</i> .
date/year/eng	A year in English, in any format.
date/mmm/eng	The month in English, written in full or in short form. For example, <i>September</i> , <i>Sept</i> .
date/ddd/eng	The day of the week in English. For example, <i>Monday</i> , <i>Tuesday</i> .

**date\_eng.ecr, continued**

Entity	Description
date/rel_period/eng	A period relative to the current date in English.
date/rel_day/eng	A day relative to the current date in English.
date/mmmdd/eng	The month and day in English. For example, <i>January 5th, January 5, or January the 5th.</i>
date/ddmmm/eng	The day and month in English. For example, <i>5th January, 5 January, or 5th of January.</i>
date/day_date/eng	The date preceded by the day of the week in English. For example, <i>Sat January 5, Saturday the 5th Jan.</i>
date/month_dd_year/eng	The month, day, and year in English. For example, <i>January 5th, 2008.</i>
date/dd_month_year/eng	The day, month, and year in English. For example, <i>5th January, 2008.</i>
date/day_date_year/eng	The date and year, preceded by the day of the week, in English. For example, <i>Saturday, January 5th, 2008.</i>
date/mmm_year/eng	The month and year in English. For example, <i>January 2008.</i>
date/eng	<p>A date in any format in English. Supported formats include:</p> <p>Date and month, with optional day and optional year:</p> <ul style="list-style-type: none"> <li>• 04 Oct 2008</li> <li>• 4th October 2008</li> <li>• 4 Oct</li> <li>• 4th of October 2008</li> <li>• October 4th 2008</li> <li>• 4th Oct '08</li> <li>• 04 OCTOBER '08</li> <li>• Saturday, October the 4th</li> <li>• Sat 4th of Oct</li> <li>• SATURDAY 4 OCTOBER 2008</li> <li>• SAT OCT 4</li> <li>• Sat. 4 Oct. 2008</li> </ul>

**date\_eng.ecr, continued**

Entity	Description
	Extra delimiter support for formats where the year is present: <ul style="list-style-type: none"> <li>• 04_OCT_2008</li> <li>• 4.10.08</li> <li>• 04/10/2008</li> <li>• Saturday 4-10-08</li> <li>• 04102008 (years 1970-2029 only)</li> <li>• 28-10-2008</li> <li>• 10/28/08</li> <li>• OCT 28 2008</li> </ul>

**date\_fre.ecr**

Entity	Description
date/season/fre	The seasons in French. For example, <i>l'Hiver, saison des pluies</i> .
date/ddd/fre	A day of the week, in French. For example, <i>Lundi, Mardi, VEN</i> .
date/mmm/fre	Month, written in full or in short form, in French. For example, <i>Septembre, Sept</i> .
date/year/fre	A year in any format.
date/ddmmm/fre	The day and month in French. For example, <i>5e Janvier, 5 Janvier</i> .
date/day_date/fre	The day and month in French, preceded by the day of the week. For example, <i>Samedi, 5 Janvier</i> .
date/date_year/fre	The day, month, and year in French. For example, <i>5 Janvier, 2008</i> .
date/day_date_year/fre	The day, month, and year in French, preceded by the day of the week. For example, <i>Samedi, 5 Janvier, 2008</i> .
date/mmm_year/fre	The month and year in French. For example, <i>Janvier, 2008</i> .

**date\_fre.ecr, continued**

Entity	Description
date/fre	<p>A date in any format in French. Supported formats include:</p> <p>Date and month, with optional day and optional year:</p> <ul style="list-style-type: none"> <li>• 04 OCT. 2008</li> <li>• 4ième Octobre 2008</li> <li>• 4 Oct</li> <li>• 4 10 '08</li> <li>• 04 OCTOBRE '08</li> <li>• Samedi, 4 Oct</li> <li>• SAMEDI 4 OCTOBRE 2008</li> <li>• Sam. 4 Oct. 2008</li> </ul> <p>Extra delimiter support for formats where the year is present:</p> <ul style="list-style-type: none"> <li>• 04_OCT_2008</li> <li>• 04/10/2008</li> <li>• Samedi 4-10-08</li> <li>• 04102008 (years 1970-2029 only)</li> </ul>

**date\_ger.ecr**

Entity	Description
date/ddd/ger	A day of the week in German. For example, <i>Montag</i> , <i>Dienstag</i> .
date/mmm/ger	A month in German. For example, <i>März</i> .
date/year/ger	A year in any format.
date/ddmmyyyy_dotspace/ger	dd. mm. yyyy. For example, <i>5. 1. 2008</i> .
date/ddmmm/ger	The day and month in German. For example, <i>5 Januar</i> .
date/day_date/ger	The day and month in German, preceded by the day of the week. For example, <i>Samstag, 5. Januar</i> .
date/date_year/ger	The day, month, and year in German. For example, <i>5. Januar, 2008</i> .

**date\_ger.ecr, continued**

Entity	Description
date/day_date_year/ger	The day, month, and year in German, preceded by the day of the week. For example, <i>Samstag, 5. Januar, 2008.</i>
date/ger	<p>A date in any numeric format in German. Supported formats include:</p> <p>Date and month, with optional day and optional year:</p> <ul style="list-style-type: none"> <li>• 04 Okt 2008</li> <li>• 4 OKTOBER 2008</li> <li>• 4. okt</li> <li>• 4 Oktober '08</li> <li>• 04 OCT. '08</li> <li>• 04. 2. 2007</li> <li>• Samstag, 03.2.2007</li> <li>• SONNABEND 4 OKTOBER 2008</li> <li>• SA 04 OKT</li> <li>• Sa. 4. Okt. 2008</li> </ul> <p>Extra delimiter support for formats where the year is present:</p> <ul style="list-style-type: none"> <li>• 04_OKT_2008</li> <li>• 04/10/2008</li> <li>• SA. 04-Okt-2008</li> <li>• 04102008 (years 1970-2029 only)</li> <li>• 28-10-2008</li> </ul>
date/mmm_year/ger	The month and year in German. For example, <i>Januar 2008.</i>

**date\_ita.ecr**

Entity	Description
date/season/ita	The seasons in Italian. For example, <i>la primavera, l'inverno.</i>
date/ddd/ita	A day of the week in Italian. For example, <i>lunedì,</i>

**date\_ita.ecr, continued**

Entity	Description
	<i>MAR.</i>
date/mmm/ita	A month in Italian. For example, <i>gen.</i> , <i>FEBBRAIO</i> .
date/year/ita	A year in any format.
date/ddmmm/ita	The day and month in Italian. For example, <i>5 di gennaio</i> .
date/day_date/ita	The day and month in Italian, preceded by the day of the week. For example, <i>sabato 5 di gennaio</i> .
date/date_year/ita	The day, month, and year in Italian. For example, <i>5 di gennaio del 2008</i> .
date/day_date_year/ita	The day, month, and year in Italian, preceded by the day of the week. For example, <i>sabato 5 di gennaio del 2008</i> .
date/ita	<p>A date in any format in Italian. Supported formats include:</p> <p>Date and month, with optional day and optional year:</p> <ul style="list-style-type: none"> <li>• 04 Ott 2008</li> <li>• 4 OTTOBRE 2008</li> <li>• 4 ott</li> <li>• 04 di Ottobre 2008</li> <li>• 4 di Ott del '08</li> <li>• 4 Ott. '08</li> <li>• Venerdì', 03 di Ottobre</li> <li>• Sab 4 di Ott</li> <li>• VENERDÌ 03 DI OTTOBRE DEL 2008</li> <li>• SAB 4 OTT</li> <li>• Sab. 4 Ott. 2008</li> </ul> <p>Extra delimiter support for formats where the year is present:</p> <ul style="list-style-type: none"> <li>• 04_OTT_2008</li> <li>• 04/10/2008</li> <li>• Venerdì 3-10-08</li> </ul>

**date\_ita.ecr, continued**

Entity	Description
	<ul style="list-style-type: none"> <li>• 04102008 (years 1970-2029 only)</li> <li>• 28-10-2008</li> </ul>
date/mmm_year/ita	Month and year in Italian. For example, <i>gennaio del 2008</i> .

**date\_jpn.ecr**

Entity	Description
date/season/jpn	The seasons in Japanese.
date/ddd/jpn	A day of the week in Japanese.
date/mmm/jpn	A month in Japanese (Kanji, numerals and fullwidth numerals).
date/year_gregorian/jpn	A year in the Gregorian calendar, in Japanese, in any format, with optional A.D./B.C.
date/year_imperial/jpn	Japanese imperial calendar year from 1868 onwards, in any format.
date/mmmdd/jpn	The month and day in Japanese.
date/day_date/jpn	The day and month in Japanese, preceded by the day of the week.
date/date_year_gregorian/jpn	The year, month, and day in the Gregorian calendar, in Japanese.
date/date_year_imperial/jpn	The year, month, and day in the Japanese imperial calendar, in Japanese.
date/day_date_year_gregorian/jpn	The day, month, and year in the Gregorian calendar, in Japanese, preceded by the day of the week.
date/day_date_year_imperial/jpn	The day, month, and year in the Japanese imperial calendar, in Japanese, preceded by the day of the week.
date/jpn	A date in any numeric format in Japanese.
date/mmm_year_gregorian/jpn	The month and year in the Gregorian calendar, in Japanese.
date/mmm_year_imperial/jpn	The month and year in the Japanese imperial calendar, in Japanese.

**date\_numeric.ecr**

Entity	Description
date/dd	A day from 1 to 31.
date/dd_fullwidth	A day from 1 to 31, in fullwidth characters.
date/dd2	A day from 01 to 31.
date/dd2_fullwidth	A day from 01 to 31, in fullwidth characters.
date/mm	A month from 1 to 12.
date/mm_fullwidth	A month from 1 to 12, in fullwidth characters.
date/mm2	A month from 01 to 12.
date/mm2_fullwidth	A month from 01 to 12, in fullwidth characters.
date/yy	The last two digits of the year. For example, <i>67</i> , <i>08</i> .
date/yy_fullwidth	The last two digits of the year, in fullwidth characters.
date/yyyy	A three- or four-digit year, from 100 to 2099.
date/yyyy_fullwidth	A three- or four-digit year in fullwidth characters, from 100 to 2099.
date/yyyy4	A four-digit year, from 1000 to 2099.
date/yyyy4_fullwidth	A four-digit year in fullwidth characters, from 1000 to 2099.
date/year	A year in any numerical format.
date/year_fullwidth	A year in any numerical format in fullwidth characters.
date/yyyymmddsep	yyyy-mm-dd. For example, <i>2008-10-28</i> .
date/yyyymmdd	yyyymmdd. For example, <i>20081028</i> .
date/yyyymmdd_safe	yyyymmdd for a date between 19700101 and 20291231. For example, <i>20081028</i> .
date/yymmddsep	yy-mm-dd. For example, <i>08-10-28</i> .
date/yymmdd	yymmdd. For example, <i>081028</i> .
date/ddmmyyyysep	dd-mm-yyyy. For example, <i>28-10-2008</i> .
date/ddmmyyyy	ddmmyyyy. For example, <i>28102008</i> .
date/ddmmyyyy_safe	ddmmyyyy for a date between 01011970 and 31122029. For example, <i>28102008</i> .

**date\_numeric.ecr, continued**

Entity	Description
date/ddmmyysep	dd-mm-yy. For example, <i>28-10-08</i> .
date/ddmmyy	ddmmyy. For example, <i>281008</i> .
date/mmdyyyysp	mm-dd-yyyy. For example, <i>10-28-2008</i> .
date/mmdyyyyy	mmdyyyyy. For example, <i>10282008</i> .
date/mmdyyyyy_safe	mmdyyyyy for a date between 01011970 and 12312029. For example, <i>10282008</i> .
date/mmdyysep	mm-dd-yy. For example, <i>10-28-2008</i> .
date/mmdyy	mmdyy. For example, <i>102808</i> .

**date\_por.ecr**

Entity	Description
date/season/por	The seasons in Portuguese. For example, <i>Verão, Outono</i> .
date/ddd/por	A day of the week in Portuguese. For example, <i>Segunda-feira, Terça-feira, DOM</i> .
date/mmm/por	A month in Portuguese. For example, <i>Setembro</i> .
date/year/por	A year in any format.
date/ddmmm/por	The day and month in Portuguese. For example, <i>5 de Janeiro</i> .
date/day_date/por	The day and month in Portuguese, preceded by the day of the week. For example, <i>Sábado 5 de Janeiro</i> .
date/date_year/por	The day, month, and year in Portuguese. For example, <i>5 de maio 2008</i> .
date/day_date_year/por	The day, month, and year in Portuguese, preceded by the day of the week. For example, <i>Sábado 5 de janeiro de 2008</i> .
date/por	Any date in Portuguese. Supported formats include: Date and month, with optional day and optional year: <ul style="list-style-type: none"> <li>• 04 Out. 2008</li> <li>• 4 OUTUBRO 2008</li> </ul>

**date\_por.ecr, continued**

Entity	Description
	<ul style="list-style-type: none"> <li>• 04 de Outubro 2008</li> <li>• 4 de Out de '08</li> <li>• SÁB 04 OUT 2008</li> <li>• Sábado, 04 de Outubro</li> <li>• Terça-feira 14 Out. 1947</li> <li>• SÁBADO 04 DE OUTUBRO DE 2008</li> <li>• Quinta-feira, 12 de Setembro de 2013 EC</li> <li>• 4 de Março de 2012</li> </ul> <p>Extra delimiter support for formats where the year is present:</p> <ul style="list-style-type: none"> <li>• 04_OUT_2008</li> <li>• 04/10/2008</li> <li>• Quarta feira 30-12-1953</li> <li>• 04102008 (years 1970-2029 only)</li> <li>• 28-10-2008</li> </ul>
date/mmm_year/por	The month and year in Portuguese. For example, <i>Junho de 2008</i> .

**date\_spa.ecr**

Entity	Description
date/season/spa	The seasons in Spanish. For example, <i>el invierno, la primavera</i> .
date/ddd/spa	A day of the week in Spanish. For example, <i>Lunes, Domingo</i> .
date/mmm/spa	A month in Spanish. For example, <i>Septiembre</i> .
date/year/spa	A year in any format.
date/ddmmm/spa	The day and month in Spanish. For example, <i>5 de enero</i> .
date/date_year/spa	The day, month, and year in Spanish. For example, <i>5 de enero 2008</i> .

**date\_spa.ecr, continued**

Entity	Description
date/day_date/spa	The day and month in Spanish, preceded by the day of the week. For example, <i>Sábado 5 de enero</i> .
date/day_date_year/spa	The day, month, and year in Spanish, preceded by the day of the week. For example, <i>Sábado 5 de enero de 2008</i> .
date/mmm_year/spa	The month and year in Spanish. For example, <i>Januar 2008</i> .
date/spa	<p>Any date in Spanish. Supported formats include:</p> <p>Date and month, with optional day and optional year:</p> <ul style="list-style-type: none"> <li>• 04 Oct 2008</li> <li>• 4 OCTUBRE 2008</li> <li>• 4 OCT</li> <li>• 4 de Octubre 2008</li> <li>• 4 de Oct de '08</li> <li>• 04 OCT. '08</li> <li>• Sábado, 04 de Octubre</li> <li>• Jueves, 12 de Septiembre de 2013 d. J.C.</li> <li>• SÁBADO 04 DE OCTUBRE DE 2008</li> <li>• SAB 4 OCT</li> <li>• Sab. 4 Oct. 2008</li> </ul> <p>Extra delimiter support for formats where the year is present:</p> <ul style="list-style-type: none"> <li>• 04_OCT_2008</li> <li>• 04/10/2008</li> <li>• Sábado 4-10-08</li> <li>• 04102008 (years 1970-2029 only)</li> <li>• 28-10-2008</li> </ul>

**datetime\_advanced\_eng.ecr**

Entity <sup>1</sup>	Description
datetime/advanced_hms24/eng	Time in hh:mm:ss.ss ZZZ format (seconds, fractional seconds, and timezone are optional). For example, <i>04:35</i> , <i>18:56:00</i> , <i>21:42:56.45 +0100</i> .
datetime/advanced_hms24_range/eng	Time range in hh:mm:ss.ss ZZZ format (seconds, fractional seconds, and timezone are optional). For example, <i>04:35-04:36</i> , <i>18:56:00-21:00:00</i> , <i>21:42:56.45 to 23:59:59.99 +0100</i> .
datetime/advanced_hm24_dot/eng	Time in hh.mm format. For example, <i>04.56</i> .
datetime/advanced_hm24_dot_range/eng	Time range in hh.mm format. For example, <i>04.56 to 12.34</i> .
datetime/advanced_hm24tz_nosep/eng	Time in hhmm ZZZ format. For example, <i>2100 GMT</i> .
datetime/advanced_hm24tz_nosep_range/eng	Time range in hhmm ZZZ format. For example, <i>2100-2330 GMT</i> .
datetime/advanced_hm24_nosep/eng	Time in hhmm format, with higher scores if the number of minutes is a multiple of 5. For example, <i>2100</i> .
datetime/advanced_hm24_nosep_range/eng	Time range in hhmm format, with higher scores if the number of minutes is a multiple of 5. For example, <i>2100-2330</i> .
datetime/advanced_hms12/eng	Time in 12-hour h:mm:ss am/pm ZZZ format (seconds and timezone are optional). For example, <i>9:30am</i> , <i>9:30:00pm GMT</i> .
datetime/advanced_hms12_range/eng	Time range in 12-hour h:mm:ss am/pm ZZZ format (seconds and timezone are optional). For example, <i>9:30-10:30am</i> , <i>9:30:00am to 9:30:00pm GMT</i> .
datetime/advanced_hm12_noampm/eng	Time in 12-hour h:mm:ss ZZZ format without am or pm specified (seconds and timezone are optional). For example, <i>9:30</i> , <i>9:30:00 GMT</i> .
datetime/advanced_hm12_noampm_range/eng	Time range in 12-hour h:mm:ss ZZZ format without am or pm specified (seconds and timezone are optional). For example, <i>9:30-10:30</i> , <i>9:30:00 to 9:30:00 GMT</i> .
datetime/advanced_hm12_dot/eng	Time in 12-hour h.mm am/pm ZZZ format (am, pm, and timezone are optional, but scores are lower without them, although multiples of 5 minutes are boosted). For example, <i>6.30am</i> , <i>8.45 GMT</i> , <i>11.35</i> .
datetime/advanced_hm12_dot_range/eng	Time range in 12-hour h.mm am/pm ZZZ format (am,

**datetime\_advanced\_eng.ecr, continued**

Entity <sup>1</sup>	Description
	pm, and timezone are optional, but scores are lower without them, although multiples of 5 minutes are boosted). For example, <i>6-7.30am</i> , <i>8.45am-6.30pm GMT</i> , <i>11-12.35</i> .
datetime/advanced_hm12_nosep/eng	Time in 12-hour hmm am/pm ZZZ format (am, pm, and timezone are optional, but scores are lower without them, although multiples of 5 minutes are boosted). For example, <i>630am</i> , <i>845 GMT</i> , <i>1135</i> .
datetime/advanced_hm12_nosep_range/eng	Time range in 12-hour hmm am/pm ZZZ format (am, pm, and timezone are optional, but scores are lower without them, although multiples of 5 minutes are boosted). For example, <i>630-730am</i> , <i>845-945 GMT</i> , <i>1135 to 345</i> .
datetime/advanced_namedtime/eng	Times of the day with a specific name in the English language. For example, <i>noon</i> , <i>midnight</i> .
datetime/advanced_clocktime_loose/eng	Time of the day, or time range, described in English (low confidence, scores reduced). For example, <i>twelve</i> .
datetime/advanced_clocktime_loose_range/eng	Time range, described in English (low confidence, scores reduced). For example, <i>two to three</i> .
datetime/advanced_clocktime_strict/eng	Time of the day, described in English (high confidence). For example, <i>twelve o'clock</i> , <i>two fifteen</i> , <i>ten past one</i> , <i>quarter to midnight</i> .
datetime/advanced_clocktime_strict_range/eng	Time range, described in English (high confidence). For example, <i>ten to ten forty-five</i> .
datetime/advanced_clocktime/eng	Time of the day, described in English (high and low confidence, scored appropriately). For example, <i>twelve o'clock</i> , <i>two fifteen in the afternoon</i> , <i>ten past one</i> , <i>quarter to midnight</i> , <i>twelve at night</i> .
datetime/advanced_clocktime_range/eng	Time range, described in English (high and low confidence, scored appropriately). For example, <i>ten to ten forty-five</i> , <i>two to three</i> .
datetime/nameddays_strict/eng	Specially named days (confident matched only). For example, <i>Christmas Day</i> , <i>Easter Monday</i> .
datetime/nameddays_all/eng	Specially named days (high and low confidence matches, scored appropriately). For example, <i>Christmas</i> , <i>Easter</i> .

**datetime\_advanced\_eng.ecr, continued**

Entity <sup>1</sup>	Description
datetime/advanced_yyyymmdd/eng	Dates in yyyy-mm-dd, yyyy-Mmm-dd, yyyy.mm.dd, yyyy.Mmm.dd, yyyy/mm/dd, or yyyy/Mmm/dd formats. For example, <i>2008-10-28</i> , <i>2008.Oct.28</i> .
datetime/advanced_yyyymmdd_range/eng	Date range in yyyy-mm-dd, yyyy-Mmm-dd, yyyy.mm.dd, yyyy.Mmm.dd, yyyy/mm/dd, or yyyy/Mmm/dd formats. For example, <i>2008-10-28 to 2008-11-03</i> , <i>2008.Oct.28-2008.Nov.03</i> .
datetime/advanced_yyyymmdd_nosep/eng	Dates in yyyy-mm-dd, yyyy.mm.dd, or yyyy/mm/dd formats. For example, <i>20081028</i> .
datetime/advanced_yyyymmdd_nosep_range/eng	Date range in yyyy-mm-dd, yyyy.mm.dd, or yyyy/mm/dd formats. For example, <i>20081028-20081103</i> .
datetime/advanced_ddmmyyyy/eng	Dates in dd-m-yyyy, dd.m.yyyy, or dd/m/yyyy formats. For example, <i>28-10-2008</i> .
datetime/advanced_ddmmyyyy_range/eng	Date range in dd-m-yyyy, dd.m.yyyy, or dd/m/yyyy formats. For example, <i>28-10-2008 to 03-11-2008</i> .
datetime/advanced_ddmmyy/eng	Dates in dd-mm-yy, dd.mm.yy, or dd/mm/yy formats. For example, <i>28.10.08</i> .
datetime/advanced_ddmmyy_range/eng	Date range in dd-mm-yy, dd.mm.yy, or dd/mm/yy formats. For example, <i>28.10.08-03.11.08</i> .
datetime/advanced_ddmm/eng	Dates in dd-mm, dd.mm, or dd/mm formats. For example, <i>28/10</i> .
datetime/advanced_ddmm_range/eng	Date range in dd-mm, dd.mm, or dd/mm formats. For example, <i>28/10-03/11</i> .
datetime/advanced_ddMmmyyyy/eng	Dates in dd-Mmm-yyyy, dd.Mmm.yyyy, or dd/Mmm/yyyy formats. For example, <i>28-Oct-2008</i> .
datetime/advanced_ddMmmyyyy_range/eng	Date range in dd-Mmm-yyyy, dd.Mmm.yyyy, or dd/Mmm/yyyy formats. For example, <i>28-Oct-2008 to 03-Nov-2008</i> .
datetime/advanced_ddMmmyy/eng	Dates in dd-Mmm-yy, dd.Mmm.yy, or dd/Mmm/yy formats. For example, <i>28.Oct.08</i> .
datetime/advanced_ddMmmyy_range/eng	Date range in dd-Mmm-yy, dd.Mmm.yy, or dd/Mmm/yy formats. For example, <i>28.Oct.08-03.Nov.08</i> .
datetime/advanced_ddMmm/eng	Dates in dd-Mmm, dd.Mmm, or dd/Mmm formats. For

**datetime\_advanced\_eng.ecr, continued**

Entity <sup>1</sup>	Description
	example, <i>28/Oct</i> .
datetime/advanced_ddMmm/eng	Date range in dd-Mmm, dd.Mmm, or dd/Mmm formats. For example, <i>28/Oct-03/Nov</i> .
datetime/advanced_mmddyyyy/eng	Dates in m-dd-yyyy, m.dd.yyyy, or m/dd/yyyy formats. For example, <i>10-28-2008</i> .
datetime/advanced_mmddyyyy_range/eng	Date range in m-dd-yyyy, m.dd.yyyy, or m/dd/yyyy formats. For example, <i>10-28-2008 to 11-03-2008</i> .
datetime/advanced_mmddyy/eng	Dates in mm-dd-yy, mm.dd.yy, or mm/dd/yy formats. For example, <i>10.28.08</i> .
datetime/advanced_mmddyy_range/eng	Date range in mm-dd-yy, mm.dd.yy, or mm/dd/yy formats. For example, <i>10.28.08 to 11.03.08</i> .
datetime/advanced_mmdd/eng	Dates in mm-dd, mm.dd, mm/dd formats. For example, <i>10/28</i> .
datetime/advanced_mmdd_range/eng	Date range in mm-dd, mm.dd, mm/dd formats. For example, <i>10/28-11/03</i> .
datetime/advanced_Mmmddyyyy/eng	Dates in Mmm-dd-yyyy, Mmm.dd.yyyy, or Mmm/dd/yyyy formats. For example, <i>Oct-28-2008</i> .
datetime/advanced_Mmmddyyyy_range/eng	Date range in Mmm-dd-yyyy, Mmm.dd.yyyy, or Mmm/dd/yyyy formats. For example, <i>Oct-28-2008 to Nov-03-2008</i> .
datetime/advanced_Mmmddyy/eng	Dates in Mmm-dd-yy, Mmm.dd.yy, or Mmm/dd/yy formats. For example, <i>Oct.28.08</i> .
datetime/advanced_Mmmddyy_range/eng	Date range in Mmm-dd-yy, Mmm.dd.yy, or Mmm/dd/yy formats. For example, <i>Oct.28.08 to Nov.03.08</i> .
datetime/advanced_Mmmdd/eng	Dates in Mmm-dd, Mmm.dd, Mmm/dd formats. For example, <i>Oct/28</i> .
datetime/advanced_Mmmdd_range/eng	Date range in Mmm-dd, Mmm.dd, Mmm/dd formats. For example, <i>Oct/28-Nov/03</i> .
datetime/advanced_Mmmyyyy/eng	Named month/year. For example, <i>Oct 2008</i> , <i>October of 2008</i> , <i>October '08</i> .
datetime/advanced_Mmmyyyy_range/eng	Named month/year range. For example, <i>Oct 2008 to Feb 2009</i> .

**datetime\_advanced\_eng.ecr, continued**

Entity <sup>1</sup>	Description
datetime/advanced_yyyymm/eng	Dates in yyyy-mm, yyyy.mm, yyyy/mm and yyyy mm formats.
datetime/advanced_yyyymm_range/eng	Date range in yyyy-mm, yyyy.mm, yyyy/mm and yyyy mm formats.
datetime/advanced_textdate_noyear/eng	A date, without a year, described in English. For example, <i>July 4th, July the 4th, The morning of Wednesday July fourth, 4th July, the 4th of July, In the morning on Wednesday fourth July, Christmas Eve, Easter Day.</i>
datetime/advanced_textdate_noyear_range/eng	A date range, without a year, described in English. For example, <i>July 4th-8th, July 4th-October 8th, July the 4th to the 8th, Wednesday 4th to Sunday 8th July, 4th July-8th October.</i>
datetime/advanced_textdate_noyear_multiple/eng	Multiple dates, without a year, described in English. For example, <i>July 4th and 8th, 4th, 5th and 6th of July, Wednesday 4th and Sunday 8th July.</i>
datetime/advanced_textdate_withyear/eng	A date, with a year, described in English. For example, <i>July 4th 2008, July the 4th 2008, The morning of Wednesday July fourth 2008, 4th July 2008, the 4th of July 2008, In the morning on Wednesday fourth July 2008, Christmas Day 2012, Easter '02.</i>
datetime/advanced_textdate_withyear_range/eng	A date range, with a year, described in English. For example, <i>July 4th-8th 2008, July 4th-October 8th 2008, July the 4th to the 8th, 2008, Wednesday 4th to Sunday 8th July 2008, 4th July-8th October 2008.</i>
datetime/advanced_textdate_withyear_multiple/eng	Multiple dates, with a year, described in English. For example, <i>July 4th and 8th, 2008, 4th, 5th and 6th of July 2008, Wednesday 4th and Sunday 8th July 2008.</i>
datetime/advanced_textdate/eng	A date, described in English (with or without a year).
datetime/advanced_textdate_range/eng	A date range, described in English (with or without a year).
datetime/advanced_textdate_multiple/eng	Multiple dates, described in English (with or without a year).
datetime/advanced_reldate/eng	A day, or part of a day, relative to today, described in English. Less confident matches are scored lower. For example, <i>This morning, tomorrow evening, Today</i>

**datetime\_advanced\_eng.ecr, continued**

Entity <sup>1</sup>	Description
	<p>(score 0.9), <i>yesterday</i> (score 0.9), <i>the day after tommorrow</i> [sic] (score 0.9), <i>Two weeks ago on Monday</i>, <i>This coming Tuesday AM</i>, <i>Two weeks on Wednesday afternoon</i>, <i>Tuesday week</i>, <i>Tomorrow fortnight</i>, <i>Two weeks ago last Monday</i>, <i>Monday last week</i>, <i>Tuesday this wk</i>, <i>Wednesday next</i>, <i>Not this Tuesday but next</i> (score 0.9), <i>Not last Monday but the one before</i> (score 0.9), <i>4th</i> (score 0.5), <i>the fourth</i> (score 0.8), <i>Wednesday the fourth of next month</i>, <i>last month on Wednesday 4th</i>, <i>The first Sunday of next month</i>, <i>Second Monday in July</i>, <i>Last Tuesday of April but one</i>, <i>Monday morning</i> (score 0.9), <i>Tuesday</i> (score 0.7).</p>
<p>datetime/advanced_reldate_range/eng</p>	<p>A date range, relative to today, described in English. Less confident matches are scored lower. For example, <i>Wednesday 4th to Friday 6th</i> (score 1.0), <i>4th-6th next month</i> (score 0.9), <i>4th to 6th</i> (score 0.8).</p>
<p>datetime/advanced_reldate_multiple/eng</p>	<p>Multiple dates, relative to today, described in English. For example, <i>4th and 6th of next month</i>.</p>
<p>datetime/advanced_relmonth/eng</p>	<p>A month, relative to today, described in English. Less confident matches are scored lower. For example, <i>In January</i> (score 0.6), <i>This July</i> (score 0.6), <i>September</i> (score 0.4) <i>Last September</i> (score 0.8), <i>January next year</i> (score 0.9), <i>Next month</i> (score 0.6), <i>last month</i> (score 0.6).</p>
<p>datetime/advanced_date_and_time/eng</p>	<p>Any date with time, in any recognized format. Relevant components are extracted. Score indicates the confidence that the matched text is a genuine reference to a date and time.</p>
<p>datetime/advanced_date_only/eng</p>	<p>Any date (without a time), in any recognized format. Relevant components are extracted. Score indicates the confidence that the matched text is a genuine reference to a date.</p>
<p>datetime/advanced_month_only/eng</p>	<p>Any date to month precision, in any recognized format. Relevant components are extracted. Score indicates the confidence that the matched text is a genuine reference to a date.</p>
<p>datetime/advanced_time_only/eng</p>	<p>Any time (without a date), in any recognized format. Relevant components are extracted. Score indicates the confidence that the matched text is a genuine</p>

**datetime\_advanced\_eng.ecr, continued**

Entity <sup>1</sup>	Description
	reference to a time.
datetime/advanced/eng	Any date, with optional time, in any recognized format. Relevant components are extracted. Score indicates the confidence that the matched text is a genuine reference to a date and time.  You can use the <code>datetime.lua</code> script to standardize the output of these entities. To allow precision to the month of the year rather than just day, set <code>RelaxedPrecision</code> to <code>True</code> in your eduction request.

<sup>1</sup>You can use the `datetime.lua` post-processing script to normalize the output of these entities to a standard format.

**E**

**ethnicity\_eng.ecr**

Entity	Description
ethnicity/nationality/eng	A nationality. For example, <i>Andorran</i> , <i>Welsh</i> .

**ethnicity\_engca.ecr**

Entity	Description
ethnicity/aboriginal/engca	A Canadian aboriginal group. For example, <i>Inuit</i> .
ethnicity/population_group/engca	A Canadian population group. For example, <i>Arab</i> , <i>White</i> .

**ethnicity\_enggb.ecr**

Entity	Description
ethnicity/enggb	Ethnicity classification in England. For example, <i>Irish</i> , <i>Indian</i> .
ethnicity/identity_code/enggb	United Kingdom identity code. For example, <i>IC1</i> , <i>IC2</i> .

#### ethnicity\_engus.ecr

Entity	Description
ethnicity/races/engus	A United States race. For example, <i>Japanese</i> , <i>White</i> .
ethnicity/races_lowercase/engus	A U.S. race in lowercase. For example, <i>japanese</i> , <i>white</i> .
ethnicity/native_american/engus	A U.S. native. For example, <i>Cherokee</i> , <i>Lambee</i> .
ethnicity/asian/engus	A U.S. ethnicity of Asian origin. For example, <i>Pakistani</i> , <i>Korean</i> .
ethnicity/pacific/engus	A U.S. ethnicity of Pacific origin. For example, <i>Fijian</i> , <i>Tongan</i> .
ethnicity/hispanic/engus	A U.S. ethnicity of Hispanic origin. For example, <i>Cuban</i> , <i>Spanish</i> .
ethnicity/engus	Any U.S. ethnicity.

#### ethnicity\_fre.ecr

Entity	Description
ethnicity/nationality/fre	Nationality in French. For example, <i>Andorrane</i> , <i>Vietnamien</i> .
ethnicity/ethnic_groups/fre	Ethnic groups in the French language. For example, <i>Africain</i> , <i>Autres</i> .

## F

The financial strength grammar relies on the `contextualize_matches.lua` post-processing script. This script uses the configurable entities to match sections of your documents, and then recombines these entities to return a different set of entities that represent the financial sentiment.

For more information see [Financial Sentiment Analysis, on page 80](#).

#### financial\_strength.ecr

Entity	Description
finance/analyst	An entity to support finding analyst statements that express financial strength.  After post-processing, this entity returns the following entities:

**financial\_strength.ecr, continued**

Entity	Description
	<ul style="list-style-type: none"> <li>• <b>finance/strong</b>. A financial analyst statement that shows improving finances. For example, "Eduction Inc. under weight to over weight".</li> <li>• <b>finance/neutral</b>. A neutral financial analyst statement. For example, "Eduction Inc. equal weight".</li> <li>• <b>finance/weak</b>. A financial analyst statement that shows degrading finances. For example, "Eduction Inc. over weight to under weight".</li> <li>• <b>finance/following/strong</b>. A financial analyst statement indicating that an analyst starts to follow a company with a positive initial outlook. For example, "Analyst Group initiates coverage on Eduction Inc. with a Buy rating".</li> <li>• <b>finance/following/neutral</b>. A financial analyst statement indicating that an analyst starts to follow a company with a neutral initial outlook. For example, "Analyst Group initiates coverage on Eduction Inc. with a hold rating".</li> <li>• <b>finance/following/weak</b>. A financial analyst statement indicating that an analyst starts to follow a company with a negative initial outlook. For example, "Analyst Group initiates coverage on Eduction Inc. with an Underperform rating."</li> </ul>
<p>finance/company/tagged/known            finance/news</p>	<p>Entities to support finding news statements that express financial strength. You must configure these entities together.</p> <p>After post-processing, these entities return the following entities:</p> <ul style="list-style-type: none"> <li>• <b>news/improve/context</b>. News about improving finances with an explicit company context. For example, "Eduction Inc. reports rise in profits".</li> <li>• <b>news/neutral/context</b>. Neutrally reported news with an explicit company subject. For example, "Eduction Inc. announced \$1bn in profits".</li> <li>• <b>news/degrade/context</b>. News about degrading finances with an explicit company context. For example, "Eduction Inc reports fall in profits".</li> <li>• <b>news/improve/nocontext</b>. News with an</li> </ul>

**financial\_strength.ecr, continued**

Entity	Description
	<p>implicit company context. For example, "Eduction Inc. had a successful year. Profits rose 10 percent".</p> <ul style="list-style-type: none"> <li>• <b>news/degrade/nocontext.</b> News of degrading finances with an implicit company context. For example, "Eduction Inc. had a bad year. Profits fell 10 percent".</li> <li>• <b>news/neutral/reports/nocontext.</b> A neutral report with an implicit or no company subject. For example, "reported profits of \$1bn".</li> <li>• <b>news/improve/reports/nocontext.</b> A report of improving finances with an implicit company subject. For example, "It was a good year for Eduction Inc as they announced a 10 percent rise in profits".</li> <li>• <b>news/degrade/reports/nocontext.</b> A report of degrading finances with an implicit company subject. For example, "It was a bad year for Eduction Inc as they announced a 10 percent fall in profits".</li> <li>• <b>news/deal/positive/context.</b> A reported approved deal with an explicit company subject. For example, "Shareholders approve the Eduction Inc. deal".</li> <li>• <b>news/deal/negative/context.</b> A reported blocked deal with an explicit company subject. For example, "Shareholders block the Eduction Inc. deal".</li> <li>• <b>news/takeover/context.</b> A reported takeover with explicit company subject. For example, "Eduction Corp. hope to consolidate their market position with a \$1bn takeover of Eduction Inc."</li> </ul>

## G

### gender\_eng.ecr

Entity	Description
gender/gender_word/eng	A word that describes a family relation or gender in English. For example, <i>lady</i> , <i>father</i> .
gender/gender_context/eng	A gender in the context of English language.
gender/all/eng	A gender in the English language, either in a word or in context.

### gender\_fre.ecr

Entity	Description
gender/gender_word/fre	A word that describes a family relation or gender in French. For example, <i>Dame</i> , <i>voisines</i> .
gender/gender_context/fre	A gender in the context of French language.
gender/all/fre	A gender in the French language, either in a word or in context.

### gender\_ger.ecr

Entity	Description
gender/gender_word/ger	A word that describes a family relation or gender in German. For example, <i>mensch</i> , <i>Frau</i> .
gender/gender_context/ger	A gender in the context of German language.
gender/all/ger	A gender in the German language, either in a word or in context.

### gov\_chicn.ecr

Entity	Description
org/gov/chicn	A Chinese government agency.

**gov\_engca.ecr**

Entity	Description
org/gov/engca	A Canadian government agency.

## H

**holiday\_ca.ecr**

Entity	Description
holiday/statutory/engca	Statutory Canadian holidays in English. For example, <i>Good Friday</i> .
holiday/statutory/freca	Statutory Canadian holidays in French. For example, <i>Le vendredi saint</i> .
holiday/statutory/ca	Statutory Canadian holidays, in English or French.
holiday/federal/engca	Federal Canadian holidays in English. For example, <i>Victoria Day</i> .
holiday/federal/freca	Federal Canadian holidays in French. For example, <i>La fête de la Reine</i> .
holiday/federal/ca	Federal Canadian holidays, in English or French.
holiday/statother/engca	Other statutory Canadian holidays in English. For example, <i>Family Day</i> .
holiday/statother/freca	Other statutory Canadian holidays in French. For example, <i>La fête du Travail</i> .
holiday/statother/ca	Other statutory Canadian holidays, in English or French.
holiday/alberta/engca holiday/britishcolumbia/engca holiday/manitoba/engca holiday/newbrunswick/engca holiday/newfoundlandlabrador/engca holiday/northwestterritories/engca holiday/novascotia/engca holiday/nunavut/engca holiday/ontario/engca	Holidays for each Canadian province and territory in English.

**holiday\_ca.ecr, continued**

Entity	Description
holiday/princeedwardisland/engca holiday/quebec/engca holiday/saskatchewan/engca holiday/yukon/engca	
holiday/prov_terr/engca	Holidays for Canadian provinces and territories in English.
holiday/other/engca	Other Canadian holidays and observances in English.
holiday/ca	All Canadian holidays.

**holiday\_enggb.ecr**

Entity	Description
holiday/bank_holiday/enggb	British Bank Holiday name.
holiday/holiday/enggb	Traditional days celebrated. For example, <i>Mother's Day</i> .

**holiday\_engus.ecr**

Entity	Description
holiday/federal/engus	U.S. federal holidays. For example, <i>Memorial Day</i> .
holiday/traditional/engus	Traditional U.S. days celebrated. For example, <i>Mother's Day</i> .
holiday/engus	All U.S. holidays.

**I**

**internet.ecr**

Entity	Description
internet/host_domain	A host name. For example, <i>www.myhost.com</i> .
internet/host_ip/ipv4	An IPv4 IP address. For example, <i>127.0.0.1</i> .

**internet.ecr, continued**

Entity	Description
internet/host_ip/ipv6	An IPv6 IP address. For example, <i>1234:5678:90AB:CDEF</i> .
internet/host_ip/ipv4mapped	An IPv4-mapped IP address. For example, <i>::FFFF:129.144.52.38</i> .
internet/host_ip	Any IP address.
internet/addr_host	Host address. For example, <i>www.myhost.com</i> or <i>192.231.21.2</i> .
internet/addr_email	Email address. For example, <i>jsmith@mailserver.com</i> .
internet/addr_email_mailto	Email address with <i>mailto:</i> prefix. For example, <i>mailto:jsmith@mailserver.com</i> .
internet/addr_https	HTTP or HTTPS address.
internet/addr_file	file:// address.
internet/addr_ftp	FTP address.
internet/addr_news	news:// address.
internet/addr_telnet	Telnet address.
internet/addr_gopher	Gopher address.

**J**

**jobtitledicts\_eng.ecr**

Entity	Description
person/titleprefix_camelcase/eng	Job title prefix in camel case. For example, <i>Acting</i> .
person/titleprefix_lowercase/eng	Job title prefix in lowercase. For example, <i>acting</i> .
person/titlesuffix_camelcase/eng	Job title suffix in camel case. For example, <i>Associate, Advisor</i> .
person/titlesuffix_lowercase/eng	Job title suffix in lowercase. For example, <i>educator, trainee</i> .
person/govdep/engus	U.S. government departments and abbreviations. For example, <i>National Security Council, FBI</i> .

**jobtitledicts\_eng.ecr, continued**

Entity	Description
person/titlegeneric_camelcase/eng	Generic job titles in camel case. For example, <i>Sales Assistant</i> .
person/titlegeneric_lowercase/eng	Generic job titles in lowercase. For example, <i>sales assistant</i> .
person/titlefull_camelcase/eng	Full job title in camel case, including prefixes and suffixes. For example, <i>Head of Customer Communications</i> .
person/titlefull_lowercase/eng	Full job title in lower case, including prefixes and suffixes. For example, <i>head of customer communications</i> .
person/titlecorp/eng	Corporate job titles. For example, <i>Chief Financial Officer</i> .
person/titlecorpabb/eng	Abbreviated version of corporate job titles. For example, <i>CFO</i> .
person/titlegov/eng	Government and cabinet titles. For example, <i>President, Secretary of Defense</i> .
person/titleroyal/eng	Royal titles. For example, <i>King</i> .
person/titlepolitical/eng	Political titles. For example, <i>Foreign Minister, Governor</i> .
person/titlereligious/eng	Religious titles. For example, <i>Pope, Father, Imam</i> .

**L**

**languages.ecr**

Entity	Description
language/iso_lowercase	Three-letter ISO 639-2/B language code. For example, <i>fin, ger</i> .
language/all	Language name in a local language, English, or other major language.
language/output_iso	Language name in a local language, English, or other major language (output is normalized to the ISO 639-2/B code)

**legal\_engus.ecr**

Entity	Description
legal/citsupr/engus	Supreme Court Citations. For example, <i>Roe v. Wade, 410 U.S. 113 (1973)</i> .
legal/citcofa/engus	Federal Court Reporter Citations. For example, <i>Universal City Studios, Inc. v. Corley, 273 F.3d 429 (2d Cir. 2001)</i> .

**M**

**measure\_eng.ecr**

Entity	Description
measure/len/met/eng	Metric measures of length. For example, <i>mm., kilometre</i> .
measure/len/usuk/eng	U.S. and UK measures of length. For example, <i>foot, mile, in.</i>
measure/area/met/eng	Metric measures of area. For example, <i>sq. m., square kilometres</i> .
measure/area/usuk/eng	U.S. and UK measures of area. For example, <i>sq. in., acres</i> .
measure/vol/met/eng	Metric measures of volume. For example, <i>microlitres, cubic centimetres</i> .
measure/vol/usuk/eng	U.S. and UK measures of volume. For example, <i>pinches, cups, gal.</i>
measure/mass/met/eng	Metric measures of mass. For example, <i>gram, tonnes</i> .
measure/mass/usuk/eng	U.S. and UK measures of mass. For example, <i>pound, lb.</i>

**medical\_condition.ecr**

Entity	Description
medical/disability/social_security/engus	Impairment for the purpose of disability evaluation under social security.
medical/disease_condition	Disease or medical condition. This grammar includes the clinical and common names for many common

**medical\_condition.ecr, continued**

Entity	Description
	medical conditions. For example, <i>Heart attack</i> or <i>myocardial infarction</i> .
medical/lifestyle	Lifestyle that relates to medical condition.

**medical\_drug.ecr**

Entity	Description
drug/brand	Trade name of medical drugs.
drug/generic	Generic name of medical drugs.
drug/medication	Description of a medication.

**medical\_healthcare\_engus.ecr**

Entity	Description
healthcare/provider/AK/engus	U.S. healthcare provider in Alaska.
healthcare/provider/AL/engus	U.S. healthcare provider in Alabama.
healthcare/provider/AR/engus	U.S. healthcare provider in Arkansas.
healthcare/provider/AZ/engus	U.S. healthcare provider in Arizona.
healthcare/provider/CA/engus	U.S. healthcare provider in California.
healthcare/provider/CO/engus	U.S. healthcare provider in Colorado.
healthcare/provider/CT/engus	U.S. healthcare provider in Connecticut.
healthcare/provider/DC/engus	U.S. healthcare provider in Washington, D.C.
healthcare/provider/DE/engus	U.S. healthcare provider in Delaware.
healthcare/provider/FL/engus	U.S. healthcare provider in Florida.
healthcare/provider/GA/engus	U.S. healthcare provider in Georgia.
healthcare/provider/HI/engus	U.S. healthcare provider in Hawaii.
healthcare/provider/IA/engus	U.S. healthcare provider in Iowa.
healthcare/provider/ID/engus	U.S. healthcare provider in Idaho.

**medical\_healthcare\_engus.ecr, continued**

Entity	Description
healthcare/provider/IL/engus	U.S. healthcare provider in Illinois.
healthcare/provider/IN/engus	U.S. healthcare provider in Indiana.
healthcare/provider/KS/engus	U.S. healthcare provider in Kansas.
healthcare/provider/KY/engus	U.S. healthcare provider in Kentucky.
healthcare/provider/LA/engus	U.S. healthcare provider in Louisiana.
healthcare/provider/MA/engus	U.S. healthcare provider in Massachusetts.
healthcare/provider/MD/engus	U.S. healthcare provider in Maryland.
healthcare/provider/ME/engus	U.S. healthcare provider in Maine.
healthcare/provider/MI/engus	U.S. healthcare provider in Michigan.
healthcare/provider/MN/engus	U.S. healthcare provider in Minnesota.
healthcare/provider/MO/engus	U.S. healthcare provider in Missouri.
healthcare/provider/MS/engus	U.S. healthcare provider in Mississippi.
healthcare/provider/MT/engus	U.S. healthcare provider in Montana.
healthcare/provider/NC/engus	U.S. healthcare provider in North Carolina.
healthcare/provider/ND/engus	U.S. healthcare provider in North Dakota.
healthcare/provider/NE/engus	U.S. healthcare provider in Nebraska.
healthcare/provider/NH/engus	U.S. healthcare provider in New Hampshire.
healthcare/provider/NJ/engus	U.S. healthcare provider in New Jersey.
healthcare/provider/NM/engus	U.S. healthcare provider in New Mexico.
healthcare/provider/NV/engus	U.S. healthcare provider in Nevada.
healthcare/provider/NY/engus	U.S. healthcare provider in New York.
healthcare/provider/OH/engus	U.S. healthcare provider in Ohio.
healthcare/provider/OK/engus	U.S. healthcare provider in Oklahoma.
healthcare/provider/OR/engus	U.S. healthcare provider in Oregon.
healthcare/provider/PA/engus	U.S. healthcare provider in Pennsylvania.
healthcare/provider/PR/engus	U.S. healthcare provider in Puerto Rico.

**medical\_healthcare\_engus.ecr, continued**

Entity	Description
healthcare/provider/RI/engus	U.S. healthcare provider in Rhode Island.
healthcare/provider/SC/engus	U.S. healthcare provider in South Carolina.
healthcare/provider/SD/engus	U.S. healthcare provider in South Dakota.
healthcare/provider/TN/engus	U.S. healthcare provider in Tennessee.
healthcare/provider/TX/engus	U.S. healthcare provider in Texas.
healthcare/provider/UT/engus	U.S. healthcare provider in Utah.
healthcare/provider/VA/engus	U.S. healthcare provider in Virginia.
healthcare/provider/VT/engus	U.S. healthcare provider in Vermont.
healthcare/provider/WA/engus	U.S. healthcare provider in Washington.
healthcare/provider/WI/engus	U.S. healthcare provider in Wisconsin.
healthcare/provider/WV/engus	U.S. healthcare provider in West Virginia.
healthcare/provider/WY/engus	U.S. healthcare provider in Wyoming.
healthcare/provider/all/engus	Any U.S. healthcare provider.

**medical\_procedure.ecr**

Entity <sup>1</sup>	Description
medical/blood_test	A blood test. For example, <i>Blood Type Test</i> or <i>hCG</i> .
medical/lab_test	A lab test. For example, <i>CD4 Lymphocyte Count</i> or <i>Insulin C-peptide</i> .
medical/surgical_procedure	A surgical procedure. For example, <i>Appendectomy</i> or <i>Hip Replacement Surgery</i> .
medical/specialty	A medical specialty. For example, <i>Dermatology</i> or <i>Psychiatry</i> .

**monetary\_value.ecr**

Entity	Description
monetary_value/full_value	A monetary value without context. For example, <i>\$5 billion</i> , <i>£9.8m</i> , <i>EUR50bn</i> , <i>£15,275,486</i> , <i>25 cents</i> .

**monetary\_value.ecr, continued**

Entity	Description
	<p>This entity has the following components:</p> <ul style="list-style-type: none"> <li>• PRECURRENCY, for example \$ from \$100.</li> <li>• POSTCURRENCY, for example cents from 25 cents.</li> <li>• VALUE, for example 50.0 from 50.0 million or 1.26 from £1.26k.</li> <li>• BIGUNITS, for example million from \$50.0 million.</li> </ul> <p>You can use the Lua post processing script <code>normalize_money.lua</code> to normalize the values. The script adds a component named NORMALIZED_VALUE to each match. For example, the input £9.8m would have a VALUE of 9.8 but a NORMALIZED_VALUE of 9,800,000.</p>

**money\_eng.ecr**

Entity	Description
money/fracunits	Fractional units of currency such as <i>Cent</i> or <i>Penny</i> .
money/iso4217	ISO 4217 currency codes. For example, <i>AUD</i> or <i>USD</i> .
money/currency	Currency name. For example, <i>Algerian dinar</i> .
money/currencyabbrev	Abbreviated currency name. For example, <i>dinar</i> or <i>dollar</i> .
money/denom_us	U.S. denominations. For example, <i>penny</i> or <i>quarter</i> .
money/symbol	Currency symbols. For example, \$ or €.

<sup>1</sup>This grammar matches the clinical names of many common medical procedures.

**N**

**number\_banking\_au.ecr**

Entity	Description
number/bsb/au	Australian bank state branch number. For example, 34 or 985.

**number\_banking\_ca.ecr**

Entity	Description
number/cpa_transit_micr/ca	Canadian Payments Association MICR transit number, in the format <i>BBBBB-AAA</i> , where <i>BBBBB</i> is a five-digit code that identifies the branch, and <i>AAA</i> is a three-digit code that identifies the institution. For example, <i>25539-001</i> .
number/cpa_transit_eft/ca	Canadian Payments Association EFT transit number, in the format <i>0AAABBBBB</i> , where <i>AAA</i> is a three-digit code that identifies the institution, and <i>BBBBB</i> is a five-digit code that identifies the branch. The first digit is always a leading zero. For example, <i>000125539</i> .
number/cpa_transit/ca	Canadian Payments Association transit number.
number/bankaccount/ca	Canadian bank account number. The entity recognizes known account number formats for particular banks, and generic seven- or 12-digit numbers, but assigns higher scores to known formats. This entity does not include the CPA transit numbers.

**number\_banking\_de.ecr**

Entity	Description
number/sort_code/de	8-digit German bank sort code. For example, <i>10019610</i> .
number/bank_number/de	German bank account number.

**number\_banking\_fr.ecr**

Entity	Description
number/bankaccount/fr	French bank account number.

**number\_banking\_gb.ecr**

Entity	Description
number/sortcode/gb	United Kingdom bank sort code. <i>For example, 301007, 30-10-07, or 30 10 07</i> . This entity recognizes any valid sort code, but assigns higher scores to known formats from several banks.

**number\_banking\_gb.ecr, continued**

Entity	Description
number/bankaccount/gb	United Kingdom bank account number, including the sort code. The sort code and account number must be separated by white space. The account number can be any eight-digit number.

**number\_banking\_ie.ecr**

Entity	Description
number/sortcode/ie	Ireland bank sort code. For example, <i>906005</i> , <i>90-60-05</i> , or <i>90 60 05</i> .
number/bankaccount/ie	Ireland bank account number.

**number\_banking\_us.ecr**

Entity	Description
number/aba_micr/us	American Bankers Association MICR transit number, in the format <i>XXXXYYYYC</i> , where <i>XXXX</i> is the Federal Reserve Routing Symbol, <i>YYYY</i> is the ABA Institution Identifier, and <i>C</i> is the check digit. For example, <i>129131673</i> .  The <code>checksum_aba_rtn.lua</code> post-processing script can verify the MICR check digit.
number/aba_fraction/us	American Bankers Association fraction transit number, in the format <i>PP-YYYY/XXXX</i> , where <i>PP</i> is a one-digit or two-digit prefix that represents the bank's check processing center location, <i>YYYY</i> is the ABA Institution identifier, and <i>XXXX</i> is the Federal Reserve Routing Symbol.
number/aba_routing/us	American Bankers Association transit number.  The <code>checksum_aba_rtn.lua</code> post-processing script can verify the MICR check digit.
number/bankaccount/us	United States bank account number, including the American Bankers Association routing number, in fraction or MICR format. The routing information and account information must be separated by a single space. The account number can be four to 17 digits, but nine-, ten-, and 12-digit numbers are given higher

**number\_banking\_us.ecr, continued**

Entity	Description
	<p>scores.</p> <p>The checksum_aba_rtn.lua post-processing script can verify the MICR check digit.</p>
number/cusip/us	<p>United States Committee on Uniform Securities Identification Procedures (CUSIP) number.</p> <p>The postprocessing_cusip.lua post-processing script can validate the checksum and set the score for this entity.</p>
number/cusip_ppn/us	<p>A CUSIP number that contains characters from the insurance industry that denote private placement numbers. This entity includes all the values from number/cusip/us.</p> <p>The postprocessing_cusip.lua post-processing script can validate the checksum and set the score for this entity.</p>
number/cusip_internal/us	<p>A CUSIP number from the range reserved for internal use. This entity is distinct from number/cusip/us and number/cusip_ppn/us.</p> <p>The postprocessing_cusip.lua post-processing script can set the score for this entity.</p>

**number\_bsn\_nl.ecr**

Entity	Description
number/bsn/nl	<p>Dutch Citizen Service Numbers (burgerservicenummer). BSNs always consist of nine digits.</p> <p>The number_bsn_n1.lua post-processing script performs validation for this entity.</p>

**number\_cc.ecr**

Entity	Description
number/cc12dn	12-digit credit card numbers with no delimiters.
number/cc12dh	12-digit credit card numbers with hyphen delimiters.

**number\_cc.ecr, continued**

Entity	Description
number/cc12ds	12-digit credit card numbers with space delimiters.
number/cc12	All 12-digit credit card numbers.
number/cc13dn	13-digit credit card numbers with no delimiters.
number/cc13dh	13-digit credit card numbers with hyphen delimiters.
number/cc13ds	13-digit credit card numbers with space delimiters.
number/cc13	All 13-digit credit card numbers.
number/cc14dn	14-digit credit card numbers with no delimiters.
number/cc14dh	14-digit credit card numbers with hyphen delimiters.
number/cc14ds	14-digit credit card numbers with space delimiters.
number/cc14	All 14-digit credit card numbers.
number/cc15dn	15-digit credit card numbers with no delimiters.
number/cc15dh	15-digit credit card numbers with hyphen delimiters.
number/cc15ds	15-digit credit card numbers with space delimiters.
number/cc15	All 15-digit credit card numbers.
number/cc16dn	16-digit credit card numbers with no delimiters.
number/cc16dh	16-digit credit card numbers with hyphen delimiters.
number/cc16ds	16-digit credit card numbers with space delimiters.
number/cc16	All 16-digit credit card numbers.
number/cc17dn	17-digit credit card numbers with no delimiters.
number/cc17dh	17-digit credit card numbers with hyphen delimiters.
number/cc17ds	17-digit credit card numbers with space delimiters.
number/cc17	All 17-digit credit card numbers.
number/cc18dn	18-digit credit card numbers with no delimiters.
number/cc18dh	18-digit credit card numbers with hyphen delimiters.
number/cc18ds	18-digit credit card numbers with space delimiters.
number/cc18	All 18-digit credit card numbers.

**number\_cc.ecr, continued**

Entity	Description
number/cc19dn	19-digit credit card numbers with no delimiters.
number/cc19dh	19-digit credit card numbers with hyphen delimiters.
number/cc19ds	19-digit credit card numbers with space delimiters.
number/cc19	All 19-digit credit card numbers.
number/ccdn	All credit card numbers with no delimiters.
number/ccdh	All credit card numbers with hyphen delimiters.
number/ccds	All credit card numbers with space delimiters.
number/cc	<p>Any credit card number.</p> <p>Micro Focus Education supports the following credit card formats:</p> <ul style="list-style-type: none"> <li>• American Express</li> <li>• Bankcard</li> <li>• China Union Pay</li> <li>• DanKort</li> <li>• Diners Club Carte Blanche</li> <li>• Diners Club International</li> <li>• Diners Club enRoute</li> <li>• Discover</li> <li>• InstaPayment</li> <li>• JCB</li> <li>• Laser</li> <li>• Maestro</li> <li>• Mastercard</li> <li>• Solo</li> <li>• Switch</li> <li>• Visa</li> </ul>
number/cc_amex	<p>American Express credit card number. American Express credit card account numbers are 15 digits in lengths, and generally start with either 34 or 37. For example, 378124403602370.</p>

**number\_cc.ecr, continued**

Entity	Description
number/cc_bankcard	Bankcard credit card number (discontinued in 2006).
number/cc_china_union_pay	China UnionPay credit card number. Most China UnionPay card numbers have prefixes from 620 to 625, and range in length from 16 to 19 characters.
number/cc_diners_club	Diners Club credit card number. Most Diners Club credit card numbers are 16 or 14 digits long. For example, 30544726571210 (Carte Blanche), 36072371463677 (International), or 5484308289255581 (North America).
number/cc_discover	Discover credit card number. Discover credit card numbers start with 6011, 622126 to 622925, 644, 645, 646, 647, 648, 649, or 65, and are 16 digits long. For example, 6011541256841963.
number/cc_instapayment	InstaPayment credit card number. InstaPayment credit card numbers start with either 637, 638, or 639, and are 16 digits long. For example, 6393519709142682.
number/cc_jcb	JCB credit card number. JCB credit card numbers consist of 16 digits. Either the first four digits must be 3088, 3096, 3112, 3158, or 3337, or the first eight digits must be in the range 35280000 to 35899999. For example, 3158745776935953.
number/cc_laser	Laser credit card number (discontinued in 2014). Laser credit card numbers start with 6304, 6706, 6771, or 6709, and are between 16 to 19 digits long. For example, 6709682431878947.
number/cc_maestro	Maestro credit card number. Maestro credit card numbers start with 5018, 5020, 5038, 5893, 6304, 6759, 6761, 6762, or 6763, and are between 16 to 19 digits long (although they can have as few as 12 digits). For example, 5018452935461261.
number/cc_mastercard	Mastercard credit card number. Mastercard credit card numbers start with 51, 52, 53, 54, or 55, and are between 16 to 19 digits long.
number/cc_solo	16-digit, 18-digit, or 19-digit Solo credit card number (discontinued in 2011). For example, 633110199990016.

**number\_cc.ecr, continued**

Entity	Description
number/cc_switch	16-digit, 18-digit, or 19-digit Switch credit card number (rebranded as Maestro). Switch credit card numbers begin with 4903, 4905, 4911, 4936, 564182, 633110, 6333, or 6759.
number/cc_visa	Visa credit card number. Most Visa credit card numbers start with 4 and are 16 digits long; however, there are a few that consist of 13 digits. The numbers are always spaced in four groups of four digits each. For example, 4929 8198 5006 5312.

**number\_dni\_es.ecr**

Entity	Description
number/dni/es	Spanish DNI (national identity card).  <b>NOTE:</b> You must set EnableComponents to True for the provided post-processing Lua script to work.

**number\_driverlic\_ca.ecr**

Entity	Description
number/driverlic/AB/ca	Driver's licence number for each Canadian province and territory. The two-letter codes are defined by ISO 3166-2.
number/driverlic/BC/ca	
number/driverlic/MB/ca	
number/driverlic/NB/ca	
number/driverlic/NL/ca	
number/driverlic/NS/ca	
number/driverlic/NT/ca	
number/driverlic/NU/ca	
number/driverlic/ON/ca	
number/driverlic/PE/ca	
number/driverlic/QC/ca	
number/driverlic/SK/ca	
number/driverlic/YT/ca	
number/driverlic/ca	All Canadian driver's licence numbers.

**number\_driverlic\_de.ecr**

Entity	Description
number/driverlic/de	German driver's licence number.

**number\_driverlic\_fr.ecr**

Entity	Description
number/driverlic/fr	French driver's licence number.

**number\_driverlic\_gb.ecr**

Entity	Description
number/driverlic/gb	United Kingdom driving licence number.

**number\_driverlic\_us.ecr**

Entity	Description
number/driverlic/AL/us	Driver's licence number for each U.S. state.
number/driverlic/AK/us	
number/driverlic/AR/us	
number/driverlic/AZ/us	
number/driverlic/CA/us	
number/driverlic/CO/us	
number/driverlic/CT/us	
number/driverlic/DC/us	
number/driverlic/DE/us	
number/driverlic/FL/us	
number/driverlic/GA/us	
number/driverlic/HI/us	
number/driverlic/IA/us	
number/driverlic/ID/us	
number/driverlic/IL/us	
number/driverlic/IN/us	
number/driverlic/KS/us	

**number\_driverlic\_us.ecr, continued**

Entity	Description
number/driverlic/KY/us	
number/driverlic/LA/us	
number/driverlic/MA/us	
number/driverlic/MD/us	
number/driverlic/ME/us	
number/driverlic/MI/us	
number/driverlic/MN/us	
number/driverlic/MO/us	
number/driverlic/MS/us	
number/driverlic/MT/us	
number/driverlic/NC/us	
number/driverlic/ND/us	
number/driverlic/NE/us	
number/driverlic/NH/us	
number/driverlic/NJ/us	
number/driverlic/NM/us	
number/driverlic/NV/us	
number/driverlic/NY/us	
number/driverlic/OH/us	
number/driverlic/OK/us	
number/driverlic/OR/us	
number/driverlic/PA/us	
number/driverlic/RI/us	
number/driverlic/SC/us	
number/driverlic/SD/us	
number/driverlic/TN/us	
number/driverlic/TX/us	
number/driverlic/UT/us	
number/driverlic/VA/us	
number/driverlic/VT/us	
number/driverlic/WA/us	

**number\_driverlic\_us.ecr, continued**

Entity	Description
number/driverlic/WV/us number/driverlic/WI/us number/driverlic/WY/us	
number/driverlic/us	All U.S. driver's licence numbers.

**number\_fuel.ecr**

Entity	Description
number/fuel_voyager	A Voyager fleet card number, with various permitted number groupings and delimiters.

**number\_iban.ecr**

Entity	Description
number/ibandn/albania number/ibands/albania number/ibandn/andorra number/ibands/andorra number/ibandn/austria number/ibands/austria number/ibandn/azerbaijan number/ibands/azerbaijan number/ibandn/bahrain number/ibands/bahrain number/ibandn/belarus number/ibands/belarus number/ibandn/belgium number/ibands/belgium number/ibandn/bosniaherzegovina number/ibands/bosniaherzegovina number/ibandn/bulgaria	<p>Undelimited (dn) or space-delimited (ds) International Bank Account Number (IBAN) for each country. For more information on IBAN formatting requirements for each country, see <a href="https://www.iban.com/structure.html">https://www.iban.com/structure.html</a>.</p> <p><b>NOTE:</b> North Macedonia is the name for Macedonia since February 2019. The Macedonia entity remains in the grammar for compatibility. It matches the same patterns as North Macedonia.</p>

**number\_iban.ecr, continued**

Entity	Description
number/ibands/bulgaria	
number/ibandn/brazil	
number/ibands/brazil	
number/ibandn/costarica	
number/ibands/costarica	
number/ibandn/croatia	
number/ibands/croatia	
number/ibandn/cyprus	
number/ibands/cyprus	
number/ibandn/czechrepublic	
number/ibands/czechrepublic	
number/ibandn/denmark	
number/ibands/denmark	
number/ibandn/dominicanrepublic	
number/ibands/dominicanrepublic	
number/ibandn/egypt	
number/ibands/egypt	
number/ibandn/elsalvador	
number/ibands/elsalvador	
number/ibandn/estonia	
number/ibands/estonia	
number/ibandn/faroeislands	
number/ibands/faroeislands	
number/ibandn/finland	
number/ibands/finland	
number/ibandn/france	
number/ibands/france	
number/ibandn/georgia	
number/ibands/georgia	
number/ibandn/germany	
number/ibands/germany	

**number\_iban.ecr, continued**

Entity	Description
number/ibandn/gibraltar	
number/ibands/gibraltar	
number/ibandn/greece	
number/ibands/greece	
number/ibandn/greenland	
number/ibands/greenland	
number/ibandn/guatemala	
number/ibands/guatemala	
number/ibandn/holysee	
number/ibands/holysee	
number/ibandn/hungary	
number/ibands/hungary	
number/ibandn/iceland	
number/ibands/iceland	
number/ibandn/iraq	
number/ibands/iraq	
number/ibandn/ireland	
number/ibands/ireland	
number/ibandn/israel	
number/ibands/israel	
number/ibandn/italy	
number/ibands/italy	
number/ibandn/jordan	
number/ibands/jordan	
number/ibandn/kazakhstan	
number/ibands/kazakhstan	
number/ibandn/kosovo	
number/ibands/kosovo	
number/ibandn/kuwait	
number/ibands/kuwait	
number/ibandn/latvia	

**number\_iban.ecr, continued**

Entity	Description
number/ibands/latvia	
number/ibandn/lebanon	
number/ibands/lebanon	
number/ibandn/liechtenstein	
number/ibands/liechtenstein	
number/ibandn/lithuania	
number/ibands/lithuania	
number/ibandn/luxembourg	
number/ibands/luxembourg	
number/ibandn/macedonia	
number/ibands/macedonia	
number/ibandn/malta	
number/ibands/malta	
number/ibandn/mauritania	
number/ibands/mauritania	
number/ibandn/mauritius	
number/ibands/mauritius	
number/ibandn/moldova	
number/ibands/moldova	
number/ibandn/monaco	
number/ibands/monaco	
number/ibandn/montenegro	
number/ibands/montenegro	
number/ibandn/netherlands	
number/ibands/netherlands	
number/ibandn/northmacedonia	
number/ibands/northmacedonia	
number/ibandn/norway	
number/ibands/norway	
number/ibandn/pakistan	
number/ibands/pakistan	

**number\_iban.ecr, continued**

Entity	Description
number/ibandn/palestine	
number/ibands/palestine	
number/ibandn/poland	
number/ibands/poland	
number/ibandn/portugal	
number/ibands/portugal	
number/ibandn/qatar	
number/ibands/qatar	
number/ibandn/romania	
number/ibands/romania	
number/ibandn/saintlucia	
number/ibands/saintlucia	
number/ibandn/sanmarino	
number/ibands/sanmarino	
number/ibandn/saotomeprincipe	
number/ibands/saotomeprincipe	
number/ibandn/saudiarabia	
number/ibands/saudiarabia	
number/ibandn/serbia	
number/ibands/serbia	
number/ibandn/seychelles	
number/ibands/seychelles	
number/ibandn/slovakrepublic	
number/ibands/slovakrepublic	
number/ibandn/slovenia	
number/ibands/slovenia	
number/ibandn/spain	
number/ibands/spain	
number/ibandn/sweden	
number/ibands/sweden	
number/ibandn/switzerland	

**number\_iban.ecr, continued**

Entity	Description
number/ibands/switzerland	
number/ibandn/timorleste	
number/ibands/timorleste	
number/ibandn/tunisia	
number/ibands/tunisia	
number/ibandn/turkey	
number/ibands/turkey	
number/ibandn/ukraine	
number/ibands/ukraine	
number/ibandn/unitedarabemirates	
number/ibands/unitedarabemirates	
number/ibandn/unitedkingdom	
number/ibands/unitedkingdom	
number/ibandn/virginislandsbritish	
number/ibands/virginislandsbritish	
number/ibandn	All IBAN numbers without delimiters.
number/ibands	All IBAN numbers with space delimiters.

**number\_insee\_fr.ecr**

Entity	Description
number/insee/fr	French INSEE number. INSEE numbers are composed of 13 digits and a two-digit key.  Score="0.2" is used for examples with unspecified months.

**number\_licenseplate\_ca.ecr**

Entity	Description
number/licenseplate/AB/ca	Licence plate numbers for each Canadian province and territory.
number/licenseplate/BC/ca	
number/licenseplate/MB/ca	

**number\_licenseplate\_ca.ecr, continued**

Entity	Description
number/licenseplate/NB/ca	
number/licenseplate/NL/ca	
number/licenseplate/NT/ca	
number/licenseplate/NS/ca	
number/licenseplate/NU/ca	
number/licenseplate/ON/ca	
number/licenseplate/PE/ca	
number/licenseplate/QC/ca	
number/licenseplate/SK/ca	
number/licenseplate/YT/ca	
number/licenseplate/ca	All Canadian licence plate numbers.

**number\_licenseplate\_de.ecr**

Entity	Description
number/licenseplate/de	German vehicle number plate.

**number\_licenseplate\_es.ecr**

Entity	Description
number/licenseplate/es	Spanish vehicle number plate.

**number\_licenseplate\_fr.ecr**

Entity	Description
number/licenseplate/fr	French vehicle registration number.

**number\_licenseplate\_gb.ecr**

Entity	Description
number/licenseplate/gb	United Kingdom vehicle registration number.

**number\_licenseplate\_us.ecr**

Entity	Description
number/licenseplate/AL/us	Licence plate numbers for each U.S. state.
number/licenseplate/AK/us	
number/licenseplate/AR/us	
number/licenseplate/AZ/us	
number/licenseplate/CA/us	
number/licenseplate/CO/us	
number/licenseplate/CT/us	
number/licenseplate/DE/us	
number/licenseplate/DC/us	
number/licenseplate/FL/us	
number/licenseplate/GA/us	
number/licenseplate/HI/us	
number/licenseplate/IA/us	
number/licenseplate/ID/us	
number/licenseplate/IL/us	
number/licenseplate/IN/us	
number/licenseplate/KS/us	
number/licenseplate/KY/us	
number/licenseplate/LA/us	
number/licenseplate/MA/us	
number/licenseplate/MD/us	
number/licenseplate/ME/us	
number/licenseplate/MI/us	
number/licenseplate/MN/us	
number/licenseplate/MO/us	
number/licenseplate/MS/us	
number/licenseplate/MT/us	
number/licenseplate/NC/us	
number/licenseplate/ND/us	
number/licenseplate/NE/us	
number/licenseplate/NH/us	

**number\_licenseplate\_us.ecr, continued**

Entity	Description
number/licenseplate/NJ/us	
number/licenseplate/NM/us	
number/licenseplate/NV/us	
number/licenseplate/NY/us	
number/licenseplate/OH/us	
number/licenseplate/OK/us	
number/licenseplate/OR/us	
number/licenseplate/PA/us	
number/licenseplate/RI/us	
number/licenseplate/SC/us	
number/licenseplate/SD/us	
number/licenseplate/TN/us	
number/licenseplate/TX/us	
number/licenseplate/UT/us	
number/licenseplate/VA/us	
number/licenseplate/VT/us	
number/licenseplate/WA/us	
number/licenseplate/WV/us	
number/licenseplate/WI/us	
number/licenseplate/WY/us	
number/licenseplate/us	United States license plate number.

**number\_mac\_address.ecr**

Entity	Description
number/EUI48dh	MAC address in EUI-48 format (hyphen-separated). For example, <i>01-23-45-67-89-Ab</i>
number/EUI48dc	MAC address in EUI-48 format (colon-separated). For example, <i>01:23:45:67:89:Ab</i>
number/EUI48	MAC address in EUI-48 format. For example, <i>01-23-45-67-89-Ab</i>

#### number\_mac\_address.ecr, continued

Entity	Description
number/EUI64dh	MAC address in EUI-64 format (hyphen-separated). For example, <i>01-23-45-67-89-ab-CD-eF</i>
number/EUI64dc	MAC address in EUI-64 format (colon-separated). For example, <i>01:23:45:67:89:ab:CD:eF</i>
number/EUI64	MAC address in EUI-64 format. For example, <i>01-23-45-67-89-ab-CD-eF</i>

#### number\_ni\_gb.ecr

Entity	Description
number/nids/gb	UK National Insurance number with space delimiters.
number/nidn/gb	UK National Insurance number without delimiters.
number/nidh/gb	UK National Insurance number with hyphen delimiters.
number/ni/gb	Any UK National Insurance number. The format of the number is two prefix letters, six digits, and one suffix letter.

#### number\_passport\_engca.ecr

Entity	Description
number/passport_number/engca	Canadian passport number (in any context).
number/passport_context/engca	Canadian passport number (when found in English-language context).

#### number\_passport\_enggb.ecr

Entity	Description
number/passport_context/enggb	UK passport number (when found in English-language context).

#### number\_passport\_engus.ecr

Entity	Description
number/passport_context/engus	U.S. passport number (when found in English-language context).

#### number\_passport\_freca.ecr

Entity	Description
number/passport_number/freca	French Canadian passport number (in any context).
number/passport_context/freca	French Canadian passport number (when found in French-language context).

#### number\_passport\_frefr.ecr

Entity	Description
number/passport_number/frefr	French passport number (in any context).
number/passport_context/frefr	French passport number (when found in French-language context).

#### number\_passport\_gerde.ecr

Entity	Description
number/passport_context/gerde	German passport number (when found in German-language context).

#### number\_phone\_au.ecr

Entity	Description
phone/landline/au	A complete landline phone number in Australia. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/mobile/au	A complete mobile phone number in Australia. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/other/au	A complete 08- or 09- phone number in Australia. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

#### number\_phone\_au.ecr, continued

Entity	Description
phone/all/au	Any complete phone number in Australia. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

#### number\_phone\_be.ecr

Entity	Description
phone/landline/be	A complete landline phone number in Belgium. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/mobile/be	A complete mobile phone number in Belgium. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/other/be	A complete 08- or 09- phone number in Belgium. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/all/be	Any complete phone number in Belgium. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

#### number\_phone\_ca.ecr

Entity	Description
phone/numds/ca	A numeric-only Canadian phone number, delimited by spaces. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/numdh/ca	A numeric-only Canadian phone number, delimited by hyphens. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/numdd/ca	A numeric-only Canadian phone number, delimited by dots. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/numdn/ca	An undelimited, numeric-only Canadian phone number. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/num/ca	Any numeric-only Canadian phone number. To ensure

**number\_phone\_ca.ecr, continued**

Entity	Description
	that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
<code>phone/alphanumds/ca</code>	An alphanumeric Canadian phone number, delimited by spaces.
<code>phone/alphanumdh/ca</code>	An alphanumeric Canadian phone number, delimited by hyphens. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
<code>phone/alphanumdd/ca</code>	An alphanumeric Canadian phone number, delimited by dots.
<code>phone/alphanumdn/ca</code>	An undelimited, alphanumeric Canadian phone number.
<code>phone/alphanum/ca</code>	Any alphanumeric Canadian phone number. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

**number\_phone\_cn.ecr**

Entity	Description
<code>phone/landline/cn</code>	A Chinese landline phone number. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
<code>phone/mobile/cn</code>	A Chinese mobile phone number. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
<code>phone/tollfree/cn</code>	A Chinese toll free phone number.
<code>phone/all/cn</code>	Any Chinese phone number. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

**number\_phone\_de.ecr**

Entity	Description
<code>phone/landline/de</code>	A complete landline phone number in Germany. To ensure that this entity performs correctly, set

#### number\_phone\_de.ecr, continued

Entity	Description
	TangibleCharacters to include '+' and '('.
phone/mobile/de	A complete mobile phone number in Germany. To ensure that this entity performs correctly, set TangibleCharacters to include '+' and '('.
phone/other/de	A complete freephone or premium phone number in Germany. To ensure that this entity performs correctly, set TangibleCharacters to include '+' and '('.
phone/all/de	Any complete German phone number. To ensure that this entity performs correctly, set TangibleCharacters to include '+' and '('.

#### number\_phone\_es.ecr

Entity	Description
phone/landline/es	A complete landline phone number in Spain. To ensure that this entity performs correctly, set TangibleCharacters to include '+' and '('.
phone/mobile/es	A complete mobile phone number in Spain. To ensure that this entity performs correctly, set TangibleCharacters to include '+' and '('.
phone/other/es	A complete freephone or premium phone number in Spain. To ensure that this entity performs correctly, set TangibleCharacters to include '+' and '('.
phone/all/es	Any complete phone number in Spain. To ensure that this entity performs correctly, set TangibleCharacters to include '+' and '('.

#### number\_phone\_fr.ecr

Entity	Description
phone/landline/fr	A complete landline phone number in France. To ensure that this entity performs correctly, set TangibleCharacters to include '+' and '('.
phone/mobile/fr	A complete mobile phone number in France. To ensure that this entity performs correctly, set TangibleCharacters to include '+' and '('.

**number\_phone\_fr.ecr, continued**

Entity	Description
phone/other/fr	A complete 08- or 09- phone number in France. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/all/fr	Any complete phone number in France. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

**number\_phone\_gb.ecr**

Entity	Description
phone/areacode/gb	United Kingdom area code.
phone/landline/gb	A complete landline phone number in the United Kingdom. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/mobile/gb	A complete mobile phone number in the United Kingdom. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/freephone/gb	A complete freephone phone number in the United Kingdom. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/business/gb	A complete 08- or 09- phone number in the United Kingdom. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/non_geographic/gb	A complete non-geographic phone number in the United Kingdom. For example, <i>0345 678 579 40</i> . To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/personal/gb	A complete 070- phone number in the United Kingdom. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/all/gb	Any complete phone number in the United Kingdom. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

#### number\_phone\_it.ecr

Entity	Description
phone/landline/it	A complete landline phone number in Italy. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/mobile/it	A complete mobile phone number in Italy. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/other/it	A premium rate, freephone, or shared-cost phone number in Italy. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/all/it	Any complete phone number in Italy. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

#### number\_phone\_lu.ecr

Entity	Description
phone/landline/lu	A complete landline phone number in Luxembourg. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/mobile/lu	A complete mobile phone number in Luxembourg. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/all/lu	Any complete phone number in Luxembourg. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

#### number\_phone\_nl.ecr

Entity	Description
phone/landline/nl	A complete landline phone number in the Netherlands. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/mobile/nl	A complete mobile phone number in the Netherlands. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

#### number\_phone\_nl.ecr, continued

Entity	Description
phone/other/nl	A complete 08- or 09- phone number in the Netherlands. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/all/nl	Any complete phone number in the Netherlands. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

#### number\_phone\_pt.ecr

Entity	Description
phone/landline/pt	A complete landline phone number in Portugal. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/mobile/pt	A complete mobile phone number in Portugal. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/other/pt	Other complete phone number in Portugal. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/all/pt	Any complete phone number in Portugal. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

#### number\_phone\_us.ecr

Entity	Description
phone/numds/us	A numeric-only U.S. phone number, delimited by spaces. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/numdh/us	A numeric-only U.S. phone number, delimited by hyphens. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/numdd/us	A numeric-only U.S. phone number, delimited by dots. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.

**number\_phone\_us.ecr, continued**

Entity	Description
phone/numdn/us	An undelimited, numeric-only U.S. phone number. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/num/us	Any numeric-only U.S. phone number. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '+' and '('.
phone/alphanumds/us	An alphanumeric U.S. phone number, delimited by spaces.
phone/alphanumdh/us	An alphanumeric U.S. phone number, delimited by hyphens.
phone/alphanumdd/us	An alphanumeric U.S. phone number, delimited by dots.
phone/alphanumdn/us	An undelimited, alphanumeric U.S. phone number.
phone/alphanum/us	Any alphanumeric U.S. phone number.

**number\_sin\_ca.ecr**

Entity	Description
number/sindh/ca	Canadian social insurance number with dash delimiters.
number/sinds/ca	Canadian social insurance number with space delimiters.
number/sindn/ca	Canadian social insurance number without delimiters.
number/sin/ca	Any Canadian social security number.

**number\_ss\_us.ecr**

Entity	Description
number/ssdh/us	Social Security number with dash delimiters.
number/ssdsh/us	Social Security number with soft hyphen delimiters.
number/ssds/us	Social Security number with space delimiters.
number/ssdnbs/us	Social Security number with non-breaking space delimiters.

**number\_ss\_us.ecr, continued**

Entity	Description
number/ssdn/us	Social Security number without delimiters.
number/ss/us	Any Social Security number.
number/medicareid/us	Medicare ID.

**number\_swiftcode.ecr**

Entity	Description
number/swiftcode	Swift code.

**number\_telecoms.ecr**

Entity	Description
number/imei	International Mobile Station Equipment Identity number.
number/imeisv	International Mobile Station Equipment Identity Software Version number.
number/meid_hex	Mobile Equipment Identifier (hexadecimal format).
number/iccid	Integrated Circuit Card Identifier number.
number/imsi	International Mobile Subscriber Identity number.
number/plmn	Public Land Mobile Network number.
number/msisdn	Mobile Subscriber Integrated Services Digital Network number.

**number\_types\_chi.ecr**

Entity	Description
number/one_to_nine/chi	The numbers one to nine in Chinese.
number/zero_to_nine/chi	The numbers zero to nine in Chinese.
number/zero_to_twelve/chi	The numbers zero to 12 in Chinese.
number/zero_to_twenty_four/chi	The numbers zero to 24 in Chinese.

**number\_types\_chi.ecr, continued**

Entity	Description
number/one_to_thirty_one/chi	The numbers one to 31 in Chinese.
number/zero_to_fifty_five/chi	The numbers zero to 55 in steps of five in Chinese.
number/zero_to_fifty_nine/chi	The numbers zero to 59 in Chinese.
number/one_to_ninety_nine/chi	The numbers one to 99 in Chinese.
number/one_to_one_hundred/chi	The numbers one to 100 in Chinese.
number/all/chi	Large numbers in Chinese.
number/num/chi	A simple string of digits that does not start with a zero in Chinese.
number/digits/chi	String of digits in Chinese.
number/fraction/chi	A simple fraction consisting of two strings of digits that do not start with a zero. For example, $-12/13$ , $1/5$ .

**number\_types\_eng.ecr**

Entity	Description
number/num/eng	A simple string of digits that does not start with a zero. For example, $123$ .
number/ncomma/eng	A number without commas. For example, $123456$ .
number/comma/eng	A number with commas. For example, $123,456$ .
number/sign/eng	A sign. For example $+$ , $-$ , <i>plus</i> , <i>minus</i> .
number/natural/eng	A natural number. For example, $123,456$ .
number/int/eng	An integer. For example, $-123,456$ , <i>minus 2</i> , $+20$ .
number/real/eng	A real number. For example, $123.456$ , $-123.456$ .
number/fraction/eng	A simple fraction of two unsigned strings of digits that do not start with a zero. For example, $12/13$ .
number/fractalpha/eng	An alphabetical fraction. For example, <i>one half</i> , <i>three sixths</i> , <i>three and five ninths</i> .
number/fracnum/eng	Numeric fractions. For example, $-12/13$ .
number/fracmixed/eng	Mixed fractions. For example, <i>1 twelfth</i> , <i>8 fourteenths</i> , <i>3 and five ninths</i> .

**number\_types\_eng.ecr, continued**

Entity	Description
number/pcnt/eng	Percent. For example, <i>100%</i> , <i>100 percent</i> , <i>12.78%</i> .
number/suff/eng	Numbers with a suffix. For example, <i>1st</i> , <i>3rd</i> .
number/suffalpha/eng	Fractions with mixed alphabetical and numeric terms. For example, <i>a 12th</i> , <i>three 3rds</i> .
number/doz/eng	Number based on dozen. For example, <i>half a dozen</i> , <i>2 dozen</i> , <i>three and a half dozen</i> .
number/alpha/eng	Alphabetical numbers less than 100. For example, <i>one</i> , <i>ten</i> , <i>thirty-one</i> .
number/bigalpha/eng	Big alphabetical numbers.
number/bignum/eng	Big numeric abbreviated numbers.
number/big/eng	A big number, alphabetical or numeric abbreviated.
number/sci/eng	A number in scientific notation. For example, <i>1.23x10<sup>11</sup></i> , <i>1.23E+5</i> , <i>6.1<sup>-3</sup></i> .
number/fullalpha/eng	A fully written out number up to 999,999,999,999,999. For example, <i>one thousand two hundred and thirty four</i> .
number/numord/eng	An ordinal number up to 999. For example, <i>thirty fourth</i> .
number/num_plurals/eng	Plural numbers. For example, <i>dozens</i> , <i>millions</i> .

**number\_types\_fre.ecr**

Entity	Description
number/num/fre	A simple string of digits that does not start with 0. For example, <i>123</i> .
number/num_sep/fre	A number with separators. For example, <i>123.456.789</i> .
number/digits/fre	A string of digits. For example, <i>00123</i> .
number/natural/fre	A natural number. For example, <i>123.456.789</i> or <i>123456789</i> .
number/fraction/fre	A simple fraction of two unsigned strings of digits that do not start with a zero. For example, <i>12/13</i> .
number/int/fre	An integer. For example, <i>-123.456.789</i> ; <i>moins 2</i> ; <i>20</i> .

**number\_types\_fre.ecr, continued**

Entity	Description
number/real/fre	A real number. For example, <i>123.456</i> , <i>-123.456</i> .
number/numalpha/fre	A fully written out number up to 999. For example, <i>deux cent trente-quatre</i> .
number/numord/fre	An ordinal number up to 999. For example, <i>trente quatrième</i> .

**number\_vin.ecr**

Entity	Description
number/vin/wmi	The world manufacturer identifier section (3 characters) of a vehicle identification number.
number/vin/vds	The vehicle descriptor section (6 characters) of a vehicle identification number.
number/vin/model_year	The model year character of a vehicle identification number.
number/vin/plant_code	The plant code character of a vehicle identification number.
number/vin/seq_number	The vehicle identifier section sequential number (6 characters) of a vehicle identification number.
number/vin/vis	The vehicle identifier section (8 characters) of a vehicle identification number.
number/vin	A vehicle identification number (17 characters).
number/vin/anonymized	An anonymized vehicle identification number (first 9 or 11 characters).

**O**

**organization.ecr**

Entity	Description
org/organization	An organization.

## P

### person\_name\_chicn.ecr

Entity	Description
person/femalefirstname_s/chicn	Popular simplified Chinese female first name.
person/malefirstname_s/chicn	Popular simplified Chinese male first name.
person/lastname_s/chicn	Popular simplified Chinese last name.
person/firstname/chicn	Chinese first name.
person/namelastfirst/chicn	Chinese last and first name.

### person\_name\_dutnl.ecr

Entity	Description
person/femalefirstname/dutnl	Popular Dutch female first name.
person/malefirstname/dutnl	Popular Dutch male first name.
person/firstname/dutnl	Dutch first name.
person/surname/dutnl	Dutch surname.
person/namefirstmiddlelast/dutn	Dutch first, optional middle, and last name.

### person\_name\_engcn.ecr

Entity	Description
person/femalefirstname/engcn	Popular Chinese female first name in English.
person/femalefirstname_lowercase/engcn	Popular Chinese female first name in lowercase English.
person/malefirstname/engcn	Popular Chinese male first name in English.
person/malefirstname_lowercase/engcn	Popular Chinese male first name in lowercase English.
person/lastname/engcn	Popular Chinese last name in English.
person/firstname/engcn	Chinese first name in English.
person/namelastfirst/engcn	Chinese last and first name in English.
person/namefirstlast/engcn	Chinese first and last name in English.

**person\_name\_enggb.ecr**

Entity	Description
person/femalefirstname/enggb	Popular UK female first name.
person/malefirstname/enggb	Popular UK male first name.
person/lastname/enggb	Popular UK last name.
person/firstname/enggb	UK first name.
person/namefirstlast/enggb	UK first and last name.
person/namefirstmiddlelast/enggb	UK first, optional middle, and last name.

**person\_name\_enggr.ecr**

Entity	Description
person/femalefirstname/enggr	Popular Greek female first name.
person/malefirstname/enggr	Popular Greek male first name.
person/lastname/enggr	Popular Greek last name.
person/firstname/enggr	Greek first name.
person/namefirstlast/enggr	Greek first and last name.

**person\_name\_engin.ecr**

Entity	Description
person/femalefirstname/engin	Popular Indian female first name.
person/malefirstname/engin	Popular Indian male first name.
person/lastname/engin	Popular Indian last name.
person/firstname/engin	Indian first name.
person/namefirstlast/engin	Indian first and last name.
person/namefirstmiddlelast/engin	Indian first, optional middle, and last name.

**person\_name\_engjp.ecr**

Entity	Description
person/femalefirstname/engjp	Popular Japanese female first name in English.
person/malefirstname/engjp	Popular Japanese male first name in romanji.
person/lastname/engjp	Popular Japanese last name in English.
person/firstname/engjp	Japanese first name in English.
person/namelastfirst/engjp	Japanese last and first name in English.

**person\_name\_engru.ecr**

Entity	Description
person/femalefirstname/engru	Popular Russian female first name in English.
person/malefirstname/engru	Popular Russian male first name in English.
person/lastname/engru	Popular Russian last name in English.
person/firstname/engru	Russian first name in English.
person/namefirstlast/engru	Russian first and last name in English.
person/namefirstmiddlelast/engru	Russian first, optional middle, and last name in English.

**person\_name\_engus.ecr**

Entity	Description
person/femalefirstname/engus	Popular U.S. female first name.
person/malefirstname/engus	Popular U.S. male first name.
person/lastname/engus	Popular U.S. last name.
person/firstname/engus	U.S. first name.
person/compoundlastname/engus	U.S. last name that might be compound.
person/namefirstlast/engus	U.S. first and last name.
person/namefirstmiddlelast/engus	U.S. first, optional middle, and last name.
person/nameinitial/engus	U.S. initialed name.
person/namelastsuffix/engus	Last name and suffix.

**person\_name\_engus.ecr, continued**

Entity	Description
person/namefirstneelast/engus	First name and maiden name.
person/namelastcommafirst/engus	Full name in address book format ( <i>Last Name, First Name</i> ).

**person\_name\_frefr.ecr**

Entity	Description
person/femalefirstname/frefr	Popular French female first name.
person/malefirstname/frefr	Popular French male first name.
person/lastname/frefr	Popular French last name.
person/firstname/frefr	French first name.
person/namefirstlast/frefr	French first and last name.
person/namefirstmiddlelast/frefr	French first, optional middle, and last name.

**person\_name\_gerde.ecr**

Entity	Description
person/femalefirstname/gerde	Popular German female first name.
person/malefirstname/gerde	Popular German male first name.
person/lastname/gerde	Popular German last name.
person/firstname/gerde	German first name.
person/namefirstmiddlelast/gerde	German first, optional middle, and last name.

**person\_name\_itait.ecr**

Entity	Description
person/femalefirstname/itait	Popular Italian female first name.
person/malefirstname/itait	Popular Italian male first name.
person/lastname/itait	Popular Italian last name.
person/firstname/itait	Italian first name.

**person\_name\_itait.ecr, continued**

Entity	Description
person/namefirstlast/itait	Italian first and last name.
person/namefirstmiddlelast/itait	Italian first, optional middle, and last name.

**person\_name\_jpnjp.ecr**

Entity	Description
person/femalefirstname/jpnjp	Popular Japanese female first name.
person/malefirstname/jpnjp	Popular Japanese male first name in kanj.
person/lastname/jpnjp	Popular Japanese last name in kanj.
person/firstname/jpnjp	Japanese first name.
person/namelastfirst/jpnjp	Japanese last and first name.

**person\_name\_norno.ecr**

Entity	Description
person/femalefirstname/norno	Popular Norwegian female first name.
person/malefirstname/norno	Popular Norwegian male first name.
person/lastname/norno	Popular Norwegian last name.
person/firstname/norno	Norwegian first name.
person/namefirstlast/norno	Norwegian first and last name.
person/namefirstmiddlelast/norno	Norwegian first, optional extra given name, optional middle name, and last name.

**person\_name\_rusru.ecr**

Entity	Description
person/femalefirstname_unambiguous	Common Russian female first name in Russian that rarely has any alternative meaning.
person/malefirstname_unambiguous	Common Russian male first name in Russian that rarely has any alternative meaning.

**person\_name\_rusru.ecr, continued**

Entity	Description
person/femalefirstname/rusru	Russian female first name in Russian.
person/femalelastname/rusru	Russian female last name in Russian.
person/malefirstname/rusru	Russian male first name in Russian.
person/malelastname/rusru	Russian male last name in Russian.
person/firstname/rusru	Russian first name in Russian.
person/lastname/rusru	Russian last name in Russian.
person/fullname/rusru	Russian full name in Russian.

**person\_name\_spaes.ecr**

Entity	Description
person/femalefirstname/spaes	Popular Spanish female first name.
person/malefirstname/spaes	Popular Spanish male first name.
person/lastname/spaes	Popular Spanish last name.
person/firstname/spaes	Spanish first name.
person/compoundlastname/spaes	Spanish compound last name.
person/namefirstoptionalast/spaes	Spanish first and optional last name.
person/namefirstlast/spaes	Spanish first and last name.
person/namelastfirst/spaes	Spanish last name, comma, and first name.
person/fullname	Spanish full name.

**person\_name\_swese.ecr**

Entity	Description
person/femalefirstname/swese	Popular Swedish female first name.
person/malefirstname/swese	Popular Swedish male first name.
person/lastname/swese	Popular Swedish last name.
person/firstname/swese	Swedish first name.
person/namefirstlast/swese	Swedish first and last name.

**person\_politician\_engus.ecr**

<b>Entity</b>	<b>Description</b>
person/poli_hor/engus	Full names of members of the U.S. House of Representatives. For example, <i>Robert E. Cramer</i> , <i>Robert Cramer</i> .
person/poli_last_hor/engus	Last name of House of Representatives members. For example, <i>Cramer</i> .
person/poli_sen/engus	Full name of U.S. senate members.
person/poli_last_sen/engus	Last name of U.S. senate members.
person/poli_gov/engus	Full name of U.S. governors.
person/poli_last_gov/engus	Last name of U.S. governors.
person/poli_cabinet_gw_bush/engus	Full name of a member of the George W. Bush administration.
person/poli_last_cabinet_gw_bush/engus	Last name of a member of the George W. Bush administration.
person/poli_cabinet_obama/engus	Full name of a member of the Barack Obama administration.
person/poli_last_cabinet_obama/engus	Last name of a member of the Barack Obama administration.
person/poli_cabinet_trump/engus	Full name of a member of the Donald Trump administration.
person/poli_last_cabinet_trump/engus	Last name of a member of the Donald Trump administration.
person/poli_other_2012/engus	Full name of other currently active politician. For example, a Presidential nominee.
person/poli_last_other_2012/engus	Last name of other currently active politician. For example, a Presidential nominee.
person/poli_president/engus	Past and present U.S. Presidents.
person/poli_title_hor/engus	Formal title for legislative members. For example, <i>Congressman Cramer</i> .
person/poli_title_sen/engus	Formal title for senate members.
person/poli_title_gov/engus	Formal title for governors.
<b>Entity</b>	<b>Description</b>
person/politician/jpnjp	Japanese politician.

#### person\_public\_figure\_chi.ecr

Entity	Description
person/politician/chicn	Chinese politician.
person/legislativecouncil/chihk	Hong Kong legislative council member.
person/entertainer/chi	Chinese entertainer.
person/npc/chicn	Chinese National People's Congress delegate.

#### person\_public\_figure\_eng.ecr

Entity	Description
person/public_figure/eng	A list of public figures in English.

#### person\_public\_figure\_jpn.ecr

Entity	Description
person/public_figure/jpn	A list of public figures in Japanese.

#### person\_salutation\_eng.ecr

Entity	Description
person/salutation/common/eng	Common salutation. For example, <i>Mr.</i>
person/salutation/military/eng	Military salutation.
person/salutation/political/eng	Political salutation.
person/salutation/religious/eng	Religious salutation.
person/salutation/nobility/eng	Salutation of nobility.
person/salutation/eng	Any salutation in English.

#### person\_salutation\_fre.ecr

Entity	Description
person/salutation/fre	French salutations. For example, <i>Madame, Mlle.</i>

**person\_suffix\_eng.ecr**

Entity	Description
person/suffixjr/eng	Name suffixes. For example, <i>Jr.</i>
person/suffixrmn/eng	Roman suffixes. For example, <i>III.</i>
person/suffixacab/eng	Academic suffix – Bachelor’s. For example, <i>BA.</i>
person/suffixacam/eng	Academic suffix – Master’s. For example, <i>MA.</i>
person/suffixacad/eng	Academic suffix – Doctoral. For example, <i>PhD.</i>
personal/suffixprof/eng	Professional suffix. For example, <i>MD.</i>

**place\_albal.ecr**

Entity	Description
place/city1/albal	Albanian settlement with over 100,000 inhabitants.
place/city1_uppercase/albal	Albanian settlement with over 100,000 inhabitants, in uppercase.
place/city2/albal	Albanian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/albal	Albanian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/county/albal	Albanian county.
place/county_uppercase/albal	Albanian county in uppercase.
place/district/albal	Albanian district.
place/district_uppercase/albal	Albanian district in uppercase.

**place\_albxk.ecr**

Entity	Description
place/city1/albxk	Kosovan settlement with over 100,000 inhabitants.
place/city1_uppercase/albxk	Kosovan settlement with over 100,000 inhabitants, in uppercase.
place/city2/albxk	Kosovan settlement with between 10,000 and 100,000 inhabitants.

**place\_albxk.ecr, continued**

Entity	Description
place/city2_uppercase/albxk	Kosovan settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/district/albxk	Kosovan district.
place/district_uppercase/albxk	Kosovan district in uppercase.

**place\_bosba.ecr**

Entity	Description
place/city1/bosba	Settlement of Bosnia and Herzegovina with over 100,000 inhabitants.
place/city1_uppercase/bosba	Settlement of Bosnia and Herzegovina with over 100,000 inhabitants, in uppercase.
place/city2/bosba	Settlement of Bosnia and Herzegovina with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/bosba	Settlement of Bosnia and Herzegovina with between 10,000 and 100,000 inhabitants, in uppercase.

**place\_chicn.ecr**

Entity	Description
place/city/chicn	Chinese city.
place/province/chicn	Chinese province.

**place\_chihk.ecr**

Entity	Description
place/district/chihk	District in Hong Kong.
place/island/chihk	Island in Hong Kong.
place/port/chihk	Port in Hong Kong.
place/hospital/chihk	Hospital in Hong Kong.
place/tunnel/chihk	Tunnel in Hong Kong.
place/bridge/chihk	Bridge in Hong Kong.

#### place\_chihk.ecr, continued

Entity	Description
place/hotel/chihk	Hotel in Hong Kong.
place/locality/chihk	Place in Hong Kong.

#### place\_chitw.ecr

Entity	Description
place/city/chitw	Major divisions of Taiwan, including six special municipalities, three provincial cities, and 13 counties.
place/district/chitw	Subdivisions of the major divisions of Taiwan. The subdivisions include city districts, county-controlled cities, urban townships, and rural townships.

#### place\_countries.ecr

Entity	Description
country/iso_lowercase	ISO 3166-1 alpha-2 country code.
country/all	Country in a local or major language.
country/output_iso	Country in a local or major language (output is normalized to the ISO 3166-1 alpha-2 code).

#### place\_czech.ecr

Entity	Description
place/city1/czech	Czech settlement with over 100,000 inhabitants.
place/city1_uppercase/czech	Czech settlement with over 100,000 inhabitants, in uppercase.
place/city2/czech	Czech settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/czech	Czech settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/region/czech	Czech region.
place/region_uppercase/czech	Czech region in uppercase.

**place\_dandk.ecr**

Entity	Description
place/city1/dandk	Danish settlement with over 100,000 inhabitants.
place/city1_uppercase/dandk	Danish settlement with over 100,000 inhabitants, in uppercase.
place/city2/dandk	Danish settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/dandk	Danish settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/region/dandk	Danish region.
place/region_uppercase/dandk	Danish region in uppercase.
place/municipality/dandk	Danish municipality.
place/municipality_uppercase/dandk	Danish municipality in uppercase.
place/island/dandk	Danish island
place/island_uppercase/dandk	Danish island in uppercase

**place\_dutnl.ecr**

Entity	Description
place/city1/dutnl	Dutch settlement with over 100,000 inhabitants.
place/city1_uppercase/dutnl	Dutch settlement with over 100,000 inhabitants, in uppercase.
place/city2/dutnl	Dutch settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/dutnl	Dutch settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/county/dutnl	Dutch county.
place/county_uppercase/dutnl	Dutch county in uppercase.
place/municipality/dutnl	Dutch municipality.
place/municipality_uppercase/dutnl	Dutch municipality in uppercase.
place/island/dutnl	Dutch island.
place/island_uppercase/dutnl	Dutch island in uppercase.

**place\_dutsr.ecr**

Entity	Description
place/city1/dutsr	Surinamese settlement with over 100,000 inhabitants.
place/city1_uppercase/dutsr	Surinamese settlement with over 100,000 inhabitants, in uppercase.
place/city2/dutsr	Surinamese settlement with under 100,000 inhabitants.
place/city2_uppercase/dutsr	Surinamese settlement with under 100,000 inhabitants, in uppercase.
place/district/dutsr	Surinamese district.
place/district_uppercase/dutsr	Surinamese district in uppercase.

**place\_engae.ecr**

Entity	Description
place/city1/engae	Settlement of the United Arab Emirates with over 100,000 inhabitants.
place/city1_uppercase/engae	Settlement of the United Arab Emirates with over 100,000 inhabitants, in uppercase.
place/city2/engae	Settlement of the United Arab Emirates with under 100,000 inhabitants.
place/city2_uppercase/engae	Settlement of the United Arab Emirates with under 100,000 inhabitants, in uppercase.
place/emirate/engae	Emirate of the United Arab Emirates.
place/emirate_uppercase/engae	Emirate of the United Arab Emirates in uppercase.

**place\_engau.ecr**

Entity	Description
place/state/engau	Australian state or territory.
place/state_uppercase/engau	Australian state or territory in uppercase.
place/state_abbrev/engau	Australian state or territory abbreviations.
place/state_capital/engau	Australian state or territory capitals.

**place\_engau.ecr, continued**

Entity	Description
place/state_capital_uppercase/engau	Australian state or territory capitals in uppercase.
place/city1/engau	Australian city with population greater than 100,000.
place/city1_uppercase/engau	Australian city with population greater than 100,000, in uppercase.
place/city2/engau	Australian city with population between 10,000 and 100,000.
place/city2_uppercase/engau	Australian city with population between 10,000 and 100,000, in uppercase.
place/city/NSW/engau	Settlement in New South Wales.
place/city_uppercase/NSW/engau	Settlement in New South Wales, in uppercase.
place/city/QLD/engau	Settlement in Queensland, Australia.
place/city_uppercase/QLD/engau	Settlement in Queensland, Australia, in uppercase.
place/city/SA/engau	Settlement in South Australia.
place/city_uppercase/SA/engau	Settlement in South Australia, in uppercase.
place/city/TAS/engau	Settlement in Tasmania.
place/city_uppercase/TAS/engau	Settlement in Tasmania, in uppercase.
place/city/VIC/engau	Settlement in Victoria, Australia.
place/city_uppercase/VIC/engau	Settlement in Victoria, Australia, in uppercase.
place/city/WA/engau	Settlement in Western Australia.
place/city_uppercase/WA/engau	Settlement in Western Australia, in uppercase.
place/city/NT/engau	Settlement in Northern Territory, Australia.
place/city_uppercase/NT/engau	Settlement in Northern Territory, Australia, in uppercase.
place/city/ACT/engau	Settlement in Australian Capital Territory.
place/city_uppercase/ACT/engau	Settlement in Australian Capital Territory, in uppercase.
place/city/engau	Australian cities.
place/city_uppercase/engau	Australian cities in uppercase.

**place\_engbd.ecr**

Entity	Description
place/city1/engbd	Bangladeshi settlement with over 100,000 inhabitants.
place/city1_uppercase/engbd	Bangladeshi settlement with over 100,000 inhabitants, in uppercase.
place/city2/engbd	Bangladeshi settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engbd	Bangladeshi settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/division/engbd	Bangladeshi division.
place/division_uppercase/engbd	Bangladeshi division in uppercase.
place/district/engbd	Bangladeshi district.
place/district_uppercase/engbd	Bangladeshi district in uppercase.

**place\_engbg.ecr**

Entity	Description
place/city1/engbg	Bulgarian settlement with over 100,000 inhabitants.
place/city1_uppercase/engbg	Bulgarian settlement with over 100,000 inhabitants, in uppercase.
place/city2/engbg	Bulgarian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engbg	Bulgarian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/engbg	Bulgarian province.
place/province_uppercase/engbg	Bulgarian province in uppercase.

**place\_engby.ecr**

Entity	Description
place/city1/engby	Belarusian settlement with over 100,000 inhabitants.
place/city1_uppercase/engby	Belarusian settlement with over 100,000 inhabitants, in uppercase.

**place\_engby.ecr, continued**

Entity	Description
place/city2/engby	Belarusian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engby	Belarusian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/region/engby	Belarusian region.
place/region_uppercase/engby	Belarusian region in uppercase.

**place\_engca.ecr**

Entity	Description
place/region/engca	Canadian province or territory.
place/region_uppercase/engca	Canadian province or territory in uppercase.
place/region_abbrev/engca	Canadian province or territory abbreviation.
place/region_all/engca	Canadian province or territory full name or abbreviation.
place/region_all_uppercase/engca	Canadian province or territory full name or abbreviation, in uppercase.
place/region_capitals/engca	Canadian provincial or territorial capital.
place/region_capitals_uppercase/engca	Canadian provincial or territorial capital in uppercase.
place/city1/engca	Canadian settlement with over 100,000 inhabitants.
place/city1_uppercase/engca	Canadian settlement with over 100,000 inhabitants, in uppercase.
place/city2/engca	Canadian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engca	Canadian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/city/AB/engca place/city_uppercase/AB/engca place/city/BC/engca place/city_uppercase/BC/engca place/city/MB/engca	Settlements in each Canadian province or territory, in normal or uppercase.

**place\_engca.ecr, continued**

Entity	Description
place/city_uppercase/MB/engca	
place/city/NB/engca	
place/city_uppercase/NB/engca	
place/city/NL/engca	
place/city_uppercase/NL/engca	
place/city/NS/engca	
place/city_uppercase/NS/engca	
place/city/ON/engca	
place/city_uppercase/ON/engca	
place/city/PE/engca	
place/city_uppercase/PE/engca	
place/city/QC/engca	
place/city_uppercase/QC/engca	
place/city/SK/engca	
place/city_uppercase/SK/engca	
place/city/NT/engca	
place/city_uppercase/NT/engca	
place/city/NU/engca	
place/city_uppercase/NU/engca	
place/city/YT/engca	
place/city_uppercase/YT/engca	
place/city/engca	Canadian settlement.
place/city_uppercase/engca	Canadian settlement in uppercase.

**place\_engcn.ecr**

Entity	Description
place/city0/engcn	Chinese settlement with over 1,000,000 inhabitants.
place/city0_uppercase/engcn	Chinese settlement with over 1,000,000 inhabitants, in uppercase.

**place\_engcn.ecr, continued**

Entity	Description
place/city1/engcn	Chinese settlement with over 100,000 inhabitants.
place/city1_uppercase/engcn	Chinese settlement with over 100,000 inhabitants, in uppercase.
place/city2/engcn	Chinese settlement with over 10,000 inhabitants.
place/city2_uppercase/engcn	Chinese settlement with over 10,000 inhabitants, in uppercase.
place/province/engcn	Chinese province.
place/province_uppercase/engcn	Chinese province in uppercase.

**place\_enggb.ecr**

Entity	Description
place/possession/enggb	UK crown dependencies.
place/possession_uppercase/enggb	UK crown dependencies in uppercase.
place/country/enggb	UK countries.
place/country_uppercase/enggb	UK countries in uppercase.
place/country_capital/enggb	UK country capitals.
place/country_capital_uppercase/enggb	UK country capitals in uppercase.
place/county/england/enggb	Counties in England.
place/county_uppercase/england/enggb	Counties in England, in uppercase.
place/county/northern_ireland/enggb	Counties in Northern Ireland.
place/county_uppercase/northern_ireland/enggb	Counties in Northern Ireland, in uppercase.
place/county/scotland/enggb	Counties in Scotland.
place/county_uppercase/scotland/enggb	Counties in Scotland, in uppercase.
place/county/wales/enggb	Counties in Wales.
place/county_uppercase/wales/enggb	Counties in Wales, in uppercase.
place/county/enggb	Counties in UK.

**place\_enggb.ecr, continued**

Entity	Description
place/county_uppercase/enggb	Counties in UK in uppercase.
place/city1/enggb	Settlement in the UK with over 100,000 inhabitants.
place/city1_uppercase/enggb	Settlement in the UK with over 100,000 inhabitants, in uppercase.
place/city/england/enggb	Settlements in each UK country, in normal or uppercase.
place/city_uppercase/england/enggb	
place/city/scotland/enggb	
place/city_uppercase/scotland/enggb	
place/city/wales/enggb	
place/city_uppercase/wales/enggb	
place/city/northern_ireland/enggb	
place/city_uppercase/northern_ireland/enggb	
place/city/enggb	UK settlements.
place/city_uppercase/enggb	UK settlements in uppercase.
place/londonborough/enggb	London borough.
place/island/enggb	Major islands of the United Kingdom.
place/island_uppercase/enggb	Major islands of the United Kingdom in uppercase.

**place\_enggr.ecr**

Entity	Description
place/city1/enggr	Greek settlement with over 100,000 inhabitants.
place/city1_uppercase/enggr	Greek settlement with over 100,000 inhabitants, in uppercase.
place/city2/enggr	Greek settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/enggr	Greek settlement with between 10,000 and 100,000 inhabitants, in uppercase.

**place\_enggr.ecr, continued**

Entity	Description
place/region/enggr	Greek region.
place/region_uppercase/enggr	Greek region in uppercase.
place/prefecture/enggr	Greek prefecture (obsolete after 2010).
place/prefecture_uppercase/enggr	Greek prefecture in uppercase (obsolete after 2010).
place/municipality/enggr	Greek municipality.
place/municipality_uppercase/enggr	Greek municipality in uppercase.
place/island/enggr	Greek island.
place/island_uppercase/enggr	Greek island in uppercase.

**place\_enggy.ecr**

Entity	Description
place/city1/enggy	Guyanana settlement with over 100,000 inhabitants.
place/city1_uppercase/enggy	Guyanana settlement with over 100,000 inhabitants, in uppercase.
place/city2/enggy	Guyanana settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/enggy	Guyanana settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/region/enggy	Guyanana region.
place/region_uppercase/enggy	Guyanana region in uppercase.

**place\_enghk.ecr**

Entity	Description
place/district/enghk	District in Hong Kong.
place/island/enghk	Island in Hong Kong.
place/enghk	Street in Hong Kong.

**place\_engid.ecr**

Entity	Description
place/city1/engid	Indonesian settlement with over 100,000 inhabitants.
place/city1_uppercase/engid	Indonesian settlement with over 100,000 inhabitants, in uppercase.
place/city2/engid	Indonesian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engid	Indonesian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/engid	Indonesian province.
place/province_uppercase/engid	Indonesian province in uppercase.
place/regency/engid	Indonesian regency.
place/regency_uppercase/engid	Indonesian regency in uppercase.
place/island/engid	Indonesian island.
place/island_uppercase/engid	Indonesian island in uppercase.

**place\_engie.ecr**

Entity	Description
place/city1/engie	Irish settlement with over 100,000 inhabitants.
place/city1_uppercase/engie	Irish settlement with over 100,000 inhabitants, in uppercase.
place/city2/engie	Irish settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engie	Irish settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/county_engie	Irish county.
place/county_uppercase/engie	Irish county in uppercase.
place/island/engie	Irish island.
place/island_uppercase/engie	Irish island in uppercase.

**place\_engin.ecr**

Entity	Description
place/city1/engin	Indian settlement with over 100,000 inhabitants.
place/city1_uppercase/engin	Indian settlement with over 100,000 inhabitants, in uppercase.
place/city2/engin	Indian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engin	Indian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/state/engin	Indian state.
place/state_uppercase/engin	Indian state in uppercase.
place/union_territory/engin	Indian union territory.
place/union_territory_uppercase/engin	Indian union territory in uppercase.
place/district/engin	Indian district.
place/district_uppercase/engin	Indian district in uppercase.
place/island/engin	Indian island.
place/island_uppercase/engin	Indian island in uppercase.

**place\_engir.ecr**

Entity	Description
place/city1/engir	Iranian settlement with over 100,000 inhabitants.
place/city1_uppercase/engir	Iranian settlement with over 100,000 inhabitants, in uppercase.
place/city2/engir	Iranian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engir	Iranian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/engir	Iranian province.
place/province_uppercase/engir	Iranian province in uppercase.
place/county/engir	Iranian county.
place/county_uppercase/engir	Iranian county in uppercase.

**place\_engjp.ecr**

Entity	Description
place_city1/engjp	Japanese settlement with over 100,000 inhabitants, in English.
place_city1_uppercase/engjp	Japanese settlement with over 100,000 inhabitants, in uppercase English.
place/city2/engjp	Japanese settlement with between 10,000 and 100,000 inhabitants, in English.
place/city2_uppercase/engjp	Japanese settlement with between 10,000 and 100,000 inhabitants, in uppercase English.
place/special_ward/engjp	Special ward of Tokyo in English.
place/special_ward_uppercase/engjp	Special ward of Tokyo in uppercase English.
place/island/engjp	Japanese island in English.
place/island_uppercase/engjp	Japanese island in uppercase English.
place/prefecture/engjp	Japanese prefectures in English.
place/prefecture_uppercase/engjp	Japanese prefectures in uppercase English.
place/region/engjp	Japanese regions in English.
place/region_uppercase/engjp	Japanese regions in uppercase English.
place/city/aichi/engjp place/city_uppercase/aichi/engjp place/city/akita/engjp place/city_uppercase/akita/engjp place/city/aomori/engjp place/city_uppercase/aomori/engjp place/city/chiba/engjp place/city_uppercase/chiba/engjp place/city/ehime/engjp place/city_uppercase/ehime/engjp place/city/fukui/engjp place/city_uppercase/fukui/engjp place/city/fukuoka/engjp place/city_uppercase/fukuoka/engjp	Cities in each Japanese prefecture in English, in normal or uppercase.

**place\_engjp.ecr, continued**

Entity	Description
place/city/fukushima/engjp	
place/city_uppercase/fukushima/engjp	
place/city/gifu/engjp	
place/city_uppercase/gifu/engjp	
place/city/gunma/engjp	
place/city_uppercase/gunma/engjp	
place/city/hiroshima/engjp	
place/city_uppercase/hiroshima/engjp	
place/city/hokkaido/engjp	
place/city_uppercase/hokkaido/engjp	
place/city/hyogo/engjp	
place/city_uppercase/hyogo/engjp	
place/city/ibaraki/engjp	
place/city_uppercase/ibaraki/engjp	
place/city/ishikawa/engjp	
place/city_uppercase/ishikawa/engjp	
place/city/iwate/engjp	
place/city_uppercase/iwate/engjp	
place/city/kagawa/engjp	
place/city_uppercase/kagawa/engjp	
place/city/kagoshima/engjp	
place/city_uppercase/kagoshima/engjp	
place/city/kanagawa/engjp	
place/city_uppercase/kanagawa/engjp	
place/city/kochi/engjp	
place/city_uppercase/kochi/engjp	
place/city/kumamoto/engjp	
place/city_uppercase/kumamoto/engjp	
place/city/kyoto/engjp	
place/city_uppercase/kyoto/engjp	
place/city/mie/engjp	

**place\_engjp.ecr, continued**

Entity	Description
place/city_uppercase/mie/engjp	
place/city/miyagi/engjp	
place/city_uppercase/miyagi/engjp	
place/city/miyazaki/engjp	
place/city_uppercase/miyazaki/engjp	
place/city/nagano/engjp	
place/city_uppercase/nagano/engjp	
place/city/nagasaki/engjp	
place/city_uppercase/nagasaki/engjp	
place/city/nara/engjp	
place/city_uppercase/nara/engjp	
place/city/niigata/engjp	
place/city_uppercase/niigata/engjp	
place/city/oita/engjp	
place/city_uppercase/oita/engjp	
place/city/okayama/engjp	
place/city_uppercase/okayama/engjp	
place/city/okinawa/engjp	
place/city_uppercase/okinawa/engjp	
place/city/osaka/engjp	
place/city_uppercase/osaka/engjp	
place/city/saga/engjp	
place/city_uppercase/saga/engjp	
place/city/saitama/engjp	
place/city_uppercase/saitama/engjp	
place/city/shiga/engjp	
place/city_uppercase/shiga/engjp	
place/city/shimane/engjp	
place/city_uppercase/shimane/engjp	
place/city/shizuoka/engjp	
place/city_uppercase/shizuoka/engjp	

**place\_engjp.ecr, continued**

Entity	Description
place/city/tochigi/engjp	
place/city_uppercase/tochigi/engjp	
place/city/tokushima/engjp	
place/city_uppercase/tokushima/engjp	
place/city/tokyo/engjp	
place/city_uppercase/tokyo/engjp	
place/city/tottori/engjp	
place/city_uppercase/tottori/engjp	
place/city/toyama/engjp	
place/city_uppercase/toyama/engjp	
place/city/wakayama/engjp	
place/city_uppercase/wakayama/engjp	
place/city/yamagata/engjp	
place/city_uppercase/yamagata/engjp	
place/city/yamaguchi/engjp	
place/city_uppercase/yamaguchi/engjp	
place/city/yamanashi/engjp	
place/city_uppercase/yamanashi/engjp	
place/city/engjp	Japanese cities in English.

**place\_engkr.ecr**

Entity	Description
place/city1_rr/engkr	South Korean settlement with over 100,000 inhabitants, in revised romanization.
place/city1_rr_uppercase/engkr	South Korean settlement with over 100,000 inhabitants, in uppercase revised romanization.
place/city2_rr/engkr	South Korean settlement with between 10,000 and 100,000 inhabitants, in revised romanization.
place/city2_rr_uppercase/engkr	South Korean settlement with between 10,000 and 100,000 inhabitants, in uppercase revised romanization.

**place\_engkr.ecr, continued**

Entity	Description
place/province_rr/engkr	South Korean province in revised romanization.
place/province_rr_uppercase/engkr	South Korean province in uppercase revised romanization.
place/county_rr/engkr	South Korean county in revised romanization.
place/county_rr_uppercase/engkr	South Korean county in uppercase revised romanization.
place/island_rr/engkr	South Korean island in revised romanization.
place/island_rr_uppercase/engkr	South Korean island in uppercase revised romanization.
place/city1_mcr/engkr	South Korean settlement with over 100,000 inhabitants in McCune-Reischauer romanization.
place/city1_mcr_uppercase/engkr	South Korean settlement with over 100,000 inhabitants, in uppercase McCune-Reischauer romanization.
place/city2_mcr/engkr	South Korean settlement with between 10,000 and 100,000 inhabitants, in McCune-Reischauer romanization.
place/city2_mcr_uppercase/engkr	South Korean settlement with between 10,000 and 100,000 inhabitants, in uppercase McCune-Reischauer romanization.
place/province_mcr/engkr	South Korean province in McCune-Reischauer romanization.
place/province_mcr_uppercase/engkr	South Korean province in uppercase McCune-Reischauer romanization.
place/county_mcr/engkr	South Korean county in McCune-Reischauer romanization.
place/county_mcr_uppercase/engkr	South Korean county in uppercase McCune-Reischauer romanization.
place/island_mcr/engkr	South Korean island in McCune-Reischauer romanization.
place/island_mcr_uppercase/engkr	South Korean island in uppercase McCune-Reischauer romanization.

**place\_englk.ecr**

Entity	Description
place/city1/englk	Sri Lankan settlement with over 100,000 inhabitants.
place/city1_uppercase/englk	Sri Lankan settlement with over 100,000 inhabitants, in uppercase.
place/city2/englk	Sri Lankan settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/englk	Sri Lankan settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/englk	Sri Lankan province.
place/province_uppercase/englk	Sri Lankan province in uppercase.
place/district/englk	Sri Lankan district.
place/district_uppercase/englk	Sri Lankan district in uppercase.

**place\_engmk.ecr**

Entity	Description
place/city1/engmk	Macedonian settlement with over 100,000 inhabitants.
place/city1_uppercase/engmk	Macedonian settlement with over 100,000 inhabitants, in uppercase.
place/city2/engmk	Macedonian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engmk	Macedonian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/municipality/engmk	Macedonian municipality.
place/municipality_uppercase/engmk	Macedonian municipality in uppercase.

**place\_engmn.ecr**

Entity	Description
place/city1/engmn	Mongolian settlement with over 100,000 inhabitants.
place/city1_uppercase/engmn	Mongolian settlement with over 100,000 inhabitants, in uppercase.

**place\_engmn.ecr, continued**

Entity	Description
place/city2/engmn	Mongolian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engmn	Mongolian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/engmn	Mongolian province.
place/province_uppercase/engmn	Mongolian province in uppercase.

**place\_engmy.ecr**

Entity	Description
place/city1/engmy	Malaysian settlement with over 100,000 inhabitants.
place/city1_uppercase/engmy	Malaysian settlement with over 100,000 inhabitants, in uppercase.
place/city2/engmy	Malaysian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engmy	Malaysian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/state/engmy	Malaysian state.
place/state_uppercase/engmy	Malaysian state in uppercase.
place/district/engmy	Malaysian district.
place/district_uppercase/engmy	Malaysian district in uppercase.

**place\_engnz.ecr**

Entity	Description
place/city1/engnz	New Zealand settlement with over 100,000 inhabitants.
place/city1_uppercase/engnz	New Zealand settlement with over 100,000 inhabitants, in uppercase.
place/city2/engnz	New Zealand settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engnz	New Zealand settlement with between 10,000 and

**place\_engnz.ecr, continued**

Entity	Description
	100,000 inhabitants, in uppercase.
place/region/engnz	New Zealand region.
place/region_uppercase/engnz	New Zealand region in uppercase.
place/terr_auth/engnz	New Zealand territorial authority.
place/terr_auth_uppercase/engnz	New Zealand territorial authority in uppercase.
place/island/engnz	New Zealand island.
place/island_uppercase/engnz	New Zealand island in uppercase.

**place\_engph.ecr**

Entity	Description
place/city1/engph	Philippine settlement with over 100,000 inhabitants.
place/city1_uppercase/engph	Philippine settlement with over 100,000 inhabitants, in uppercase.
place/city2/engph	Philippine settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engph	Philippine settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/region/engph	Philippine region.
place/region_uppercase/engph	Philippine region in uppercase.
place/province/engph	Philippine province.
place/province_uppercase/engph	Philippine province in uppercase.
place/island/engph	Philippine island.
place/island_uppercase/engph	Philippine island in uppercase.

**place\_engpk.ecr**

Entity	Description
place/city1/engpk	Pakistani settlement with over 100,000 inhabitants.
place/city1_uppercase/engpk	Pakistani settlement with over 100,000 inhabitants, in

**place\_engpk.ecr, continued**

Entity	Description
	uppercase.
place/city2/engpk	Pakistani settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engpk	Pakistani settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/engpk	Pakistani province.
place/province_uppercase/engpk	Pakistani province in uppercase.
place/district/engpk	Pakistani district.
place/district_uppercase/engpk	Pakistani district in uppercase.

**place\_engqa.ecr**

Entity	Description
place/city1/engqa	Qatari settlement with over 100,000 inhabitants.
place/city1_uppercase/engqa	Qatari settlement with over 100,000 inhabitants, in uppercase.
place/city2/engqa	Qatari settlement with fewer than 100,000 inhabitants.
place/city2_uppercase/engqa	Qatari settlement with fewer than 100,000 inhabitants, in uppercase.
place/municipality/engqa	Qatari municipality.
place/municipality_uppercase/engqa	Qatari municipality in uppercase.

**place\_engru.ecr**

Entity	Description
place/city1/engru	Russian settlement with over 100,000 inhabitants.
place/city1_uppercase/engru	Russian settlement with over 100,000 inhabitants, in uppercase.
place/city2/engru	Russian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engru	Russian settlement with between 10,000 and 100,000

**place\_engru.ecr, continued**

Entity	Description
	inhabitants, in uppercase.
place/republic/engru	Russian republic (type of region).
place/republic_uppercase/engru	Russian republic (type of region), in uppercase.
place/oblast/engru	Russian oblast (type of region).
place/oblast_uppercase/engru	Russian oblast (type of region), in uppercase.
place/krai/engru	Russian krai (type of region).
place/krai_uppercase/engru	Russian krai (type of region), in uppercase.
place/okrug/engru	Russian okrug (type of region).
place/okrug_uppercase/engru	Russian okrug (type of region), in uppercase.
place/federal_city/engru	Russian federal city (type of region).
place/federal_city_uppercase/engru	Russian federal city (type of region), in uppercase.
place/region/engru	Russian region.
place/region_uppercase/engru	Russian region, in uppercase.
place/island/engru	Russian island.
place/island_uppercase/engru	Russian island, in uppercase.

**place\_engsa.ecr**

Entity	Description
place/city1/engsa	Saudi Arabian settlement with over 100,000 inhabitants.
place/city1_uppercase/engsa	Saudi Arabian settlement with over 100,000 inhabitants, in uppercase.
place/city2/engsa	Saudi Arabian settlement with fewer than 100,000 inhabitants.
place/city2_uppercase/engsa	Saudi Arabian settlement with fewer than 100,000 inhabitants, in uppercase.
place/province/engsa	Saudi Arabian province.
place/province_uppercase/engsa	Saudi Arabian province in uppercase.

**place\_ength.ecr**

Entity	Description
place/city1/ength	Thai settlement with over 100,000 inhabitants.
place/city1_uppercase/ength	Thai settlement with over 100,000 inhabitants, in uppercase.
place/city2/ength	Thai settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/ength	Thai settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/ength	Thai province.
place/province_uppercase/ength	Thai province in uppercase.

**place\_engtw.ecr**

Entity	Description
place/city1/engtw	Taiwanese settlement with over 100,000 inhabitants.
place/city1_uppercase/engtw	Taiwanese settlement with over 100,000 inhabitants, in uppercase.
place/city2/engtw	Taiwanese settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engtw	Taiwanese settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/county/engtw	Taiwanese county.
place/county_uppercase/engtw	Taiwanese county in uppercase.

**place\_engua.ecr**

Entity	Description
place/city1/engua	Ukrainian settlement with over 100,000 inhabitants.
place/city1_uppercase/engua	Ukrainian settlement with over 100,000 inhabitants, in uppercase.
place/city2/engua	Ukrainian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engua	Ukrainian settlement with between 10,000 and

**place\_engua.ecr, continued**

Entity	Description
	100,000 inhabitants, in uppercase.
place/region/engua	Ukrainian region.
place/region_uppercase/engua	Ukrainian region in uppercase.

**place\_engus.ecr**

Entity	Description
place/possession/engus	U.S. possessions in long form. For example, <i>American Samoa</i> .
place/possession_uppercase/engus	U.S. possessions in long form, in uppercase.
place/possession_abbrev/engus	U.S. possession abbreviations. For example, <i>GU</i> .
place/state/engus	U.S. states. For example, <i>New Hampshire</i> .
place/state_uppercase/engus	U.S. states, in uppercase.
place/state_abbrev/engus	U.S. states abbreviations. For example, <i>AL</i> .
place/poss_state/engus	U.S. possessions and states.
place/poss_state_abbrev/engus	U.S. possession and state abbreviations.
place/statecapital/engus	U.S. state capitals.
place/statecapital_uppercase/engus	U.S. state capitals, in uppercase.
place/city/AL/engus place/city_uppercase/AL/engus place/city/AK/engus place/city_uppercase/AK/engus place/city/AZ/engus place/city_uppercase/AZ/engus place/city/AR/engus place/city_uppercase/AR/engus place/city/CA/engus place/city_uppercase/CA/engus place/city/CO/engus	Settlements in each U.S. state, in normal or uppercase.

**place\_engus.ecr, continued**

Entity	Description
place/city_uppercase/CO/engus	
place/city/CT/engus	
place/city_uppercase/CT/engus	
place/city/DE/engus	
place/city_uppercase/DE/engus	
place/city/FL/engus	
place/city_uppercase/FL/engus	
place/city/GA/engus	
place/city_uppercase/GA/engus	
place/city/HI/engus	
place/city_uppercase/HI/engus	
place/city/ID/engus	
place/city_uppercase/ID/engus	
place/city/IL/engus	
place/city_uppercase/IL/engus	
place/city/IN/engus	
place/city_uppercase/IN/engus	
place/city/IA/engus	
place/city_uppercase/IA/engus	
place/city/KS/engus	
place/city_uppercase/KS/engus	
place/city/KY/engus	
place/city_uppercase/KY/engus	
place/city/LA/engus	
place/city_uppercase/LA/engus	
place/city/ME/engus	
place/city_uppercase/ME/engus	
place/city/MD/engus	
place/city_uppercase/MD/engus	
place/city/MA/engus	
place/city_uppercase/MA/engus	

**place\_engus.ecr, continued**

Entity	Description
place/city/MI/engus	
place/city_uppercase/MI/engus	
place/city/MN/engus	
place/city_uppercase/MN/engus	
place/city/MS/engus	
place/city_uppercase/MS/engus	
place/city/MO/engus	
place/city_uppercase/MO/engus	
place/city/MT/engus	
place/city_uppercase/MT/engus	
place/city/NE/engus	
place/city_uppercase/NE/engus	
place/city/NV/engus	
place/city_uppercase/NV/engus	
place/city/NH/engus	
place/city_uppercase/NH/engus	
place/city/NJ/engus	
place/city_uppercase/NJ/engus	
place/city/NM/engus	
place/city_uppercase/NM/engus	
place/city/NY/engus	
place/city_uppercase/NY/engus	
place/city/NC/engus	
place/city_uppercase/NC/engus	
place/city/ND/engus	
place/city_uppercase/ND/engus	
place/city/OH/engus	
place/city_uppercase/OH/engus	
place/city/OK/engus	
place/city_uppercase/OK/engus	
place/city/OR/engus	

**place\_engus.ecr, continued**

Entity	Description
place/city_uppercase/OR/engus	
place/city/PA/engus	
place/city_uppercase/PA/engus	
place/city/RI/engus	
place/city_uppercase/RI/engus	
place/city/SC/engus	
place/city_uppercase/SC/engus	
place/city/SD/engus	
place/city_uppercase/SD/engus	
place/city/TN/engus	
place/city_uppercase/TN/engus	
place/city/TX/engus	
place/city_uppercase/TX/engus	
place/city/UT/engus	
place/city_uppercase/UT/engus	
place/city/VA/engus	
place/city_uppercase/VA/engus	
place/city/VT/engus	
place/city_uppercase/VT/engus	
place/city/WA/engus	
place/city_uppercase/WA/engus	
place/city/WI/engus	
place/city_uppercase/WI/engus	
place/city/WV/engus	
place/city_uppercase/WV/engus	
place/city/WY/engus	
place/city_uppercase/WY/engus	
place/city1/engus	U.S. city with over 100,000 inhabitants.
place/city1_uppercase/engus	U.S. city with over 100,000 inhabitants, in uppercase.
place/city2/engus	U.S. city with over 10,000 inhabitants.

**place\_engus.ecr, continued**

Entity	Description
place/city2_uppercase/engus	U.S. city with over 10,000 inhabitants, in uppercase.
place/county/AL/engus	County in Alabama.
place/county/AK/engus	County in Alaska.
place/county/AZ/engus	County in Arizona.
place/county/AR/engus	County in Arkansas.
place/county/CA/engus	County in California.
place/county/CO/engus	County in Colorado.
place/county/CT/engus	County in Connecticut.
place/county/DE/engus	County in Delaware.
place/county/FL/engus	County in Florida.
place/county/GA/engus	County in Georgia.
place/county/HI/engus	County in Hawaii.
place/county/ID/engus	County in Idaho.
place/county/IL/engus	County in Illinois.
place/county/IN/engus	County in Indiana.
place/county/IA/engus	County in Iowa.
place/county/KS/engus	County in Kansas.
place/county/KY/engus	County in Kentucky.
place/county/LA/engus	County in Louisiana.
place/county/ME/engus	County in Maine.
place/county/MD/engus	County in Maryland.
place/county/MA/engus	County in Massachusetts.
place/county/MI/engus	County in Michigan.
place/county/MN/engus	County in Minnesota.
place/county/MS/engus	County in Mississippi.
place/county/MO/engus	County in Missouri.
place/county/MT/engus	County in Montana.
place/county/NE/engus	County in Nebraska.
place/county/NV/engus	County in Nevada.
place/county/NH/engus	County in New Hampshire.

**place\_engus.ecr, continued**

Entity	Description
place/county/NJ/engus	County in New Jersey.
place/county/NM/engus	County in New Mexico.
place/county/NY/engus	County in New York.
place/county/NC/engus	County in North Carolina.
place/county/ND/engus	County in North Dakota.
place/county/OH/engus	County in Ohio.
place/county/OK/engus	County in Oklahoma.
place/county/OR/engus	County in Oregon.
place/county/PA/engus	County in Pennsylvania.
place/county/RI/engus	County in Rhode Island.
place/county/SC/engus	County in South Carolina.
place/county/SD/engus	County in South Dakota.
place/county/TN/engus	County in Tennessee.
place/county/TX/engus	County in Texas.
place/county/UT/engus	County in Utah.
place/county/VT/engus	County in Vermont.
place/county/VA/engus	County in Virginia.
place/county/WA/engus	County in Washington.
place/county/WV/engus	County in West Virginia.
place/county/WI/engus	County in Wisconsin.
place/county/WY/engus	County in Wyoming.
place/county_uppercase/AL/engus	County in Alabama in uppercase.
place/county_uppercase/AK/engus	County in Alaska in uppercase.
place/county_uppercase/AZ/engus	County in Arizona in uppercase.
place/county_uppercase/AR/engus	County in Arkansas in uppercase.
place/county_uppercase/CA/engus	County in California in uppercase.
place/county_uppercase/CO/engus	County in Colorado in uppercase.
place/county_uppercase/CT/engus	County in Connecticut in uppercase.
place/county_uppercase/DE/engus	County in Delaware in uppercase.
place/county_uppercase/FL/engus	County in Florida in uppercase.
place/county_uppercase/GA/engus	County in Georgia in uppercase.

**place\_engus.ecr, continued**

Entity	Description
place/county_uppercase/HI/engus	County in Hawaii in uppercase.
place/county_uppercase/ID/engus	County in Idaho in uppercase.
place/county_uppercase/IL/engus	County in Illinois in uppercase.
place/county_uppercase/IN/engus	County in Indiana in uppercase.
place/county_uppercase/IA/engus	County in Iowa in uppercase.
place/county_uppercase/KS/engus	County in Kansas in uppercase.
place/county_uppercase/KY/engus	County in Kentucky in uppercase.
place/county_uppercase/LA/engus	County in Louisiana in uppercase.
place/county_uppercase/ME/engus	County in Maine in uppercase.
place/county_uppercase/MD/engus	County in Maryland in uppercase.
place/county_uppercase/MA/engus	County in Massachusetts in uppercase.
place/county_uppercase/MI/engus	County in Michigan in uppercase.
place/county_uppercase/MN/engus	County in Minnesota in uppercase.
place/county_uppercase/MS/engus	County in Mississippi in uppercase.
place/county_uppercase/MO/engus	County in Missouri in uppercase.
place/county_uppercase/MT/engus	County in Montana in uppercase.
place/county_uppercase/NE/engus	County in Nebraska in uppercase.
place/county_uppercase/NV/engus	County in Nevada in uppercase.
place/county_uppercase/NH/engus	County in New Hampshire in uppercase.
place/county_uppercase/NJ/engus	County in New Jersey in uppercase.
place/county_uppercase/NM/engus	County in New Mexico in uppercase.
place/county_uppercase/NY/engus	County in New York in uppercase.
place/county_uppercase/NC/engus	County in North Carolina in uppercase.
place/county_uppercase/ND/engus	County in North Dakota in uppercase.
place/county_uppercase/OH/engus	County in Ohio in uppercase.
place/county_uppercase/OK/engus	County in Oklahoma in uppercase.
place/county_uppercase/OR/engus	County in Oregon in uppercase.
place/county_uppercase/PA/engus	County in Pennsylvania in uppercase.
place/county_uppercase/RI/engus	County in Rhode Island in uppercase.
place/county_uppercase/SC/engus	County in South Carolina in uppercase.
place/county_uppercase/SD/engus	County in South Dakota in uppercase.

**place\_engus.ecr, continued**

Entity	Description
place/county_uppercase/TN/engus	County in Tennessee in uppercase.
place/county_uppercase/TX/engus	County in Texas in uppercase.
place/county_uppercase/UT/engus	County in Utah in uppercase.
place/county_uppercase/VT/engus	County in Vermont in uppercase.
place/county_uppercase/VA/engus	County in Virginia in uppercase.
place/county_uppercase/WA/engus	County in Washington in uppercase.
place/county_uppercase/WV/engus	County in West Virginia in uppercase.
place/county_uppercase/WI/engus	County in Wisconsin in uppercase.
place/county_uppercase/WY/engus	County in Wyoming in uppercase.
place/county/engus	Any U.S. county.
place/county_uppercase/engus	Any U.S. county in uppercase.

**place\_engvn.ecr**

Entity	Description
place/city1/engvn	Vietnamese settlement with over 100,000 inhabitants.
place/city1_uppercase/engvn	Vietnamese settlement with over 100,000 inhabitants, in uppercase.
place/city2/engvn	Vietnamese settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engvn	Vietnamese settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/engvn	Vietnamese province.
place/province_uppercase/engvn	Vietnamese province in uppercase.
place/district/engvn	Vietnamese district.
place/district_uppercase/engvn	Vietnamese district in uppercase.

**place\_engza.ecr**

Entity	Description
place/city1/engza	South African settlement with over 100,000

**place\_engza.ecr, continued**

Entity	Description
	inhabitants.
place/city1_uppercase/engza	South African settlement with over 100,000 inhabitants, in uppercase.
place/city2/engza	South African settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/engza	South African settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/engza	South African province.
place/province_uppercase/engza	South African province in uppercase.
place/district/engza	South African district.
place/district_uppercase/engza	South African district in uppercase.
place/island/engza	South African island.
place/island_uppercase/engza	South African island in uppercase.

**place\_estee.ecr**

Entity	Description
place/city1/estee	Estonian settlement with over 100,000 inhabitants.
place/city1_uppercase/estee	Estonian settlement with over 100,000 inhabitants, in uppercase.
place/city2/estee	Estonian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/estee	Estonian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/county/estee	Estonian county.
place/county_uppercase/estee	Estonian county in uppercase.

**place\_finfi.ecr**

Entity	Description
place/city1/finfi	Finnish settlement with over 100,000 inhabitants.

**place\_finfi.ecr, continued**

Entity	Description
place/city1_uppercase/finfi	Finnish settlement with over 100,000 inhabitants, in uppercase.
place/city2/finfi	Finnish settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/finfi	Finnish settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/region/finfi	Finnish region.
place/region_uppercase/finfi	Finnish region in uppercase.
place/island/finfi	Finnish island.
place/island_uppercase/finfi	Finnish island in uppercase.

**place\_frefr.ecr**

Entity	Description
place/city1/frefr	French settlement with over 100,000 inhabitants.
place/city1_uppercase/frefr	French settlement with over 100,000 inhabitants, in uppercase.
place/region_metro/frefr	French metropolitan regions.
place/region_metro_uppercase/frefr	French metropolitan regions in uppercase.
place/department_metro/Alsace/frefr	Departments of each French metropolitan region, in normal or uppercase.
place/department_metro_uppercase/Alsace/frefr	
place/department_metro/Aquitaine/frefr	
place/department_metro_uppercase/Aquitaine/frefr	
place/department_metro/Auvergne/frefr	
place/department_metro_uppercase/Auvergne/frefr	
place/department_metro/BasseNormandie/frefr	
place/department_metro_uppercase/BasseNormandie/frefr	
place/department_metro/Bourgogne/frefr	

**place\_frefr.ecr, continued**

Entity	Description
place/department_metro_uppercase/Bourgogne/frefr	
place/department_metro/Brittany/frefr	
place/department_metro_uppercase/Brittany/frefr	
place/department_metro/Centre/frefr	
place/department_metro_uppercase/Centre/frefr	
place/department_metro/ChampagneArdenne/frefr	
place/department_metro_uppercase/ChampagneArdenne/frefr	
place/department_metro/Corsica/frefr	
place/department_metro_uppercase/Corsica/frefr	
place/department_metro/FrancheComte/frefr	
place/department_metro_uppercase/FrancheComte/frefr	
place/department_metro/HauteNormandie/frefr	
place/department_metro_uppercase/HauteNormandie/frefr	
place/department_metro/IleDeFrance/frefr	
place/department_metro_uppercase/IleDeFrance/frefr	
place/department_metro/LanguedocRoussillon/frefr	
place/department_metro_uppercase/LanguedocRoussillon/frefr	
place/department_metro/Limousin/frefr	
place/department_metro_uppercase/Limousin/frefr	
place/department_metro/Lorraine/frefr	
place/department_metro_uppercase/Lorraine/frefr	
place/department_metro/MidiPyrenees/frefr	
place/department_metro_uppercase/MidiPyrenees/frefr	

**place\_frefr.ecr, continued**

Entity	Description
place/department_metro/NordPasDeCalais/frefr	
place/department_metro_uppercase/NordPasDeCalais/frefr	
place/department_metro/PaysDeLaLoire/frefr	
place/department_metro_uppercase/PaysDeLaLoire/frefr	
place/department_metro/Picardie/frefr	
place/department_metro_uppercase/Picardie/frefr	
place/department_metro/PoitouCharentes/frefr	
place/department_metro_uppercase/PoitouCharentes/frefr	
place/department_metro/ProvenceAlpesCoteDAzur/frefr	
place/department_metro_uppercase/ProvenceAlpesCoteDAzur/frefr	
place/department_metro/RhoneAlpes/frefr	
place/department_metro_uppercase/RhoneAlpes/frefr	
place/department_metro/frefr	French metropolitan departments.
place/department_metro_uppercase/frefr	French metropolitan departments in uppercase.
place/departmentcode_metro/frefr	French metropolitan department INSEE codes.
place/departmentcode_overseas/frefr	French overseas department INSEE codes.
place/communcode_metro/frefr	French metropolitan commune INSEE codes.
place/communcode_overseas/frefr	French overseas commune INSEE codes.

**place\_frefr.ecr, continued**

Entity	Description
place/city/alsace/Bas_Rhin/frefr	Settlements in each French department, in normal or uppercase.
place/city_uppercase/alsace/Bas_Rhin/frefr	
place/city/alsace/Haut_Rhin/frefr	
place/city_uppercase/alsace/Haut_Rhin/frefr	
place/city/aquitaine/Dordogne/frefr	
place/city_uppercase/aquitaine/Dordogne/frefr	
place/city/aquitaine/Gironde/frefr	
place/city_uppercase/aquitaine/Gironde/frefr	
place/city/aquitaine/Landes/frefr	
place/city_uppercase/aquitaine/Landes/frefr	
place/city/aquitaine/Lot_et_Garonne/frefr	
place/city_uppercase/aquitaine/Lot_et_Garonne/frefr	
place/city/aquitaine/Pyrenees_Atlantiques/frefr	
place/city_uppercase/aquitaine/Pyrenees_Atlantiques/frefr	
place/city/auvergne/Allier/frefr	
place/city_uppercase/auvergne/Allier/frefr	
place/city/auvergne/Cantal/frefr	
place/city_uppercase/auvergne/Cantal/frefr	
place/city/auvergne/Haute_Loire/frefr	
place/city_uppercase/auvergne/Haute_Loire/frefr	
place/city/auvergne/Puy_de_Dome/frefr	
place/city_uppercase/auvergne/Puy_de_Dome/frefr	

**place\_frefr.ecr, continued**

Entity	Description
place/city/basseNormandie/Calvados/frefr	
place/city_ uppercase/basseNormandie/Calvados/frefr	
place/city/basseNormandie/Manche/frefr	
place/city_ uppercase/basseNormandie/Manche/frefr	
place/city/basseNormandie/Ome/frefr	
place/city_uppercase/basseNormandie/Ome/frefr	
place/city/bourgogne/Cote_dOr/frefr	
place/city_uppercase/bourgogne/Cote_dOr/frefr	
place/city/bourgogne/Nievre/frefr	
place/city_uppercase/bourgogne/Nievre/frefr	
place/city/bourgogne/Saone_et_Loire/frefr	
place/city_uppercase/bourgogne/Saone_et_ Loire/frefr	
place/city/bourgogne/Yonne/frefr	
place/city_uppercase/bourgogne/Yonne/frefr	
place/city/brittany/Cotes_dArmor/frefr	
place/city_uppercase/brittany/Cotes_dArmor/frefr	
place/city/brittany/Finistere/frefr	
place/city_uppercase/brittany/Finistere/frefr	

**place\_frefr.ecr, continued**

Entity	Description
place/city/brittany/Ille_et_Vilaine/frefr	
place/city_uppercase/brittany/Ille_et_Vilaine/frefr	
place/city/brittany/Morbihan/frefr	
place/city_uppercase/brittany/Morbihan/frefr	
place/city/centre/Cher/frefr	
place/city_uppercase/centre/Cher/frefr	
place/city/centre/Eure_et_Loir/frefr	
place/city_uppercase/centre/Eure_et_Loir/frefr	
place/city/centre/Indre/frefr	
place/city_uppercase/centre/Indre/frefr	
place/city/centre/Indre_et_Loire/frefr	
place/city_uppercase/centre/Indre_et_Loire/frefr	
place/city/centre/Loir_et_Cher/frefr	
place/city_uppercase/centre/Loir_et_Cher/frefr	
place/city/centre/Loiret/frefr	
place/city_uppercase/centre/Loiret/frefr	
place/city/champagneArdenne/Ardennes/frefr	
place/city_uppercase/champagneArdenne/Ardennes/frefr	

**place\_frefr.ecr, continued**

Entity	Description
place/city/champagneArdenne/Aube/frefr	
place/city_ uppercase/champagneArdenne/Aube/frefr	
place/city/champagneArdenne/Mame/frefr	
place/city_ uppercase/champagneArdenne/Mame/frefr	
place/city/champagneArdenne/Haute_Mame/frefr	
place/city_uppercase/champagneArdenne/Haute_ Mame/frefr	
place/city/corsica/Corse_du_Sud/frefr	
place/city_uppercase/corsica/Corse_du_Sud/frefr	
place/city/corsica/Haute_Corse/frefr	
place/city_uppercase/corsica/Haute_Corse/frefr	
place/city/francheComte/Doubs/frefr	
place/city_uppercase/francheComte/Doubs/frefr	
place/city/francheComte/Jura/frefr	
place/city_uppercase/francheComte/Jura/frefr	
place/city/francheComte/Haute_Saone/frefr	
place/city_uppercase/francheComte/Haute_ Saone/frefr	
place/city/francheComte/Territoire_de_Belfort/frefr	
place/city_uppercase/francheComte/Territoire_de_ Belfort/frefr	

**place\_frefr.ecr, continued**

Entity	Description
place/city/hauteNormandie/Eure/frefr	
place/city_uppercase/hauteNormandie/Eure/frefr	
place/city/hauteNormandie/Seine_Maritime/frefr	
place/city_uppercase/hauteNormandie/Seine_Maritime/frefr	
place/city/ileDeFrance/Seine_et_Marne/frefr	
place/city_uppercase/ileDeFrance/Seine_et_Marne/frefr	
place/city/ileDeFrance/Yvelines/frefr	
place/city_uppercase/ileDeFrance/Yvelines/frefr	
place/city/ileDeFrance/Essonne/frefr	
place/city_uppercase/ileDeFrance/Essonne/frefr	
place/city/ileDeFrance/Hauts_de_Seine/frefr	
place/city_uppercase/ileDeFrance/Hauts_de_Seine/frefr	
place/city/ileDeFrance/Seine_Saint_Denis/frefr	
place/city_uppercase/ileDeFrance/Seine_Saint_Denis/frefr	
place/city/ileDeFrance/Val_de_Marne/frefr	
place/city_uppercase/ileDeFrance/Val_de_Marne/frefr	
place/city/ileDeFrance/Val_dOise/frefr	
place/city_uppercase/ileDeFrance/Val_dOise/frefr	

**place\_frefr.ecr, continued**

Entity	Description
place/city/ileDeFrance/Paris/frefr	
place/city_uppercase/ileDeFrance/Paris/frefr	
place/city/languedocRoussillon/Aude/frefr	
place/city_uppercase/languedocRoussillon/Aude/frefr	
place/city/languedocRoussillon/Gard/frefr	
place/city_uppercase/languedocRoussillon/Gard/frefr	
place/city/languedocRoussillon/Herault/frefr	
place/city_uppercase/languedocRoussillon/Herault/frefr	
place/city/languedocRoussillon/Lozere/frefr	
place/city_uppercase/languedocRoussillon/Lozere/frefr	
place/city/languedocRoussillon/Pyrenees_Orientales/frefr	
place/city_uppercase/languedocRoussillon/Pyrenees_Orientales/frefr	
place/city/limousin/Correze/frefr	
place/city_uppercase/limousin/Correze/frefr	
place/city/limousin/Creuse/frefr	
place/city_uppercase/limousin/Creuse/frefr	
place/city/limousin/Haute_Vienne/frefr	
place/city_uppercase/limousin/Haute_Vienne/frefr	

**place\_frefr.ecr, continued**

Entity	Description
place/city/lorraine/Meurthe_et_Moselle/frefr	
place/city_uppercase/lorraine/Meurthe_et_Moselle/frefr	
place/city/lorraine/Meuse/frefr	
place/city_uppercase/lorraine/Meuse/frefr	
place/city/lorraine/Moselle/frefr	
place/city_uppercase/lorraine/Moselle/frefr	
place/city/lorraine/Vosges/frefr	
place/city_uppercase/lorraine/Vosges/frefr	
place/city/midiPyrenees/Ariege/frefr	
place/city_uppercase/midiPyrenees/Ariege/frefr	
place/city/midiPyrenees/Aveyron/frefr	
place/city_uppercase/midiPyrenees/Aveyron/frefr	
place/city/midiPyrenees/Haute_Garonne/frefr	
place/city_uppercase/midiPyrenees/Haute_Garonne/frefr	
place/city/midiPyrenees/Gers/frefr	
place/city_uppercase/midiPyrenees/Gers/frefr	
place/city/midiPyrenees/Lot/frefr	
place/city_uppercase/midiPyrenees/Lot/frefr	

**place\_frefr.ecr, continued**

Entity	Description
place/city/midiPyrenees/Hautes_Pyrenees/frefr	
place/city_uppercase/midiPyrenees/Hautes_Pyrenees/frefr	
place/city/midiPyrenees/Tarn/frefr	
place/city_uppercase/midiPyrenees/Tarn/frefr	
place/city/midiPyrenees/Tarn_et_Garonne/frefr	
place/city_uppercase/midiPyrenees/Tarn_et_Garonne/frefr	
place/city/nordPasDeCalais/Nord/frefr	
place/city_uppercase/nordPasDeCalais/Nord/frefr	
place/city/nordPasDeCalais/Pas_de_Calais/frefr	
place/city_uppercase/nordPasDeCalais/Pas_de_Calais/frefr	
place/city/paysDeLaLoire/Loire_Atlantique/frefr	
place/city_uppercase/paysDeLaLoire/Loire_Atlantique/frefr	
place/city/paysDeLaLoire/Maine_et_Loire/frefr	
place/city_uppercase/paysDeLaLoire/Maine_et_Loire/frefr	
place/city/paysDeLaLoire/Mayenne/frefr	
place/city_uppercase/paysDeLaLoire/Mayenne/frefr	
place/city/paysDeLaLoire/Sarthe/frefr	
place/city_uppercase/paysDeLaLoire/Sarthe/frefr	

**place\_frefr.ecr, continued**

Entity	Description
place/city/paysDeLaLoire/Vendee/frefr	
place/city_uppercase/paysDeLaLoire/Vendee/frefr	
place/city/picardie/Aisne/frefr	
place/city_uppercase/picardie/Aisne/frefr	
place/city/picardie/Oise/frefr	
place/city_uppercase/picardie/Oise/frefr	
place/city_uppercase/picardie/Somme/frefr	
place/city/poitouCharentes/Charente/frefr	
place/city_uppercase/poitouCharentes/Charente/frefr	
place/city/poitouCharentes/Charente_Maritime/frefr	
place/city_uppercase/poitouCharentes/Charente_Maritime/frefr	
place/city/poitouCharentes/Deux_Sevres/frefr	
place/city_uppercase/poitouCharentes/Deux_Sevres/frefr	
place/city/poitouCharentes/Vienne/frefr	
place/city_uppercase/poitouCharentes/Vienne/frefr	
place/city/provenceAlpesCoteDAzur/Alpes_de_Haute_Provence/frefr	
place/city_uppercase/provenceAlpesCoteDAzur/Alpes_de_Haute_Provence/frefr	
place/city/provenceAlpesCoteDAzur/Hautes_Alpes/frefr	
place/city_uppercase/provenceAlpesCoteDAzur/Hautes_Alpes/frefr	
place/city/provenceAlpesCoteDAzur/Alpes_Maritimes/frefr	

**place\_frefr.ecr, continued**

Entity	Description
place/city_uppercase/provenceAlpesCoteDAzur/Alpes_Maritimes/frefr	
place/city/provenceAlpesCoteDAzur/Bouches_du_Rhone/frefr	
place/city_uppercase/provenceAlpesCoteDAzur/Bouches_du_Rhone/frefr	
place/city/provenceAlpesCoteDAzur/Var/frefr	
place/city_uppercase/provenceAlpesCoteDAzur/Var/frefr	
place/city/provenceAlpesCoteDAzur/Vaucluse/frefr	
place/city_uppercase/provenceAlpesCoteDAzur/Vaucluse/frefr	
place/city/rhoneAlpes/Ain/frefr	
place/city_uppercase/rhoneAlpes/Ain/frefr	
place/city/rhoneAlpes/Ardeche/frefr	
place/city_uppercase/rhoneAlpes/Ardeche/frefr	
place/city/rhoneAlpes/Drome/frefr	
place/city_uppercase/rhoneAlpes/Drome/frefr	
place/city/rhoneAlpes/Isere/frefr	
place/city_uppercase/rhoneAlpes/Isere/frefr	

**place\_frefr.ecr, continued**

Entity	Description
place/city/rhoneAlpes/Loire/frefr	
place/city_uppercase/rhoneAlpes/Loire/frefr	
place/city/rhoneAlpes/Rhone/frefr	
place/city_uppercase/rhoneAlpes/Rhone/frefr	
place/city/rhoneAlpes/Savoie/frefr	
place/city_uppercase/rhoneAlpes/Savoie/frefr	
place/city/rhoneAlpes/Haute_Savoie/frefr	
place/city_uppercase/rhoneAlpes/Haute_Savoie/frefr	
place/city/frefr	French cities.
place/city_uppercase/frefr	French cities in uppercase.

**place\_fregf.ecr**

Entity	Description
place/city2/fregf	French Guianan settlement with over 10,000 inhabitants.
place/city2_uppercase/fregf	French Guianan settlement with over 10,000 inhabitants, in uppercase.
place/canton/fregf	French Guianan canton.
place/canton_uppercase/fregf	French Guianan canton in uppercase.

**place\_geo\_dut.ecr**

Entity	Description
place/country/dut	Country in Dutch.
place/country_capital/dut	Country capital in Dutch.

**place\_geo\_eng.ecr**

Entity	Description
place/region/eng	Regions. For example, <i>Asia-Pacific</i> .
place/region_uppercase/eng	Regions in uppercase.
place/continent/eng	Continents. For example, <i>Africa</i> .
place/continent_uppercase/eng	Continents in uppercase.
place/ocean/eng	Oceans. For example, <i>Pacific</i> .
place/ocean_uppercase/eng	Oceans in uppercase.
place/country/eng	Countries. For example, <i>Australia</i> .
place/country_uppercase/eng	Countries in uppercase.
place/country_capital/eng	Country capitals. For example, <i>Canberra</i> .
place/country_capital_uppercase/eng	Country capitals in uppercase.
place/direction/eng	Directions. For example, <i>Southwest</i> .
place/direction_uppercase/eng	Directions in uppercase.
place/direction_abb/eng	Direction abbreviations. For example, <i>SW</i> .
place/direction_mod/eng	Direction modifiers. For example, <i>Southwestern, Central, Downtown</i> .
place/direction_mod_uppercase/eng	Direction modifiers in uppercase.
place/area/eng	Areas. For example, <i>Cape, Canyon, Grassland, Peninsula</i> .
place/area_uppercase/eng	Areas in uppercase.
place/street_type/eng	Street types. For example, <i>Ave, Street, Place</i> .
place/street_type_uppercase/eng	Street types in uppercase.

**place\_geo\_fre.ecr**

Entity	Description
place/street_type/fre	Street types in French. For example, <i>Chauss, Cloitre</i> .
place/street_type_lowercase/fre	Street types in lowercase French. For example, <i>chauss, cloitre</i> .
place/street_type_uppercase/fre	Street types in uppercase French. For example,

**place\_geo\_fre.ecr, continued**

Entity	Description
	<i>CHAUSS, CLOITRE.</i>
place/house_type/fre	House types in French. For example, <i>Residence, Batiment.</i>
place/house_type_uppercase/fre	House types in uppercase French.
place/direction/fre	Directions in French. For example, <i>Sudouest.</i>
place/direction_uppercase/fre	Directions in uppercase French.
place/direction_abb/fre	Direction abbreviations in French. For example, <i>NO.</i>

**place\_gerat.ecr**

Entity	Description
place/city1/gerat	Austrian settlement with over 100,000 inhabitants.
place/city1_uppercase/gerat	Austrian settlement with over 100,000 inhabitants, in uppercase.
place/city2/gerat	Austrian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/gerat	Austrian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/state/gerat	Austrian state.
place/state_uppercase/gerat	Austrian state in uppercase.

**place\_gerde.ecr**

Entity	Description
place/state/gerde	German states.
place/state_uppercase/gerde	German states in uppercase.
place/state_abbrev/gerde	German state abbreviations.
place/city/state_capital/gerde	German state capitals.
place/city_uppercase/state_capital/gerde	German state capitals in uppercase.
place/city/bw/gerde	Settlements in each German state, in normal or

**place\_gerde.ecr, continued**

Entity	Description
place/city_uppercase/bw/gerde	uppercase.
place/city/by/gerde	
place/city_uppercase/by/gerde	
place/city/be/gerde	
place/city_uppercase/be/gerde	
place/city/bb/gerde	
place/city_uppercase/bb/gerde	
place/city/hb/gerde	
place/city_uppercase/hb/gerde	
place/city/hh/gerde	
place/city_uppercase/hh/gerde	
place/city/he/gerde	
place/city_uppercase/he/gerde	
place/city/mv/gerde	
place/city_uppercase/mv/gerde	
place/city/ni/gerde	
place/city_uppercase/ni/gerde	
place/city/nw/gerde	
place/city_uppercase/nw/gerde	
place/city/rp/gerde	
place/city_uppercase/rp/gerde	
place/city/sl/gerde	
place/city_uppercase/sl/gerde	
place/city/sn/gerde	
place/city_uppercase/sn/gerde	
place/city/st/gerde	
place/city_uppercase/st/gerde	
place/city/sh/gerde	
place/city_uppercase/sh/gerde	
place/city/th/gerde	
place/city_uppercase/th/gerde	

**place\_gerde.ecr, continued**

Entity	Description
place/city1/gerde	German settlement with more than 100,000 inhabitants.
place/city1_uppercase/gerde	German settlement with more than 100,000 inhabitants, in uppercase.
place/city/gerde	German cities.
place/city_uppercase/gerde	German cities in uppercase.

**place\_hrvhr.ecr**

Entity	Description
place/city1/hrvhr	Croatian settlement with over 100,000 inhabitants.
place/city1_uppercase/hrvhr	Croatian settlement with over 100,000 inhabitants, in uppercase.
place/city2/hrvhr	Croatian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/hrvhr	Croatian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/county/hrvhr	Croatian county.
place/county_uppercase/hrvhr	Croatian county in uppercase.

**place\_hunhu.ecr**

Entity	Description
place/city1/hunhu	Hungarian settlement with over 100,000 inhabitants.
place/city1_uppercase/hunhu	Hungarian settlement with over 100,000 inhabitants, in uppercase.
place/city2/hunhu	Hungarian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/hunhu	Hungarian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/county/hunhu	Hungarian county.
place/county_uppercase/hunhu	Hungarian county in uppercase.

### place\_itait.ecr

Entity	Description
place/city1/itait	Italian settlement with over 100,000 inhabitants.
place/city1_uppercase/itait	Italian settlement with over 100,000 inhabitants, in uppercase.
place/city2/itait	Italian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/itait	Italian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/region_abbreviation/itait	2-letter abbreviation for an Italian region. For example, RM (includes SCV and RSM).
place/region/itait	Italian region.
place/region_uppercase/itait	Italian region in uppercase.
place/municipality/itait	Italian municipality.
place/municipality_uppercase/itait	Italian municipality in uppercase.
place/island/itait	Italian island.
place/island_uppercase/itait	Italian island in uppercase.
place/locality/itait	Italian place.
place/locality_uppercase/itait	Italian place in uppercase.

### place\_jpnjp.ecr

Entity	Description
place/prefecture/jpnjp	Japanese prefectures.
place/region/jpnjp	Japanese regions.

**place\_jpnjp.ecr, continued**

Entity	Description
place/city/aichi/jpnjp	Settlements in each Japanese prefecture.
place/city/akita/jpnjp	
place/city/aomori/jpnjp	
place/city/chiba/jpnjp	
place/city/ehime/jpnjp	
place/city/fukui/jpnjp	
place/city/fukuoka/jpnjp	
place/city/fukushima/jpnjp	
place/city/gifu/jpnjp	
place/city/gunma/jpnjp	
place/city/hiroshima/jpnjp	
place/city/hokkaido/jpnjp	
place/city/hyogo/jpnjp	
place/city/ibaraki/jpnjp	

**place\_jpnjp.ecr, continued**

Entity	Description
place/city/ishikawa/jpnjp	
place/city/iwate/jpnjp	
place/city/kagawa/jpnjp	
place/city/kagoshima/jpnjp	
place/city/kanagawa/jpnjp	
place/city/kochi/jpnjp	
place/city/kumamoto/jpnjp	
place/city/kyoto/jpnjp	
place/city/mie/jpnjp	
place/city/miyagi/jpnjp	
place/city/miyazaki/jpnjp	
place/city/nagano/jpnjp	
place/city/nagasaki/jpnjp	
place/city/nara/jpnjp	
place/city/niigata/jpnjp	
place/city/oita/jpnjp	
place/city/okayama/jpnjp	
place/city/okinawa/jpnjp	

**place\_jpnjp.ecr, continued**

Entity	Description
place/city/osaka/jpnjp	
place/city/saga/jpnjp	
place/city/saitama/jpnjp	
place/city/shiga/jpnjp	
place/city/shimane/jpnjp	
place/city/shizuoka/jpnjp	
place/city/tochigi/jpnjp	
place/city/tokushima/jpnjp	
place/city/tokyo/jpnjp	
place/city/tottori/jpnjp	
place/city/toyama/jpnjp	
place/city/wakayama/jpnjp	
place/city/yamagata/jpnjp	
place/city/yamaguchi/jpnjp	
place/city/yamanashi/jpnjp	
place/city/jpnjp	Japanese settlements.
place/misc/jpnjp	Japanese places.

**place\_kokr.ecr**

Entity	Description
place/province/kokr	Province of South Korea, in Korean language.
place/province_DPRK/kokr	Province of North Korea (DPRK) as claimed by South Korea (Republic of Korea), in Korean language.
place/district/kokr	District of South Korea, in Korean language.
place/city1/kokr	Settlement in South Korea with over 100,000 inhabitants, in Korean language.
place/city_DPRK/kokr	Settlement in North Korea (DPRK) as claimed by South Korea (Republic of Korea), in Korean language.

**place\_kokr.ecr, continued**

Entity	Description
place/city2/kokr	Settlement in South Korea with between 10,000 and 100,000 inhabitants, in Korean language.

**place\_lat\_long.ecr**

Entity	Description
place/lat_long	Geographical co-ordinate in any format (minimum precision is 1/10 degree or one minute of a degree). Supports the components NS, EW, LAT_DEGREES, LAT_DECIMAL, LAT_MINUTES, LAT_SECONDS, LONG_DEGREES, LONG_DECIMAL, LONG_MINUTES, and LONG_SECONDS  You can use the <code>lat_long.lua</code> post-processing script to process this entity.
place/utm	Geographical co-ordinate written using the Universal Transverse Mercator convention. Supports no components.

**place\_lavlv.ecr**

Entity	Description
place/city1/lavlv	Latvian settlement with over 100,000 inhabitants.
place/city1_uppercase/lavlv	Latvian settlement with over 100,000 inhabitants, in uppercase.
place/city2/lavlv	Latvian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/lavlv	Latvian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/municipality/lavlv	Latvian municipality.
place/municipality_uppercase/lavlv	Latvian municipality in uppercase.

**place\_litlt.ecr**

Entity	Description
place/city1/litlt	Lithuanian settlement with over 100,000 inhabitants.
place/city1_uppercase/litlt	Lithuanian settlement with over 100,000 inhabitants, in uppercase.
place/city2/litlt	Lithuanian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/litlt	Lithuanian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/county/litlt	Lithuanian county.
place/county_uppercase/litlt	Lithuanian county in uppercase.

**place\_mil\_engus.ecr**

Entity	Description
place/mil/engus	U.S. military places.
place/mil_uppercase/engus	U.S. military places in uppercase.

**place\_mulbe.ecr**

Entity	Description
place/city1/mulbe	Belgian settlement with over 100,000 inhabitants.
place/city1_uppercase/mulbe	Belgian settlement with over 100,000 inhabitants, in uppercase.
place/city2/mulbe	Belgian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/mulbe	Belgian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/mulbe	Belgian province.
place/province_uppercase/mulbe	Belgian province in uppercase.
place/region/mulbe	Belgian region.
place/region_uppercase/mulbe	Belgian region in uppercase.

**place\_mulch.ecr**

Entity	Description
place/city1/mulch	Swiss settlement with over 100,000 inhabitants.
place/city1_uppercase/mulch	Swiss settlement with over 100,000 inhabitants, in uppercase.
place/city2/mulch	Swiss settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/mulch	Swiss settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/canton/mulch	Swiss canton.
place/canton_uppercase/mulch	Swiss canton in uppercase.
place/canton_abbrev/mulch	Two-letter abbreviation for a Swiss canton (always uppercase).

**place\_mullu.ecr**

Entity	Description
place/city2/mullu	Luxembourgish city.
place/city2_uppercase/mullu	Luxembourgish city in uppercase.
place/district/mullu	Luxembourgish district.
place/district_uppercase/mullu	Luxembourgish district in uppercase.
place/canton/mullu	Luxembourgish canton.
place/canton_uppercase/mullu	Luxembourgish canton in uppercase.

**place\_norno.ecr**

Entity	Description
place/city1/nomo	Norwegian settlement with over 100,000 inhabitants.
place/city1_uppercase/nomo	Norwegian settlement with over 100,000 inhabitants, in uppercase.
place/city2/nomo	Norwegian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/nomo	Norwegian settlement with between 10,000 and

**place\_norno.ecr, continued**

Entity	Description
	100,000 inhabitants, in uppercase.
place/county/nomo	Norwegian county.
place/county_uppercase/nomo	Norwegian county in uppercase.
place/island/nomo	Norwegian island.
place/island_uppercase/nomo	Norwegian island in uppercase.

**place\_polpl.ecr**

Entity	Description
place/city1/polpl	Polish settlement with over 100,000 inhabitants.
place/city1_uppercase/polpl	Polish settlement with over 100,000 inhabitants, in uppercase.
place/city2/polpl	Polish settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/polpl	Polish settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/polpl	Polish province.
place/province_uppercase/polpl	Polish province in uppercase.
place/county/polpl	Polish county.
place/county_uppercase/polpl	Polish county in uppercase.
place/province/polpl	Polish province (in English).
place/province_uppercase/polpl	Polish province in uppercase (in English).
place/county/polpl	Polish county (in English).
place/county_uppercase/polpl	Polish county in uppercase (in English).

**place\_porbr.ecr**

Entity	Description
place/city1/porbr	Brazilian settlement with over 100,000 inhabitants.
place/city1_uppercase/porbr	Brazilian settlement with over 100,000 inhabitants, in

**place\_porbr.ecr, continued**

Entity	Description
	uppercase.
place/city2/porbr	Brazilian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/porbr	Brazilian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/state/porbr	Brazilian state.
place/state_uppercase/porbr	Brazilian state in uppercase.
place/island/porbr	Brazilian island.
place/island_uppercase/porbr	Brazilian island in uppercase.

**place\_porpt.ecr**

Entity	Description
place/city1/porpt	Portuguese settlement with over 100,000 inhabitants.
place/city1_uppercase/porpt	Portuguese settlement with over 100,000 inhabitants, in uppercase.
place/city2/porpt	Portuguese settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/porpt	Portuguese settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/district/porpt	Portuguese district.
place/district_uppercase/porpt	Portuguese district in uppercase.
place/island/porpt	Portuguese island.
place/island_uppercase/porpt	Portuguese island in uppercase.

**place\_rummd.ecr**

Entity	Description
place/city1/rummd	Moldovan settlement with over 100,000 inhabitants.
place/city1_uppercase/rummd	Moldovan settlement with over 100,000 inhabitants, in uppercase.

**place\_rummd.ecr, continued**

Entity	Description
place/city2/rummd	Moldovan settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/rummd	Moldovan settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/district/rummd	Moldovan district.
place/district_uppercase/rummd	Moldovan district in uppercase.

**place\_rumro.ecr**

Entity	Description
place/city1/rumro	Romanian settlement with over 100,000 inhabitants.
place/city1_uppercase/rumro	Romanian settlement with over 100,000 inhabitants, in uppercase.
place/city2/rumro	Romanian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/rumro	Romanian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/county/rumro	Romanian county.
place/county_uppercase/rumro	Romanian county in uppercase.

**place\_slksk.ecr**

Entity	Description
place/city1/slksk	Slovakian settlement with over 100,000 inhabitants.
place/city1_uppercase/slksk	Slovakian settlement with over 100,000 inhabitants, in uppercase.
place/city2/slksk	Slovakian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/slksk	Slovakian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/region/slksk	Slovakian region.
place/region_uppercase/slksk	Slovakian region in uppercase.

**place\_slvsi.ecr**

Entity	Description
place/city1/slvsi	Slovenian settlement with over 100,000 inhabitants.
place/city1_uppercase/slvsi	Slovenian settlement with over 100,000 inhabitants, in uppercase.
place/city2/slvsi	Slovenian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/slvsi	Slovenian settlement with between 10,000 and 100,000 inhabitants, in uppercase.

**place\_spaar.ecr**

Entity	Description
place/city1/spaar	Argentinian settlement with over 100,000 inhabitants.
place/city1_uppercase/spaar	Argentinian settlement with over 100,000 inhabitants, in uppercase.
place/city2/spaar	Argentinian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/spaar	Argentinian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/spaar	Argentinian province.
place/province_uppercase/spaar	Argentinian province in uppercase.
place/island/spaar	Argentinian island.
place/island_uppercase/spaar	Argentinian island in uppercase.

**place\_spabo.ecr**

Entity	Description
place/city1/spabo	Bolivian settlement with over 100,000 inhabitants.
place/city1_uppercase/spabo	Bolivian settlement with over 100,000 inhabitants, in uppercase.
place/city2/spabo	Bolivian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/spabo	Bolivian settlement with between 10,000 and 100,000

**place\_spabo.ecr, continued**

Entity	Description
	inhabitants, in uppercase.
place/department/spabo	Bolivian department.
place/department_uppercase/spabo	Bolivian department in uppercase.
place/province/spabo	Bolivian province.
place/province_uppercase/spabo	Bolivian province in uppercase.

**place\_spacl.ecr**

Entity	Description
place/city1/spacl	Chilean settlement with over 100,000 inhabitants.
place/city1_uppercase/spacl	Chilean settlement with over 100,000 inhabitants, in uppercase.
place/city2/spacl	Chilean settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/spacl	Chilean settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/region/spacl	Chilean region.
place/region_uppercase/spacl	Chilean region in uppercase.
place/commune/spacl	Chilean commune.
place/commune_uppercase/spacl	Chilean commune in uppercase.

**place\_spaco.ecr**

Entity	Description
place/city1/spaco	Colombian settlement with over 100,000 inhabitants.
place/city1_uppercase/spaco	Colombian settlement with over 100,000 inhabitants, in uppercase.
place/city2/spaco	Colombian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/spaco	Colombian settlement with between 10,000 and 100,000 inhabitants, in uppercase.

**place\_spaco.ecr, continued**

Entity	Description
place/department/spaco	Colombian department.
place/department_uppercase/spaco	Colombian department in uppercase.

**place\_spaec.ecr**

Entity	Description
place/city1/spaec	Ecuadorian settlement with over 100,000 inhabitants.
place/city1_uppercase/spaec	Ecuadorian settlement with over 100,000 inhabitants, in uppercase.
place/city2/spaec	Ecuadorian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/spaec	Ecuadorian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/province/spaec	Ecuadorian province.
place/province_uppercase/spaec	Ecuadorian province in uppercase.
place/island/spaec	Ecuadorian island.
place/island_uppercase/spaec	Ecuadorian island in uppercase.

**place\_spaes.ecr**

Entity	Description
place/city1/spaes	Spanish settlements with over 100,000 inhabitants.
place/city1_uppercase/spaes	Spanish settlements with over 100,000 inhabitants, in uppercase.
place/city2/spaes	Spanish settlements with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/spaes	Spanish settlements with between 10,000 and 100,000 inhabitants, in uppercase.
place/region/spaes	Region in Spain.
place/region_uppercase/spaes	Region in Spain in uppercase.
place/province/spaes	Province in Spain.

**place\_spaes.ecr, continued**

Entity	Description
place/province_uppercase/spaes	Province in Spain in uppercase.
place/island/spaes	Balearic and Canary Islands.
place/island_uppercase/spaes	Balearic and Canary Islands in uppercase.

**place\_spamx.ecr**

Entity	Description
place/city1/spamx	Mexican settlements with over 100,000 inhabitants.
place/city1_uppercase/spamx	Mexican settlements with over 100,000 inhabitants, in uppercase.
place/city2/spamx	Mexican settlements with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/spamx	Mexican settlements with between 10,000 and 100,000 inhabitants, in uppercase.
place/state/spamx	States in Mexico.
place/state_uppercase/spamx	States in Mexico in uppercase.
place/islands/spamx	Mexican islands.
place/islands_uppercase/spamx	Mexican islands in uppercase.

**place\_spape.ecr**

Entity	Description
place/city1/spape	Peruvian settlement with over 100,000 inhabitants.
place/city1_uppercase/spape	Peruvian settlement with over 100,000 inhabitants, in uppercase.
place/city2/spape	Peruvian settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/spape	Peruvian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/region/spape	Peruvian region.
place/region_uppercase/spape	Peruvian region in uppercase.

**place\_spapy.ecr**

Entity	Description
place/city1/spapy	Paraguayan settlement with over 100,000 inhabitants.
place/city1_uppercase/spapy	Paraguayan settlement with over 100,000 inhabitants, in uppercase.
place/city2/spapy	Paraguayan settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/spapy	Paraguayan settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/region/spapy	Paraguayan region.
place/region_uppercase/spapy	Paraguayan region in uppercase.
place/commune/spapy	Paraguayan commune.
place/commune_uppercase/spapy	Paraguayan commune in uppercase.

**place\_spauy.ecr**

Entity	Description
place/city1/spauy	Uruguayan settlement with over 100,000 inhabitants.
place/city1_uppercase/spauy	Uruguayan settlement with over 100,000 inhabitants, in uppercase.
place/city2/spauy	Uruguayan settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/spauy	Uruguayan settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/department/spauy	Uruguayan department.
place/department_uppercase/spauy	Uruguayan department in uppercase.

**place\_spave.ecr**

Entity	Description
place/city1/spave	Venezuelan settlement with over 100,000 inhabitants.
place/city1_uppercase/spave	Venezuelan settlement with over 100,000 inhabitants, in uppercase.

**place\_spave.ecr, continued**

Entity	Description
place/city2/spave	Venezuelan settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/spave	Venezuelan settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/region/spave	Venezuelan region.
place/region_uppercase/spave	Venezuelan region in uppercase.
place/state/spave	Venezuelan state.
place/state_uppercase/spave	Venezuelan state in uppercase.
place/island/spave	Venezuelan island.
place/island_uppercase/spave	Venezuelan island in uppercase.

**place\_srpme.ecr**

Entity	Description
place/city1/srpme	Montenegrin settlement with over 100,000 inhabitants.
place/city1_uppercase/srpme	Montenegrin settlement with over 100,000 inhabitants, in uppercase.
place/city2/srpme	Montenegrin settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/srpme	Montenegrin settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/municipality/srpme	Montenegrin municipality.
place/municipality_uppercase/srpme	Montenegrin municipality in uppercase.

**place\_srprs.ecr**

Entity	Description
place/city1/srprs	Serbian settlement with over 100,000 inhabitants.
place/city1_uppercase/srprs	Serbian settlement with over 100,000 inhabitants, in uppercase.
place/city2/srprs	Serbian settlement with between 10,000 and 100,000

**place\_srprs.ecr, continued**

Entity	Description
	inhabitants.
place/city2_uppercase/srprs	Serbian settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/district/srprs	Serbian district.
place/district_uppercase/srprs	Serbian district in uppercase.

**place\_swese.ecr**

Entity	Description
place/city1/swese	Swedish settlement with over 100,000 inhabitants.
place/city1_uppercase/swese	Swedish settlement with over 100,000 inhabitants, in uppercase.
place/city2/swese	Swedish settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/swese	Swedish settlement with between 10,000 and 100,000 inhabitants, in uppercase.
place/county/swese	Swedish county.
place/county_uppercase/swese	Swedish county in uppercase.
place/island/swese	Swedish island.
place/island_uppercase/swese	Swedish island in uppercase.

**place\_turtr.ecr**

Entity	Description
place/city1/turtr	Turkish settlement with over 100,000 inhabitants.
place/city1_uppercase/turtr	Turkish settlement with over 100,000 inhabitants, in uppercase.
place/city2/turtr	Turkish settlement with between 10,000 and 100,000 inhabitants.
place/city2_uppercase/turtr	Turkish settlement with between 10,000 and 100,000 inhabitants, in uppercase.

**place\_turtr.ecr, continued**

Entity	Description
place/region/turtr	Turkish region.
place/region_uppercase/turtr	Turkish region in uppercase.
place/province/turtr	Turkish province.
place/province_uppercase/turtr	Turkish province in uppercase.
place/district/turtr	Turkish district.
place/district_uppercase/turtr	Turkish district in uppercase.

**profanity\_chi.ecr**

Entity	Description
profanity/biological/chi	Potentially offensive term in Chinese pertaining to biological processes (including obscured representations).
profanity/sexual/chi	Potentially offensive term in Chinese pertaining to sex (including obscured representations).
profanity/personal/chi	Directly insulting term in Chinese (including obscured representations).
profanity/exclaim/chi	Potentially offensive term in Chinese pertaining to exclamation (including obscured representations).
profanity/chi	<p>Any potentially offensive Chinese term (including obscured representations).</p> <p>Eduction gives higher scores to matches with a greater tendency to offend.</p> <p>The following <code>MinScore</code> parameter values are provided as a guide:</p> <ul style="list-style-type: none"> <li>• <code>MinScore=0.7</code> removes many weakly offensive terms and phrases</li> <li>• <code>MinScore=1.1</code> returns moderately-offensive terms and phrases</li> <li>• <code>MinScore=1.3</code> returns only strongly offensive terms and phrases</li> <li>• <code>MinScore=2.5</code> returns no matches at all</li> </ul>
profanity/phrase/chi	Any potentially offensive Chinese phrase (including

**profanity\_chi.ecr, continued**

Entity	Description
	<p>obscured representations).</p> <p>The following <code>MinScore</code> parameter values are provided as a guide:</p> <ul style="list-style-type: none"> <li>• <code>MinScore=0.7</code> removes many weakly offensive terms and phrases</li> <li>• <code>MinScore=1.1</code> returns moderately-offensive terms and phrases</li> <li>• <code>MinScore=1.3</code> returns only strongly offensive terms and phrases</li> <li>• <code>MinScore=3.0</code> returns no matches at all</li> </ul>

**profanity\_eng.ecr**

Entity	Description
profanity/blasphemous/eng	Religious term often used for blasphemy (including obscured representations).
profanity/homophobic/eng	Homophobic term (including obscured representations).
profanity/racial/eng	Racial derogatory term (including obscured representations).
profanity/personal/eng	Personally insulting term. Contains all racial and homophobic offensive terms (including obscured representations).
profanity/sexual/eng	Potentially offensive term pertaining to sex (including obscured representations).
profanity/biological/eng	Potentially offensive term pertaining to biological processes (including obscured representations).
profanity/censored/eng	Word that appears in the text in a fully-censored format.
profanity/eng	<p>Any potentially-offensive English term (including obscured representations)</p> <p>Eduction gives higher scores to matches with a greater tendency to offend.</p> <p>The following <code>MinScore</code> parameter values are provided</p>

**profanity\_eng.ecr, continued**

Entity	Description
	as a guide: <ul style="list-style-type: none"> <li>• MinScore=0.1 removes false matches, for example from URL shorteners</li> <li>• MinScore=0.7 removes many weakly offensive terms and phrases</li> <li>• MinScore=1.1 returns moderately-offensive terms and phrases</li> <li>• MinScore=1.3 returns only strongly offensive terms and phrases</li> <li>• MinScore=2.5 returns no matches at all</li> </ul>

**psi\_api\_credentials.ecr**

Entity <sup>1</sup>	Description
psi/api_credentials/client_id/aws	An Amazon Web Services client ID.
psi/api_credentials/client_id/bitly	A Bitly client ID.
psi/api_credentials/client_id/facebook	A Facebook ID.
psi/api_credentials/client_id/flickr	A Flickr ID.
psi/api_credentials/client_id/foursquare	A Foursquare client ID.
psi/api_credentials/client_id/linkedin	A LinkedIn client ID.
psi/api_credentials/client_id/twitter	A Twitter client ID.
psi/api_credentials/secret_key/aws	An Amazon Web Services secret key.
psi/api_credentials/secret_key/bitly	A Bitly secret key.
psi/api_credentials/secret_key/facebook	A Facebook secret key.
psi/api_credentials/secret_key/flickr	A Flickr secret key.
psi/api_credentials/secret_key/foursquare	A Foursquare secret key.
psi/api_credentials/secret_key/linkedin	A LinkedIn secret key.
psi/api_credentials/secret_key/twitter	A Twitter secret key.

**psi\_private\_key.ecr**

Entity	Description
psi/private_key/pem/begin	Textual encoding pre-encapsulation boundary for Public Key Cryptography Standards (RFC7468). To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '-'.  
psi/private_key/pem/end	Textual encoding post-encapsulation boundary for Public Key Cryptography Standards (RFC7468). To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '-'.  
psi/private_key/pem	PEM format private key. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '-'.  For this entity, you might need to increase the value of <code>MaxEntityLength</code> .
psi/private_key/xkms/rsakeypair/begin	XML Key Management Specification 2.0 <code>RSAPair</code> start element. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '<'.  
psi/private_key/xkms/rsakeypair/end	XML Key Management Specification 2.0 <code>RSAPair</code> end element. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '<'.  
psi/private_key/xkms/rsakeypair	XML Key Management Specification 2.0 <code>RSAPair</code> element. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '<'.  For this entity, you might need to increase the value of <code>MaxEntityLength</code> .
psi/private_key/xkms/rsakeyvalue/begin	XML Signature <code>RSAPairValue</code> start element. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '<'.  
psi/private_key/xkms/rsakeyvalue/end	XML Signature <code>RSAPairValue</code> end element. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '<'.  
psi/private_key/xkms/rsakeyvalue	XML Signature <code>RSAPairValue</code> element. To ensure that this entity performs correctly, set <code>TangibleCharacters</code> to include '<'.  For this entity, you might need to increase the value of <code>MaxEntityLength</code> .
psi/private_key/xkms/dsakeyvalue/begin	XML Signature <code>DSAKeyPairValue</code> start element. To ensure that this entity performs correctly, set

**psi\_private\_key.ecr, continued**

Entity	Description
	TangibleCharacters to include '<'.
psi/private_key/xkms/dsakeyvalue/end	XML Signature DSAKeyValue end element. To ensure that this entity performs correctly, set TangibleCharacters to include '<'.
psi/private_key/xkms/dsakeyvalue	XML Signature DSAKeyValue element. To ensure that this entity performs correctly, set TangibleCharacters to include '<'.
	For this entity, you might need to increase the value of MaxEntityLength.

<sup>1</sup>You must use the `psi_api_credentials_postprocessing.lua` post-processing script for this grammar. The post-processing script adjusts the scores for likely and unlikely matches, and normalizes the scores for these entities in the range 0-1.

## S

The sentiment grammar files have *lite* versions. The lite versions are identical to the full versions in most respects, but they do not support components or user modification. They can process data up to twice as fast as the full versions, depending on language.

Micro Focus recommends that you use the lite versions except when you need to use components or modify the built-in dictionaries.

The lite grammars have the same name as the full version, with `_lite` after the language. For example, the file name of the Chinese sentiment grammar file is `sentiment_chi.ecr`, and the file name of the lite version is `sentiment_chi_lite.ecr`.

**sentiment\_ara.ecr and sentiment\_ara\_lite.ecr**

Entity	Description
sentiment/positive/ara	An Arabic phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.
sentiment/negative/ara	An Arabic phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT components.
sentiment/ara	A positive or negative phrase in Arabic. This entity adds a POSITIVE or NEGATIVE component wrapper to an empty string after the match. You can use this component to determine the sentiment of the phrase. Use this entity when faster performance is desirable.

**sentiment\_ara.ecr and sentiment\_ara\_lite.ecr, continued**

Entity	Description
	Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.

**sentiment\_chi.ecr and sentiment\_chi\_lite.ecr**

Entity	Description
sentiment/positive/chi	A Chinese phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.
sentiment/negative/chi	A Chinese phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT components.
sentiment/chi	<p>A positive or negative phrase in Chinese. This entity adds a POSITIVE or NEGATIVE component wrapper to an empty string after the match. You can use this component to determine the sentiment of the phrase. Use this entity when faster performance is desirable.</p> <p>Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.</p>

**sentiment\_cze.ecr and sentiment\_cze\_lite.ecr**

Entity	Description
sentiment/positive/cze	A Czech phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.
sentiment/negative/cze	A Czech phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT components.
sentiment/cze	<p>A positive or negative phrase in Czech. This entity adds a POSITIVE or NEGATIVE component wrapper to an empty string after the match. You can use this component to determine the sentiment of the phrase. Use this entity when faster performance is desirable.</p> <p>Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.</p>

**sentiment\_dut.ecr and sentiment\_dut\_lite.ecr**

Entity	Description
sentiment/positive/dut	A Dutch phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.
sentiment/negative/dut	A Dutch phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT components.  Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.

**sentiment\_eng.ecr and sentiment\_eng\_lite.ecr**

Entity	Description
sentiment/positive/eng	An English phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.
sentiment/negative/eng	An English phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT components.
sentiment/eng	A positive or negative phrase in English. This entity adds a POSITIVE or NEGATIVE component wrapper to an empty string after the match. You can use this component to determine the sentiment of the phrase. Use this entity when faster performance is desirable.  Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.

**sentiment\_basic\_eng.ecr**

Entity	Description
sentiment/positive/eng sentiment/negative/eng sentiment/eng	If recall with sentiment_eng.ecr is too low, and your documents are generally short comments, use sentiment_basic_eng.ecr to extract additional matches. This grammar contains carefully-selected lists of positive and negative terms that help determine the sentiment of a document in which sentiment_eng.ecr found no matches.  TOPIC and SENTIMENT components are <b>not</b> supported.

**sentiment\_basic\_eng.ecr, continued**

Entity	Description
	<p>sentiment_basic_eng.ecr contains terms in title case, but research shows that for most data these impair recall, so these are given a lower score. Micro Focus recommends that you set EntityMinScoreN to 0.4 to filter out these terms unless you need them.</p>

**sentiment\_fre.ecr and sentiment\_fre\_lite.ecr**

Entity	Description
sentiment/positive/fre	<p>A French phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.</p>
sentiment/negative/fre	<p>A French phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT components.</p>
sentiment/fre	<p>A positive or negative phrase in French. This entity adds a POSITIVE or NEGATIVE component wrapper to an empty string after the match. You can use this component to determine the sentiment of the phrase. Use this entity when faster performance is desirable.</p> <p>Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.</p>

**sentiment\_ger.ecr and sentiment\_get\_lite.ecr**

Entity	Description
sentiment/positive/ger	<p>A German phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.</p>
sentiment/negative/ger	<p>A German phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT components.</p>
sentiment/ger	<p>A positive or negative phrase in German. This entity adds a POSITIVE or NEGATIVE component wrapper to an empty string after the match. You can use this component to determine the sentiment of the phrase. Use this entity when faster performance is desirable.</p> <p>Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.</p>

**sentiment\_ita.ecr and sentiment\_ita\_lite.ecr**

Entity	Description
sentiment/positive/ita	An Italian phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.
sentiment/negative/ita	An Italian phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT components.
sentiment/ita	A positive or negative phrase in Italian. This entity adds a POSITIVE or NEGATIVE component wrapper to an empty string after the match. You can use this component to determine the sentiment of the phrase. Use this entity when faster performance is desirable.  Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.

**sentiment\_pol.ecr and sentiment\_pol\_lite.ecr**

Entity	Description
sentiment/positive/pol	A Polish phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.
sentiment/negative/pol	A Polish phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT components.
sentiment/pol	A positive or negative phrase in Polish. This entity adds a POSITIVE or NEGATIVE component wrapper to an empty string after the match. You can use this component to determine the sentiment of the phrase. Use this entity when faster performance is desirable.  Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.

**sentiment\_por.ecr and sentiment\_por\_lite.ecr**

Entity	Description
sentiment/positive/por	A Portuguese phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.
sentiment/negative/por	A Portuguese phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT

**sentiment\_por.ecr and sentiment\_por\_lite.ecr, continued**

Entity	Description
	components.
sentiment/por	<p>A positive or negative phrase in Portuguese. This entity adds a POSITIVE or NEGATIVE component wrapper to an empty string after the match. You can use this component to determine the sentiment of the phrase. Use this entity when faster performance is desirable.</p> <p>Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.</p>

**sentiment\_rus.ecr and sentiment\_rus\_lite.ecr**

Entity	Description
sentiment/positive/rus	A Russian phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.
sentiment/negative/rus	A Russian phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT components.
sentiment/rus	<p>A positive or negative phrase in Russian. This entity adds a POSITIVE or NEGATIVE component wrapper to an empty string after the match. You can use this component to determine the sentiment of the phrase. Use this entity when faster performance is desirable.</p> <p>Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.</p>

**sentiment\_spa.ecr and sentiment\_spa\_lite.ecr**

Entity	Description
sentiment/positive/spa	A Spanish phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.
sentiment/negative/spa	A Spanish phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT components.

**sentiment\_spa.ecr and sentiment\_spa\_lite.ecr, continued**

Entity	Description
sentiment/spa	<p>A positive or negative phrase in Spanish. This entity adds a POSITIVE or NEGATIVE component wrapper to an empty string after the match. You can use this component to determine the sentiment of the phrase. Use this entity when faster performance is desirable.</p> <p>Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.</p>

**sentiment\_tur.ecr and sentiment\_tur\_lite.ecr**

Entity	Description
sentiment/positive/tur	A Turkish phrase that expresses a positive statement. Supports the TOPIC and SENTIMENT components.
sentiment/negative/tur	A Turkish phrase that expresses a negative statement. Supports the TOPIC and SENTIMENT components.
sentiment/tur	<p>A positive or negative phrase in Turkish. This entity adds a POSITIVE or NEGATIVE component wrapper to an empty string after the match. You can use this component to determine the sentiment of the phrase. Use this entity when faster performance is desirable.</p> <p>Micro Focus recommends that you configure Education to allow all duplicates, and set TangibleCharacters to :;@#.</p>

## T

**team\_american\_football.ecr**

Entity	Description
org/football/us	American Football team in the U.S.
org/football/ca	<p>Canadian Football team in Canada.</p> <p>All synonyms for team names produce the same normalized text (for example, <i>The Bears</i> normalizes to <i>Chicago Bears</i>) to identify variant team names.</p>

#### team\_baseball.ecr

Entity	Description
org/baseball/mlb	Major League baseball team in the U.S. and Canada. All synonyms for team names produce the same normalized text (for example, <i>LA Dodgers</i> normalizes to <i>Los Angeles Dodgers</i> ) to identify variant team names.

#### team\_basketball.ecr

Entity	Description
org/basketball/nba	Basketball team in the NBA. All synonyms for team names produce the same normalized text (for example, <i>Sixers</i> normalizes to <i>Philadelphia 76ers</i> ) to identify variant team names.

#### team\_hockey.ecr

Entity	Description
org/hockey/nhl	Hockey team in the NHL. All synonyms for team names produce the same normalized text (for example, <i>NJ Devils</i> normalizes to <i>New Jersey Devils</i> ) to identify variant team names.

#### team\_soccer.ecr

Entity	Description
org/soccer/us	Soccer team in U.S. and Canada (Major League Soccer).
org/soccer/gb	Football (soccer) team in the United Kingdom. Set EntityMinScoreN=0.99 to filter out ambiguous names such as <i>Celtic</i> .
org/soccer/de	Football (soccer) team in Germany (current Bundesliga teams). Set EntityMinScoreN=0.99 to filter out ambiguous names such as <i>Wolfsburg</i> .
org/soccer/fr	Football (soccer) team in France. Set EntityMinScoreN=0.99 to filter out ambiguous names such as <i>Nice</i> .

**team\_soccer.ecr, continued**

Entity	Description
org/soccer/nl	Football (soccer) team in the Netherlands. Set EntityMinScoreN=0.99 to filter out ambiguous names such as <i>Ajax</i> .
org/soccer/es	Football (soccer) team in Spain (current Primera & Segunda Divisiones teams). Set EntityMinScoreN=0.99 to filter out ambiguous names such as <i>Barcelona</i> .
org/soccer/it	Football (soccer) team in Italy (current teams in Serie A and Serie B). Set EntityMinScoreN=0.99 to filter out ambiguous names such as <i>Inter</i> .  All synonyms for team names produce the same normalized text (for example, <i>Man United</i> normalizes to <i>Manchester United</i> ) to identify variant team names.

**time\_chi.ecr**

Entity	Description
time/time_of_day/chi	A descriptive time of day in Chinese.
time/time_of_day_simplified/chi	A descriptive time of day in simplified Chinese.
time/period/chi	An amount of time in Chinese.
time/period_simplified/chi	An amount of time in simplified Chinese.
time/alpha_time/chi	Time of the day in Chinese words.
time/alpha_time_simplified/chi	Time of the day in simplified Chinese words and ASCII numbers.
time/hms/chi	Time in hours and minutes with optional seconds and fractions.
time/hms_simplified/chi	Time in hours and minutes with optional seconds and fractions, in simplified Chinese and ASCII numbers.
time/chi	Any time of day in Chinese, in a variety of formats.
time/simplified/chi	Any time of day in simplified Chinese and ASCII numbers, in a variety of formats.

**time\_eng.ecr**

Entity	Description
time/time_of_day/eng	A descriptive time of day in English. For example, <i>dawn, morning, Mid-afternoon.</i>
time/period/eng	An amount of time. For example, <i>day, quarter, month, decades.</i>
time/alpha_time/eng	Time of day in English words, for example, <i>4 o'clock, ten past five.</i>
time/hms/eng	Time in hours and minutes with optional seconds and fractions.
time/eng	Any time in English or numeric format. Supported formats include: <ul style="list-style-type: none"> <li>• 20:20 GMT+0100</li> <li>• 00:15</li> <li>• 4:54</li> <li>• 20:20:20.20202020202020</li> <li>• 04:54 a.m.</li> <li>• 02:20 at night</li> <li>• quarter past midnight</li> <li>• 20 to midnight</li> <li>• ten past six</li> <li>• One o'clock</li> <li>• 6.10pm</li> <li>• 1.49 in the afternoon</li> <li>• noon</li> <li>• 5:00 UTC+1</li> <li>• 19:15 Hawaii-Aleutian Time</li> </ul>

**time\_fre.ecr**

Entity	Description
time/time_of_day/fre	A descriptive time of day in French. For example, <i>l'aube, Matin.</i>

**time\_fre.ecr, continued**

Entity	Description
time/period/fre	An amount of time. For example, <i>une décennie, un siècle</i> .
time/alpha_time/fre	Time of day in French words. For example, <i>sept heures du matin, trois heures de l'après-midi</i> .
time/hms/fre	Time in hours and minutes with optional seconds and fractions.
time/fre	Any time in French or numeric format. Supported formats include: <ul style="list-style-type: none"> <li>• 20:20 GMT+0100</li> <li>• 00:15</li> <li>• 4:54</li> <li>• 20:20:20.20202020202020</li> <li>• 04:54 du matin</li> <li>• 4.54 de la nuit</li> <li>• minuit et 15</li> <li>• midi moins vingt</li> <li>• 6 heures 20 du soir</li> <li>• 1 heure 49 de l'après midi</li> <li>• une heure trente cinq</li> <li>• six heures et dix</li> <li>• midi</li> <li>• 5:00 UTC+1</li> <li>• 19:15 PDT</li> </ul>

**time\_ger.ecr**

Entity	Description
time/time_of_day/ger	A descriptive time of day. For example, <i>Nachmittag</i> .
time/period/ger	An amount of time in German (all declensions). For example, <i>Jahrzehnt</i> .
time/alpha_time/ger	Time of day in German words. For example, <i>fünf nach</i>

**time\_ger.ecr, continued**

Entity	Description
	<i>zehn.</i>
time/hms/ger	Time in hours and minutes with optional seconds and fractions.
time/ger	Any time in German or numeric format. Supported formats include: <ul style="list-style-type: none"> <li>• 20:20 GMT+0100</li> <li>• 00:15</li> <li>• 4:54</li> <li>• 20:20:20.2020202020202020</li> <li>• 04:54 morgens</li> <li>• 4.54 nachts</li> <li>• viertel nach mitternacht</li> <li>• 6.20 nachmittags</li> <li>• 1 Uhr 49 nachmittags</li> <li>• Fünf Uhr</li> <li>• Sechs Uhr Zehn</li> <li>• mittag</li> <li>• 5:00 UTC+1</li> <li>• 19:15 PDT</li> </ul>

**time\_ita.ecr**

Entity	Description
time/time_of_day/ita	A descriptive time of day in Italian. For example, <i>pomeriggio.</i>
time/period/ita	An amount of time in Italian. For example, <i>giorno, Mesi, secolo.</i>
time/alpha_time/ita	Time of day in Italian words. For example, <i>Sono le 4, 5 y 10 delpomeriggio, mezzanotte meno cinque.</i>
time/hms/ita	Time in hours and minutes with optional seconds and fractions.

**time\_ita.ecr, continued**

Entity	Description
time/ita	<p>Any time in Italian or numeric format. Supported formats include:</p> <ul style="list-style-type: none"><li>• 20:20 GMT+0100</li><li>• 00:15</li><li>• 4:54</li><li>• 20:20:20.2020202020202020</li><li>• 4.54 del mattino</li><li>• Tre e tre quarti di notte</li><li>• un quarto alle sette</li><li>• dieci all'una</li><li>• sono le due meno cinque</li><li>• 6 e 20</li><li>• 1 e 49 del pomeriggio</li><li>• 13:35</li><li>• sei e dieci</li><li>• Mezzo giorno</li><li>• 5:00 UTC+1</li><li>• 19:15 PDT</li></ul>

**time\_numeric.ecr**

Entity	Description
time/hms12	12-hour time in hours and minutes, with optional seconds and fractions.
time/hms24	24-hour time in hours and minutes, with optional seconds and fractions.
time/tz_abbr	Standard timezone abbreviations.
time/tz_abbr_plus	Standard timezone abbreviations with optional +/- hh:mm modifier.

**time\_por.ecr**

Entity	Description
time/time_of_day/por	A descriptive time of day in Portuguese. For example, <i>manhã, pôr do dol.</i>
time/period/por	An amount of time in Portuguese. For example, <i>dia, Mês, séculos.</i>
time/alpha_time/por	Time of day in Portuguese words. For example, <i>São dez, doze e um quarto da noite, meia-noite menos 15.</i>
time/hms/por	Time in hours and minutes with optional seconds and fractions.
time/por	Any time in Portugese. Supported formats include: <ul style="list-style-type: none"> <li>• 20:20 GMT+0100</li> <li>• 00:15</li> <li>• 4:54</li> <li>• 20:20:20.20202020202020</li> <li>• 4.54 da manhã</li> <li>• doze e quarto da noite (Brazilian Portuguese)</li> <li>• São vinte e cinco para as cinco da manhã</li> <li>• cinco e vinte da manhã</li> <li>• 1 e 49 da tarde</li> <li>• 13:35</li> <li>• seis e dez</li> <li>• Meio-dia</li> <li>• 5:00 UTC+1</li> <li>• 19:15 PDT</li> <li>• 7 em ponto</li> </ul>

**time\_spa.ecr**

Entity	Description
time/time_of_day/spa	A descriptive time of day in Spanish. For example, <i>a la medianoche, al amanecer.</i>
time/period/spa	An amount of time in Spanish. For example, <i>década.</i>

**time\_spa.ecr, continued**

Entity	Description
time/alpha_time/spa	Time of day in Spanish words. For example, <i>a media mañana</i> .
time/hms/spa	Time in hours and minutes with optional seconds and fractions.
time/spa	Any time in Spanish or numeric format. Supported formats include: <ul style="list-style-type: none"> <li>• 20:20 GMT+0100</li> <li>• 00:15</li> <li>• 4:54</li> <li>• 20:20:20.2020202020202020</li> <li>• 04:54 de la mañana</li> <li>• 4.54 por la noche</li> <li>• doce y cuarto de la noche</li> <li>• Son las cinco menos veinticinco de la mañana</li> <li>• cinco y veinte de la mañana</li> <li>• 1 y 49 de la tarde</li> <li>• 13:35</li> <li>• seis y diez</li> <li>• mediodía</li> <li>• 5:00 UTC+1</li> <li>• 19:15 PDT</li> <li>• 7 en punto</li> </ul>

**transport\_airport.ecr**

Entity	Description
airport/icao	Airport ICAO code.
airport/iata	Airport IATA code.

**transport\_car.ecr**

Entity	Description
car/make_model	Make and model of car.

**U**

**university.ecr**

Entity	Description
org/university	A university.

## Standard Grammar – Source

Eduction includes standard grammar files in source form (XML) and their compiled equivalents (ECR). The source files import compiled Eduction standard grammar files and illustrate sample usage. You can modify these XML source files and recompile them to customize a grammar for the needs of your Eduction application.

The following table lists public entities defined in the XML source files. It excludes the public entities that are republished from the imported Eduction ECR grammar files.

File	Entity	Description
measure.xml	measure/all/eng	An editable collection of patterns that match length, area, volume, and mass.
money.xml <sup>1</sup>	money/all	All currency amounts.  <b>NOTE:</b> This grammar file supports some English alphabetic numbers, for example, <i>seven cents</i> , <i>\$12 million</i> , <i>one hundred dollars</i> , <i>£5m</i> .
pci_dss.xml	pci_dss/person_name/engus pci_dss/date/engus pci_dss/credit_card/engus pci_dss/bank_names/engus	Person names. Dates. Credit and debit card numbers. Bank names.
pii.xml	pii/person_name/engus pii/phone_number/engus pii/email_address/engus	Personal names. Phone numbers. Email addresses.

<sup>1</sup>When matching symbols in the money entities, the Eduction option `MatchWholeWord` must be set to `0` (false). Otherwise, when encountering a string such as `$10.70`, Eduction will not recognize that `$` is the start of a token. Instead, it looks only for matches starting on the `1` and on the `7`, and will not return `$10.70`.

File	Entity	Description
	pii/ip_address/engus	IP addresses.
	pii/social_security/engus	Social Security numbers.
	pii/car_numberplate/engus	Car license plate numbers.
	pii/driver_license/engus	Driver's license numbers.
	pii/credit_card/engus	Credit and debit card numbers.
	pii/date/engus	Dates.
	pii/country	Countries.
	pii/state/engus	U.S. states or possessions.
	pii/county/engus	U.S. counties.
	pii/city/engus	U.S. cities.
	pii/address/engus	Geographical addresses.
	pii/zipcode/engus	U.S. zipcodes.
	pii/age/engus	Age.
	pii/gender/engus	Gender.
	pii/race/engus	Race.
	pii/job_title/engus	Job title.
	pii/disease_and_condition/engus	Disease or medical condition.
	pii/account_number/engus	Generic account number with 6-8 digits in a predictable context.
	pii/license_number/engus	Generic license number with specific alphanumeric format.
	pii/facebook_url/engus	Example URL for a personal Web page (Facebook).

File	Entity	Description
place_europe.xml	place/country/europe	European country in English (and some local languages).
	place/country_uppercase/europe	European country in English and local languages (uppercase).
	place/city1/europe	European settlement with over 100,000 inhabitants, in local language.
	place/city1_uppercase/europe	European settlement with over 100,000 inhabitants, in local language (uppercase).
	place/city2/europe	European settlement with between 10,000 and 100,000 inhabitants, in local language.
	place/city2_uppercase/europe	European settlement with between 10,000 and 100,000 inhabitants, in local language (uppercase).
	place/region/Europe	High-level administrative division, in local language.
	place/region_uppercase/Europe	High-level administrative division, in local language (uppercase).

File	Entity	Description
place_south_america.xml	place/country/south_america	South American country in English, Spanish, or Portuguese.
	place/country_uppercase/south_america	South American country in English, Spanish, or Portuguese (uppercase).
	place/city1/south_america	South American settlement with over 100,000 inhabitants, in local language.
	place/city1_uppercase/south_america	South American settlement with over 100,000 inhabitants, in local language (uppercase).
	place/city2/south_america	South American settlement with between 10,000 and 100,000 inhabitants, in local language.
	place/city2_uppercase/south_america	South American settlement with between 10,000 and 100,000 inhabitants, in local language (uppercase).
	place/island/south_america	South American island, in local language.
	place/island_uppercase/south_america	South American island, in local language (uppercase).
	place/region/south_america	High-level administrative division, in local language.
	place/region_uppercase/south_america	High-level administrative division, in local language (uppercase).
retention.xml	retention/admission_date	Admission date.
	retention/discharge_date	Discharge date.
	retention/birth_date	Birth date.
	retention/age/eng	Age.
sample.xml	sample/solar_system	A simple entity for planets of the solar system.
sentiment_user_chi.xml	sentiment/user_client_name sentiment/user_client_brand sentiment/user_client_rv1_name	You can use these files to modify the sentiment analysis grammar files for the relevant languages to give access to extra domain-specific vocabulary.

File	Entity	Description
	sentiment/user_client_rv1_brand sentiment/user_third_party_company_name sentiment/user_third_party_company_brand sentiment/user_positive_adjective sentiment/user_negative_adjective sentiment/user_positive_noun sentiment/user_negative_noun sentiment/user_neutral_noun sentiment/user_positive_verb sentiment/user_negative_verb sentiment/user_neutral_verb sentiment/user_positive_idiom sentiment/user_negative_idiom	
sentiment_user_ara.xml sentiment_user_cze.xml sentiment_user_dutch.xml sentiment_user_eng.xml sentiment_user_	sentiment/user_positive_adjective sentiment/user_negative_adjective sentiment/user_neutral_adjective sentiment/user_positive_adverb sentiment/user_negative_adverb sentiment/user_neutral_adverb sentiment/user_positive_noun sentiment/user_negative_noun	

File	Entity	Description
fre.xml	sentiment/user_neutral_noun	
sentiment_user_ger.xml	sentiment/user_positive_verb	
	sentiment/user_negative_verb	
sentiment_user_ita.xml	sentiment/user_neutral_verb	
sentiment_user_pol.xml	sentiment/user_positive_match	
	sentiment/user_negative_match	
sentiment_user_por.xml	sentiment/user_good_noun (English only)	
sentiment_user_rus.xml		
sentiment_user_spa.xml		
sentiment_user_tur.xml		

The entities in this table incorporate the compiled Education entities in combination with Education XML grammar to create additional entities. The XML illustrates how to use the compiled Education entities. You can modify these XML files and compile them into Education ECR files that you can then use for specific applications.

The Education grammar files have three advantages:

- Allows for fined-grained access to basic entities that include more complex entities. You can then customize the complex entities to increase the precision and recall of the matching process.
- Provides both the compiled ECR grammar files as well as source-form XML grammar files that reference them.
- Separate ECR files reduce the memory footprint and file size.

# Chapter 14: Grammar Format

## Reference

This section provides a reference for the syntax and regular expressions that you can use in grammar files.

For details of how to modify the grammars, see [Create and Modify Education Grammars, on page 81](#).  
For details of the grammar files provided with Education, see [Standard Grammars, on page 108](#).

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## Eduction Grammar Syntax

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The tables in this section describe the Eduction grammar syntax defined in the `edk.dtd` (see [Education Grammar DTD, on page 300](#)).

In these tables, the terms in angled brackets `<>` describe the value that you must insert. The XML elements, attributes, and values are defined in lower case.

Although the Eduction compiler accepts uppercase element and attribute names, this functionality is deprecated, retained for backward compatibility.

The `edk.dtd` file represents the current definition for Eduction grammar files. All Eduction grammars must follow this DTD.

### **<grammars>**

**Element:** grammars

**Child Elements:** [<include>](#), [<grammar>](#)

**Description:** This is the top-level element in an Education grammar.

**Example:** `<grammars version="1.0" debug="true" case="sensitive">`

Attribute	Value	Default	Description
version	<version string>	none	An optional character string that provides version information for the grammar.
case	sensitive insensitive inherited	inherited	Determines whether a match is case sensitive. The value <code>inherited</code> takes the value from the application level, which in the case of Education applications is usually <code>sensitive</code> .
debug	true false	false	Displays verbose information for the grammars element while <code>edktool</code> compiles the grammar.

## <include>

**Element:** include

**Child Elements:** [<publish>](#)

**Description:** References another Education grammar file for inclusion.

**Example:** `<include path="winter_names.ecr" type="private"/>`

Attribute	Value	Default	Description
path	<path to the grammar file>		The path to the grammar file to include. A value is required.
type	public private	public	The default setting of <code>public</code> retains the <code>private/public</code> visibility of entities in an included XML grammar (included ECR grammars, by definition of a compiled grammar, only contain public entities). Set <code>type</code> to <code>private</code> to hide the included public entities in the file that includes the grammar.

## <publish>

**Element:** publish

**Child Elements:** none

**Description:** Makes a private entity public. The entity can be anywhere in an included XML file chain.

**NOTE:** You cannot access private entities in a compiled ECR file, so that even if you know the name of the private entity, `publish` cannot make it public.

**Example:** `<publish name="grammar2/g2e2"/>`

Attribute	Value	Default	Description
name	<entity name>		The name of the private entity from an included XML file that you want to make public. A value is required.

## <grammar>

**Element:** grammar

**Child Elements:** <extern>, <entity>

**Description:** Defines a grammar, which is a collection of entities. You use entities for matching.

**Example:** <grammar name="grammar1" case="inherited" extend="disallow" debug="inherited">

Attribute	Value	Default	Description
name	<grammar name>		The name of the grammar. A value is required.
case	sensitive insensitive inherited	inherited	Determines whether a match is case sensitive. The value <code>inherited</code> accepts the case matching mode of the <grammars> parent.
extend	append replace disallow	disallow	The mode to use for updating a grammar. Set this option to <b>append</b> to add the new entities to the existing grammar definition. Set it to <b>replace</b> to ignore the existing definition and use the new one. Set <code>extend</code> to <b>disallow</b> to prevent the new definition adding to or replacing values if there is already a grammar with the same name.
debug	true false inherited	inherited	Displays verbose information for the dictionary element during compilation. The value <code>inherited</code> accepts the debug mode of the <code>grammars</code> parent.

## <extern>

**Element:** extern

**Child Elements:** none

**Description:** Identifies an external grammar by name so that you do not have to explicitly name the grammar when you refer to the entities that it contains. For example, if the external grammar is called `grammar1`, and it has an entity `entity1`, then in your current grammar, you can refer to the entity as `entity1` rather than `grammar1/entity1`.

**Example:** <extern name="grammar2"/>

Attribute	Value	Default	Description
name	<grammar name>		The name of the external grammar. A value is required.

## <entity>

**Element:** entity

**Child Elements:** <entry>, <pattern>

**Description:** Defines an entity that you can use for matching.

**Example:** <entity name="entity1" type="public" case="insensitive" extend="disallow" debug="true">

Attribute	Value	Default	Description
name	<grammar name>		The name of the grammar. A value is required.
type	public private	private	Defines the entity as public or private.
case	sensitive insensitive inherited	inherited	Determines whether a match is case sensitive. The value inherited accepts the case matching mode of the <grammars> parent.
extend	append replace disallow	disallow	Extends or replaces an existing entity definition.
debug	true false inherited	inherited	Displays verbose information for the entity element during compilation. The value inherited accepts the debug mode of the grammar parent.

## <entry>

**Element:** entry

**Child Elements:** <headword>, <synonym>

**Description:** An entry represents an individual value that an entity matches. The entry has one or more attributes such as the actual phrase that returns (the *headword*), the case, and so on.

**Example:** <entry headword="mat" score=".3" case="inherited" debug="inherited">

Attribute	Value	Default	Description
headword	#CDATA		The dictionary entry. You can specify headword as either an attribute or a subelement, but you must not use both.
score	>= 0	1	<p>A score to use to assign any weightings to the matches.</p> <ul style="list-style-type: none"> <li>A score of 1 is the default score.</li> <li>A score of 0 always excludes the matching tag from the results. You can use this value to specify exceptions to grammar rules.</li> </ul> <p>You can use these weightings for a variety of purposes:</p> <ul style="list-style-type: none"> <li>They can represent the confidence you have in the accuracy of the match (where a value of 1 represents certainty, and lower values represent lesser confidence).</li> <li>They can represent the importance of a match. For example, in the sentiment grammars the score represents the strength of the sentiment.</li> </ul> <p>When there are multiple scores, Education multiplies them together. For example, if a match on an entity has a score of 1.5, and you use that entity in another entity that has a score of 0.4, the resulting score is 0.6.</p> <p>If you specify a minimum score during extraction, Education extracts only those matches with a sufficiently high score. You can also display the exact scores of any match during extraction.</p> <p><b>NOTE:</b> Micro Focus recommends that you set entity and pattern scores to be no lower than 0.01 and no higher than 100.</p>
case	sensitive insensitive inherited	inherited	Determines whether a match is case sensitive. The value <code>inherited</code> accepts the case matching mode of the <code>&lt;entity&gt;</code> parent.
debug	true false inherited	inherited	Displays verbose information for the entry element during compilation. The value <code>inherited</code> accepts the debug mode of the <code>&lt;entity&gt;</code> parent.

## <headword>

**Element:** headword

**Child Elements:** none

**Description:** A headword is the exact sequence of characters that produce an entity match.

**Example:** See example in [<entry>](#), on page 290.

Attribute	Value	Default	Description
<code>&lt;element contents&gt;</code>	<code>&lt;the headword&gt;</code>		The headword value.  <b>NOTE:</b> If the <code>entry</code> element contains a headword attribute, it cannot have a headword subelement.
<code>case</code>	<code>sensitive</code> <code>insensitive</code> <code>inherited</code>	<code>inherited</code>	Determines whether a match is case sensitive. The value <code>inherited</code> accepts the case matching mode of the <a href="#">&lt;entry&gt;</a> , on page 290 parent.
<code>score</code>	<code>&gt;= 0</code>	<code>1</code>	A score to use to assign any weightings to the matches. <ul style="list-style-type: none"> <li>A score of 1 is the default score.</li> <li>A score of 0 always excludes the matching tag from the results. You can use this value to specify exceptions to grammar rules.</li> </ul> You can use these weightings for a variety of purposes: <ul style="list-style-type: none"> <li>They can represent the confidence you have in the accuracy of the match (where a value of 1 represents certainty, and lower values represent lesser confidence).</li> <li>They can represent the importance of a match. For example, in the sentiment grammars the score represents the strength of the sentiment.</li> </ul> When there are multiple scores, Education multiplies them together. For example, if a match on an entity has a score of 1.5, and you use that entity in another entity that has a score of 0.4, the resulting score is 0.6. <p>If you specify a minimum score during extraction, Education extracts only those matches with a sufficiently high score. You can also display the exact scores of any match during extraction.</p> <b>NOTE:</b> Micro Focus recommends that you set entity and pattern scores to be no lower than 0.01 and no higher than 100.

## <synonym>

**Element:** synonym

**Child Elements:** none

**Description:** A synonym is an alternative sequence of characters to a headword. Synonym matching produces an entity match, but returns the headword in place of the matching synonym. For example, if you search for *dog* with the synonym *canine* enabled, matches for *canine* return as if they matched *dog*.

**Example:**

```
<entry headword="Vatican City">
  <synonym score="1.2">The Vatican</synonym>
  <synonym score="1.1">Holy See</synonym>
  <synonym>Città del Vaticano</synonym>
  <synonym>Citta del Vaticano</synonym>
</entry>
```

Attribute	Value	Default	Description
<element contents>	<the synonym>		The synonym value.
case	sensitive insensitive inherited	inherited	Determines whether a match is case sensitive. The value inherited accepts the case matching mode of the <a href="#">&lt;entry&gt;</a> , on page 290 parent.
score	>= 0	the same as for the parent <entry>	The score value for the synonym.  By default, all synonyms are assigned the same score as the parent entry. If you change the score, the synonym match returns the parent entry as usual, but with the adjusted score.

## <pattern>

**Element:** pattern

**Child Elements:** none

**Description:** Defines a pattern used for matching.

**Example:** <pattern score=".1" case="insensitive" replace="replacechars" insert\_before="prefix\_" insert\_after="\_suffix">cat</pattern>

Attribute	Value	Default	Description
pattern	<actual pattern>		A value is required.
score	>= 0	1	A score to use to assign any weightings to the matches. <ul style="list-style-type: none"> <li>A score of 1 is the default score.</li> <li>A score of 0 always excludes the matching tag from the results. You can use this value to specify exceptions to grammar rules.</li> </ul> You can use these weightings for a variety of purposes:

Attribute	Value	Default	Description
			<ul style="list-style-type: none"> <li>They can represent the confidence you have in the accuracy of the match (where a value of 1 represents certainty, and lower values represent lesser confidence).</li> <li>They can represent the importance of a match. For example, in the sentiment grammars the score represents the strength of the sentiment.</li> </ul> <p>When there are multiple scores, Education multiplies them together. For example, if a match on an entity has a score of 1.5, and you use that entity in another entity that has a score of 0.4, the resulting score is 0.6.</p> <p>If you specify a minimum score during extraction, Education extracts only those matches with a sufficiently high score. You can also display the exact scores of any match during extraction.</p> <p><b>NOTE:</b> Micro Focus recommends that you set entity and pattern scores to be no lower than 0.01 and no higher than 100.</p>
case	sensitive insensitive inherited	inherited	Determines whether a match is case sensitive. The value inherited accepts the case matching mode of the grammars parent.
replace	<text to replace the match>	<no default>	Education replaces the text of the match with the specified text.
insert_before	<text to insert before the match>	<no default>	Education inserts the specified text before the text of the match.
insert_after	<text to insert after the match>	<no default>	Education inserts the specified text after the text of the match.
debug	true false inherited	inherited	Displays verbose information for the pattern element during compilation. The value inherited accepts the debug mode of the <entity> parent.

# Regular Expressions

This section describes the regular expressions syntax that Eduction supports.

The Eduction engine parser interprets regular expression syntax nearly identically to the UNIX regular expression syntax. The regular expression syntax also includes some extensions for matching substrings.

## Operators

The following table describes the base regular expression operators available in the Eduction engine, and the pattern the operator matches.

Operator	Matched Pattern
\	Quote the next metacharacter.
^	Match the beginning of a line.
\$	Match the end of a line.
.	Match any character (except newline).
	Alternation.
()	Used for grouping to force operator precedence.
[xy]	The character x or y.
[x-z]	The range of characters between x and z.
[^z]	Any character except z.  <b>NOTE:</b> For performance reasons, Micro Focus recommends that you explicitly list all the characters that you want to match, rather than using this operator.  <b>NOTE:</b> To use negated character classes in case-insensitive entities, you must include letters in both cases, for example <code>[^Zz]</code> rather than <code>[^z]</code> .

## Quantifiers

Operator	Matched Pattern
*	Match 0 or more times.

Operator	Matched Pattern
<code>+</code>	Match 1 or more times.
<code>?</code>	Match 0 or 1 times.
<code>{n}</code>	Match exactly $n$ times.
<code>{n,}</code>	Match at least $n$ times.
<code>{n,m}</code>	Match at least $n$ times, but no more than $m$ times.

## Metacharacters

Operator	Matched Pattern
<code>\t</code>	Match tab.
<code>\n</code>	Match newline.
<code>\r</code>	Match return.
<code>\f</code>	Match formfeed.
<code>\a</code>	Match alarm (bell, beep, and so on).
<code>\e</code>	Match escape.
<code>\v</code>	Match vertical tab.
<code>\021</code>	Match octal character (in this example, 21 octal).
<code>\xF0</code>	Match hex character (in this example, F0 hex).
<code>\x{263a}</code>	Match wide hex character (Unicode).
<code>\w</code>	Match word character: <code>[A-Za-z0-9_]</code> .
<code>\W</code>	Match non-word character: <code>[^A-Za-z0-9_]</code> .
<code>\s</code>	Match whitespace character. This metacharacter also includes <code>\n</code> and <code>\r</code> : <code>[\t\n\r]</code> .
<code>\S</code>	Match non-whitespace character: <code>[^\t\n\r]</code> .
<code>\d</code>	Match digit character: <code>[0-9]</code> .
<code>\D</code>	Match non-digit character: <code>[^0-9]</code> .
<code>\b</code>	Match word boundary.
<code>\B</code>	Match non-word boundary.

Operator	Matched Pattern
\A	Match start of string (never match at line breaks).
\Z	Match end of string. Never match at line breaks; only match at the end of the final buffer of text submitted for matching.
\p{ <i>class</i> }	Match any character that belongs to the specified Unicode character class. For example, \p{Sc} matches any currency symbol. You can omit the braces for single-character class names: \p{C} and \pC are equivalent. For a list of supported character classes, see <a href="#">Supported Unicode Character Classes, on the next page</a> .
\P{ <i>class</i> }	Match any character that does not belong to the specified Unicode character class. For example \P{Sc} matches any character that is not a currency symbol. You can omit the braces for single-character class names: \P{C} and \PC are equivalent. For a list of supported character classes, see <a href="#">Supported Unicode Character Classes, on the next page</a> .  <b>NOTE:</b> For performance reasons, Micro Focus recommends that you avoid using negated character classes where possible.

## Extensions

Operator	Matched Pattern
(?A: <i>entity</i> )	Match a previously defined entity, and copy it into the definition of the new entity. For example: <pre>&lt;include path="number_types_eng.ecr"/&gt;   &lt;entity name="fracpos" type="private"&gt;     &lt;pattern&gt;(?A:number/fractalpha/eng)&lt;/pattern&gt;   &lt;/entity&gt;</pre> Copying an entity improves pattern execution speed, but increases compilation time and memory usage. Micro Focus recommends that you use reference (?A^ in all cases, unless your grammar file is very simple, and extraction speed is critical.
(?A^ <i>entity</i> )	Match a previously defined entity, and reference it in the definition of the new entity. Referencing an entity minimizes the size and memory usage of the grammar, but can decrease performance. The performance impact depends on the size and structure of the grammar.
(?A! <i>expr</i> )	Match the expression <i>expr</i> but exclude its output. This option designates an expression that helps identify an entity, but is not part of it. For example: <pre>&lt;entity name="age_landmark" type="private"&gt;</pre>

Operator	Matched Pattern
	<pre>                     &lt;pattern&gt;Age:{0,1}\s*&lt;/pattern&gt;                     &lt;pattern&gt;Años:{0,1}\s*&lt;/pattern&gt;                 &lt;/entity&gt;                 &lt;entity name="age" type="public"&gt;                     &lt;pattern&gt;(?!(?A^age_landmark))[1-9][0-9]?&lt;/pattern&gt;                 &lt;/entity&gt;             </pre> <p>When you use this grammar to search the following text:</p> <p style="padding-left: 40px;">Name: Simon. Age: 32. Address. 12 Fifth Street, Las Vegas.</p> <p>The grammar returns the text 32 but ignores 12, because it does not have the prefix "Age:", which is matched upon but excluded from the output.</p>
<p>(?A=  <i>component:expr</i>)</p>	<p>Define a component in an entity definition. A component is a named part of an entity.</p> <p>For example, the following grammar defines areacode and main as components:</p> <pre>                 &lt;grammars&gt;                     &lt;grammar name="number"&gt;                         &lt;entity name="phone" type="public"&gt;                             &lt;pattern&gt;(?!A=areacode:[0-9]{3})-(?!A=main:[0-9]{3}-[0-9]{4})&lt;/pattern&gt;                         &lt;/entity&gt;                     &lt;/grammar&gt;                 &lt;/grammars&gt;             </pre> <p>If the data contains the following phrase:</p> <p style="padding-left: 40px;">The phone number is 408-555-1342.</p> <p>and the following configuration options are set:</p> <pre>                 OutputSimpleMatchInfo=false                 EnableComponents=true             </pre> <p>then the output displays the areacode value 408 and the main value 555-1342 separately.</p>

## Supported Unicode Character Classes

This section lists the Unicode character classes that are supported by the regular expression engine. Use the one- or two-letter class name in your patterns. For example to match a currency symbol:

```
\p{Sc}
```

The supported classes are:

- C - Other
- Cc - Control
- Cf - Format

- Co - PrivateUse
- Cs - Surrogate
- L - Letter
- Ll - LowercaseLetter
- Lm - ModifierLetter
- Lo - OtherLetter
- Lt - TitlecaseLetter
- Lu - UppercaseLetter
- M - Mark
- Mc - SpacingMark
- Me - EnclosingMark
- Mn - NonSpacingMark
- N - Number
- Nd - DecimalNumber
- Nl - LetterNumber
- No - OtherNumber
- P - Punctuation
- Pc - ConnectorPunctuation
- Pd - DashPunctuation
- Pe - ClosePunctuation
- Pf - FinalPunctuation
- Pi - InitialPunctuation
- Po - OtherPunctuation
- Ps - OpenPunctuation
- S - Symbol
- Sc - CurrencySymbol
- Sk - ModifierSymbol
- Sm - MathSymbol
- So - OtherSymbol
- Z - Separator
- Zl - LineSeparator
- Zp - ParagraphSeparator

- Zs - SpaceSeparator

Character class assignments are as provided by unicode.org - see <http://www.unicode.org/Public/UNIDATA/UnicodeData.txt>.

## Eduction Grammar DTD

The XML DTD describing the Eduction grammar (that is, `edk.dtd`) is as follows:

```
<!ELEMENT grammars (include*, grammar*)>
<!ATTLIST grammars
  version CDATA #IMPLIED
  case (sensitive|insensitive|inherited) "inherited"
  debug (true|false) "false"
>
<!ELEMENT include (publish*)>
<!ATTLIST include
  path CDATA #REQUIRED
  type (private|public) "public"
>
<!ELEMENT publish EMPTY>
<!ATTLIST publish
  name CDATA #IMPLIED
>
<!ELEMENT grammar (extern*,entity+)>
<!ATTLIST grammar
  name CDATA #REQUIRED
  case (sensitive|insensitive|inherited) "inherited"
  extend (append|replace|disallow) "disallow"
  debug (true|false|inherited) "inherited"
>
<!ELEMENT extern EMPTY>
<!ATTLIST extern
  name CDATA #REQUIRED
>
<!ELEMENT entity (entry*,pattern*)+>
<!ATTLIST entity
  name CDATA #REQUIRED
  type (private|public) "private"
  case (sensitive|insensitive|inherited) "inherited"
  extend (append|replace|disallow) "disallow"
  debug (true|false|inherited) "inherited"
>
<!ELEMENT entry (headword?,synonym*)>
<!ATTLIST entry
  headword CDATA #IMPLIED
  score CDATA "1"
  case (sensitive|insensitive|inherited) "inherited"
```

```
debug (true|false|inherited) "inherited"  
>  
<!ELEMENT headword (#PCDATA)>  
<!ATTLIST headword  
score CDATA "1"  
case (sensitive|insensitive|inherited) "inherited"  
>  
<!ELEMENT synonym (#PCDATA)>  
<!ATTLIST synonym  
case (sensitive|insensitive|inherited) "inherited"  
>  
<!ELEMENT pattern (#PCDATA)>  
<!ATTLIST pattern  
score CDATA "1"  
case (sensitive|insensitive|inherited) "inherited"  
replace CDATA #IMPLIED  
insert_before CDATA #IMPLIED  
insert_after CDATA #IMPLIED  
>
```



# Chapter 15: edktool Command-Line Options

This section provides a reference for the command-line options that you can use with the edktool command-line tool.

- [edktool Options](#) .....303
- [Wildcard Expressions in edktool](#) .....314

## edktool Options

This section describes how to use edktool to:

- list the entities that exist in a grammar file.
- test and benchmark extraction.
- compile grammar files.

To view a summary of the options you can use with edktool, run the following command:

```
edktool help
```

The tool also provides more detailed help for some features. For example, to view more information about the `compile` feature, run the following command:

```
edktool help compile
```

## Assess

This command assesses the performance and accuracy of an Education grammar against a set of pre-tagged examples.

You must supply a text file with one phrase on each line; the `Assess` feature checks whether each line contains a match.

You must specify at least one input file, using the `-v` parameter or the `-w` parameter. If required, you can specify both of these parameters.

The following table describes the parameters for this command.

<code>-l</code>	<	The file containing a valid license key for Education.
<code>licensefile</code>	>	If you do not specify a license key, edktool attempts to load the license <code>licensekey.dat</code> in its current working directory. You must specify the license parameter if your license is in a different location.

- `-c`            A configuration file to control the assessment. See [Education Configuration File, on page 95](#).  
`<configfile>`  
You can specify one or more grammar files and one or more entities in place of a configuration file. Specifying a configuration file overrides the grammar (`-g`) or entity (`-e`) parameters.
- `-g` `<grammarfile`  
`>`            A grammar file to use. Edktool ignores this option if you set a configuration file with `-c`.  
If you provide a grammar file but you do not specify any entities with `-e`, Education extracts all entities in the grammar file.  
You can use wildcard expressions in this parameter. See [Wildcard Expressions in edktool, on page 314](#).
- `-e` `<entity>`    The entities to extract. Separate multiple entities with a comma. Edktool ignores this option if you set a configuration file with `-c`.  
You can use wildcard expressions in this parameter. See [Wildcard Expressions in edktool, on page 314](#).
- `-x`            (Optional) Modifies the behavior so that `Assess` checks for exact matches.
- `-m` `<matched`  
`entities>`    (Optional) This parameter does not change the extraction behavior, but enables you to check which entities are producing the matches.
- `-v` `<valid_`  
`input>`       A file of phrases where a match would be valid.
- `-w`            A file of phrases where a match would be invalid.  
`<invalid_`  
`input>`
- `-a`            (Optional) Display additional output, including the results for every phrase in your input files. By default, the output includes explanations of each failure, and statistics such as recall, precision, and F1 (depending on the type of input file you provide).
- `-o`            (Optional) Send the output to a file. By default, Education sends output to the console.  
`<`  
`outputfile>`    The output is a list of all phrases that failed. For valid input this would be a phrase that contained no match; for invalid input this would be a phrase that contained a match.
- `-q`            (Optional) Run in quiet mode. In this case, edktool removes all descriptive messages from the output and shows only a list of examples that failed, in the form "FAIL: "text" is matched by "entity"" or similar, depending on the test specifications. If you also set the `-a` parameter, examples that pass are also included in the output.

For more information on how to use the `Assess` feature to check the effectiveness and performance of your grammar files, see [Assess and Measure Education Grammars, on page 90](#).

## Example

```
edktool a -l <license> -c <configuration_file> [-a] [-o <output_file>]
```

Run several assessments from a single Education configuration file.

The configuration file must contain a numbered [assessment*N*] section for each assessment you want to run. You must specify the input files, the entities to match, and whether to require exact matches. For example:

```
[assessment0]
valid=data.txt

[assessment1]
entities=entity1,entity2
valid=match.txt
invalid=should_not_match.txt
exact=true
```

You can specify multiple entities by separating them with commas, or by using wildcard expressions (see [Wildcard Expressions in edktool, on page 314](#)).

## Benchmark

This command runs edktool in benchmarking mode. This mode runs multiple concurrent extraction sessions, several times to test the performance of a grammar. Edktool reads the input document once, and feeds it into each session. It produces timing information after all runs are complete.

The following table describes the parameters for this command.

- |                  |                                                                                                                                                                                                                                                                                                         |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| -l <licensefile> | The file containing a valid license key for Education.<br><br>If you do not specify a license key, edktool attempts to load the license <code>licensekey.dat</code> in its current working directory. You must specify the license parameter if your license is in a different location.                |
| -i <inputfile>   | The file to perform entity extraction on. The input file must be plain text.                                                                                                                                                                                                                            |
| -c <configfile>  | A configuration file controlling the extraction. See <a href="#">Education Configuration File, on page 95</a> .<br><br>You can specify one or more grammar files and one or more entities in place of a configuration file. Specifying a configuration file overrides the grammar or entity parameters. |
| -g <grammarfile> | A grammar file to use. Edktool ignores this option if you set a configuration file with <code>-c</code> .<br><br>If you provide a grammar file but do not specify any entities with <code>-e</code> , Education extracts all entities in the grammar file.                                              |
|                  | <b>NOTE:</b> You can use the <code>MinScore</code> parameter only if you use <code>-c</code> . Without a configuration file, you can specify a grammar that supports scoring, but edktool does not filter out matches based on those scores.                                                            |
|                  | You can use wildcard expressions in this parameter. See <a href="#">Wildcard Expressions in edktool, on page 314</a> .                                                                                                                                                                                  |
| -e <entity>      | The entities to extract. Separate multiple entities with a comma. Edktool                                                                                                                                                                                                                               |

ignores this option if you set a configuration file with `-c`.

You can use wildcard expressions in this parameter. See [Wildcard Expressions in edktool, on page 314](#).

<code>-d</code>	(Optional) Return details of the matching strings and their locations in the input file.
<code>-s &lt;sessions&gt;</code>	The number of sessions to run concurrently during each iteration of the benchmarking test.
<code>-n &lt;number&gt;</code>	The number of iterations of the benchmarking test to run.
<code>-b</code>	Set this parameter to read the input file in binary mode, rather than text mode. If you create a grammar file that matches entities with only Windows (CR LF) line endings and you run edktool on Windows, edktool must read the input file in binary mode for it to find any matches. Micro Focus recommends that you create grammar files capable of handling both Windows and Unix line endings.

The benchmarking command runs the specified number of concurrent sessions and iterations and then displays the timing for each run, with a summary showing:

- the total number of observations.
- maximum and minimum times.
- the standard deviation.

## Compile

This command creates a compiled Education grammar file.

```
edktool c <grammarfile>
```

The following table lists the optional parameters for this command.

<code>-l &lt;licensefile&gt;</code>	The file containing a valid license key for Education.  If you do not specify a license key, edktool attempts to load the license <code>licensekey.dat</code> in its current working directory. You must specify the license parameter if your license is in a different location.
<code>-i &lt;inputfile&gt;</code>	The uncompiled (source) XML Education grammar file to process.
<code>-e &lt;entity&gt;</code>	A comma-separated list of entities to include in the output file.  When you include entities in the command line, Education includes only those entities in the output file. Otherwise, Education includes all entities from the input file in the output file.  You can use wildcard expressions in the entity list. See <a href="#">Wildcard Expressions in edktool, on page 314</a> .

- o *<outputfile>* The output file name. If you do not specify the output file name, Education creates an output file using the XML grammar file name with `.ecr` appended.
- c *<configfile>* The compilation configuration file to use. See [Use a Compilation Configuration File, on page 89](#).

When you compile a grammar, the XML file must follow the Education syntax rules for grammar files. The ECR file is a proprietary format that is optimized for fast loading into the Education engine at run time. While the engine can load XML grammar files, as well as compiled ECR files, compiling a grammar file makes loading quicker.

Compiled grammar files are binary files, which you cannot read. You can use the `List` option to view the public entities in a compiled grammar file.

## Examples

To compile `mygrammar.xml` into `mygrammar.ecr`:

```
edktool c mygrammar.xml
```

To compile all the entities in the `common` entity type in `mygrammar.xml` into `compiledgrammar.ecr`:

```
edktool c -i mygrammar.xml -e common/* -o compiledgrammar.ecr
```

## Extract

This command extracts entities from a document. It can print the output to a file, or to the console. You can use this option to test your grammars.

The following table describes the available parameters for this command.

- l *<licensefile>* The file containing a valid license key for Education.  
If you do not specify a license key, `edktool` attempts to load the license `licensekey.dat` in its current working directory. You must specify the license parameter if your license is in a different location.
- i *<inputfile>* The file to perform entity extraction on. The input file must be a UTF-8 encoded plain text file.
- c *<configfile>* A configuration file controlling the extraction. See [Education Configuration File, on page 95](#).  
You can specify one or more grammar files and one or more entities in place of a configuration file. Specifying a configuration file overrides the grammar or entity parameters.
- g *<grammarfile>* A grammar file to use. `Edktool` ignores this option if you set a configuration file with `-c`.  
If you provide a grammar file but do not specify any entities with `-e`, Education extracts all entities in the grammar file.

- You can use wildcard expressions in this parameter. See [Wildcard Expressions in edktool, on page 314](#).
- e <entity>** The entities to extract. Separate multiple entities with a comma. Edktool ignores this option if you set a configuration file with `-c`.
- You can use wildcard expressions in this parameter. See [Wildcard Expressions in edktool, on page 314](#).
- o <outputfile>** The file to write the results of the extraction to. The output file is an XML file that contains the matched entities.
- q** (Optional) Run in quiet mode. In this case, edktool removes all descriptive messages from the output and shows the XML matchlist only (that is, an XML document with all the matches and any configured metadata).
- r <redaction\_file>** (Optional) The name of a copy of the input file to produce, with all matches redacted. For example:
- The driver ##### was questioned.
- See [Redact Extraction Results, below](#).
- b** Read the input file in binary mode, rather than text mode. If you create a grammar file that matches entities with only Windows (CR LF) line endings and you run edktool on Windows, edktool must read the input file in binary mode for it to find any matches. Micro Focus recommends that you create grammar files capable of handling both Windows and Unix line endings.

The extract option requires an input file (in plain text format) and either a configuration file or a grammar file. If you do not provide a configuration file, edktool searches the file for any specified entities in the specified grammar (or all entities, if none are specified). For example, in the simplest command line:

```
C:\>edktool e -i myData.txt -g grammar1.ecr,grammar2.ecr
```

This command runs edktool without a configuration file. It processes the data file `myData.txt` with the grammar files `grammar1.ecr` and `grammar2.ecr`. Edktool identifies all the entities in the two grammar files, and matches on these. The output is sent to the console in XML format, identifying matches in the data file and using the entity names to generate field names for the matches that contain the matched data. It matches the entire body of the plain text input file.

## Redact Extraction Results

You can enable redaction on extracted matches in edktool either by setting `RedactedOutput` to `True` in the edktool configuration file, or by specifying a redaction file using the `-r` parameter at the command line.

The entities identified as matches by edktool are redacted from the input text to form the redacted output. For example:

Input:

The driver Joe Bloggs was questioned.

Output:

The driver ##### was questioned.

Eduction sends redacted output to the file specified in the `-r` parameter. If you do not specify this argument but you have enabled redaction in the configuration file, Eduction displays redacted output in the console after the list of matches, unless you have set the `-q` parameter at the command line to enable quiet mode. In quiet mode, edktool does not display redacted output in the console.

## Examples

```
edktool e -i myPlainTextFile.txt -g myGrammar.ecr
```

Extracts all entities in `myGrammar.ecr` from `myPlainTextFile.txt`, sending the output to the console in XML format, with the field names for the matching text automatically generated from the entity names found in `myGrammar.ecr`.

## XML Output Format

This section describes the XML output tags and attributes that edktool returns when you run the extract command with a plain text file.

### <MATCH>

The details of a match.

Attribute	Description
EntityName	The name of the matched entity.
Offset	The match start position in the buffer, in bytes.
OffsetLength	The match start position in the buffer, in characters. This value returns only when <code>OutputSimpleMatchInfo=FALSE</code> . See <a href="#">OutputSimpleMatchInfo, on page 344</a> .
Score	The final score for this match.
NormalizedTextSize	The length of the normalized text, in bytes. This value returns only when <code>OutputSimpleMatchInfo=FALSE</code> . See <a href="#">OutputSimpleMatchInfo, on page 344</a> .
NormalizedTextLength	The length of the normalized text, in characters. This value returns only when <code>OutputSimpleMatchInfo=FALSE</code> . See <a href="#">OutputSimpleMatchInfo, on page 344</a> .
OriginalTextSize	The length of the matched text, in bytes. This value returns only when <code>OutputSimpleMatchInfo=FALSE</code> . See <a href="#">OutputSimpleMatchInfo, on page 344</a> .
OriginalTextLength	The length of the matched text, in characters. This value returns only when <code>OutputSimpleMatchInfo=FALSE</code> . See <a href="#">OutputSimpleMatchInfo, on page 344</a> .

The following table lists the child elements that <MATCH> contains.

Child Elements	Description
<ORIGINAL_TEXT>	The text from the input that was matched.  This value returns only when <code>OutputSimpleMatchInfo=FALSE</code> . See <a href="#">OutputSimpleMatchInfo</a> , on page 344.
<NORMALIZED_TEXT>	The normalized match text.  Normalized text might differ from the original text if, for example, a synonym was matched (in which case the original text is replaced with the headword), or a pattern used the <code>replace</code> attribute or the <code>(?A! . . .)</code> syntax.  The text might also be adjusted by post-processing scripts, if configured.
<COMPONENTS>	The match components, if present for this entity and when <code>EnableComponents=TRUE</code> .

### <COMPONENT>

The details of a component.

Attribute	Description
Name	The component name.
Text	The component text (normalized, if applicable).
Offset	The component start position in the matched text, in bytes.
OffsetLength	The component start position in the matched text, in characters.
TextSize	The component text length, in bytes.
TextLength	The component text length, in characters.

## Generate

This command generates an uncompiled XML source file from a plain text file.

The plain text file must contain a list of headwords that you want to use to create a single entity. You cannot include patterns, synonyms, scoring, and so on in the plain text file.

The `generate` command creates a headword from each line in the plain text file. It ignores whitespace and blank lines. You can include comment lines (a line beginning with `//`). Edktool skips these comment lines when it generates the XML grammar.

```
edktool g -i <inputfile>
```

The following table describes the parameters for this command.

- `-i <inputfile>` The plaintext grammar file to process. This file must contain one potential match on each line.
- `-e <entity>` The name of the entity to create (the resulting XML grammar file contains a single entity). If you do not specify a name, the entity is given a default name based on the name of the input file.  
  
You can use wildcard expressions in this parameter. See [Wildcard Expressions in edktool, on page 314](#).
- `-o <outputfile>` The output file name.

## Help

This command lists the valid `edktool` commands, with brief descriptions for each.

## List

This command lists the entities in an uncompiled (source) XML Education grammar file or a compiled ECR grammar file. Listing the contents of an XML file lists all entities in the file, both private and public. Listing the contents of a compiled ECR file lists all public entities.

**NOTE:** The compiled ECR file does not include any private entities that are not referenced by the public entities.

To enable this feature, type `edktool l <grammarfile>` at the command line.

The following table describes the optional parameters for this command.

- `-a` List the license requirements for a particular compiled grammar file, as well as the components that the entity can return.  
  
For example, the following output:  
  
`category: place languages: English or French`  
  
indicates that the user must be licensed for either English or French in the place category. If multiple lines appear, then the license must satisfy the conditions in every line.
- `-q` Run in quiet mode. In this case, `edktool` removes all descriptive messages from the output and shows the entity list only. The output includes components if you also set the `-a` parameter.

## Example

To list all public entities in the compiled grammar file `mygrammar.ecr`:

```
edktool list mygrammar.ecr
```

## Measure

This command measures the precision and recall between extraction runs by comparing the *expected results* of entity extraction with the *actual results*.

You create expected results once and keep them as a base reference for ongoing tests. You then generate actual results as required each time you modify a grammar. Edktool compares the two results to generate precision and recall information.

To generate expected results, run `edktool -extract`, and then revise the generated output file so that it contains the correct matches. From then on, you use `edktool -extract` to create the actual results, and the `measure` command compares the two files to generate precision and recall information on an ongoing basis.

The following table describes the parameters for this command.

<code>-e &lt;expectedfile&gt;</code>	The expected results file.
<code>-a &lt;actualfile&gt;</code>	The actual results file from subsequent extraction runs with modified grammar files.
<code>-o &lt;resultsfile&gt;</code>	The output file, including the results for precision, recall, and differences.
<code>-q</code>	(Optional) Run in quiet mode. In this case, <code>edktool</code> removes all descriptive messages from the output and shows only the differences between the expected and actual output.

For more information on how to use `measure` to check the effectiveness and performance of your grammar files, see [Assess and Measure Education Grammars, on page 90](#).

## Example

The following example compares `expected.xml` with `actual.xml` and puts the difference in `difference.xml`, including precision and recall. Quiet mode is enabled, so all descriptive messages are removed from the output.

```
edktool m -e expected.xml -a actual.xml -o difference.xml -q
```

## Permissions

This command reads any specified directory and returns a list of all compiled grammar files inside it that you can access using the specified license.

```
edktool p -d <directory> -l <licencefile>
```

The following table describes the optional parameters for this command.

<code>-l &lt;licensefile&gt;</code>	The file containing a valid license key for Education. If you do not specify a license key, <code>edktool</code> attempts to load the license
-------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------

- `licensekey.dat` in its current working directory. You must specify the license parameter if your license is in a different location.
- a Set this parameter to return a list of all compiled grammar files inside the directory that are **not** accessible under the specified license.
  - q Run in quiet mode. In this case, `edktool` removes all descriptive messages from the output and shows a list of file names only, in the format `Valid: filename.ecr` or, if you also included the `-a` parameter, `Invalid: filename.ecr`.

## Unify

This command generates a grammar file that contains one or more combined entities.

A *combined entity* is a single entity that combines the patterns for a predetermined set of entities.

Eduction can find matches for a combined entity faster than it can find matches for the equivalent list of source entities, because in the combined entity the list of patterns is optimized as a single unit.

Eduction automatically returns matches using the source entity names, so you do not lose any information about which entity produced a match.

The following table describes the parameters for this command.

- |                               |                                                                                                                                                                                                                                                                                                      |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| -l <i>&lt;licensefile&gt;</i> | The file containing a valid license key for Eduction.<br><br>If you do not specify a license key, <code>edktool</code> attempts to load the license <code>licensekey.dat</code> in its current working directory. You must specify the license parameter if your license is in a different location. |
| -g <i>&lt;grammarfile&gt;</i> | A comma-separated list of grammar files that contain the source entities to combine.                                                                                                                                                                                                                 |
| -e <i>&lt;entity&gt;</i>      | The definition for a combined entity, in the form:<br><br><code>combined-name=source-name1,source-name2,...</code><br><br>If you want to create more than one combined entity you can use the <code>-e</code> parameter multiple times.                                                              |
| -o <i>&lt;outputfile&gt;</i>  | The output grammar file.                                                                                                                                                                                                                                                                             |

## Examples

The following example creates a grammar file named `custom.ecr` that contains an entity named `pII/address/custom`, by combining the address entities for France and Germany.

```
edktool unify -o custom.ecr -g address.ecr -e  
pII/address/custom=pII/address/fr,pII/address/de
```

You can create more than one combined entity by passing the `-e` parameter multiple times.

```
edktool unify -o custom.ecr -g address.ecr,telephone.ecr -e  
pii/address/custom=pii/address/fr,pii/address/de -e  
pii/telephone/context/custom=pii/telephone/context/fr,pii/telephone/context/de
```

## Wildcard Expressions in edktool

The `-e` and `-g` parameters in the [Generate](#), [Compile](#), [Assess](#), [Extract](#) and [Benchmark](#) options in edktool support wildcard expressions. For example, if you want to use all of the available sentiment analysis files in the `grammars` directory, you can type `-e "grammars/sentiment_*.ecr"` instead of typing a lengthy comma-separated list of multiple files.

You can use the `*` wildcard to match any number of characters, or the `?` wildcard to match a single character.

**NOTE:** In some cases (for example, on Linux operating systems), the command shell automatically expands wildcard expressions, which can produce unexpected results in Education. To avoid this, enclose your wildcard expression in quotation marks.

# Chapter 16: Education Parameter Reference

This section lists the parameters that you can use in your Education configuration file.

You can use these parameters in the Education SDK either by creating an edk engine with an appropriate configuration file, or by using the API to set equivalent parameters after you create the engine. You can also use these parameters in your edktool configuration file.

**NOTE:** For a list of parameters available in Education Server, refer to the *Education Server Reference*.

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## AllowDuplicates

**DEPRECATED:** The `AllowDuplicates` parameter is deprecated in Eduction version 12.5.0 and later.

This parameter is still available for existing implementations, but it might be incompatible with new functionality. The parameter might be deleted in future.

A list of document fields in which Eduction can write multiple results from a single entity. If you allow multiple results from a single entity by setting [AllowMultipleResults, below](#) to `TRUE`, and the input text contains more than one match to an entity, Eduction writes the results to multiple fields with the same name.

This parameter is used only when generating output in IDOL IDX format. It has no effect on XML.

You can specify multiple fields by separating them with commas.

<b>Type:</b>	String
<b>Default:</b>	
<b>Required:</b>	No
<b>Configuration Section:</b>	Any section that you have defined for Eduction settings.
<b>Example:</b>	<code>AllowDuplicates=ANIONIC_SURFACTANTS,PERSON</code>
<b>See Also:</b>	<a href="#">AllowMultipleResults, below</a> <a href="#">EntityN, on page 332</a> <a href="#">EntityFieldN, on page 330</a>

## AllowMultipleResults

This parameter specifies how many results to return, when Eduction finds multiple matches at the same offset (starting position) in the input text. Eduction returns only one result by default, but you can choose to return all of the matches or up to one per entity.

Set this parameter to one of the following values:

- **All** or **True**. Eduction returns all results.
- **OnePerEntity**. Eduction returns up to one result per entity at each offset.
- **No** or **False**. Eduction does not return multiple results at the same offset.

This parameter can be useful when the same text has multiple interpretations. For example, if the input text contains the word `Georgia`, it might refer to a person's name, the U.S. state, or the country. By

default, Education returns only one match. This behavior is appropriate if it is not important to you that Georgia has multiple interpretations. Set `AllowMultipleResults=All` to return all three matches. Set `AllowMultipleResults=OnePerEntity` to return one match from each entity.

*Example*

The following table shows how the results from Education change when you set the parameters `AllowMultipleResults` and `AllowOverlaps`.

In this example, the input is "The President of the United States of America is in London today to meet the British Prime Minister", and three entities have been defined:

- entity1 matches political offices, for example "President of the United States".
- entity2 matches corporate titles including "President".
- entity3 matches places including "United States" and "United States of America".

Parameters	AllowOverlaps=False	AllowOverlaps=True
<b>AllowMultipleResults=False</b>	<p>Education returns the match "President of the United States" (entity1).</p> <p>The match "President" (entity2) is ignored because it shares the same starting point as "President of the United States" and <code>AllowMultipleResults=FALSE</code>.</p> <p>The matches "United States" and "United States of America" (entity3) are ignored because they overlap with "President of the United States" and <code>AllowOverlaps=FALSE</code>.</p>	<p>Education returns the match "President of the United States" (entity1).</p> <p>The match "President" (entity2) is ignored because it shares the same starting point as "President of the United States" and <code>AllowMultipleResults=FALSE</code>.</p> <p>Overlapping matches are allowed, so Education returns a match "United States of America" (entity3). The match "United States" (entity3) is ignored because it shares the same starting point as "United States of America" and <code>AllowMultipleResults=FALSE</code>.</p>
<b>AllowMultipleResults=OnePerEntity</b>	<p>Education returns the match "President of the United States" (entity1).</p> <p>Education returns the match "President" (entity2). Although it shares the same starting point as "President of the United States" it is matched by a different entity and <code>AllowMultipleResults</code> is set to <code>OnePerEntity</code>.</p> <p>The matches "United States" and "United States of America"</p>	<p>Education returns the match "President of the United States" (entity1).</p> <p>Education returns the match "President" (entity2). Although it shares the same starting point as "President of the United States" it is matched by a different entity and <code>AllowMultipleResults</code> is set to <code>OnePerEntity</code>.</p> <p>Overlapping matches are allowed, so Education returns a match</p>

	(entity3) are ignored because they overlap with "President of the United States" and AllowOverlaps=FALSE.	"United States of America" (entity3). The match "United States" (entity3) is ignored because it shares the same starting point as "United States of America" and AllowMultipleResults is set to OnePerEntity.
<b>AllowMultipleResults=True</b>	<p>Eduction returns the match "President of the United States" (entity1).</p> <p>Eduction returns the match "President" (entity2) because AllowMultipleResults=True.</p> <p>The matches "United States" and "United States of America" (entity3) are ignored because they overlap with "President of the United States" and AllowOverlaps=FALSE.</p>	Eduction returns all of the matches. These are "President of the United States" (entity1), "President" (entity2), "United States" (entity3), and "United States of America" (entity3).

<b>Type:</b>	String
<b>Default:</b>	False
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	AllowMultipleResults=All
<b>See Also:</b>	<a href="#">AllowOverlaps</a> , below <a href="#">EntityN</a> , on page 332 <a href="#">EntityFieldN</a> , on page 330 <a href="#">NonGreedyMatch</a> , on page 343

## AllowOverlaps

A Boolean value that specifies whether to return more than one match, when Eduction finds overlapping matches that start at different characters (offsets). To return overlapping matches set this parameter to **True**.

**NOTE:** To specify whether to return overlapping matches that have the same offset, use the

configuration parameter [AllowMultipleResults](#), on page 317.

*Example*

The following table shows how the results from Education change when you set the parameters `AllowMultipleResults` and `AllowOverlaps`.

In this example, the input is "The President of the United States of America is in London today to meet the British Prime Minister", and three entities have been defined:

- entity1 matches political offices, for example "President of the United States".
- entity2 matches corporate titles including "President".
- entity3 matches places including "United States" and "United States of America".

Parameters	AllowOverlaps=False	AllowOverlaps=True
<b>AllowMultipleResults=False</b>	<p>Education returns the match "President of the United States" (entity1).</p> <p>The match "President" (entity2) is ignored because it shares the same starting point as "President of the United States" and <code>AllowMultipleResults=FALSE</code>.</p> <p>The matches "United States" and "United States of America" (entity3) are ignored because they overlap with "President of the United States" and <code>AllowOverlaps=FALSE</code>.</p>	<p>Education returns the match "President of the United States" (entity1).</p> <p>The match "President" (entity2) is ignored because it shares the same starting point as "President of the United States" and <code>AllowMultipleResults=FALSE</code>.</p> <p>Overlapping matches are allowed, so Education returns a match "United States of America" (entity3). The match "United States" (entity3) is ignored because it shares the same starting point as "United States of America" and <code>AllowMultipleResults=FALSE</code>.</p>
<b>AllowMultipleResults=OnePerEntity</b>	<p>Education returns the match "President of the United States" (entity1).</p> <p>Education returns the match "President" (entity2). Although it shares the same starting point as "President of the United States" it is matched by a different entity and <code>AllowMultipleResults</code> is set to <code>OnePerEntity</code>.</p> <p>The matches "United States" and "United States of America" (entity3) are ignored because they</p>	<p>Education returns the match "President of the United States" (entity1).</p> <p>Education returns the match "President" (entity2). Although it shares the same starting point as "President of the United States" it is matched by a different entity and <code>AllowMultipleResults</code> is set to <code>OnePerEntity</code>.</p> <p>Overlapping matches are allowed, so Education returns a match "United States of America"</p>

	overlap with "President of the United States" and AllowOverlaps=FALSE.	(entity3). The match "United States" (entity3) is ignored because it shares the same starting point as "United States of America" and AllowMultipleResults is set to OnePerEntity.
<b>AllowMultipleResults=True</b>	<p>Eduction returns the match "President of the United States" (entity1).</p> <p>Eduction returns the match "President" (entity2) because AllowMultipleResults=True.</p> <p>The matches "United States" and "United States of America" (entity3) are ignored because they overlap with "President of the United States" and AllowOverlaps=FALSE.</p>	Eduction returns all of the matches. These are "President of the United States" (entity1), "President" (entity2), "United States" (entity3), and "United States of America" (entity3).

<b>Type:</b>	Boolean
<b>Default:</b>	False
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	AllowOverlaps=True
<b>See Also:</b>	<a href="#">AllowMultipleResults, on page 317</a> <a href="#">NonGreedyMatch, on page 343</a>

## CantHaveFieldCSVs

**DEPRECATED:** The CantHaveFieldCSVs parameter is deprecated in Eduction version 12.5.0 and later.

This parameter is still available for existing implementations, but it might be incompatible with new functionality. The parameter might be deleted in future.

The names of fields that Eduction ignores when reading an XML file. This option allows you to specify fields in documents that you want to discard before the documents are stored.

To specify multiple fields, separate them with commas (there must be no space before or after a comma). You can use wildcards.

<b>Type:</b>	String
<b>Default:</b>	
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Server</b>
<b>Example:</b>	<code>CantHaveFieldCSVs=*/STANDARD_HEADER</code>  In this example, any STANDARD_HEADER fields that a document contains are discarded before the document is stored in IDOL server.
<b>See Also:</b>	

## CaseNormalization

The case conversion to use for all incoming text. To improve performance, use this parameter to convert all text to lowercase or uppercase before attempting to match text.

This parameter takes one of the following values:

- **None.** No case conversion.
- **Lower.** All incoming text is converted to lowercase.
- **Upper.** All incoming text is converted to uppercase.

If your grammar file consists of only lowercase or only uppercase characters but your text is mixed case, you can improve performance by setting `CaseNormalization` to **Lower** or **Upper** respectively. This provides a greater performance improvement than setting [MatchCase, on page 339](#) to `False`.

If you set this parameter to `Lower` or `Upper`, set [MatchCase, on page 339](#) to `True`.

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	<code>CaseNormalization=lower</code>
<b>See Also:</b>	<a href="#">CaseNormalizationBehavior, on the next page</a> <a href="#">CaseSensitiveFieldName, on the next page</a> <a href="#">MatchCase, on page 339</a>

## CaseNormalizationBehavior

The algorithm to use for case normalization. This parameter accepts one of the following values:

- **Default.** The default behavior.
- **Turkic.** Use this option with Turkic languages to ensure that case normalization performs correctly with the dotted and dotless "i" characters.

<b>Type:</b>	String
<b>Default:</b>	Default
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	CaseNormalizationBehavior=Turkic
<b>See Also:</b>	<a href="#">CaseNormalization, on the previous page</a>

## CaseSensitiveFieldName

Set `CaseSensitiveFieldName` to `True` to preserve the case of configured field names. In this case, the field names are case sensitive.

Set `CaseSensitiveFieldName` to `False` to convert all field names to uppercase when Eduction produces matches.

<b>Type:</b>	Boolean
<b>Default:</b>	False
<b>Required:</b>	No
<b>Configuration Section:</b>	Any section that you have defined for Eduction settings.
<b>Example:</b>	CaseSensitiveFieldName=True
<b>See Also:</b>	

## CellEntityN

The entities to extract for the cell rows of input tables. This parameter allows you to extract entities from structured data.

When matching CSV or TSV input, Eduction matches the first non-empty row of input against the configured header entities (see [HeaderEntityN, on page 336](#)). In subsequent rows, Eduction matches individual cells against the cell entity corresponding to the matched header entity, if any.

For example:

```
HeaderEntity0=pii/date/dob/landmark/all  
CellEntity0=pii/date/nocontext/all
```

This example matches date of birth landmark values in the header, and for all subsequent rows in that column, it extracts any date values.

You can specify multiple entities in a comma-separated list. If the table header matches any of the configured header entities, Eduction matches the cell content against any of the configured cell entities. This option might be useful if you want to match a particular entity in multiple languages, or if you want to include a custom entity.

You can also use wildcard expressions in the entity names. The \* wildcard matches any number of characters, and the ? wildcard matches a single character.

For more information about table extraction, see [Extract Entities from Tables, on page 57](#).

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	HeaderEntity0=pii/date/dob/landmark/all CellEntity0=pii/date/nocontext/all
<b>See Also:</b>	<a href="#">HeaderEntityN, on page 336</a>

## CJKNormalization

This parameter allows you to specify how to normalize Chinese, Japanese, and Korean data before extraction.

You can set the following values:

- Kana. Normalize half width kana to full width kana.
- OldNew. Normalize old kanji to new kanji.
- Number. Normalize Chinese or kanji number characters to ASCII number characters.
- HwNum. Normalize full width number characters to ASCII number characters.
- HwAlpha. Normalize full width alphabet characters to ASCII alphabet characters.
- SimpChi. Normalize traditional Chinese to simplified Chinese.
- FwJamo. Normalize half width jamo to full width jamo.

Separate multiple options with a comma.

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	CJKNormalization=SimpChi,Kana
<b>See Also:</b>	

## Databases

**DEPRECATED:** The Databases parameter is deprecated in Eduction version 12.5.0 and later.

This parameter is still available for existing implementations, but it might be incompatible with new functionality. The parameter might be deleted in future.

The names of the databases to which a document belongs. Eduction runs only on documents that belong to the comma-separated list of databases. If you do not list databases, Eduction runs on documents from all databases.

**NOTE:** If you restrict Databases, and an IDX does not have a DREDBNAME entry for a document, Eduction does not match on that document. However, if you select all databases, Eduction does match the document.

<b>Type:</b>	String
<b>Default:</b>	
<b>Required:</b>	No
<b>Configuration</b>	Any section that you have defined for Eduction settings.

<b>Section:</b>	
<b>Example:</b>	Databases=DB1,DB2,DB3
<b>See Also:</b>	<a href="#">EntityN, on page 332</a> <a href="#">EntityFieldN, on page 330</a>

## DocumentDelimiterCSVs

**DEPRECATED:** The DocumentDelimiterCSVs parameter is deprecated in Eduction version 12.5.0 and later.

This parameter is still available for existing implementations, but it might be incompatible with new functionality. The parameter might be deleted in future.

The fields in an XML file that mark the start and end of an IDOL document. You must have only one document level for each XML schema.

When identifying fields use the formats:

- `FieldName` to match root-level fields.
- `*/FieldName` to match all fields except root-level.
- `Path/FieldName` to match fields that the specified path points to.

<b>Type:</b>	String
<b>Default:</b>	*/DOCUMENT
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Server</b>
<b>Example:</b>	<code>DocumentDelimiterCSVs=*/DOCUMENT,*/SPEECH</code> In this example, the beginning and end of individual documents in a file is marked by opening and closing DOCUMENT and SPEECH tags.
<b>See Also:</b>	

## EnableComponents

Set this parameter to **False** to return only the entity. Set it to **True** to return the entity and all the components of the entity.

This parameter requires `OutputSimpleMatchInfo` to be set to **False**.

<b>Type:</b>	Boolean
<b>Default:</b>	False
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	EnableComponents=True
<b>See Also:</b>	<a href="#">OutputSimpleMatchInfo</a> , on page 344

## EnableUniqueMatches

Set `EnableUniqueMatches` to `True` to return only a single occurrence of a particular value. In this case, two `EntityN` definitions cannot return the same value, even if they use different patterns. If the same value occurs more than once, Eduction returns only the first instance, even if the matches occur for different entities.

By default, Eduction displays duplicates unless you set `EnableUniqueMatches` to `True` to explicitly remove them.

<b>Type:</b>	Boolean
<b>Default:</b>	False
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	EnableUniqueMatches=True
<b>See Also:</b>	

## Entities

A list of entities that you want to modify using the post processing script. If you do not set this parameter, you can use the script to modify the matches for every entity.

You can separate multiple entities with a comma, and you can use wildcard expressions. The asterisk (\*) wildcard matches any number of characters, and the question mark (?) wildcard matches a single character.

For example, set `Entities` to `phone/*` to apply the script to the `phone/landline/gb`, `phone/mobile/gb` entities and so on.

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	Any section that you have defined for an Eduction post-processing task
<b>Example:</b>	PostProcessingTask0=EductionLuaPostProcessing  [EductionLuaPostProcessing] Script=scripts/eduction_post_process.lua Entities=phone/landline/gb,phone/mobile/gb
<b>See Also:</b>	<a href="#">Script, on page 352</a> <a href="#">ProcessEnMasse, on page 348</a> <a href="#">PostProcessingTaskN, on page 345</a>

## EntityAdvancedFieldN

A comma-separated list of advanced fields to return, associated with the entities specified by the [EntityN, on page 332](#) parameter.

To use this option you must:

- set `OutputSimpleMatchInfo` to `False` for edktool.
- set `EnableComponents` to `True` for edktool.
- define components in the entity definition.

You configure `EntityAdvancedFieldN` in a similar way to [EntityFieldN](#). You set `EntityAdvancedFieldN` to a comma-separated list of advanced fields that you want to return. The value of the advanced field is the output of simple operations (`min`, `max`, `sum`, and `ave`) on the values of entity components.

For example, for the following configuration:

```
Entity0=testgrammar/testentity
EntityField0=FIELD0
EntityAdvancedField0=OfferPrice:max(price1 price2),BidPrice:min(price1 price2)
```

And the following data:

```
share price1 price2
Com1 165 167
Com2 1890 1880
```

An entity with the following pattern:

```
<grammar name="testgrammar">
<entity name="testentity" type="public">
```

```
<pattern>(A=price1:\d+)\s+(A=price2:\d+)</pattern>  
</entity>  
</grammar>
```

Returns the following results as fields:

```
#DREFIELD FIELD0="165 167"  
#DREFIELD OfferPrice="167"  
#DREFIELD BidPrice="165"  
#DREFIELD FIELD0="1890 1880"  
#DREFIELD OfferPrice="1890"  
#DREFIELD BidPrice="1880"
```

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	Any section that you have defined for Eduction settings
<b>Example:</b>	Entity0=testgrammar/testentity EntityField0=FIELD0 EntityAdvancedField0=OfferPrice:max(price1 price2),BidPrice:min(price1 price2)
<b>See Also:</b>	<a href="#">EntityN, on page 332</a> <a href="#">EntityZoneN, on page 334</a>

## EntityComponentFieldN

A comma-separated list of entity components that you want to return as fields, associated with the entities specified by the [EntityN, on page 332](#) parameter.

To use this option you must:

- set `OutputSimpleMatchInfo` to **False** for edktool.
- set `EnableComponents` to **True** for edktool.
- define components in the entity definition.

You configure `EntityComponentFieldN` in a similar way to [EntityFieldN](#). Set `EntityComponentFieldN` to a comma-separated list of entity components to return as fields.

For example, for the following configuration:

```
Entity0=testgrammar/testentity  
EntityField0=FIELD0  
EntityComponentField0=Name, Age
```

And the following data:

```
name    age
geoff   45
jane    54
```

An entity with the following pattern:

```
<grammar name="testgrammar">
<entity name="testentity" type="public">
<pattern>name\s+age(\n(?:A=Name:\w+)\s+(?:A=Age:\d+)){1,}</pattern>
</entity>
</grammar>
```

Returns the following values as fields:

```
#DREFIELD Name="geoff"
#DREFIELD Age="45"
#DREFIELD Name="jane"
#DREFIELD Age="54"
```

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	Entity0=testgrammar/testentity EntityField0=FIELD0 EntityComponentField0=Name,Age
<b>See Also:</b>	<a href="#">EntityN, on page 332</a> <a href="#">EntityZoneN, on page 334</a>

## EntityFieldN

A comma-separated list of document fields to associate with the entities specified by the [EntityN, on page 332](#) or [CellEntityN, on page 324](#) parameter. When a document contains particular entities, Education saves the associated text in the fields that you specify in this parameter. The entity field number *N* must match the corresponding [EntityN, on page 332](#) or [CellEntityN, on page 324](#) number.

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>

<b>Example:</b>	Entity0=edk_common_entities/ss_number EntityField0=SOCIAL_SECURITY_NUMBER  Entity1=edk_common_entities/postal_address EntityField1=SHIPPING_ADDRESS
<b>See Also:</b>	<a href="#">EntityN, on the next page</a> <a href="#">CellEntityN, on page 324</a> <a href="#">EntitySearchFieldsN, on page 333</a> <a href="#">EntityZoneN, on page 334</a>

## EntityMatchRangeN

A range of matching instances of the entity that you want to return. The entity match range number *N* must match the corresponding [EntityN](#) number.

Specify the matches to return as a comma separated list, for example 1, 2, 3, 5, 7. You can also specify a range with a hyphen, for example 1-3, 5, 7.

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	Entity0=edk_common_entities/ss_number EntityMatchRange0=1-3,6,9- This example specifies the first through third match for the <code>ss_number</code> entity, as well as the sixth match and all matches starting with the ninth.
<b>See Also:</b>	<a href="#">EntityN, on the next page</a>

## EntityMinScoreN

The minimum score that a match for the corresponding [EntityN, on the next page](#) must have for it to return. The lowest possible score is 0. The upper limit varies depending on the entity.

Set a higher minimum score to indicate that matches must meet a higher confidence level to return.

**NOTE:** Eduction applies the minimum score threshold before it runs any post-processing tasks (see [Post-Processing, on page 101](#)). If your post-processing task reduces the score for a match to below the `EntityMinScoreN` threshold, Eduction does not automatically discard the match.

To filter matches after all post-processing tasks have completed, set [PostProcessThreshold](#), on [page 346](#)

The *score* for an entity is defined by the author of the grammar and defaults to **1**. See the Education Grammar Syntax for a description of the score attribute.

The entity number (*N*) in `EntityMinScoreN` must match the corresponding entity number in the `EntityN` entry.

<b>Type:</b>	Long
<b>Default:</b>	0 (returns all matches)
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	To specify a minimum score of 0.5 for Entity0: <code>Entity0=edk_common_entities/ss_number</code> <code>EntityMinScore0=0.5</code>
<b>See Also:</b>	<a href="#">EntityN</a> , below <a href="#">MinScore</a> , on <a href="#">page 342</a> <a href="#">PostProcessThreshold</a> , on <a href="#">page 346</a>

## EntityN

A comma-separated list of entities to extract. Entities are defined in the grammar file that you set in the [ResourceFiles](#) parameter. Replace *N* with the zero-based rank of the entity.

You must associate each entity with a field by setting [EntityFieldN](#).

You cannot use the entity name `entities/ZoneStartN` or `entities/ZoneEndN` (where *N* is a numeric value). These entity names are reserved for use by Education.

If you do not define an `EntityN` parameter, Education looks for all entities in all loaded grammar files. In this case, Education automatically generates the `EntityFieldN` settings from the entities found in grammar files, by converting the entity names to uppercase and replacing slashes with an underscore. For example, for the entity `edk_common_entities/place`, Education generates the entity field: `EDK_COMMON_ENTITIES_PLACE`.

If you want to use several entities, you can use wildcard expressions instead of typing a lengthy comma-separated list. For example:

```
Entity0=place/city1/*,place/city2/*  
EntityField0=CITY  
Entity1=place/*/spabo  
EntityField1=BOLIVIAN_PLACE
```

You can use the \* wildcard to match any number of characters, or the ? wildcard to match a single character.

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	<pre>Entity0=edk_common_entities/ss_number EntityField0=SOCIAL_SECURITY_NUMBER EntityZone0=0  Entity1=edk_common_entities/postal_address EntityField1=SHIPPING_ADDRESS EntityZone1=1  ZoneStart0=Social Security: ZoneEnd0=Shipping Address  ZoneStart1=Shipping Address: ZoneEnd1=Billing Address</pre>
<b>See Also:</b>	<a href="#">EntityFieldN, on page 330</a> <a href="#">EntityMinScoreN, on page 331</a> <a href="#">EntitySearchFieldsN, below</a> <a href="#">EntityZoneN, on the next page</a>

## EntitySearchFieldsN

The document fields to search for the corresponding [EntityN, on the previous page](#) entity.

Use this parameter if you want to search a different set of fields for this entity than the fields you set in [SearchFields, on page 353](#). If you do not set EntitySearchFieldsN, Education searches the fields specified by [SearchFields, on page 353](#).

<b>Type:</b>	String
<b>Default:</b>	The value of <a href="#">SearchFields, on page 353</a>
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	In the following example, Education returns matches for Entity0

	<p>(airport/icao) only if they occur in the STARTAIRPORT or DESTAIRPORT fields.</p> <p>EntitySearchFieldsN is not set for Entity4 (place/state/engus), so Eduction returns matches if they are present in the specified <a href="#">SearchFields</a>, on page 353.</p> <p>[Eduction]              SearchFields=DRECONTENT</p> <p>Entity0=airport/icao              EntityField0=AIRPORTCODE              EntitySearchFields0=STARTAIRPORT,DESTAIRPORT</p> <p>Entity1=person/femalefirstname/engus              EntityField1=FIRSTNAME              EntitySearchFields1=PASSENGER_FIRSTNAME</p> <p>Entity2=person/malefirstname/engus              EntityField2=FIRSTNAME              EntitySearchFields2=PASSENGER_FIRSTNAME</p> <p>Entity3=person/lastname/engus              EntityField3=SURNAME              EntitySearchFields3=PASSENGER_SURNAME</p> <p>Entity4=place/state/engus              EntityField4=STATE</p>
<b>See Also:</b>	<p><a href="#">EntityN</a>, on page 332</p> <p><a href="#">EntityFieldN</a>, on page 330</p> <p><a href="#">SearchFields</a>, on page 353</p>

## EntityZoneN

Associates an [EntityN](#) entity with one or more zones that you define by using [ZoneStartN](#) and [ZoneEndN](#). Set EntityZoneN the number of the [ZoneStartN](#) and [ZoneEndN](#) parameters to associate with the [EntityN](#). Eduction searches for the entity in the specified zones. The entity zone number *N* must match the corresponding [EntityN](#) number.

<b>Type:</b>	Long
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>

<b>Example:</b>	Entity0=edk_common_entities/ss_number EntityField0=SOCIAL_SECURITY_NUMBER EntityZone0=0  Entity1=edk_common_entities/postal_address EntityField1=SHIPPING_ADDRESS EntityZone1=1  ZoneStart0=Social Security: ZoneEnd0=Shipping Address  ZoneStart1=Shipping Address: ZoneEnd1=Billing Address
<b>See Also:</b>	<a href="#">ZoneEndN, on page 357</a> <a href="#">ZoneStartN, on page 358</a>

## Exclusion

Set `Exclusion` to `True` to specify that you want to discard any previous pre-filter windows that match the associated pre-filter [Regex, on page 350](#) or [ResourceFile, on page 351](#) parameter.

Eduction runs your pre-filter tasks in the configured order. You can use an `Exclusion` to exclude match windows that were found by a previous pre-filter. Eduction compares any candidate windows that have been found by an earlier task to the regex or dictionary for the exclusion task. It discards any windows that match the exclusion filter.

For example, if you create a pre-filter that finds numbers to find potential address matches, you can add a subsequent exclusion to remove numbers that are part of dates:

```
[Eduction]
PrefilterTask0=NumberWordPrefilter
PrefilterTask1=ExcludeDatesPrefilter
PrefilterTask2=StreetMarkersPrefilter
```

```
[NumberWordPrefilter]
Regex=\p{N}+,?\p{Z}+\p{Lu}\p{L}
WindowCharsBeforeMatch=100
WindowCharsAfterMatch=100
```

```
[ExcludeDatesPrefilter]
Regex=\b([1-9]|[12]\d|3[01]) (Jan|Feb|Mar|Apr|May|Jun|Jul|Aug|Sep|Oct|Nov|Dec)
Exclusion=True
```

```
[StreetMarkersPrefilter]
ResourceFile=prefilter/address_street_markers.dpf
WindowCharsBeforeMatch=100
WindowCharsAfterMatch=100
```

The `NumberWordPrefilter` task might find potential matches for dates such as *15 March*. The subsequent `ExcludeDatesPrefilter` removes windows that include these dates, so that they are not checked against the Education entities.

The third task attempts to find windows based on a dictionary of street markers. Because this task is configured after the exclusion filter, it finds input text such as *15 March Street* that had been removed by the exclusion.

**NOTE:** The parameters that control the window size ([WindowCharsAfterMatch](#), on page 356 and [WindowCharsBeforeMatch](#), on page 357) are not relevant to pre-filters that have `Exclusion` set to `True`.

<b>Type:</b>	Boolean
<b>Default:</b>	False
<b>Required:</b>	No
<b>Configuration Section:</b>	<i>MyPreFilterTask</i>
<b>Example:</b>	<code>Exclusion=True</code>
<b>See Also:</b>	<a href="#">Regex</a> , on page 350 <a href="#">ResourceFile</a> , on page 351

## HeaderEntityN

The entities to extract for the header rows of input tables. This parameter allows you to extract entities from structured data.

When matching CSV or TSV input, Education matches the first non-empty row of input against these configured header entities. You can use this to extract *landmark* values that describe something that you want to find in a table column. You specify the entity to extract from the other cells by setting [CellEntityN](#), on page 324

For example:

```
HeaderEntity0=pii/date/dob/landmark/all  
CellEntity0=pii/date/nocontext/all
```

This example matches date of birth landmark values in the header, and for all subsequent rows in that column, it extracts any date values.

**NOTE:** The IDOL PII Package, IDOL PHI Package, and IDOL PCI Package, provide landmark entities in most grammars. To extract entities from tables with the Education standard grammar files, you might need to create your own landmark entities.

You can specify multiple entities in a comma-separated list. If the table header matches any of the configured header entities, Education matches the cell content against any of the configured cell

entities. This option might be useful if you want to match a particular entity in multiple languages, or if you want to include a custom entity in addition to a standard one.

You can also use wildcard expressions in the entity names. The \* wildcard matches any number of characters, and the ? wildcard matches a single character.

For more information about table extraction, see [Extract Entities from Tables, on page 57](#).

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	HeaderEntity0=pii/date/dob/landmark/all CellEntity0=pii/date/nocontext/all
<b>See Also:</b>	<a href="#">CellEntityN, on page 324</a>

## InvalidRegexAfterMatch

A regular expression that cannot form part of the valid match for a pre-filter.

When Eduction runs a pre-filter task, it finds a potential match and creates a match window by selecting characters before and after the potential match (you configure the size of the match window by using [WindowCharsAfterMatch, on page 356](#) and [WindowCharsBeforeMatch, on page 357](#)). You can use `InvalidRegexAfterMatch` to specify a pattern that definitely cannot form part of a valid match. When Eduction finds something that matches this non-valid pattern in the match window after the potential match, it truncates the match window to exclude the non-valid pattern and any text after it.

For example, if you know that your pattern can only include space characters, letters, and numbers, you can use the following setting to truncate the match window if Eduction finds anything else:

```
InvalidRegexAfterMatch=[^ \p{L}\p{N}]
```

<b>Type:</b>	String
<b>Default:</b>	
<b>Required:</b>	No
<b>Configuration Section:</b>	<b><i>MyPreFilterTask</i></b>
<b>Example:</b>	<code>InvalidRegexAfterMatch=[^ \p{L}\p{N}]</code>
<b>See Also:</b>	<a href="#">Regex, on page 350</a> <a href="#">ResourceFile, on page 351</a>

[WindowCharsAfterMatch, on page 356](#)  
[WindowCharsBeforeMatch, on page 357](#)

## InvalidRegexBeforeMatch

A regular expression that cannot form part of the valid match for a pre-filter.

When Eduction runs a pre-filter task, it finds a potential match and creates a match window by selecting characters before and after the potential match (you configure the size of the match window by using [WindowCharsAfterMatch, on page 356](#) and [WindowCharsBeforeMatch, on page 357](#)). You can use `InvalidRegexBeforeMatch` to specify a pattern that definitely cannot form part of a valid match. When Eduction finds something that matches this non-valid pattern in the match window before the potential match, it truncates the match window to exclude the non-valid pattern and any text before it.

For example, if you know that your pattern can only include space characters, letters, and numbers, you can use the following setting to truncate the match window if Eduction finds anything else:

```
InvalidRegexBeforeMatch=[^ \p{L}\p{N}]
```

<b>Type:</b>	String
<b>Default:</b>	
<b>Required:</b>	No
<b>Configuration Section:</b>	<i>MyPreFilterTask</i>
<b>Example:</b>	<code>InvalidRegexBeforeMatch=[^ \p{L}\p{N}]</code>
<b>See Also:</b>	<a href="#">Regex, on page 350</a> <a href="#">ResourceFile, on page 351</a> <a href="#">WindowCharsAfterMatch, on page 356</a> <a href="#">WindowCharsBeforeMatch, on page 357</a>

## LanguageDirectory

The path of an IDOL Server language directory that contains the relevant sentence breaking libraries and associated data files.

This parameter enables tokenization of Chinese, Japanese, Korean, and Thai languages.

<b>Type:</b>	String
--------------	--------

<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	C:\Program Files\IDOLServer\IDOL\langfiles
<b>See Also:</b>	<a href="#">Locale, below</a>

## Locale

The locale to use to tokenize the input text.

By default, Education uses an English tokenizer. You can set `Locale` to one of the following values to enable tokenization for Chinese, Japanese, Korean, and Thai:

- CHI
- JPN
- KOR
- THA

**NOTE:** The Education standard grammar files are developed without this setting. Micro Focus recommends that you use this parameter only when you are using custom grammar files that have been developed with a specific tokenization.

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	<code>Locale=THA</code>
<b>See Also:</b>	<a href="#">LanguageDirectory, on the previous page</a>

## MatchCase

Set this parameter to `False` to ignore case when matching characters.

By default, Education is case sensitive when matching characters, which improves the performance of matching. You can use `MatchCase` to turn off all case sensitivity in matching.

You can also use case attributes in your grammars to turn off case sensitivity for particular entities. See [Case Sensitive Matches, on page 53](#).

<b>Type:</b>	Boolean
<b>Default:</b>	True
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	MatchCase=False
<b>See Also:</b>	

## MatchTimeout

The maximum time to spend searching for matches (to all chosen entities) at a particular offset. You can specify the timeout in seconds and fractional seconds (for example 5.5 means five and a half seconds).

After it reaches the timeout, Education returns the best match it has found (if any) and continues looking for matches later in the text.

Education usually finds matches very quickly, so in most cases you do not need to set this timeout.

**NOTE:** When edktool reports settings, it returns values for the timeout in milliseconds. For example, if you set MatchTimeout to 4.5, it returns the timeout value as 4500.

<b>Type:</b>	Integer
<b>Default:</b>	60
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	MatchTimeout=30
<b>See Also:</b>	<a href="#">RequestTimeout, on page 351</a>

## MatchWholeWord

Set MatchWholeWord to **True** to match only terms in the text that begin and end on a whole word boundary.

Set `MatchWholeWord` to `False` to match terms that start and end anywhere, including in the middle of a word in the text.

For example, when `MatchWholeWord=True`, a search for the term `80` does not find a match in the text string `80mph`. When `MatchWholeWord=False`, a search for the term `par` finds a match in the text string `separated`.

For more information on modifying the matching behavior by using `MatchWholeWord`, see [Match Special Characters, on page 55](#).

<b>Type:</b>	Boolean
<b>Default:</b>	True
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	<code>MatchWholeWord=False</code>
<b>See Also:</b>	<a href="#">TangibleCharacters, on page 354</a> <a href="#">TokenWithPunctuation, on page 355</a>

## MaxEntityLength

The maximum number of characters in a returned entry.

Reducing this number can assist performance by preventing Eduction from scanning a long string of text for an entity that is expected to be small.

<b>Type:</b>	Integer
<b>Default:</b>	256
<b>Allowed Range:</b>	Minimum: 1 Maximum: 1024
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	<code>MaxEntityLength=100</code>
<b>See Also:</b>	<a href="#">EntityN, on page 332</a> <a href="#">ZoneEndN, on page 357</a> <a href="#">ZoneStartN, on page 358</a>

## MaxMatchesPerDoc

The maximum number of matches to allow in each document.

<b>Type:</b>	Integer
<b>Default:</b>	Unlimited
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	MaxMatchesPerDoc=15
<b>See Also:</b>	

## MinScore

The minimum score that a match must have for Education to return it. The lowest possible score is 0. The upper limit varies depending on the entity.

Set a higher minimum score to indicate that matches must meet a higher confidence level to return.

This parameter applies to all entities. You can also set [EntityMinScoreN, on page 331](#), which applies to the entities specified by the corresponding [EntityN, on page 332](#) parameter. If you set both parameters, a match must exceed both thresholds.

**NOTE:** Education applies this threshold before it runs any post-processing tasks (see [Post-Processing, on page 101](#)). To filter matches after all post-processing tasks have completed, set [PostProcessThreshold, on page 346](#)

**NOTE:** You can override the value of this parameter by using the associated Education SDK functions.

<b>Type:</b>	Long
<b>Default:</b>	0 (all matches are returned)
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	MinScore=0.5
<b>See Also:</b>	<a href="#">EntityMinScoreN, on page 331</a>

## NonGreedyMatch

Set `NonGreedyMatch` to `True` to configure Education to return the shortest match that it finds. In this case, when Education finds two matches that start at the same word, from two different entities, Education returns only the shortest match.

Setting `NonGreedyMatch` to `True` implicitly turns off [AllowOverlaps, on page 319](#) and [AllowMultipleResults, on page 317](#). If you have set these parameters, `NonGreedyMatch` takes precedence.

For more information on how to configure the Education matching behavior using `NonGreedyMatch`, see [Select Matches, on page 60](#).

<b>Type:</b>	Boolean
<b>Default:</b>	False
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	<code>NonGreedyMatch=True</code>
<b>See Also:</b>	<a href="#">AllowMultipleResults, on page 317</a> <a href="#">AllowOverlaps, on page 319</a>

## NumTasks

**DEPRECATED:** The `NumTasks` parameter is deprecated for Education version 12.5.0 and later. Use the [PostProcessingTaskN, on page 345](#) parameter to define your post-processing tasks. In this case, Education automatically calculates the number of tasks.

The `NumTasks` parameter is still available for existing implementations, but it might be incompatible with new functionality. The parameter might be deleted in future.

The number of post-processing tasks that you want to configure.

See [Post-Processing, on page 101](#) for more information.

<b>Type:</b>	Integer
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration</b>	<b>[PostProcessingTasks]</b>

<b>Section:</b>	
<b>Example:</b>	NumTasks=1
<b>See Also:</b>	<a href="#">TaskN, on page 355</a>

## OutputScores

**DEPRECATED:** The `OutputScores` parameter is deprecated in Eduction version 12.5.0 and later. This parameter is still available for existing implementations, but it might be incompatible with new functionality. The parameter might be deleted in future.

Set `OutputScores` to `True` to include the score associated with a match in the output from an extraction task. If the output is in IDX format, Eduction adds the score as a new DREFIELD, with the field name SCORE. If the output is in XML format, it adds the score as an attribute with the name "score".

**NOTE:** This parameter applies to `edktoo1` only.

<b>Type:</b>	Boolean
<b>Default:</b>	True
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	OutputScores=True
<b>See Also:</b>	

## OutputSimpleMatchInfo

**DEPRECATED:** The `OutputSimpleMatchInfo` parameter is deprecated in Eduction version 12.5.0 and later.

This parameter is still available for existing implementations, but it might be incompatible with new functionality. The parameter might be deleted in future.

Set `OutputSimpleMatchInfo` to `True` to generate basic match information only, such as document, entity, position, and original text. To use this option, you must use `edktoo1` with both the `extract` option and the option to generate a list of matches.

If `OutputSimpleMatchInfo=True`, [EnableComponents, on page 326](#) has no effect and reverts to **False**.

<b>Type:</b>	Boolean
<b>Default:</b>	False
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	<code>OutputSimpleMatchInfo=False</code>
<b>See Also:</b>	<a href="#">EnableComponents, on page 326</a>

## PostProcessingTaskN

The name of an Education post-processing task to run.

This parameter specifies the name of a section in the Education configuration file that contains the parameters required to run the task. To run multiple tasks, use numbered parameters (`PostProcessingTask0`, `PostProcessingTask1`, and so on).

You can use a post processing task to modify the output from Education, or format the output to meet your requirements.

For more information, see [Post-Processing, on page 101](#).

<b>Type:</b>	String
<b>Default:</b>	
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	<code>PostProcessingTask0=EducationLuaPostProcessing</code>  <code>[EducationLuaPostProcessing]</code> <code>Script=scripts/education_post_process.lua</code>
<b>See Also:</b>	<a href="#">Script, on page 352</a> <a href="#">Entities, on page 327</a> <a href="#">ProcessEnMasse, on page 348</a>

## PostProcessThreshold

**DEPRECATED:** The [PostProcessingTasks] configuration section is deprecated for Education version 12.5 and later. Set PostProcessThreshold in the [Education] section.

The [PostProcessingTasks] section is still available for existing implementations, but it might be incompatible with new functionality. The parameter might be deleted in future.

The minimum score that a match must have, after all post-processing tasks have completed, for Education to return that match.

The threshold applies to all entities. Specify a higher threshold to indicate that matches must meet a higher confidence level to return.

This parameter is similar to [MinScore, on page 342](#). Use PostProcessThreshold when you want to filter the matches after all post-processing tasks have completed, rather than before post-processing begins.

**NOTE:** You can override the value of this parameter by using the associated Education SDK functions.

<b>Type:</b>	Number
<b>Default:</b>	All matches are returned
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	PostProcessThreshold=0.4
<b>See Also:</b>	<a href="#">MinScore, on page 342</a>

## PreFilterMaxReturnedBytes

The maximum number of bytes that a pre-filter task can produce without a resulting Education match.

The pre-filter process generates windows with potential matches, based on your pre-filter criteria. Education runs matching on these windows as soon as the pre-filter generates them.

PreFilterMaxReturnedBytes allows you to specify a threshold for the amount of data that the pre-filter can output without a subsequent match. This option allows you to more quickly reject documents that match the pre-filter but are unlikely to contain real matches.

When a match is found in a pre-filter window the counter is reset and another match must occur before the specified limit is reached, otherwise Education stops processing.

To turn off this pre-filter threshold, set PreFilterMaxReturnedBytes to **0** (unlimited).

**NOTE:** If you use Education SDK functions to set a pre-filter byte threshold, the SDK functions override the value of the `PreFilterMaxReturnedBytes` configuration parameter.

<b>Type:</b>	Integer
<b>Default:</b>	0 (unlimited)
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	<code>PreFilterMaxReturnedBytes=1000000</code>
<b>See Also:</b>	<a href="#">PreFilterTaskN</a> , below

## PreFilterTaskN

The name of an Education pre-filtering task to run. This parameter specifies the name of a section in the Education configuration file that contains the parameters required to run the task. Replace the value *N* with the number of the task, starting from zero (`PreFilterTask0`, `PreFilterTask1`, and so on)

Pre-filtering tasks use a regular expression to perform an initial check to find strings that might match an entity in your input text. It then restricts Education matching to windows of several characters around these potential matches. This process can improve performance for some grammars, by restricting the amount of the input text that Education checks in detail for matches.

In the pre-filter configuration sections, you set [Regex](#), on page 350 to a regular expression that finds potential matches. You use [WindowCharsAfterMatch](#), on page 356 and [WindowCharsBeforeMatch](#), on page 357 to specify the size of the matching window to use.

Education runs all your configured pre-filtering tasks for all input text, so ensure that your pre-filter task applies to all your configured grammars and entities. Use a different configuration for any entities that you do not want to pre-filter.

When you configure multiple pre-filtering tasks, Education runs each of them on your full input text. It then merges any windows that overlap from different tasks, and uses all the resulting windows as input text for the full matching process.

For more information, see [Pre-Filter Tasks](#), on page 97.

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>

<b>Example:</b>	<pre>[Eduction] PreFilterTask0=AddressPreFilter  [AddressPreFilter] Regex=\d{1,7} WindowCharsAfterMatch=100 WindowCharsBeforeMatch=100</pre>
<b>See Also:</b>	

## ProcessEnMasse

Set `ProcessEnMasse` to **True** to use the entire set of educed matches as input for your post-processing script, rather than a single match. This option enables your script to look at all the matches at once and modify them accordingly.

For example, to increase the score of a match if it is found near other matches, you must consider all of the matches together.

By default, Eduction sends an individual match to the post-processing script.

<b>Type:</b>	Boolean
<b>Default:</b>	False
<b>Required:</b>	No
<b>Configuration Section:</b>	Any section that you have defined for an Eduction post processing task.
<b>Example:</b>	<pre>PostProcessingTask0=EductionLuaPostProcessing  [EductionLuaPostProcessing] Script=scripts/eduction_post_process.lua ProcessEnMasse=True</pre>
<b>See Also:</b>	<a href="#">Entities, on page 327</a> <a href="#">Script, on page 352</a> <a href="#">PostProcessingTaskN, on page 345</a>

## RedactedOutput

Set `RedactedOutput` to **True** to redact sensitive information in the output text.

You can also set **one** of [RedactionOutputString, on the next page](#) or [RedactionReplacementCharacter, on the next page](#). If you do not set either parameter, the default behavior is to replace redacted text with

[redacted] in the output. If you configure both, [RedactionReplacementCharacter](#), below takes precedence.

<b>Type:</b>	Boolean
<b>Default:</b>	False
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	RedactedOutput=False
<b>See Also:</b>	<a href="#">RedactionOutputString</a> , below <a href="#">RedactionReplacementCharacter</a> , below

## RedactionOutputString

A string that replaces redacted information in the output text.

<b>Type:</b>	String
<b>Default:</b>	[redacted]
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	RedactionOutputString=[censored]
<b>See Also:</b>	<a href="#">RedactionReplacementCharacter</a> , below

## RedactionReplacementCharacter

A single character that replaces each character in redacted text.

<b>Type:</b>	String
<b>Default:</b>	Use [redacted] for the whole redacted string
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>

<b>Example:</b>	RedactionReplacementCharacter=*
<b>See Also:</b>	<a href="#">RedactionOutputString, on the previous page</a>

## RedactionType

The method to use for replacing text when you use redaction. You can use one of the following options:

- **Normalize.** Replace a match with the normalized form of the text. For example, you could replace a match *ten to nine twenty third of June* with the normalized version *8:50 23rd of June*.
- **Replace.** Replace a match with a censored string or replacement character.
- **Entity.** Replace the match with the name of the matching entity.

**NOTE:** If you set [AllowOverlaps, on page 319](#) to **True**, you cannot set **RedactionType** to **Normalize**, because Education Server cannot normalize overlapping phrases.

<b>Type:</b>	String
<b>Default:</b>	Replace
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	RedactionType=Normalize
<b>See Also:</b>	<a href="#">RedactionReplacementCharacter, on the previous page</a> <a href="#">RedactionOutputString, on the previous page</a>

## Regex

A regular expression to use to find potential matches in your input text.

Education uses the configured **Regex** to run an initial check to find potential matches in your input text. It then creates a match window by selecting characters before and after the potential match, and uses your grammar to find actual matches in these windows.

Set this parameter to a regular expression that broadly matches everything that might be a match for your intended entity. For example, to match telephone numbers or addresses, you might find any string of digits. This narrows down the amount of text that Education must match against your entity, while ensuring that it does not miss potential matches.

You can use [WindowCharsAfterMatch, on page 356](#) and [WindowCharsBeforeMatch, on page 357](#) to determine the size of the matching window to use.

<b>Type:</b>	String
<b>Default:</b>	
<b>Required:</b>	No
<b>Configuration Section:</b>	<i>MyPreFilterTask</i>
<b>Example:</b>	Regex=\d{1,7}
<b>See Also:</b>	<a href="#">WindowCharsAfterMatch, on page 356</a> <a href="#">WindowCharsBeforeMatch, on page 357</a>

## RequestTimeout

The maximum time to spend processing a single input file or document. You can specify the timeout in seconds and fractional seconds (for example 5.5 means five and a half seconds).

After it reaches the timeout, Education stops processing and returns any results that were found. In most cases Education does not reach the default timeout, but it can prevent Education running for a long time with abnormal documents.

**NOTE:** When edktool reports settings, it returns values for the timeout in milliseconds. For example, if you set RequestTimeout to 4.5, it returns the timeout value as 4500.

<b>Type:</b>	Integer
<b>Default:</b>	300
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	RequestTimeout=120
<b>See Also:</b>	<a href="#">MatchTimeout, on page 340</a>

## ResourceFile

The full path to a JSON file that contains a dictionary of terms to use to find potential matches in your input text.

Education uses the terms in the configured file to run an initial check to find potential matches in your input text. It then creates a match window by selecting characters before and after the potential match, and uses your grammar to find actual matches in these windows.

You can use a provided dictionary file, which is in a binary format with the file extension DPF, or you can create a custom JSON file with your own dictionary. For details of the format of the JSON file, see [Dictionary ResourceFile Format, on page 98](#).

You can use [WindowCharsAfterMatch, on page 356](#) and [WindowCharsBeforeMatch, on page 357](#) to determine the size of the matching window to use.

<b>Type:</b>	String
<b>Default:</b>	
<b>Required:</b>	No
<b>Configuration Section:</b>	<i>MyPreFilterTask</i>
<b>Example:</b>	ResourceFile=custom_dictionary.json
<b>See Also:</b>	<a href="#">WindowCharsAfterMatch, on page 356</a> <a href="#">WindowCharsBeforeMatch, on page 357</a>

## ResourceFiles

The full path to a compiled ECR file that contains Eduction grammar entries. You must specify at least one resource file.

You can specify multiple resource files by separating them with commas, or by using wildcard expressions. You can use the \* wildcard to match any number of characters, or the ? wildcard to match a single character. For example, set ResourceFiles to `<grammar_files_directory>/sentiment_*.ecr` to use all available sentiment grammars.

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	Yes
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	ResourceFiles=C:\MyGrammar\gram1.ecr,C:\MyGrammar\gram2.ecr
<b>See Also:</b>	

## Script

The path to the Lua post-processing script to run to process the data that the Eduction engine returns. See [Post-Processing, on page 101](#) for more information.

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	Any section that you have defined for an Education post processing task.
<b>Example:</b>	Script=./scripts/checksum.lua
<b>See Also:</b>	<a href="#">Entities, on page 327</a> <a href="#">ProcessEnMasse, on page 348</a> <a href="#">PostProcessingTaskN, on page 345</a>

## SearchFields

**DEPRECATED:** The SearchFields parameter is deprecated in Education version 12.6.0 and later. This parameter is still available for existing implementations, but it might be incompatible with new functionality. The parameter might be deleted in future.

A comma-separated list of fields to search for entities, for example DRECONTENT or DRETITLE.

To search for a specific entity only in specific fields, you can set [EntitySearchFieldsN, on page 333](#), which overrides the value of this parameter for specific entities.

When you select multiple fields in a document for parsing, Education returns matches in the following field order:

- DRREFERENCE
- DRETITLE
- DRECONTENT
- Any remaining fields in the order in which they are specified.

<b>Type:</b>	String
<b>Default:</b>	DRETITLE,SUMMARY,DRECONTENT
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Education</b>
<b>Example:</b>	SearchFields=DRECONTENT,DRETITLE
<b>See Also:</b>	<a href="#">EntityN, on page 332</a> <a href="#">EntitySearchFieldsN, on page 333</a>

## SuppressMatchLogging

Set `SuppressMatchLogging` to `True` to suppress log entries for every entity and zone pattern found in a document.

When you have set logging to `Full` in the Eduction configuration file, Eduction records a log entry for every entity and zone pattern that it finds in a document. You can set `SuppressMatchLogging` to `True` to suppress these log entries.

This option is useful when you want to log the performance timing information, but do not want the verbose match entries.

<b>Type:</b>	Boolean
<b>Default:</b>	False
<b>Required:</b>	No
<b>Configuration Section:</b>	Eduction
<b>Example:</b>	<code>SuppressMatchLogging=True</code>
<b>See Also:</b>	

## TangibleCharacters

A list of punctuation characters to treat as part of the word, rather than as word boundaries. By default, Eduction treats almost all punctuation characters as word boundaries.

**NOTE:** You cannot specify spaces, returns, and tabs as `TangibleCharacters`.

This parameter has no effect when `MatchWholeWord` is set to `False`.

For more information on using `TangibleCharacters` to specify punctuation characters to match, or to match punctuation at the start of a match, see [Match Special Characters, on page 55](#).

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>

<b>Example:</b>	TangibleCharacters=-/\@
<b>See Also:</b>	<a href="#">MatchWholeWord, on page 340</a> <a href="#">TokenWithPunctuation, below</a>

## TaskN

**DEPRECATED:** The `TaskN` parameter is deprecated for Eduction version 12.5.0 and later. Use the [PostProcessingTaskN, on page 345](#) parameter in the [Eduction] section.

The `TaskN` parameter is still available for existing implementations, but it might be incompatible with new functionality. The parameter might be deleted in future.

The name of an Eduction post-processing task to run. This parameter specifies the name of a section in the Eduction configuration file that contains the parameters required to run the task. To run multiple tasks, use numbered parameters (`Task0`, `Task1`, and so on).

You can use a post processing task to modify the output from the Eduction module, or format the output to meet your requirements. For more information, see [Post-Processing, on page 101](#).

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>PostProcessingTasks</b>
<b>Example:</b>	Task0=EductionLuaPostProcessing  [EductionLuaPostProcessing] Script=scripts/eduction_post_process.lua
<b>See Also:</b>	<a href="#">Script, on page 352</a> <a href="#">Entities, on page 327</a> <a href="#">ProcessEnMasse, on page 348</a> <a href="#">NumTasks, on page 343</a>

## TokenWithPunctuation

Set `TokenWithPunctuation` to `True` to treat all punctuation characters as part of a word token, rather than treating them as word boundaries. This option is equivalent to setting [TangibleCharacters, on the previous page](#) to all punctuation characters.

This parameter has no effect when [MatchWholeWord, on page 340](#) is set to `False`.

<b>Type:</b>	Boolean
<b>Default:</b>	False
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	TokenWithPunctuation=True
<b>See Also:</b>	<a href="#">MatchWholeWord</a> , on page 340 <a href="#">TangibleCharacters</a> , on page 354

For more information on using `TokenWithPunctuation` to configure all punctuation marks as tangible characters, see [Match Special Characters](#), on page 55.

## ValidatePostProcessingTasks

Set `ValidatePostProcessingTasks` to `False` to skip post-processing entity validation when an Eduction engine starts.

By default, when Eduction starts a new engine, it checks that the configured entities are present in the loaded grammar files. You might want to skip this step when you have a stable configuration, and speed is critical.

<b>Type:</b>	Boolean
<b>Default:</b>	True
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	ValidatePostProcessingTasks=False
<b>See Also:</b>	<a href="#">PostProcessingTaskN</a> , on page 345

## WindowCharsAfterMatch

The minimum number of UTF-8 characters to include in the matching window when Eduction finds a potential match.

Eduction uses the configured [Regex](#), on page 350 to run an initial check to find potential matches in your input text. It then creates a match window by selecting characters before and after the potential match, and then uses your grammar to find actual matches in these windows.

You configure the window size by using [WindowCharsBeforeMatch](#), [below](#) and [WindowCharsAfterMatch](#). Eduction sets the end of a match window at the closest word boundary after the configured number of characters.

<b>Type:</b>	Long
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<i>MyPreFilterTask</i>
<b>Example:</b>	WindowCharsAfterMatch=100
<b>See Also:</b>	<a href="#">TokenWithPunctuation</a> , on page 355

## WindowCharsBeforeMatch

The number of UTF-8 characters to include in the matching window when Eduction finds a potential match.

Eduction uses the configured [Regex](#), on page 350 to run an initial check to find potential matches in your input text. It then creates a match window by selecting characters before and after the potential match, and then uses your grammar to find actual matches in these windows.

You configure the window size by using [WindowCharsAfterMatch](#), on the previous page and [WindowCharsBeforeMatch](#). Eduction sets the start of a match window at the closest word boundary before the configured number of characters.

<b>Type:</b>	Long
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<i>MyPreFilterTask</i>
<b>Example:</b>	WindowCharsBeforeMatch=100
<b>See Also:</b>	<a href="#">TokenWithPunctuation</a> , on page 355

## ZoneEndN

A regular expression that defines the end point of a zone.

A zone is a section of a field defined by a start and end pattern. Zones locate entities in parts of a field. If you do not add zone entries, Eduction searches the entire field. If you do not set the end pattern, the search begins at a match for the start pattern and continues until the end of the field.

Use [EntityZoneN](#) to associate an entity identified in an [EntityN](#) parameter with one or more zones that you define by using [ZoneStartN](#) and [ZoneEndN](#).

**NOTE:** Your start and end patterns must not match the same text in a field.

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>
<b>Example:</b>	ZoneStart0=Social Security: ZoneEnd0=Shipping Address  ZoneStart1=Shipping Address: ZoneEnd1=Billing Address
<b>See Also:</b>	<a href="#">EntityN, on page 332</a> <a href="#">EntityZoneN, on page 334</a> <a href="#">ZoneStartN, below</a>

## ZoneStartN

A regular expression that defines the start point of a zone.

A zone is a section of a field defined by a start and end pattern. Zones locate entities in parts of a field. If you do not add zone entries, Eduction searches the entire field. If you do not set the start pattern, the search begins at the start of the field and continues until a match for the end pattern.

Use [EntityZoneN](#) to associate an entity identified in an [EntityN](#) parameter with one or more zones that you define by using [ZoneStartN](#) and [ZoneEndN](#).

**NOTE:** Your start and end patterns must not match the same text in a field.

<b>Type:</b>	String
<b>Default:</b>	None
<b>Required:</b>	No
<b>Configuration Section:</b>	<b>Eduction</b>

<b>Example:</b>	ZoneStart0=Social Security: ZoneEnd0=Shipping Address  ZoneStart1=Shipping Address: ZoneEnd1=Billing Address
<b>See Also:</b>	<a href="#">EntityN, on page 332</a> <a href="#">EntityZoneN, on page 334</a> <a href="#">ZoneEndN, on page 357</a>



# Chapter 17: Eduction Lua Methods Reference

This section describes the methods you can use in your Lua post-processing scripts.

**TIP:** The Eduction SDK allows you to use all standard IDOL Lua functions and methods. Most of these functions and methods are not relevant to Eduction, but in some cases you might find the general functions useful.

For details of the available methods, refer to the *IDOL NiFi Ingest Getting Started Guide*.

- [edkComponent Methods](#) .....361
- [edkEnMasseMatch Methods](#) .....366
- [edkMatch Methods](#) .....368
- [session Methods](#) .....378
- [Standard IDOL Lua Functions](#) .....378

## edkComponent Methods

The following methods are available on edkComponent objects.

You can obtain an edkComponent object using the [getComponent](#) method of an [edkmatch](#) object.

Method	Description
<a href="#">getMatchedOffset</a>	Returns the offset of a component in the matched text, in bytes.
<a href="#">getMatchedOffsetLength</a>	Returns the offset of a component in the matched text, in Unicode characters.
<a href="#">getMatchedText</a>	Returns the text that a component originally matched.
<a href="#">getMatchLength</a>	Returns the size of the component matched text, in Unicode characters
<a href="#">getMatchSize</a>	Returns the size of the component matched text, in bytes.
<a href="#">getName</a>	Returns the name of a component.
<a href="#">getOffset</a>	Returns the offset of a component in the normalized text, in bytes.
<a href="#">getOffsetLength</a>	Returns the offset of a component in the normalized text, in Unicode characters.

Method	Description
<a href="#">getText</a>	Returns the text that a component matches.
<a href="#">setMatchLength</a>	Modifies the size of the component matched text, in Unicode characters
<a href="#">setMatchSize</a>	Modifies the size of the component matched text, in bytes.
<a href="#">setName</a>	Modifies the name of a component.
<a href="#">setText</a>	Modifies the text that a component matches.

## getMatchedOffset

Provides information on where in a document a particular component is found.

### Syntax

```
edkcomponent:getMatchedOffset()
```

### Returns

The position of the component, in bytes from the beginning of the original match text buffer.

## getMatchedOffsetLength

Provides information on where in a document a particular component is found.

### Syntax

```
edkcomponent:getMatchedOffsetLength()
```

### Returns

The position of the component, in characters from the beginning of the original match text buffer.

## getMatchedText

Returns the input text for a particular component, that is, the text **before** any normalization or modification that occurs as part of the extraction process.

### Syntax

```
edkcomponent:getMatchedText()
```

### Returns

The input text for the component match.

## getMatchLength

Provides information on the size of a particular component match.

### Syntax

```
edkcomponent:getMatchLength()
```

### Returns

The size of the component matched text, in characters.

## getMatchSize

Provides information on the size of a particular component match.

### Syntax

```
edkcomponent:getMatchSize()
```

### Returns

The size of the component matched text, in bytes.

## getName

Retrieves the name of a component.

### Syntax

```
edkcomponent:getName()
```

### Returns

The component name. You can use [setName](#) to edit the component name.

## getOffset

Provides information on where in a document a particular component is found.

## Syntax

```
edkcomponent:getOffset()
```

## Returns

The position of the component, in bytes from the beginning of the normalized match text buffer.

## getOffsetLength

Provides information on where in a document a particular component is found.

## Syntax

```
edkcomponent:getOffsetLength()
```

## Returns

The position of the component, in characters from the beginning of the normalized match text buffer.

## getText

Returns the normalized output text matched by a particular component.

## Syntax

```
edkcomponent:getText()
```

## Returns

The matched text for a specified component. You can use [setText](#) to edit the text.

## setMatchLength

Modifies the size of a component match.

## Syntax

```
edkcomponent:setMatchLength(new_length)
```

## Arguments

Argument	Description
new_length	The new length of the match, in characters.

## Returns

The new length of the component matched text, in characters.

### *Related Topics*

- [getMatchLength, on page 363](#)

## setMatchSize

Modifies the size of a component match.

## Syntax

```
edkcomponent:setMatchLength(new_size)
```

## Arguments

Argument	Description
new_size	The new size of the match, in bytes.

## Returns

The new size of the component matched text, in bytes.

### *Related Topics*

- [getMatchSize, on page 363](#)

## setName

Edits the name of the component that you retrieved with [getName](#).

## Syntax

```
edkcomponent:setName(new_name)
```

## Arguments

Argument	Description
<code>new_name</code>	The new name for the component.

## Returns

The new component name.

## setText

Modifies the normalized text matched by a particular component that you retrieved with [getText](#).

## Syntax

```
edkcomponent:setText(new_text)
```

## Arguments

Argument	Description
<code>new_text</code>	The new matched text for the component.

## Returns

The new matched text for the specified component.

# edkEnMasseMatch Methods

An `edkEnMasseMatch` object represents a match that is being processed in an en-masse post processing task. You cannot manipulate the match directly; instead you call the [getMatch](#) method to obtain an `edkmatch` object.

The following methods are available on `edkEnMasseMatch` objects.

Method	Description
<a href="#">getMatch</a>	Returns an <code>edkmatch</code> object that represents the match.
<a href="#">getOutput</a>	Returns whether the match is included in the results.
<a href="#">setOutput</a>	Sets whether to include the match in the results.

## getMatch

Returns an `edkmatch` object that you can use to manipulate the match.

### Syntax

```
edkEnMasseMatch:getMatch()
```

### Returns

An `edkmatch` object.

### Example

The following example Lua script uses the `getMatch` method to obtain an `edkmatch` object:

```
function processmatches(matches)
    -- example that discards matches with score < 0.5
    for k,v in ipairs (matches) do
        local edkmatch = v:getMatch()
        if edkmatch:getScore() < 0.5 then
            v:setOutput(false)
        end
    end
end
end
```

## getOutput

Returns whether the match is included in the results.

### Syntax

```
edkEnMasseMatch:getOutput()
```

### Returns

Boolean. True if the match is going to be included in the results, or `false` if it is going to be discarded.

## setOutput

Sets whether to include the match in the results.

### Syntax

```
edkEnMasseMatch:setOutput(output)
```

## Arguments

Argument	Description
output	A Boolean value that specifies whether to include the match in the results (true) or discard it (false).

## Example

The following script uses the `setOutput` method to discard matches with a score less than 0.5:

```
function processmatches(matches)
  -- example that discards matches with score < 0.5
  for k,v in ipairs (matches) do
    local edkmatch = v:getMatch()
    if edkmatch:getScore() < 0.5 then
      v:setOutput(false)
    end
  end
end
end
```

## edkMatch Methods

The following methods are available on `edkMatch` objects.

Constructor	Description
<a href="#">LuaEdkMatch:new</a> , <a href="#">on the next page</a>	Creates an <code>edkMatch</code> object.

Method	Description
<a href="#">addComponent</a>	Adds a new component to the match.
<a href="#">getComponent</a>	Returns a specific component.
<a href="#">getComponentCount</a>	Returns the total number of components in a match.
<a href="#">getContribution</a>	Returns a specific scoring contribution.
<a href="#">getContributionsCount</a>	Returns the number of scoring contributions, that contributed to the score for the match.
<a href="#">getEntityName</a>	Returns the name of an entity in a match.
<a href="#">getMatchedText</a>	Returns the input text for a match.

Method	Description
<a href="#">getOffset</a>	Returns the position of a match (in bytes).
<a href="#">getOffsetLength</a>	Returns the position of a match (in characters).
<a href="#">getOutputText</a>	Returns the output text for a match.
<a href="#">getScore</a>	Returns the score of a match.
<a href="#">setEntityName</a>	Edits an entity name in a match.
<a href="#">setMatchedText</a>	Edits the input text for a match.
<a href="#">setOffset</a>	Edits the position of a match (in bytes).
<a href="#">setOffsetLength</a>	Edits the position of a match (in bytes).
<a href="#">setOutputText</a>	Assigns a new value to the output text for a match.
<a href="#">setScore</a>	Edits the score of a match.

## LuaEdkMatch:new

The constructor for a LuaEdkMatch object (creates a new LuaEdkMatch object).

### Syntax

```
LuaEdkMatch:new()
```

or

```
LuaEdkMatch:new(entity_name, matched_text, offset)
```

### Arguments

**NOTE:** You can use this constructor without arguments to create a match without values set. However, to reduce the amount of repeated code, Micro Focus recommends that you use the alternative version that allows you to create a match with some important information populated.

Argument	Description
entity_name	The name of the entity that the match belongs to.
matched_text	The matching text.
offset	The position of the match (in bytes).

### Returns

(edkMatch). The new edkMatch object.

## addComponent

Adds a new component to the match. For example, if your Education task returns an email address as a match, you can use `addComponent` to extract the text after the `@` symbol and add it as a `DOMAIN` component for the match.

You can also use `addComponent` to add metadata from other sources. For example, if you have extracted a place name, you can add components called `"LATITUDE"` and `"LONGITUDE"`, and populate them with data from a different source, regardless of the fact that they were not components of the original text.

### Syntax

```
edkmatch.addComponent(name, offset, offsetLength)
```

or

```
edkmatch.addComponent(name, offset, offsetLength, originalOffset,  
originalOffsetLength)
```

### Arguments

Argument	Description
<code>name</code>	The name of the new component (for example, <code>TOPIC</code> , or <code>SENTIMENT</code> )
<code>offset</code>	The position of the text to use as the new component, in bytes from the start of the normalized text of the match.
<code>offsetLength</code>	The position of the text to use as the new component, in characters from the start of the normalized text of the match.
<code>originalOffset</code>	(optional) The position of the text to use as the new component, in bytes from the start of the original text of the match. If you do not set <code>originalOffset</code> , the value is set to the same as <code>offset</code> .
<code>originalOffsetLength</code>	(optional) The position of the text to use as the new component, in characters from the start of the original text of the match. If you do not set <code>originalOffsetLength</code> , the value is set to the same as <code>offset</code> .

**NOTE:** If you are unsure of the correct `offset` or `offsetLength`, or the component value comes from an external source, you can set `offset` or `offsetLength` to **0**.

### Returns

The new empty component object.

### **Related Topics**

- [getName](#), on page 363
- [setName](#), on page 365
- [getText](#), on page 364
- [setText](#), on page 366

## **getComponent**

The `getComponent` method returns a specified component object. The components are zero-indexed. For example, if you have six components, you can get the last component by using `edkmatch:getComponent(5)`.

### **Syntax**

```
edkmatch:getComponent(index)
```

### **Arguments**

Argument	Description
index	The number of the component to get (where the first component has the index zero).

### **Returns**

The component object at the specified index position in the match.

### **Related Topics**

- [getName](#), on page 363
- [setName](#), on page 365
- [getText](#), on page 364
- [setText](#), on page 366

## **getComponentCount**

Returns the total number of components in a match.

### **Syntax**

```
edkmatch:getComponentCount()
```

## Returns

The number of components.

## getContribution

Returns a specified scoring contribution.

The final score for a match (as retrieved through the [getScore](#) method) can be the product of multiple scoring contributions. For some entities the score is then normalized (for example so that it is always a value between 0 and 1).

## Syntax

```
edkmatch:getContribution(index)
```

## Arguments

Argument	Description
index	The number of the contribution to get (where the first contribution has the index zero).

## Returns

The scoring contribution.

## Example

The following example demonstrates how to obtain scoring contributions:

```
function processmatch(edkmatch)
    local contributionsCount = edkmatch:getContributionsCount()
    print ("Contributions count: ", contributionsCount)
    if contributionsCount >= 1 then
        for i=0, contributionsCount-1, 1 do
            local contribution = edkmatch:getContribution(i)
            print ("Contribution " .. i .. ": " , contribution)
        end
    end
    print ("Score: " , edkmatch:getScore())
    return true
end
```

This script produces output similar to:

```
Contributions count:    4.0
Contribution 0:        1.0
```

```
Contribution 1:      0.75
Contribution 2:      1.0
Contribution 3:      0.6
Score: 0.45
```

## getContributionsCount

Returns the number of scoring contributions, that contributed to the score for the match.

### Syntax

```
edkmatch:getContributionsCount()
```

### Returns

The number of scoring contributions.

### Example

For an example that demonstrates how to obtain scoring contributions, see the example for the [getContribution](#) method.

## getEntityName

Gets an entity name from a match.

### Syntax

```
edkmatch:getEntityName()
```

### Returns

The name of the entity in a match. You can use [setEntityName](#) to edit the name.

## getMatchedText

Returns the input text for a particular match, that is, the text **before** any normalization or modification that occurs as part of the extraction process.

### Syntax

```
edkmatch:getMatchedText()
```

## Returns

The input text for a match. You can use [setMatchedText](#) to edit the text.

## Related Topics

- [getOutputText](#), below

## getOffset

Provides information on where in a document a particular match is found.

## Syntax

```
edkmatch:getOffset()
```

## Returns

The position of the match, in bytes from the beginning of the text buffer. You can use [setOffset](#) to edit this information.

## getOffsetLength

Provides information on where in a document a particular match is found.

## Syntax

```
edkmatch:getOffsetLength()
```

## Returns

The position of the match, in characters from the beginning of the text buffer. You can use [setOffsetLength](#) to edit this information.

## getOutputText

Returns the output text for a match; that is, the text after any normalization or modification that takes place as part of the extraction process.

## Syntax

```
edkmatch:getOutputText()
```

## Returns

The output text of a match. You can use [setOutputText](#) to edit the text.

### Related Topics

- [getMatchedText](#), on page 373

## getScore

Retrieves the score for a match.

### Syntax

```
edkmatch:getScore()
```

### Returns

The score for the match. You can use [setScore](#) to edit the score.

## setEntityName

Modifies the name of the entity that you retrieved by using [getEntityName](#).

### Syntax

```
edkmatch:setEntityName(new_name)
```

### Arguments

Argument	Description
new_name	The new name for the entity in the match.

### Returns

The new entity name.

## setMatchedText

Modifies the input text that you retrieved by using [getMatchedText](#).

The input text is the text before any normalization or modification that takes place as part of the extraction process. By contrast, [setOutputText](#) enables you to modify the output text after any changes.

### Syntax

```
edkmatch:setMatchedText(new_text)
```

## Arguments

Argument	Description
<code>new_text</code>	The new value that you want to assign to the input text.

## Returns

The new input text.

## setOffset

Modifies the position of a match in a document.

## Syntax

```
edkmatch:setOffset(new_offset)
```

## Arguments

Argument	Description
<code>new_offset</code>	The new position of the match, in bytes from the start of the text buffer.

## Returns

The new position of the match (in bytes).

## Related Topics

- [getOffset, on page 374](#)

## setOffsetLength

Modifies the position of a match in a document.

## Syntax

```
edkmatch:setOffsetLength(new_length)
```

## Arguments

Argument	Description
<code>new_length</code>	The new position of the match, in characters from the start of the text buffer.

## Returns

The new position of the match (in characters).

## setOutputText

Modifies the output text that you retrieved by using [getOutputText](#).

The output text is the text after any normalization or modification that takes place as part of the extraction process. By contrast, [setMatchedText](#) enables you to modify the input text before any changes are made.

## Syntax

```
edkmatch:setOutputText(new_text)
```

## Arguments

Argument	Description
new_text	The new value that you want to assign to the output text for a match.

## Returns

The new output text.

## setScore

Modifies the match score that you retrieved with [getScore](#).

## Syntax

```
edkmatch:setScore(new_score)
```

## Arguments

Argument	Description
new_score	The new score for the match.

## Returns

The new score for the match.

## session Methods

The following methods are available on `session` objects.

Constructor	Description
<a href="#">injectMatch</a>	Injects a match into the current matching session.

### injectMatch

Injects a match into the current matching session.

This method accepts an `edkMatch` object. This `edkMatch` must be one that you create in the Lua script; nothing happens if you call `injectMatch` on the match from Education that you first pass into the `finalizematch` function.

After you call this function, the session takes ownership of the match, so you cannot use the created match in any subsequent functions.

**NOTE:** You cannot perform additional post-processing on injected matches. Education skips these matches at post-processing time, to prevent infinite loops.

### Syntax

```
session:injectMatch(edkMatch)
```

### Arguments

Argument	Description
<code>edkMatch</code>	An <code>edkMatch</code> object.

## Standard IDOL Lua Functions

The Education SDK allows you to use all standard IDOL Lua functions and methods. Most of these functions and methods are not relevant to Education, but in some cases you might find the general functions useful.

For details of the available methods, refer to the *IDOL NiFi Ingest Getting Started Guide*.

# Glossary

## A

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### **ACI (Autonomy Content Infrastructure)**

A technology layer that automates operations on unstructured information for cross-enterprise applications. ACI enables an automated and compatible business-to-business, peer-to-peer infrastructure. The ACI allows enterprise applications to understand and process content that exists in unstructured formats, such as email, Web pages, Microsoft Office documents, and IBM Notes.

### **ACI Server**

A server component that runs on the Autonomy Content Infrastructure (ACI).

### **ACL (access control list)**

An ACL is metadata associated with a document that defines which users and groups are permitted to access the document.

### **action**

A request sent to an ACI server.

### **active directory**

A domain controller for the Microsoft Windows operating system, which uses LDAP to authenticate users and computers on a network.

## C

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### **Category component**

The IDOL Server component that manages categorization and clustering.

### **Community component**

The IDOL Server component that manages users and communities.

### **compiled grammar**

A grammar file that has been compiled from XML into ECR file format using the Education command-line tool edktool, so that Education can use it directly. See also: XML, ECR file, grammar, standard grammar, user grammar.

### **components**

An attribute of a matched entity (a component of the single match), for example a topic or sentiment.

### **connector**

An IDOL component (for example File System Connector) that retrieves information from a local or remote repository (for example, a file system, database, or Web site).

### **Connector Framework Server (CFS)**

Connector Framework Server processes the information that is retrieved by connectors. Connector Framework Server uses KeyView to extract document content and metadata from over 1,000 different file types. When the information has been processed, it is sent to an IDOL Server or Distributed Index Handler (DIH).

### **Content component**

The IDOL Server component that manages the data index and performs most of the search and retrieval operations from the index.

## D

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### **DAH (Distributed Action Handler)**

DAH distributes actions to multiple copies of IDOL Server or a component. It allows you to use failover, load balancing, or distributed content.

**database**

An IDOL server data pool that stores indexed information. The administrator can set up one or more databases, and specifies how data is fed to the databases. By default IDOL server contains the databases Profile, Agent, Activated, Deactivated, News and Archive.

**DIH (Distributed Index Handler)**

DIH allows you to efficiently split and index extremely large quantities of data into multiple copies of IDOL Server or the Content component. DIH allows you to create a scalable solution that delivers high performance and high availability. It provides a flexible way to batch, route, and categorize the indexing of internal and external content into IDOL Server.

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**E**

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**ECR file**

ECR is a proprietary format for grammar files that Education can easily read at runtime. You can write grammar files in XML, then use the Education command-line tool `edktool` to compile them into ECR format. See also: XML, compiled grammar.

**edktool**

A command-line tool for compiling and testing Education grammars.

**Education**

The process of extracting entities (patterns of text) from documents.

**Education engine**

The part of any Education component that processes text and performs extraction and redaction operations. You can access the engine by using the Education SDK, Education Server, or an IDOL ingestion component (CFS or IDOL NiFi Ingest).

**entity**

In Education, an entity is a word, phrase, or block of information that the Education component can match and extract from documents. An entity can be a specific text string, such as a name, or it can be a pattern of text such as an address or phone number. You define the pattern in a grammar, which Education uses to find the entities in documents.

**extraction**

Education extracts entities from documents based on the rules you have created in your dictionaries and grammars, and returns an XML list of matches, or adds the matches to the source document as new fields. See also: XML, grammar, dictionary.

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**F**

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**field**

Fields define different parts of content in IDOL documents, such as the title, content, and metadata information.

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**G**

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**grammar**

In Education, a grammar is a pattern that defines an entity.

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**H**

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**headword**

A word or short phrase that Education matches in an entity (for example, the name of a person or place).

---

**I**

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**IDOL**

The Intelligent Data Operating Layer (IDOL) Server, which integrates unstructured,

semi-structured and structured information from multiple repositories through an understanding of the content. It delivers a real-time environment in which operations across applications and content are automated.

**IDOL Proxy component**

An IDOL Server component that accepts incoming actions and distributes them to the appropriate subcomponent. IDOL Proxy also performs some maintenance operations to make sure that the subcomponents are running, and to start and stop them when necessary.

**IDX**

A structured file format that can be indexed into IDOL server. You can use a connector to import files into this format or you can manually create IDX files.

**importing**

After a document has been downloaded from the repository in which it is stored, it is imported to an IDX or XML file format. This process is called "importing".

**index**

The IDOL server data index contains document content and field information for analysis and retrieval.

**indexing**

The process of storing data in IDOL server. IDOL server stores data in different field types (such as, index, numeric and ordinary fields). It is important to store data in appropriate field types to ensure optimized performance.

**Intellectual Asset Protection System (IAS)**

An integrated security solution to protect your data. At the front end, authentication checks that users are allowed to access the system that contains the result data. At the back end, entitlement checking and

authentication combine to ensure that query results contain only documents that the user is allowed to see, from repositories that the user has permission to access. For more information, refer to the IDOL Document Security Administration Guide.

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**K****KeyView**

The IDOL component that extracts data, including text, metadata, and subfiles from over 1,000 different file types. KeyView can also convert documents to HTML format for viewing in a Web browser.

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**L****landmark**

A value that identifies a particular entity, without being a part of the entity value. For example, the phrase "Date of Birth" is a landmark for an entity that extracts dates of birth.

**LDAP**

Lightweight Directory Access Protocol. Applications can use LDAP to retrieve information from a server. LDAP is used for directory services (such as corporate email and telephone directories) and user authentication. See also: active directory, primary domain controller.

**License Server**

License Server enables you to license and run multiple IDOL solutions. You must have a License Server on a machine with a known, static IP address.

**linguistic sentiment analysis (LSA)**

See sentiment analysis.

## **Lua**

An embedded scripting language that you can use to write custom scripts to expand certain IDOL functionality.

## **Luhn algorithm**

A formula used to validate identification numbers, such as credit card numbers and social security numbers. The formula checks for errors by performing mathematical operations in the number to calculate a number that must agree with the final digit of the number.

## **M**

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### **metadata**

Data that describes and gives information about other data. For example, the metadata for a text document might include information about the author of the document, the date it was written, or a short summary.

## **O**

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### **OmniGroupServer (OGS)**

A server that manages access permissions for your users. It communicates with your repositories and IDOL Server to apply access permissions to documents.

## **P**

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### **parsing**

The process of analyzing text according to the rules of a formal grammar.

### **pattern**

A description of the entity you want to extract, which enables Education to produce a list of matches based on that pattern. Usually, a pattern specifies in general terms what a match looks like (for example, phone

numbers), by using regular expressions. You can also use it to specify an exact list, but in this case you usually use headwords. See also: entity, extraction, grammar, headword, regular expressions.

### **polarity scoring**

A number, usually between 0.50 and 1.50, that represents the strength of the sentiment in the matched phrase.

### **post-processing script**

A script that performs additional processing on matched entities. This script can validate matches (for example to calculate a checksum for an ID number), and discard matches if they do not meet the script requirements.

### **precision**

Precision is the percentage of extracted entities that are true entities. See also: recall.

### **primary domain controller**

A server computer in a Microsoft Windows domain that controls various computer resources. See also: active directory, LDAP.

## **R**

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### **recall**

The recall of an extraction is the percentage of matches that are actually returned, out of the total number of matches that should return in theory. See also: precision.

### **regular expressions**

A string that allows you to define a particular string pattern in a concise format. Matching in Education uses regular expressions to define what you want to match.

**relevance**

The similarity that a particular query result has to the initial query. IDOL Server assigns results a percentage relevance score according to how closely it matches the query criteria.

---

**S**

**sentiment analysis**

A form of Education that identifies positive and negative sentiment in text.

**standard grammar**

Education includes a set of standard grammars that allow you to extract the most common entities, such as person, place, or company names, legal terms, addresses, dates, and times. See also: entity, compiled grammar, grammar, user grammar.

---

**T**

**tagging**

The process of adding extra information to documents. The tag might be a category, or entities returned from Education. Tagging usually adds a field to a document, which you can use to search by the name of a tag.

**tokenization**

The process of analyzing text to split it into tokens. See Also: tokens

**tokens**

IDOL Server stores document text as a series of tokens. Generally, a token is a word, but it can also include other strings of characters (such as a phone number or e-mail address).

---

**U**

**user grammar**

XML files created by the user that describe entities that can locate patterns in text using the Education grammar language.

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**V**

**View**

An IDOL component that converts files in a repository to HTML formats for viewing in a Web browser.

---

**W**

**Wildcard**

A character that stands in for any character or group of characters in a query.

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**X**

**XML**

Extensible Markup Language. XML is a language that defines the different attributes of document content in a format that can be read by humans and machines. In IDOL Server, you can index documents in XML format. IDOL Server also returns action responses in XML format.

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