



# Micro Focus Enterprise Developer 5.0 for Eclipse

Release Notes

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# Micro Focus Enterprise Developer 5.0 for Eclipse Release Notes

These release notes contain information that might not appear in the Help. Read them in their entirety before you install the product.



## Note:

- This document contains a number of links to external Web sites. Micro Focus cannot be responsible for the contents of the Web site or for the contents of any site to which it might link. Web sites by their nature can change very rapidly and although we try to keep our links up-to-date, we cannot guarantee that they will always work as expected.
- Check the *Product Documentation* section of the [Micro Focus SupportLine Web site](#) for any updates to the documentation which might have been uploaded.

## Product Overview

Enterprise Developer supports IBM COBOL, IBM PL/I, IBM Assembler, IBM CICS, IBM IMS, IBM JCL, IBM DB2, IBM z/OS file formats and common batch utilities, including SORT. This means that you can develop and maintain the core mainframe online and batch applications under Enterprise Developer. You can then deploy these applications back on the mainframe or migrate them onto one of the Micro Focus Linux, UNIX or Windows-based production platforms.

The *Application Workflow Manager* section in *General Reference* explains the mainframe integration and mainframe modelling features of Enterprise Developer for z Systems.



## Note:

- The Application Workflow Manager is available within all Enterprise Developer variants and provides all the capabilities and tools to develop and maintain Application Workflow models. These models allow you to integrate tools and processes directly into Enterprise Developer. You can use the Application Workflow Manager with the following products:
  - Enterprise Developer - the Enterprise Developer setup file automatically installs the Application Workflow Manager.
  - IBM Rational Developer for System z (IDz) - see *Installing Application Workflow Manager into Rational Developer for System z (IDz)* in the installation instructions. This requires that Enterprise Developer Connect is installed and licensed.

## Upgrading from earlier Micro Focus products



**Note:** Windows-only.

This version of your product is dependent on a later version of the Microsoft C run-time system than earlier Micro Focus products. This means that COBOL executables (.exe) built with a version earlier than 4.0 might not be compatible with the current version of the run-time products. If the behavior of your application changes with the current version, we strongly recommend that you relink the main executable with the current version. This will ensure that the COBOL run-time system fully handles any run-time error conditions that might occur.

A new executable that is fully compatible with the current version can be produced without recompiling the application, as long as the original object code is available and it is relinked with the current version.

To allow your executables to benefit from the product's latest programming and performance enhancements, we recommend a full recompilation of your source code.

If you are using Eclipse, Enterprise Developer can automatically relink existing projects created with Enterprise Developer earlier than 4.0 that have executable link artefacts. Eclipse displays a warning in the **Problems** view that the project requires relinking. It then offers a Quick Fix action for you to execute that will link your project with the most recent version of the Run-Time System.

# What's New

This release provides enhancements in the following areas:

- [Amazon Web Services Quick Start for Enterprise Server](#)
- [COBOL Formatting](#)
- [Code Analysis](#)
- [Enterprise Server and Scale Out Architecture](#)
- [Enterprise Server Common Web Administration](#)
- [Application Workflow Manager](#)
- [AppMaster Builder](#)
- [CICS Support](#)
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## Amazon Web Services Quick Start for Enterprise Server

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Micro Focus has worked with Amazon Web Services (AWS) to create an AWS Quick Start for Enterprise Server. The Quick Start includes AWS CloudFormation templates and a deployment guide with step-by-step instructions that enable you to deploy Enterprise Server into a new or existing virtual private cloud (VPC) on the AWS Cloud in about 1 hour and 15 minutes.

For full information see *Micro Focus Enterprise Server on AWS* ([click here](#)).

## COBOL Formatting

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You can now reformat your COBOL code in the editor according to your preference and standards. Formatting sets the indentation based on the configuration options which you can set in **Windows > Preferences > Micro Focus > COBOL > Editor > Formatter** (for Eclipse).

You can find the COBOL formatting features on the editor context menu (for Eclipse) menu.

## Code Analysis

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You can now create the following views for your code:

- Program Flow Graph - enables you to view the overall structure of the COBOL program with nodes representing sections and paragraphs. PERFORM statements between them which affect the program flow are represented by links joining the nodes. External calls to other programs are shown but cannot be expanded in the Program Flow Graph view. Hovering over the nodes shows a tooltip containing the code representing the respective sections or paragraph. Clicking a node or a link joining said nodes positions the code editor to that point in the source, allowing quick and easy navigation of the program.
- Data Flow Analysis Tree - enables you to select a data item and then either statically trace what might change its value or what other data items it might affect.

## Enterprise Server and Scale Out Architecture

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 **Note:** This feature is in Early Adopter Product (EAP) release status.

This release offers an enhanced and improved availability, and serviceability of Enterprise Server through the ability to administer and maintain a cross-system group of regions as a single system image with the new Performance and Availability Cluster (PAC).

In order for different Enterprise Server instances to be able to work together, they need to be able to share data. This is achieved through the use of a Scale Out Repository (SOR). All ES instances in a PAC will have a common SOR (PSOR) which is used to store CICS resources (limited to PCTs, PPTs, FCTs, DCTs and TSTs in this release) as well as internal system data to facilitate synchronisation between instances. Temporary Storage Queues and Transient Data Queues can also be shared between Enterprise Server instances by directing them to a SOR. Benefits of using PACs and SORs in this way include:

- Reduced hardware costs - taking advantage of the PAC to scale-out rather than scaling-up for more efficient use of processor resources.
- Easier maintenance - Dynamically adding or removing of regions to the PAC for system maintenance.
- Increased availability - in the event of the failure of an Enterprise Server instance, the PAC can continue to operate with reduced capacity. Enterprise Server instances can reside on different machines, improving availability further.
- Dynamic scaling - Enterprise Server instances can be added to, or removed from, the PAC depending on demand.
- Better performance - throughput is no longer restricted by the resources on a single machine (scale-up).
- Improved serviceability - you can now administer the PAC and any associated regions as a single image from a new contemporary web-based administration interface (ESCWA).

## Enterprise Server Common Web Administration

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 **Note:** This feature is in Early Adopter Product (EAP) release status.

Enterprise Developer now includes a new Enterprise Server Common Web Administration interface (ESCWA). ESCWA is a web user interface and server for modern administration, monitoring and control of Enterprise Server. It offers improved usability that consolidates the different Enterprise Server user

interfaces so that native and managed regions, and security stores can be managed in one place. Features include:

- Administering directory servers across multiple hosts.
- Monitoring and control of CICS and JES Enterprise Server instances.
- Configuring and administering a security store, defined in an LDAP-compatible security manager such as Microsoft Active Directory or OpenLDAP.
- Administering the Scale-Out features - enable you to specify logical groups of Enterprise Server instances, and configure and run Performance Availability Clusters (PACs) and their related Scale-Out Repositories (SORs).
- Administering, monitoring and control of Enterprise Server for .NET regions and listeners.
- The use of current web frameworks that have a greater focus on security.
- (Included with 5.0 Patch Update 2 ) - support for Enterprise Server XA, MQ and PL/I configuration and monitoring. This includes support for XA resources, configuring MQ, Listeners and Writers, PL/I, MFCS console, Region Trace options, displaying the current ESMs on logon page and Local/loopback connections warning changes.

## Application Workflow Manager

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Improvements have been made in the following areas:

- Tools from the AWM, Eclipse, and ISPF Function Packages have been restructured and improved:
  - Tool parameters are now named so that the position of the parameter is not significant anymore.
  - You can only specify parameters which are supported by the tool.
  - Only the parameter types String and File are now supported.
  - Mass Processing is now an attribute of a tool parameter and is no longer a special input/output parameter type.
  - The tool relationship "Resource Operation Value" replaces the parameter type "ToolDefinedResourceOperation".
- A new REST Function Package has been added. It provides support for the following functions - DELETE, HEAD, GET, PATCH, POST, and PUT.

The new JSON File Descriptor has been provided to support REST payloads. This function package enables you to integrate RESTful API with your AWM workflow. See *REST Function Package* in your product Help.

- New tools in the Eclipse Function Package enable you to store and retrieve information from the Eclipse secure store:
  - Save To Secure Storage; Read From Secure Storage; Delete From Secure Storage

You can use these tools to securely store login credentials to a remote system and reuse the information for subsequent access.

- A new attribute is now available to enable you to add comments to every model component in the AWM model editor. See *Comments in the AWM Model Editor* in your product Help.

## AppMaster Builder

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The AppMaster Builder Data View Explorer tab has been redesigned in this release make it easier to create and maintain data views. Features include:

- Creating SQL data views directly from the mainframe DB2 catalog

- Creating IMS and VSAM data views without the requirement for a global DDIFILE
- Generating data views using new DDIMETA files located in the DDIMETA folder in the AMB project
- A data view import process is provided to create DDIMETA files from existing DDISYMB files

## CICS Support

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**Note:** This feature is in Early Adopter Product (EAP) release status.

This release includes the following enhancements:

- CRCN CICS transaction - this new in-built CICS transaction monitors the state of XA connections for each resource manager (RM) entry defined in the system. If CRCN finds that connections have become unavailable, it will attempt to reconnect at regular intervals. (The frequency of the monitoring is controlled by the ES\_XA\_RECONNECT environment variable.) CRCN will emit messages to the console to warn of connections lost and regained.

## COBOL Language Enhancements

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The following enhancements have been made to the COBOL syntax:

- ISO2002 conditional compilation - an additional mechanism for conditional compilation, the ISO2002 Conditional Compilation method, is now available. This has been implemented as part of the support for Enterprise COBOL 6.2.

The following compiler directing statements are supported:

```
>>DEFINE
```

```
>>IF/>>ELSE/>>END-IF
```

```
>>EVALUATE/>>WHEN/>>WHEN OTHER/>>END-EVALUATE
```

- The JSON PARSE statement enables you to convert JSON text into COBOL data formats. This has been implemented as part of the support for Enterprise COBOL 6.2.
- INSPECT statement - the performance of INSPECT... CONVERTING has been improved, particularly for cases where `source-alphabet` is long.
- Support has been added for the portable syntax for SET - `set[string]`.

## Compiler Directives

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The following Compiler directives are new in this release:

<b>JVMTARGET</b>	Specifies the JVM version number targeted by the class files generated in this compilation unit.
<b>ILNORMALIZENAMES</b>	Determines the program elements that are normalized when a program is compiled to .NET or JVM COBOL. Normalization in this context results in replacing all \$ and - (hyphen) characters with _ (underscore) characters in the name of the generated class file.

# Consolidated Trace Facility (CTF)

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This release provides the following enhancements:

- Availability of CTF from the Eclipse interface - a new property tab, CTF, in the Eclipse launch configuration dialog box helps to enable CTF tracing and specify a CTF configuration file. By default, the trace files are then saved in a **Logs** subfolder within the project's folder.
- Dynamic CTF - it is now possible to configure the CTF dynamically from outside the process being traced. This feature is only currently available on Windows platforms.

Using a new command line utility - `cblctd` - you can alter the tracing events of running applications that already have CTF tracing enabled. You can alter trace levels, add or remove components to or from the trace, and also configure the emitters in effect.

Additionally, there is also a new component that you can trace - `mf.mfdbfh` enables you to trace activity of the Micro Focus Native Database File Handler.

# Data File Tools

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This release provides the following enhancements:

- The Data File Editor now includes a Compare Files tool that enables you to compare the contents of two data files side-by-side.
- Structure files, and the layouts within them, can now be created within the Data File Editor; you no longer need to use the Classic Data File Tools utility to manage your layouts.
- When connecting to a VSAM dataset stored in an enterprise server region, you can store any passwords required for access, for the duration of your current session.
- You can view archived JES spool jobs that have been merged into one spool file using the merging archived spool files process.
- You can now quickly duplicate records in non-indexed files, using the Duplicate Record option.

# Database Access

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Enhancements are available in the following areas:

## SQL Option for DB2

- XML data type support - the following XML scalar functions are now supported - XMLATTRIBUTES, XMLCOMMENT (add), XMLCONCAT, XMLDOCUMENT, XMLELEMENT, XMLAGG(delete), XMLNAMESPACES, XMLPARSE, XMLPI, XMLSERIALIZE, XMLTEXT, XMLQUERY.
- Initial XDB Server (**add**) support for z/OS DB2 V11 - includes support for archive tables and ALIAS on sequences (delete).
- XDB Link support for z/OS DB2 V10/V11/V12 (**add**)

# Debugging

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This release includes the following enhancements:

- Animate - Eclipse now includes an additional menu option when debugging a COBOL program for setting the speed and toggling Animate mode. When active, the program will automatically step through each line of source code, updating the source code in the editor, the Debug Stack, Outline and Variables Views. See *Debugging Commands and Options* in your product Help.
- Conditional watchpoints - you can now specify conditions and hit counts for COBOL watchpoints. A condition can be in the form of an expression or it can be a hit count (for the number of times memory associated with a data item has been updated). The condition is evaluated each time the data item being watched changes. If the condition evaluates to true, then program execution stops. This enables more fine-tuning of the current watchpoint support and is useful when debugging large, complex programs.
- Dynamic core dumps - you can now invoke a core dump programmatically and continue execution of your program. A new library routine, CBL\_CREATE\_CORE, enables you to produce a core file for the current process or a process owned by the same user that owns the current process.
- Improved visibility of the PERFORM stack - the PERFORM stack and PERFORM range names are visible in system debuggers such as gdb in many cases on 32-bit Linux with Intel architecture and Solaris with Intel architecture. This was already the case on AIX, 64-bit Solaris-Intel, and all other Linux platforms (including 64-bit Linux-Intel).
- In order to include source line numbers in run-time error messages, which makes the diagnosis of issues in your program easier, the COBOL compiler now produces `.idy` files by default when building from the command line, unless the NOANIM directive is specified. You can safely remove `.idy` files after compilation if you do not need them; they do not need to be distributed with your application unless you want to debug your code. However, unless you specify the ANIM directive, generated executables such as `.dll` and `.gnt` will not be debuggable, which is consistent with prior behavior.



**Note:** Behavior has not changed if you are using an IDE or build scripts generated by an IDE.

- Stackdump files (Linux Intel 64-bit, Solaris Intel 64-bit, and Linux/390 platforms only) - you can produce a stack trace for applications in a production environment that encounter a Run-Time system error. Use the `stackdump_on_error` and `stackdump_filename` tunables to configure the production of a stackdump file when an error occurs, from which you can locate the exact line of failing code in your program.
- A new configurable tool is now available that dumps to a file stack traces of all threads in process on any Run-Time System error. [Linux Intel, Solaris Intel, zLinux only – requires ANIM on 32-bit Linux Intel]. This is only supported for native COBOL.
- Line number information is now being output for optimized builds (on Linux Intel 64-bit, Solaris Intel 64-bit, PowerLinux, zLinux, and Solaris SPARC platforms only). This is only supported for native COBOL. Because of what optimization does, the information is imperfect, but it remains highly indicative. This gives the following advantages:
  - Enables the use of the stackdump utility (where available) for optimised builds.
  - Provides location information should a signal occur when running in a system debugger such as gdb.
  - Provides some limited ability to step through optimized code in system debuggers.

## Eclipse Integration

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This release includes enhancements in the following areas:

- Supported Eclipse versions - this release supports Eclipse 4.7 (Oxygen) and 4.8 (Photon). The setup file installs Eclipse 4.8.

Eclipse 4.6 (Neon) is no longer supported.

- Java support - the 64-bit Java 8 is required to run the Eclipse IDE. The setup file installs Adopt OpenJDK 8 (u202) with Hotspot. Java 8 (32 or 64-bit versions), and Java 11 (64-bit version only) are supported for executing JVM COBOL code and for native COBOL and Java interoperability. For full details on the supported Java versions, see *Software Requirements* in your product Help.
- COBOL editor:
  - Automatic insertion of END statements - Eclipse now automatically inserts the end clause for IF, EVALUATE, PERFORM, EXEC and TRY statements.
  - Automatic insertion of closing symbols - by default, Eclipse now automatically adds closing quotes and brackets where required.
  - Search text positioned between specified columns - the **Micro Focus Find/Replace** dialog box now includes options to search between specified columns in the code.
- Directive sets - Compiler directives for your projects are now saved in language-specific `.mfdirset` XML files stored within a `.settings` subfolder in the project's folder. You can create your own versions of `.mfdirset` files and verify them against an XML schema that Micro Focus supplies.

Previously, all settings were stored in a single, proprietary IDE project file. Existing projects which currently specify directives and other similar settings in the `.cobolproj` file will be upgraded to use the new `.mfdirset` files when imported or loaded in Enterprise Developer 5.0. If you are storing your source code in a source control system, ensure that you add the `.mfdirset` files to source control as well.

- Remote connections - support is available for automatic SSH tunnelling of Micro Focus Enterprise Developer UNIX Components network traffic. You can route most Micro Focus Enterprise Developer UNIX Components network traffic using SSH port forwarding. This makes developing on a remote UNIX host running a firewall easier to configure. In addition, the network traffic is encrypted as it is being sent within an SSH tunnel. See *To create a connection to a remote UNIX host running behind a firewall* in the product Help.
- User Interface:
  - The **COBOL Explorer** view uses an icon overlaid with P to indicate COBOL programs that will not be built because they are preceded by another of the same name on the build path.
  - Improved settings UI - the COBOL, IMS, and the Run-time Configuration settings pages now use a property grid that also shows the definitions of the settings.

## Enterprise Server Security

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This release includes the following enhancements:

- Security - security features can now be employed when developers and administrators install new COBOL services (web services and EJBs) into an enterprise server instance over the network. There are a number of authentication and authorization options that can be enabled. See *Deployment Listeners* and *The .mfdeploy File* in your product Help.
- Vault Facility - a new security feature has been added that enables some Enterprise Server components to keep certain sensitive information in a form of storage defined as a vault, accessible via a configurable vault provider. The default vault provider stores data in encrypted format on disk.
- OpenSSL 1.1.1 - the OpenSSL security provider has been updated to OpenSSL version 1.1.1.

This is the stable Long Term Support version of OpenSSL.

- Added support for the ratified TLS protocol version 1.3. TLS 1.3 benefits include:
  - Much shorter initial connection negotiation sequence. This reduces the time taken to establish a link before starting to transmit data.
  - Using only the most secure ciphers and hash methods.
  - TLS 1.3 will be negotiated in preference to the older TLS protocols.

- Added support for new Ciphers and Key Exchange groups in line with TLS 1.3 requirements.
- The default security level for previously configured endpoints has been moved from Security Level 0 to Security Level 1. This removes the ability to accidentally make use of known-weak elements such as SSL3 and MD5. Similar changes to the default Security Level have recently happened to Java, Chrome, Firefox, and other systems providing secure connections.
- Fileshare Security - the Fileshare Secure TCP/IP transport provider now supports the trusted use of X509 certificates bearing the name of the Fileshare service as the Common Name element of the certificate.

In previous releases, a secure connection to a Fileshare server was made using a certificate that represented the network location upon which the Fileshare service was located. This method is still supported, but does not distinguish between the exact Fileshare server that is being connected to when more than one service can exist on a single host system. With this change, individual Fileshare services can identify themselves by using a unique certificate. While running on the same host and registered with the same network endpoint.

- Support for Active Directory user groups and group name mapping - the Enterprise Server External Security Facility's MLDAP ESM Module can now use Active Directory user group objects for Enterprise Server user groups. Also, the module can now map long group names to the 8-character-maximum names required for mainframe emulation.
- Selective auditing - administrators can audit only security activity of particular interest, reducing audit overhead and the volume of events. The Enterprise Server External Security Facility's MLDAP ESM Module can now enable ESF Audit events only for particular users, groups, and resources.
- Improved interaction with LDAP client libraries resulting in fewer LDAP-related issues and easier diagnostics - the Enterprise Server External Security Facility's MLDAP ESM Module has improved interoperation with LDAP client libraries:
  - The client library vendor and version information is logged after the library is loaded
  - The module has better heuristics for loading the correct library supplied by the OS vendor, so the "provider" configuration option can generally be omitted
  - For OpenLDAP, the module sets its proprietary "connect timeout" option
- SNI support (requires 5.0 Patch Update 1 or later) - support has been added in Patch Update 1 for the Server Name Identification (SNI) extension to TLS. This helps to avoid connectivity issues related to a growing number of Web services being hosted on SNI servers.

## IMS Support

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This release includes the following new feature:

- Checkpoint and restart are now available for output GSAM files in addition to input GSAM files.

## JCL Support

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This release includes the following enhancements:

- Spool file housekeeping - you can now merge your archived spool files to a central location where they can be viewed using the Micro Focus Data File Editor. This copies the archived spool files and merges them into a new, combined archive. It does not change the original archive, so the audit trail remains untouched, but the combined archive allows viewing of all the jobs that have been merged. The merge process is carried out using a JCL job or by using a command line utility.
- A new user exit MFJFAXIT - this user exit allows you to receive notifications when 'file open' events are processed by the JCL engine. A sample exit can be found in the `src\enterpriseserver\exits`

sub-directory of your product install directory. You can enable this exit by using the MFJFAXIT environment variable, to point to the exit program.

## Mainframe Access

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This release provides enhancements in the following areas:

- Full support for the z/Server functionality - MFA Server now has the capability to service all z/Server requests. This means it is no longer necessary to configure z/Server, and the number of started tasks running on the mainframe is reduced. Installing and configuring MFA Server becomes easier as z/Server is no longer required.
- Browse dataset using IDCAMS dump - when using the MFDAS BROWSE command, it is now possible to view the output of the IDCAMS DUMP command on the specified dataset in hex and printable characters side-by-side.
- Improved JES support for executing jobs and input datasets - it is now possible for MFA Server to interact with JES jobs that are in executing phase, and to list and download input datasets.
- Retrieve binder information for load modules - when executing the MFDAS BINDER command, it is now possible to view the binder information from a load module.
- TSO command server - MFA Server includes a new type of application server to support executing TSO commands as the current user. The address space is spawned as your user id and any valid TSO command can be executed.
- UNIX sub-system (USS) support - MFA Server can now operate on files stored on a USS file system. The available functions are - edit, browse, rename, delete, and copy USS files and directories.

## Micro Focus Native Database File Handler

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 **Note:** This feature is in Early Adopter Product (EAP) release status.

The Micro Focus Database File Handler (MFDBFH) is a file handler that enables your native CICS and batch enterprise server applications to interact with data files and certain infrastructure files stored within a database.

VSAM files may experience logical and/or physical corruption in the event of a hardware failure. This is due to a single COBOL I-O operation consisting of multiple physical I-O operations. If all the physical I-O operations that make up the COBOL I-O operation are not performed, the file can be left without integrity. In previous releases you could guard against such occurrences with Fileshare and logging, but they required some manual intervention and came with performance cost.

In this release, configuration options have been added that allow the I-O operations to be routed to an RDBMS to take advantage of the availability and performance characteristics of the database. This can be achieved with no changes required to the application. The file will be routed to the SQL database simply by changing the filename prefix to `sql://`.

Features include:

- CICS and batch Cobol file I-O can now be routed to an RDBMS with only simple configuration changes. No application changes are required.
- Supports all Micro Focus file formats
- Files can be routed to an RDBMS on a file by file basis.
- Utilities are provided to enable data to be moved between disk files and RDBMS.
- Support for PostgreSQL 10.x, Amazon Aurora PostgreSQL, Db2<sup>1</sup>, and MS SQL Server (on Windows and Linux Intel)

## Micro Focus Rumba

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This release comes with Micro Focus Rumba+ Desktop version 10 which you can choose to install with Enterprise Developer. This will enable embedded Rumba support within the IDE.

## Micro Focus Unit Testing Framework

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This release provides support for the following functionality:

- Data-driven unit tests - a new type of test suited to testing data where values read from a source are passed through the same tests.
- JCL unit tests - two types of test that interact with the JES engine on an enterprise server region. These tests are run from the command line.
- Test output colorization - test output can now include basic colorization for supported terminal emulations. This feature must be run from the command line.

## PL/I Support

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Enhancements are available in the following features:

- Code coverage in Eclipse - code coverage data can now be generated for PL/I programs in the Eclipse IDE using the same mechanisms as for COBOL programs.
- Compiler:
  - Full support for GET DATA.
  - Built-in functions:
    - New built-in functions - ALLOCATE, INDEXR, MEMCONVERT, MEMINDEX, ONCONDCOND, PLIFREE, REM, REPLACEBY2
    - The HEX built-in function now matches its z/OS version.
    - The PROCNAME and PROCEDURENAME functions used without trailing open/close parents.
  - Allow the use of VALUE to initialize members of a PL/I Data Structure.
  - Support for INONLY, NONASSIGNABLE attribute.
  - Diagnostics when a supplied parameter to a call is larger than the entry declaration.
  - Diagnostics when the Compiler detects that a loss of precision occurs as a result of operations on FIXED DECIMAL operands.
  - Compiler listings now provide additional information about arrays.
  - OPTIONS(REORDER) is now parsed but ignored.
  - \*PROCESS OPT(TIME); is now supported.
  - Support for larger concatenations when initializing variables or making assignments.
  - Support for named constants of numeric PICTURE type in static structure dimensions and initializations.
  - Diagnostics when the concatenation of two strings results in a string that is larger than the target variable.

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<sup>1</sup> Db2 support was introduced in the 5.0 Patch Update 2 release

- Support for the DUMMY ALIGNED and DUMMY UNALIGNED arguments.
- Support for the XML case asis and XML case Upper.
- Diagnostics if code attempts to use bitwise operators on non-bit variables.
- (Added in 5.0 Patch Update 1) A new option, `-fdmaxp 15,31`, has been added. With this one specified, arithmetic operations with fixed decimal operands with precision  $\leq 15$  produce a result with a maximum precision of 15. For arithmetic operations with fixed decimal operands with precision  $\leq 31$ , they produce a result with a maximum precision of 31.

The options `-fdmaxp 15,15` and `-fdmaxp 31,31` are allowed, and correspond to `-fdmaxp 15` and `-fdmaxp 31`, respectively.

- PL/I debugger in Eclipse:
  - Variables surrounding current point of execution now displayed in Variables view.
  - A Console view for PL/I programs that are being remotely debugged outside the control of Enterprise Server, and in Eclipse.
  - Data watchpoint setting using a variable declaration in the debugger.
  - PLIDUMP now emits STATIC variables in addition to AUTOMATIC and Parameters when documenting the callstack.
- The Macro preprocessor now supports %INSCAN and %XINSCAN.
- The EXEC preprocessor now supports the following:
  - SQL statements embedded within PL/I packages
  - The `-maxmsg` option for setting the maximum number of errors to be generated before terminating the compilation
  - Up to 4000 include files in a signal program
- PL/I Run-Time System - support is now available for:
  - Optionally generating Windows "Mini-Dumps" or a Linux coredump off the back of a call to PLIDUMP.
  - Dynamic allocation of datasets using the TITLE option(s).
  - Raising an ERROR condition when a called subroutine raises a COBOL RTS error.
  - FILE variables can have differing DCB when used in differing contexts.
  - STATIC FIXED BIN(31) variable accessed at open within the RECSIZE() attribute of the ENVIRONMENT.

## Platform Support

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Support is now available for the following additional or updated operating systems:

- SUSE (Power) 11 SP3, 12
- Red Hat (Power) 7.2, 7.3
- Windows Server 2019

For a full list of supported platforms, check [HTTPS://SUPPORTLINE.MICROFOCUS.COM/PRODAVAIL.ASPX](https://supportline.microfocus.com/prodavail.aspx).

## Product Documentation

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The following is new in this release:

- The *Comparison of COBOL with Other Managed Languages* document has been updated to reflect the recent enhancements in the .NET and JVM COBOL support.

# Significant Changes in Behavior or Usage

This section describes significant changes in behavior or usage. These changes could potentially affect the behavior of existing applications or impact the way the tools are used.

Where present, the numbers that follow each issue are the Support Incident Numbers followed by the Reported Problem Incident (RPI) number (in parentheses).

- [Common Communications Interface](#)
- [Communications Server](#)
- [Compiler](#)
- [Data Tools](#)
- [Documentation](#)
- [Eclipse IDE](#)
- [Enterprise Server](#)
- [Enterprise Server Auditing](#)
- [File Handling](#)
- [HCO for SQL Server](#)
- [IMS Support](#)
- [Interface Mapping Toolkit](#)
- [JCL Support](#)
- [Mainframe Access](#)
- [Micro Focus Batch Scheduler Integration](#)
- [Micro Focus Directory Server](#)
- [MFCRYPTLIB](#)
- [PL/I Support](#)
- [Request Packet Interface API](#)

## Common Communications Interface

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- Certificate subject names are now correctly checked against the name the client is attempting to connect to. Certificates registered to "localhost" should now work as expected.
- The default Cipher Suites List now includes @SECLEVEL=0. This indicates that backwards compatibility with old certificates such as MD5 is to be retained. As a result of this change, you need to review your use of the Cipher Suites List and of any old certificates.
- If using Micro Focus Common Client(MFCC) or Micro Focus Communications Server(MFCS) to connect to a non-existent remote host, it was possible to create a connection to a server listening on the same port on the local system. This is no longer possible and a bad address error is reported in the error logs.
- By default, in this and previous releases an SSL/TLS CCI client can trust a server which resides on an IP address that is not an intended connection target. You can now specify the `ssl_only_verify_literally` option in your CCI.INI file to restrict the certificate check to improve security. See "CCITCP Security Options in the CCI.INI File" in your product Help for more information. When connecting to a non-CCI protocol server, all clients perform strict certificate checking as the new default behavior

## Communications Server

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- Passphrases specified in the mf-server.dat file can now contain spaces.

2832222 (1100976)

- Configuring MFCC when run under MFCS now works as expected.

## Compiler

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- The Search order has been updated, to allow the Compiler to find Java.

## Data Tools

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- Accessing a dataset through the Data File Editor now obtains a shared lock on Enterprise Server when you open the file in shared mode.

3170479 (1115346)

## Documentation

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- The ANIM Compiler directive has changed its default when compiling from the command line on Windows platforms. The default is now ANIM. (Compiling from the IDE still defaults to ANIM.)
- The validation of server certificates for TLS (also known as SSL) connections has been corrected. This is likely to cause connection failures in cases where previously connections were incorrectly allowed. For example, if Fileshare is secured with TLS, client applications must be configured to use the hostname of the Fileshare server as it appears in the server's certificate. If the Micro Focus Directory Server is secured with TLS, then MFDS clients, such as the casstart command-line utility, will need to connect to it using a hostname that appears in the certificate MFDS is using. (Note that a certificate can contain multiple hostnames.) Consult your Certification Authority administrator for more information.

3192497 (1117068)

## Eclipse IDE

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- In the Expressions view, there has been a change to the way that the number of characters displayed is controlled. The Hex part now always displays the same number of characters as the raw data part (note that Eclipse enforces the character limit, so the number entered by the user will include those used to display the hex values). A maximum length entry of 0 is now correctly interpreted as "no limit".

3161694 (1114658)

- Eclipse now colorizes files that it will not build because they are preceded by other files of the same name on the build path. The icon of such files is overlaid by an I or P and Eclipse shows a tooltip with an explanation. This is to clarify the difference between this scenario and build-action-ignored.

3161416 (1114607)

- Micro Focus Find/Replace now provides a Column Scope group that enables you to limit searches between columns. You can specify columns or alternatively you can search only in the main code area for the file type open in the editor. By default, it searches in all columns.

3142899 (1112931)

- Compiler directives are now stored in .mfdirset files which can be specified for particular languages, at project/config/folder/file level.

2853665 (1104556)

- By default, COBOL, COBOL JVM, and Mainframe COBOL Projects have the EXITPROGRAM"ANSI" directive set in the Project Settings > COBOL Properties. This specifies that if the EXIT PROGRAM statement is executed in a program that is not under the control of a calling program, it causes execution of the program to continue with the next executable statement. See EXITPROGRAM in your product Help for more information.

- The COBOL JVM method breakpoint can now be toggled on the heading of the method.
- The Eclipse IDE has an improved user interface for settings. The COBOL, IMS, and the Run-time Configuration settings pages now use a property grid that also displays the definitions of the settings. As part of these changes the **Output path**, **Target type**, and **Bitism** are now specified in the project's Link properties, click **Micro Focus > Build Configurations > Link**.

## Enterprise Server

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- A number of audit events now contain some additional information.  
3140310 (1112666)
- Previously, the /x option of the CASRDTEX utility had been duplicated to drive XML output. This prevented the export of transactions which was the original meaning of /x. To generate an XML export, you must now specify the option /xm.  
3180233 (1116108)
- casfhsf could hang when processing HSF files that contain records from tasks that ran in different months.  
3177385 (1115884)
- A new system transaction, CRCN, is now available to monitor the state of XA connections for each resource manager (RM) entry defined in the system. CRCN is a replacement for the former XA Reconnect facility that recycled SEPs on connection loss. The XA Reconnect facility was configured by setting the ES\_XA\_RECONNECT environment variable. CRCN also uses this environment variable, although its usage differs slightly. For more information see your product Help.  
3174272 (1115727)
- On Windows, any casout and cassub messages are displayed on cassub and casout API invocation if the environment variable ES\_CAS\_API is not set to "ON".  
3160400 (1114458)
- A new environment variable, ES\_SNATRC\_DIR, is available for configuring the location of the SNA traces written by IMB's communication manager. To ensure that the SNA trace files are written to a valid directory, ES\_SNATRC\_DIR must be set before you start the region.  
3173516 (1115523)
- When defining CICS term in ESMAC, if the terminal definition includes a user ID, Enterprise Server honors the terminal user ID, and you can leave the User ID field blank. Caution: When the terminal definition includes a user ID, this logs you into the terminal without password verification. Use with care!  
3158468 (1114309)

## Enterprise Server Auditing

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- Auditing on big-endian platforms now correctly interprets numeric audit data.

## File Handling

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- RELFORMAT=MF|RM is now enabled for FOLDER and other filename tags.  
3164916 (1114803)
- The SORT-CONTROL special register is now supported during a SORT statement.  
3159740 (1114389)

- To direct the handling of relative files to a particular file handler (either MF COBOL or RM/COBOL), use the RELFORMAT=MF or RELFORMAT=RM configuration options within the [REL-DEFAULT] tag of the EXT FH.CFG file. (The default is RELFORMAT=MF.)

3157247 (1114149)

- The FORMAT parameter is now correctly ignored when the format is explicitly set in the Include statement. Also, an error is now returned if a numeric item is compared with a quoted value in an Include statement.

3186371 (1116564)

- For MFJSORT, the SORT-EBCDIC instruction is now supported through the PARM parameter of an EXEC statement.

3165343 (1114824)

- When reading continuation lines from SYSIN for MFJSORT, if line 1 breaks at column 71 with a nonblank in column 72, and columns 2-15 of line 2 are blank, DFSORT continues on line 2 with whatever character it finds in column 16 (blank or nonblank).

3159842 (1114565)

## HCO for SQL Server

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- HCOSS DB2 schema extraction has been updated to use the DB2 system default of EBCDIC SBCS CCSID <value> for DB2 columns in tables with a CCSID value of 0 (zero, CHAR family types). This has been done to appropriately handle the CCSID value for tables created using DB2 version 8 or earlier, and that have been migrated to a newer version of DB2. In addition, HCOSS DDL generation maps Euro collection sequences to the nearest match to a supported SQL Server collation sequence.

3163636 (1114937)

## IMS Support

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- A performance delay that occurred when rapidly writing checkpoint records to the IMSLOGR file has been corrected by updating the method used to verify the uniqueness of the timestamp in the key.

3131126 (1112901)

- The IMS Support feature has been updated to support checkpoint/restart for output GSAM processing.

3107543 (1109558)

## Interface Mapping Toolkit

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- If you try to deploy a stateful EJB SVI from the Visual Studio IDE after unchecking the “Reuse container after application termination” check box (in the Deployment Characteristics tab of the Runtime Environment Configuration dialog box), you receive a warning message informing you that the “Reuse container after application termination” setting will be set to true for the deployment in order to prevent the crash. In the Eclipse IDE, the unchecking of this option will just be ignored, and the option re-selected. A warning to not uncheck the option for stateful EJB SVIs is also displayed on the prior page (to the dialog box).

2663812 (1090987)

- WSDL and JSON Schema files generated for bottom-up CICS Web services now include a "maxLength" parameter for all string fields.

3175039 (1116241)

## JCL Support

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- If the catalog properties of a data set are updated using MVSCATPB, and the data set is not opened during the JCL step it is assigned to, then the updated catalog properties are not written at the end of step disposition processing.  
3186942 (1116611)
- When security is enabled and a JCL job includes either JOBLIB or STEPLIB entries, the system now checks that the user has READ access to each of the Partition Datasets (PO). If the user does not have the required access, the job abends with a COND CODE of S913.  
3176759 (1115814)
- The DATACLAS and MGMTCLAS attributes are now applied to a DATASET when it is added to the catalog and SMS support is enabled (MF\_SMS=ON).  
3174534 (1115630)
- The DSNRLI reason-code value will be hexadecimal 0x00000000 when the return-code is zero. This is a change from the previous value of decimal zero, '0000'.  
3171133 (1115344)
- MFFTP quote handling has been reworked to support IBM behavior. Filenames that contain spaces are now required to be defined within double quotes ("). This change is required to support mainframe hosted files, where single quotes (') will no longer append the user ID to start of the filename as the first node.  
3168300 (1115058)
- If JES security is enabled, when a JCL job is submitted that uses a PROC or INCLUDE file that is part of a cataloged Partitioned Dataset (PO), READ access for the dataset will be checked, and if the user does not have permission to read the dataset then an error will be reported.  
3166921 (1114955)
- When restarting a job, the COND CODES for steps prior to the restart step will not be evaluated. This is a change in the behavior where previously the values of the COND CODES from the previous run was checked. You can revert to the old behavior by setting the environment variable MFJ\_ALL\_STEP\_CHECK=Y.  
3163358 (1114688)
- The Spool Housekeeping history file, INDEXO, can now support 7-digit job numbering. A conversion utility, MFHKHCOV, is supplied to convert any existing dataset to the new format. Run this utility using the sample JCL job CONVERT.JCL. Once converted, the newly formatted dataset supports both 5- and 7-digit job numbering. If you only use 5-digit job numbering, you do not need to run the conversion. See the 'MVSSPLHK Spool Housekeeping Process' section in the Help for more information.  
3162868 (1114648)
- When performing an IEBCOPY to a partitioned data set (PDS), a check is now made to ensure that the user has DATASET ALTER permission for the PDS.  
3159837 (1114347)
- The DSNRLI functionality for the TERMINATE THREAD call has been improved so that it now calls tx\_end and then tx\_close for a particular XA resource. A ROLLBACK call will not be issued prior to the tx\_close. If an error is returned from the tx\_end function, it is reported back to the calling program as return code 12, reason code 0X00F30093.
- Missing and incorrect key values in the MF\_JCL\_AUDIT event output have been corrected. Also, the audit event code resulting from MF\_JCL\_AUDIT has also been changed from '2 1' to '5 5' to avoid conflict with the same code being used by other components.
- For RISC-based systems when running JCL jobs, you might need to set COBMAINSTACK to a high value such as 8000000.

- An issue resulting in a Run-Time System error "RTS 119 Name is not unique" when calling 'setenv' to dynamically assign a dataset from a COBOL program on a UNIX platform has been resolved. The call to "SETENV" must be made in uppercase characters.

## Mainframe Access

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- By default, VSAM files whose average LRECL are the same as the maximum LRECL are now treated as Variable when generating a .PRO file. You can override this with the existing /FIXEDVSAM flag, or by specifying a fixed VSAM import type (ESDS-FIXED, KSDS-FIXED, or RRDS-FIXED).

3181871 (1116216)

- SyncMon2 now uses the Endeavor "Source Date" and "Source Time" information to determine if a file has changed since the last synchronization.

3177475 (1115904)

## Micro Focus Batch Scheduler Integration

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- When using MFBSI, the message JES000020W (JOB number warning percentage exceeded) is now correctly handled, and no longer results in an invalid MFBSIJCL 208 return-code (JCL error).

3186963 (1116620)

## Micro Focus Directory Server

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- The event codes for several MFDS audit points have changed.
- On Windows, by default, the Enterprise Server Administration Web interface can only be contacted using the loopback address (localhost or 127.0.0.1). You can enable remote access to the Web interface by turning off the loopback mode. See "Using the Loopback Address" in your product Help for more information.

## MFCRYPTLIB

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- Passing an incorrect keyfile passphrase no longer results in receiving an RTS115 error in MFDS.

3181743 (1116186)

## PL/I Support

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- A problem with allocation of BASED, CONTROLLED, and AUTOMATIC structures has been corrected. This problem was limited to structures where the last member field was of type BIT. Specifically, the problem only occurred for BASED, CONTROLLED, and AUTOMATIC structures when the last member field is of type BIT, resulting in incorrect code generation for BASED and CONTROLLED storage at the point of allocation (i.e., an ALLOCATE statement), and for AUTOMATIC storage, incorrect stack frame allocation for the declared structure. Naturally, any module affected by this problem needs to be recompiled. To ensure that no problems arise, the user should identify all modules that use a structure or structures where the last member is of type BIT, and recompile those modules. This applies to users who have compiled code with versions of Enterprise Developer earlier than ED 4.0 HF 10. Note: BIT means a bit-string of any length, including BIT(1). It does not apply to BIT ALIGNED.

3192381 (1117048)

- The Open PL/I compiler now generates a W-Level diagnostic if a constant array dimension or extent is of type CHAR or BIT. This is usually unintended coding.
- The macro preprocessor now supports the use of %INSCAN and %XINSCAN.  
2880348 (1107310)
- Previously, if a condition prefix for STRINGRANGE was enabled and a STRINGRANGE condition occurred, it was raised to ERROR after being processed. This no longer occurs.  
3182428 (1116254)
- PLISAXA, PLISAXB, and PLISAXC processing has been enhanced to use ENTRY LIMITED functions and procedures which utilize OPTIONS(BYVALUE).  
3150969 (1113745)
- A problem causing the SQL pre-compiler to hang has been fixed.  
3165345 (1114825)
- SQL is now supported in a PL/I PACKAGE. A SQLCA declaration (usually via include of SQLCA) in a nested block (PROCEDURE or BEGIN) is not allowed. It is allowed only in the outermost block(s) or in a PACKAGE.  
3159844 (1114355)
- The PL/I Eclipse debugger now supports double-clicking in the left margin on a DCL line to set a watch on the variable for the content to change during execution.
- The PL/I Eclipse debugger now supports displaying the current value of a variable by placing the cursor over a variable name in the PL/I source.

## Request Packet Interface API

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- The default behaviour for TLS certificate Common Name (CN) matching has changed for release 5.0. It now requires a strict match on the CN value or any Subject Alternate Name (SAN). For example, 127.0.0.1 and localhost are no longer implicitly equivalent, nor are hostname and its IP address or fully-qualified domain name (FQDN) variants. When starting a region from the Enterprise Server Administration Web interface, a resolved IP address is used for the casstart -m parameter value. A resolved IP address is also used even if a hostname is specified on a command line startup.

To change this behavior and use a resolved hostname value (as determined by the machine TCP configuration, for example, hosts file entries.) set the environment variable MFDS\_DNS\_RESOLVE=Y. To use an unresolved string literal hostname, for example, a value explicitly passed in via the casstart -m command line parameter, set MFDS\_DNS\_RESOLVE=N.

3194613 (1117203)

# Known Issues

Refer to the *Known Issues and Restrictions* topic in the *Product Information* section of your product Help.

In addition, note the following:

- In Enterprise Developer 4.0 and 5.0, in an extremely small and limited set of cases, an issue could occur with running older .NET executables and .dll, and older JVM .class files. This issue only occurred if:
  1. The application performs an IS NUMERIC condition test on a variable declared with USAGE NATIONAL.
  2. The application has been created with Enterprise Developer 3.0 or earlier, and executed in Enterprise Developer 4.0 or 5.0.

In these rare cases, the IS NUMERIC test could provide the wrong answer. To resolve the issue, you need to recompile any programs that uses this construct in Enterprise Developer 5.0.

Program that do not use NATIONAL data, or those that have already been recompiled in Enterprise Developer 5.0 are not affected.

- The COBOL editor might show incorrect error messages for a linked resource with file-specific COBOL settings as the file settings are incorrectly ignored.
- When breakpoints have previously been set in a remote PL/I program in Eclipse and a new debugging session is started for a local PL/I program, the debugger will crash. The same issue occurs if previously set breakpoints are present on a local PL/I project and a remote debug session is started.

To work around this you need to clear all previously set breakpoints in remote (local) projects before starting a local (remote) debugger session. You can remove the breakpoints from the Breakpoints view in the Debugger perspective.

# Resolved Issues

The numbers that follow each issue are the Support Incident Numbers followed by the Reported Problem Incident (RPI) number (in parentheses).

- [Adis](#)
- [Application Workflow Manager](#)
- [AppMaster Builder](#)
- [Assembler Support](#)
- [Character Animator](#)
- [Cob/Cbllink/Cblnames \(32-bit PC\)](#)
- [Codeset Support](#)
- [Communications Server](#)
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- [SQL: OpenESQL](#)
- [SQL Option for DB2](#)
- [Web Service Client](#)
- [XML Support](#)
- [z/Server](#)

## **Adis**

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- ERASE EOL no longer stops Keisen attributes being inherited when enabled by x"AF" function 81.  
3169584 (1115178)
- ACCEPT LINE POSITION data-item, where data item has the JUST clause, now works as expected when the ADISCF pre-clear option is selected.  
3126794 (1111471)
- BLANK SCREEN BACKGROUND-COLOR n, where n > 7, now sets the intensity so that the bright version of the color is used to fill the screen.  
2856949 (1103978)

## Application Workflow Manager

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- AWM now supports processing output parameters returned by z/OS jobs submitted by ISPF tools.  
3176750 (1115818)
- An issue with resource out-of-sync exceptions while loading AWM systems has been resolved.  
3174553 (1115645)
- Added additional trace options for debugging problems related to AWM function packages. See "Gathering information for Micro Focus SupportLine" in the product Help for more information.  
3169085 (1115199)
- The "Compile" context menu command was not visible when multiple programs were selected in the "Application Explorer" view.  
3161802 (1114563)
- Viewing VSAM files from the MVS Explorer with the Micro Focus Data File Tools editor caused an exception and locked the mainframe file. This is now fixed. Opening a non-VSAM file with any external editor now produces a descriptive exception.  
3149730 (1113716)
- When Link with Editor is active in the Remote Systems view, the corresponding remote element is selected in MVS Explore and JES Explorer depending on the active editor.  
3142129 (1112852)
- You can now edit or browse data sets or members referenced by DD DSN statements from the JCL editor.  
3140150 (1112968)
- The effective record length of z/OS files opened through MVS Explorer is now displayed as a dark red dotted margin in Micro Focus editors.  
3139675 (1112970)
- Password property values are now masked in AWM views and basic trace messages. They do not offer encrypted password security.
- The default value for a property is now also respected for mass processing input parameters of tool descriptors.
- Jobs are now sorted by their local submit time in the Jobs view with the most recent positioned at the top of the list.
- The z/Server Search function did not work properly on data set names with special characters - for example "\$" with code page IBM01141.  
3182423 (1116249)
- Using the AWM Eclipse Base Model template caused exceptions on loading cached elements, for example, after restarting Eclipse. This has been fixed.

## **AppMaster Builder**

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- An issue with the APRPROG member erroneously containing program source code has been fixed.  
3155031 (1113985)
- The Copy+Add feature executed on an APSSCRN object sometimes failed to copy the contents of the screen. This has been fixed.  
3160879 (1114467)
- Application loading performance has been improved, and the tree view has been updated to show a question mark (?) next to items that are not in the local project, i.e. items that might be found in a workgroup or in a mainframe dataset.  
3162920 (1114651)
- Renumber/Unnumber support is now available in the Editor for APSDATA elements.  
3157450 (1114229)
- An issue that caused pasted text and the text before the cursor position to be pasted incorrectly has been fixed such that it is now split into multiple lines.  
3153690 (1113860)
- Highlighting text and pressing TAB could produce inconsistent results. The selected text will now be shifted to the right and remain selected.  
3139760 (1112620)
- You could receive an exception that was when expanding Treeview or when Editing on accessing Online Express in AMB in the Team Developer perspective.

## **Assembler Support**

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- Two Assembler copyfiles mistakenly received the short form of COBOL copyright statements which resulted in the programs of the Assembler ACCT tutorial assembling with errors.

## **Character Animator**

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- Animator no longer slows down when continuously pressing Step.  
3175862 (1115750)
- Animator can now successfully locate executables via the COBPATH environment variable when the COBPATH value is longer than 1024 characters.  
3160496 (1114416)
- Breakpoints are saved (that is, an .aif file is created) when CBL\_DEBUG\_START is used and the process terminates.  
3143776 (1113225)

## **Cob/Cbllink/Cblnames (32-bit PC)**

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- Creating an executable or shared object with the cob flags -U or -d no longer results in an assembler error message.

## **Codeset Support**

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- JCL jobs executed via the cassub command no longer produce RTS 114 MFTRNSDT errors.  
3173144 (1115497)
- Conversions from ASCII to EBCDIC, with null data, no longer get corrupted.  
3155499 (1114114)

## Communications Server

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- In some versions of Enterprise Server, a TN3270 conversation would hang if the ATTN key was used. This has been corrected.  
3173146 (1115498)
- The transferring of files via CICS RECEIVE is now working as expected.  
3159602 (1114325)
- Enterprise Server has a service deployment feature, which allows developers and administrators to install new COBOL services (web services and EJBs) into an Enterprise Server instance over the network. This functionality has been enhanced for additional security, with various options for user authentication and authorization. See the product documentation for details.

## Compiler

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- A GO TO statement that references a qualified data name, rather than a procedure name, is now correctly rejected by the Compiler.  
3191922 (1117013)
- A DBCS data item with a VALUE clause specifying ALL NX literal is now correctly rejected by the Compiler.  
3191623 (1116974)
- Large UNSTRING statements no longer produce the following error: "001-f internal error 49".  
3189648 (1116838)
- A SET 88-level TO TRUE statement when the associated field is national is now working as expected.  
3185855 (1116554)
- A valid data declaration with a RENAMES THRU clause referencing other level 66 items no longer produces Compiler error "COBCH0239S First data name does not precede second".  
3184128 (1116376)
- Parsing programs that contain numerous errors no longer causes Eclipse to crash.  
3183896 (1116502)
- A WHEN OTHER clause directly following another WHEN clause in an EVALUATE statement is now rejected by the compiler when an Enterprise Cobol dialect is specified. This emulates the mainframe behavior.  
3183810 (1116464)
- An RM dialect now supports data names up to 128 bytes in size.  
3182342 (1116261)
- Specifying an inline method invoke inappropriately (such as in a SUBTRACT statement) now receives a Compiler error, as expected. Passing inappropriate operands BY REFERENCE is similarly rejected.  
3180642 (1116128)
- A program compiled with the prexml preprocessor and the directive 'NOQUAL' now compiles as expected.  
3179843 (1116304)

- A REPLACE statement that caused the last token of a copyfile to be replaced with a longer token, and thus caused the creation of an extra line, now works as expected.  
3178437 (1115957)
- A COBOL program compiled with a mainframe dialect should treat mainframe KSDS files correctly. They are of variable length regardless of whether the "record varying" phrase is used in the FD. Previously, this was not being honored and when program A was calling program B using external files, you received an RTS 226 error message.  
3176783 (1115839)
- User-defined functions with LOCAL-STORAGE data now compile and execute as expected.  
3176478 (1115792)
- A DISPLAY statement as the last line of an ON EXCEPTION clause of another statement, with a following NOT ON EXCEPTION clause for the containing statement, and compiled with the RM compiler option, now compiles as expected without internal errors.  
3175442 (1115876)
- An INSPECT CONVERTING statement with hexadecimal literals and compiled with CHARSET(EBCDIC) now executes as expected.  
3174833 (1115673)
- Constructions of type INSPECT CONVERTING ZERO to <variable-name> now produce correct object code and execute as expected.  
3174064 (1115580)
- An SQL program with file declarations and a missing WORKING-STORAGE header now executes as expected.  
3169882 (1115216)
- During compilation, if the LIST directive had been specified and a license error occurred, an RTS error 114 would result. This has been fixed.  
3169377 (1115474)
- During compilation, if the LIST directive had been specified and a licensing error occurred, you received an RTS error 114.  
3169377 (1115319)
- A COPY REPLACING statement spanning multiple lines, with commas on the end of those lines, is now processed as expected; that is, those commas are treated as meaningful characters rather than simply separators.  
3168125 (1115173)
- PARAGRAPH and CYCLE are now correctly treated as context sensitive reserved words under an Enterprise COBOL dialect, allowing them to also be defined as user data names.  
3167488 (1115004)
- COPY SUFFIXING and COPY PREFIXING syntax now compiles and works as expected for long DBCS words.  
3166159 (1114885)
- The IMTK wizard can now process COBOL source that contains non-standard characters, such as an ampersand.  
3164533 (1115157)
- Syntax involving an EXEC keyword, within an EXEC SQL statement, is now processed as expected.  
3162629 (1115879)
- The INSPECT ... CONVERTING ... TO FUNCTION ... syntax is now working as expected.  
3160325 (1114393)
- Compilation with the CP preprocessor, of a source that has very long lines and unexpanded tab characters at the end of those lines, now works as expected.

3160255 (1114436)

- A DISPLAY of a group item containing a large table, in a program containing the 'CONSOLE IS CRT' special-name clause now compiles successfully.

3157068 (1114326)

- The performance of the following syntax has been significantly improved, especially where source-alphabet is long: INSPECT CONVERTING source-alphabet TO target-alphabet

3157067 (1114137)

- DISPLAY of a SCREEN SECTION sub-group no longer gives a COBRT153 error if there are other sub-groups with OCCURS items with un-initialized indexes.

3154391 (1113915)

- Printer files under an RM dialect are now emulated correctly.

3143299 (1113494)

- DISPLAY UPON ARGUMENT-NUMBER now behaves as expected under CHARSET"EBCDIC".

3116649 (1110478)

- When evaluating a method invoked inline as in the example below, the method was executed for each WHEN statement which could result in undesired side effects. Example:

```
evaluate object::"method"(1)
when 0
when 1
when 2
```

Now, the result is stored in a temporary item and used in any comparisons with the expressions in the WHEN clause.

- Compiling a very large COBOL program with many GO TO statements to JVM no longer results in a verification error on program load.

3188208 (1116743)

- A CALL statement USING by reference the address of a non-01-level linkage item no longer causes the containing linkage record to have a new address on return from the call.

3179701 (1116403)

- Very large programs including XML PARSE or XML GENERATE statements no longer produce system errors during compilation to JVM.

3179669 (1116054)

- An INSPECT phrase without BEFORE/AFTER, followed by another with either BEFORE or AFTER, no longer leads to incorrect results.

3172678 (1115458)

- With the ODOSLIDE directive on, bad code is no longer sometimes generated for JVM, and you no longer receive a verification error at program load.

3167786 (1115063)

- Very large programs with highly overlapping perform ranges could generate bad class files, causing verification errors when attempting to load. This has been fixed.

3166644 (1115146)

- This release provides a new utility, GetBias. It enables mapping of line numbers output from large COBOL programs compiled to JVM onto real sequential line numbers. If the length of a COBOL program exceeds 65536 lines, the compile will adjust the line numbers output to the JVM class file, but subtracting a 'bias' value from the actual value. In cases where such a program throws an exception, and the line number is therefore displayed as part of the stack trace, the GetBias utility enables you to discover the true sequential line number.

3161708 (1114641)

- When compiling for managed code, if a variable length group is passed as a parameter to another program, the generated code was attempting to evaluate the current length of that variable length group. In native code, this evaluation only happens in the case where the OCCURS DEPENDING ON item is not itself part of the variable length group. This difference meant that in some cases a null pointer exception could occur in managed code, whereas native code executed without error. Managed code behavior has now been modified to be compatible with that of native code.  
3154134 (1113891)
- When debugging an SQL program, stepping an EXEC SQL OPEN statement could cause the final line of the program to be incorrectly highlighted.  
3191710 (1117009)
- In native generated code, on all platforms except Intel x86 32-bit, a COMPUTE statement with fixed-point operands and a floating-point (comp-1 or comp-2) target could give the wrong result if a fixed-point operand was used twice in the expression. This bug has been fixed.  
3188676 (1116745)
- On the IBM mainframe, when code is compiled with NOPFD, and when an unsigned COMP-3 item containing an invalid sign nibble (such as 0xD) is the source item in a MOVE to another COMP-3 item, the sign nibble is fixed up to the correct value: 0xC for a signed COMP-3 target, and 0xF for an unsigned COMP-3 target. Micro Focus COBOL now emulates this behavior when code is compiled with SIGNFIXUP.  
3173432 (1115972)
- An issue where the COBIDY directive was handled inconsistently between the Compiler and NCG has been fixed.  
3163263 (1115112)
- A generate time error where the following message was produced has been fixed: `FATAL ERROR in ../coil/cio_jopt.c:deleting_bc() line 41; expected compare .`  
3160837 (1114435)
- For 32-bit generated code on Intel x86 platforms only: A bug has been fixed where a DISPLAY statement in generated code, compiled with LINKCHECK, would not give an RTS 203 error when using an unassigned linkage item.  
3159106 (1114292)
- In generated code, a move of the form "MOVE NATIONAL-ITEM TO NATIONAL-ITEM-JUSTIFIED" produced incorrect results when the target item was longer than the source.
- CHAIN <literal> ON EXCEPTION and CHAIN <literal> ON OVERFLOW did not work correctly when the overflow case occurred in native generated code on all platforms, with the exception of Intel x86 32-bit. This has been fixed.

## Enterprise Server

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- There is no longer an issue with the order of file retrieval for the list of console logs affecting the calculated maximum log number.  
3192214 (1117023)
- LRECL fields are now displayed correctly in Data File Tools when accessing Enterprise Server hosted data files.  
3186524 (1116586)
- An issue with stopping printer terminals has now been resolved.  
3185553 (1116498)
- MQ Security is now used when using DSNRLI.  
3183523 (1116641)

- A BATCH DLI job executed in a region with at least one XA switch active could abend at the end of a JOB on a SYNCPOINT PREPARE failure.

3181636 (1116221)

- In Data Files Tools, the performance of opening a PO dataset that is hosted within Enterprise Server has been improved.

3178780 (1116293)

- An issue that caused CTG requests using SNT users to be rejected has now been resolved.

3178729 (1115967)

- An issue with IBM PCOM was resulting in different colors in BMS in RUMBA and PCOMM. To work around this, use the new environment variable ES\_3270\_REMOVE\_NULL\_COLOR\_ATTRIB. Set ES\_3270\_REMOVE\_NULL\_COLOR\_ATTRIB to y or Y to prevent the color attribute set to null from being sent in a 3270 flow.

3176924 (1115831)

- The MQ XA switch modules now supports the BATCHONLY option.

3173781 (1115552)

- Previously, xwbauth user exit was not invoked if URIMAP path was greater than 64 characters.

3173349 (1115514)

- When a region was configured to use Extended User Storage, the associated memory was not registered with MFPM. This resulted in issues when using GETMAIN SHARED from a program compiled with the AMODE directive.

3173307 (1115549)

- CICS no longer attempts to map responses for DELETE requests for JSON RESTful services. Previously, this was causing the service to hang or encounter a Run-Time System error in dfheserv.

3172688 (1115459)

- casout will no longer crash when using the /v option and there are more than 256 initiators/batch printers/mprs.

Information for approximately 1300 processes can now be returned. If more than that exist, then casout will return as much as it can and set return-code to 4.

This may be caused by schedulers using the entry point 'casout\_getSEPS'. This can be called after using the casout API with the /v option. The signature for this entry point is:

entry 'casout\_getSEPS' using lk-casout-area.

lk-casout-area is defined in casbout.cpy but can only hold information for up to 256 processes. If there are more than 256 processes then a call to this entry point will return truncated data (that is, 256 instances) and set return-code to 4.

Since casout /v can now return data for more than 256 processes, a new optional parameter, which is a pointer, has been added to casout\_getSEPS:

entry 'casout\_getSEPS' using lk-casout-area lk-casout-user-area-ptr.

If there is data for more than 256 processes, then this pointer will be set to the address of the entire block of data.

3171604 (1115376)

- An EXEC CICS RELEASE statement now cancels the LOADED program as expected. Also, the behavior of the statement is aligned with IBM's documentation and programs that are LOADED without HOLD are cancelled/released at the end of a task.

3171175 (1115378)

- Transaction routing requests from the same terminal to an ISC connected region involving a DPL request to an APPC connected SYSTEM now execute successfully.

3170073 (1115270)

- Transactions with a timeout that was running over midnight were timing out prematurely at midnight.  
3169194 (1115144)
- CICS files configured to use a catalog entry were subject to a "fix-up" process which resolved alternate indexed dependencies when certain events occurred - for example, SET FILE ENABLE. This has been changed and the fix-up is not systematically driven. Changes applied to the associated catalog entry are no longer picked up automatically. If such changes are made, a fix-up can be requested through the Active FCT view. The file must be closed before the request is made.  
3168298 (1115080)
- Event manager exits that are enabled for SEP termination events are now invoked when a SEP, Initiator, MPR or a printer is stopped cleanly (from ESMAC and casout) and not just when they are killed.  
3168159 (1115051)
- The cursor position is now correctly identified when using floating maps - a map on top of another map.  
3166543 (1114958)
- When starting a CICS Web service application, the start code on ASSIGN was 'S ' instead of 'U '. Also, a residual EIBCALEN value was left when the application was using channel and containers instead of commarea. These issues have been fixed.  
3166323 (1114912)
- If created from a previous run, cas\_ipcs.lst and cas\_ps.lst will now be deleted at the next region startup.  
3165807 (1114872)
- In a heavily loaded Enterprise Server cluster, it was possible for jobs to be dispatched to a printer process instead of to a batch initiator. This would result in the job's lock being permanently held and prevent further submission of jobs of that name.  
3162806 (1116082)
- When Enterprise Server activates an LU62 connection to the mainframe or to another APPC linked system, you can now leave the modename to SPACE. This indicates that the remote side of the APPC connection should use an elected default modename.  
3162296 (1114713)
- When the last CICS API of a program invoked by an ECI client fails and this program handles the exception, if this program terminates with a GOBACK rather than an EXEC CICS RETURN, the ECI client does not receive an error anymore.  
3161830 (1114584)
- The position of a cursor on a map which size is different from that of the terminal size was incorrect. This has been fixed.  
3158745 (1114273)
- In an ESM secure region, when the userid field in a terminal definition was populated, there were issues at region startup or when trying to install the TERMINAL resource.  
3158468 (1115137)
- The environment variable ES\_DDBG\_PORT\_RANGE now supports ports that include less than five characters.  
3158205 (1114237)
- With ES\_XA\_NB\_RETRIES=-1 specified, Enterprise Server would leak SHM if the connection to the XA RM was lost.  
3158011 (1114246)
- CICS Web service response messages larger than 64Kb are now returned correctly.  
3155900 (1114044)
- Previously, the transformation of data from COBOL to JSON in CICS Web Services would not collapse whitespace even when CHAR-WHITESPACE=COLLAPSE was used for the generation of the wsbind file.

3154716 (1113953)

- An issue where a region would take too long to start up and eventually fail to start has been resolved.

3153774 (1113875)

- Return codes from file operations on the spool files are now displayed correctly when there is an error.

3153516 (1113882)

- When Data File Editor accesses files managed by an enterprise server region, users now need UPDATE permissions in order to access the file exclusively.

3152798 (1113831)

- You can now configure certain fields within the record that is written to a .csv format HSF report. Use the ES\_HSF\_CFG environment variable to configure the number of Custom, CICS file, TSQ, and TDQ fields in each record. To write custom data to the Custom fields, use the ES\_WRITE\_CUSTOM\_HSF library routine. See the latest SupportLine help for more information on these new features.

3151200 (1113676)

- When connecting a TN3270 to an Enterprise Server instance, if the connection was lost, the printer could not be reconnected. Now you can navigate back to ESMAC, then Clients, and stop the printer in order to reconnect it after a loss of the connection.

3142113 (1112847)

- Formatting a trace that was captured during the period when the clocks went back an hour will now format the entire trace. Previously, the formatter would exit at the point when the clocks changed.

2876312 (1106883)

- An issue with exporting PCT resources has been resolved.
- Enterprise Server, LDAP-based security: The use of Active Directory groups, or other group classes that specify membership using LDAP Distinguished Names, now works correctly when the "user ID attribute" configuration option is also used.

3187284 (1116696)

- The Enterprise Server External Security Facility (ESF) now strips leading and trailing whitespace from the user ID and other relevant fields in Verify (user authentication) requests.

3185569 (1116548)

- For Enterprise Server LDAP-based security, recent fixes to group processing exposed an issue when multiple LDAP repositories are used and all-groups mode is enabled. This could cause some or all of a user's group memberships to be disregarded, leading to incorrect denial of access to resources. The problem has been corrected.

3182724 (1116269)

- Enterprise Server's MLDAP ESM Module now supports setting LDAP passwords using salted SHA2-512 hashes. Otherwise known as the SSHA512 LDAP password type.

3178540 (1116077)

- In Enterprise Server with LDAP-based security where a security configuration uses two or more LDAP-based Security Managers, and use-all-groups mode and group federation are enabled, in some cases group membership was not processed correctly. Messages about "configured number of groups exceeded" could be logged. This issue has been resolved.

3178071 (1115917)

- With certain Enterprise Server security configurations, the Data File Editor could display a "signon failed" error when attempting to edit a dataset. This has now been fixed.

3177366 (1116022)

- The cache feature of the Enterprise Server External Security Facility now ignores some metadata when comparing requests with cache entries. This is configurable. By default, the subsystem (CICS, JES, etc.) and facility (terminal name, if any) are ignored. No ESM Modules supplied with the product use that information in making security decisions. This significantly improves the cache hit rate and system

performance in some environments. See "Enabling and Configuring Caching" in the product documentation for more information.

3172719 (1115513)

- When using LDAP-based security for Enterprise Server with an OpenLDAP-based provider (client) library, the "connect timeout" setting now works correctly.

3172554 (1115522)

- When using Enterprise Server with LDAP-based security, it is now possible to specify an LDAP attribute for user-group objects which specifies an alternative name for the group using the group short name attribute. See "MLDAP ESM Module Custom Configuration Information" in your product Help for more information.

3171437 (1115364)

- Enterprise Server LDAP-based external security no longer experiences a rare failure ("error code 7") when verifying a user with advanced group processing options enabled.

3168197 (1115048)

- LDAP-based security for Enterprise Server could produce MD5 password hashes (using the "mode=bind" and "password type=MD5" configuration option; note this is rarely used) which did not use the canonical Base64 encoding. Some LDAP servers did not recognize these password verifiers, resulting in sign-on failures after users changed their passwords. This has been fixed.

3162441 (1114843)

- In Enterprise Server, the MLDAP ESM Module now supports the short-to-long username mapping option of the External Security Facility (ESF).

3160464 (1114394)

- Enterprise Server now includes LDIF (LDAP Data Interchange Format) files suitable for configuring LDAP-based security using the OpenLDAP server.

3147666 (1113475)

- Enterprise Server's optional LDAP-based security (External Security Facility with MLDAP ESM Module) now supports the Microsoft "group" LDAP class, as used by Active Directory and AD/LDS. Consult the online product Help or ask Micro Focus Customer Care for additional information.

3109881 (1110084)

- On Linux and UNIX platforms, the MLDAP ESM module in Enterprise Server LDAP-based security, by default searches for an appropriate LDAP provider (client shared object) in the default locations used by the OS vendor's preferred LDAP client package. It is also no longer necessary to specify the "provider" option in a Security Manager configuration.
- After changes to RPI 632930, a literal with spaces at the end caused a compilation error when used in SEND MAP. This is now fixed.

3187511 (1116671)

- An issue that caused BMS Paging to terminate when no PFKeys were defined in the SIT has been fixed.

3184331 (1116708)

- CICS Web Services requester applications were not always sending the correct value for the SOAPAction header.

3182512 (1116255)

- An issue with the CASA\_ECI function was causing a run-time error on calls to modules loaded via CICS LOAD HOLD. This has been fixed.

3177527 (1116614)

- INQUIRE TASK, SET TASK FORCEPURGE and SET TASK KILL now work when passed a task ID that corresponds to a task running in a transient SEP.

3176467 (1115802)

- EXEC CICS ASSIGN PRINSYSID now returns the system identifier (SYSID) of the principal facility on a DTP exchange.  
3176355 (1115959)
- EIBTASKN now conforms to IBM CICS with a maximum value of 99999. When reached, the task number rolls over to a value greater than zero.  
3168772 (1115148)
- An issue that sometimes caused an infinite loop in user prologue code when multiple CALLs were made to the same CICS compiled program has been corrected.  
3168646 (1115243)
- UTF-8 special characters used in languages such as Swedish and German are now supported for dataset names and in FCT resources.  
3168514 (1115156)
- An issue that caused a long-running task that issued an EXEC CICS SYNCPOINT to throw a duplicate XID error has been fixed.  
3167061 (1115223)
- Programs containing CICS RECEIVE INTO / RECEIVE MAP in a DBCS environment and compiled to ASCII produced an erroneous @ symbol when data sent as part of a MAP was truncated using the Delete key. This has been fixed.  
3166924 (1114956)
- An issue in identifying the first available open port for regions containing multiple TCPIPService definitions that use the same port has been resolved. Enterprise Server now searches all ports that match the port number provided by the request, and uses the first available open port. If an error occurs, a message is returned to the client.  
3165836 (1114892)
- An issue with creating FCT entries with 'Use Catalog' has now been fixed.  
3165308 (1115000)
- The following options have been implemented for SET TERMINAL:  

```
PURGETYPE(PURGE) / PURGE
PURGETYPE(FORCEPURGE) / FORCEPURGE
PURGETYPE(KILL) / KILL

TERMSTATUS(RELEASED) / RELEASED
```
- Messages containing %s caused a CASCD error. This has been fixed.  
3164392 (1114739)
- Programs that contained RECEIVE INTO followed by a RECEIVE MAP using FROM and INTO options caused errors when compiled to ASCII. This has been fixed.  
3164390 (1114738)
- Programs that contained RECEIVE INTO followed by a RECEIVE MAP using FROM and INTO options caused errors when compiled to ASCII. This has been fixed.  
3164053 (1114708)
- The attention key was lost when using CSPG, this has now been fixed. When defining the BMS PAGING KEYS, you need to use the command first before the value for the key. For example, if the retrieve command is P/ then the PFK1 should be set to P/N (N for Next), PFK2 P/P (P for Previous) and so on.  
3161110 (1114505)
- casrdtup now supports all valid characters in the TDQ Name.  
3161013 (1114461)
- XWBAUTH is now invoked on CICS INVOKE SERVICE when the associated URIMAP is defined with AUTHENTICATE(BASIC). Important: With this update, all applications that use WEB CONVERSE or WEB SEND SESSTOKEN explicitly with the AUTHENTICATE, BASICAUTH, or NONE options, and that

do not use a URIMAP that specifies the AUTHENTICATE attribute, must be recompiled. (This does not affect applications that use a URIMAP that specifies the AUTHENTICATE attribute.)

3160060 (1114599)

- Support for the client WEB SEND command has been updated to include support for the BASICAUTH option.

3160060 (1114388)

- A copybook required to build the printer exit was missing. This has now been fixed.

3159328 (1114322)

- The INQUIRE TSQUEUE and TSQNAME now read direct for "non-browse" INQUIRE requests. Support for numitems has also been enabled.

3156161 (1114077)

- To fix An issue with the maximum length for a query string being too small, it has been increased from 255 to 1024.

3155607 (1114025)

- The DEFINE TRANSACTION topic has been updated to correct the descriptions for the DTimeout and Runaway recovery keywords.

3132186 (1111913)

- An issue which resulted in the DELETE and DETAILS button staying disabled in the casrdo45 page has now been fixed.

3181230 (1116351)

- Previously, when viewing cataloged datasets or Spool files in ESMAC, it was not possible to view any lines beyond line 99,999. Now the limit for the START field in ESMAC has been increased to hold any number up to 99,999,999.

3181032 (1116152)

- An RTS error 153 occurred when more than 6400 PCT entries were displayed in ESMAC. This has been fixed.

3167388 (1115007)

- With some specific LDAP configurations there were problems with accessing datasets from ESMAC where the configuration should have allowed access. This has now been fixed.

3167364 (1114989)

- The response time for catalog searches using 44 character strings in ESMAC has been improved.

3162969 (1114933)

- Remove locks is now enabled if the user has authorization in ESMAC.

3157534 (1114372)

- Deprecation of set-cookie meta tag in newer versions of some browsers such as Chrome or Microsoft Edge caused issues with the cookies used by ESMAC. This has now been resolved.

3154175 (1113973)

- The new JCL-specific environment variable ES\_JES\_SORT\_SPOOL\_BY specifies which column is initially used to sort the spool records in casrdo41: ES\_JES\_SORT\_SPOOL\_BY=JOBNAME|SUBDATE|JOBUSER

Note: If any other value is specified, then the spool records are sorted based on the JOBNUMBER (JOBID).

3152682 (1113846)

- The esfadmin command-line utility now allows command-line and option-file parameters of any length, up to the maximum command-line length of 8192 bytes. All esfadmin parameters can appear in the option file except -o (which specifies the name of the option file).

2881372 (1107519)

- When using Enterprise Server with LDAP-based security, with two or more LDAP External Security Managers, with the use-all-groups mode enabled, and with federation either enabled or in compatibility mode (the default), it is no longer necessary to have a definition for each user in each LDAP ESM. Specifically, once one LDAP ESM has identified the user, subsequent ESMs (those specified later in the list of security managers) can specify additional groups for that user without having to define the user again. For example, a security configuration specifies two LDAP security managers, LDAP-A and LDAP-B. LDAP-A contains only user records. LDAP-B contains only group records and resource access rule records. All-groups mode and federation are enabled. This configuration now works as expected.

2545079 (1081762)

- xa\_open in the switch module now returns the correct return-code.

3171133 (1115386)

- The path of ESDB2XA switch module is not required in the environment variable LD\_LIBRARY\_PATH when the application is compiled with XAID option and the dynamic switch module is used.

3164301 (1114734)

- Within the DB2 LUW switch module, issues associated with ESLOGGING xa\_open string parameter have been addressed, and better handling of impersonated userid when using USERP has been provided.

3156639 (1114209)

## Data Tools

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- The cursor is now visible in the free-text editing pane when the pane has focus whether it is in Shared or Exclusive mode. The cursor position will start counting from column 1, rather than column 0 as well.

3154869 (1113954)

- On systems with a Japanese Locale, the Data File Tools utility no longer includes the phrase "Technical Preview" in its title.
- The IMS DB Editor's handling of segment layouts that contain hyphens has been improved.

3156235 (1114112)

- You can now merge your archived spool files to a central location, using a JCL job or by using a command line utility. Once merged, they can easily be viewed together using the Micro Focus Data File Editor.

3154771 (1113949)

## Debugging

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- The COBOL debugger could fail to determine the correct line to highlight in certain situations such as 'stop run', when run in the Docker environment on Windows.
- During animation on SUSE Linux Enterprise Server (SLES) 12, if the process being debugged was waiting in a system-call and you attempted to exit the debug session, the session would have been terminated rather than executing a 'stop run' in the debugger. This was due to a change in the operating system between versions 11 and 12, which has now been corrected so that a 'stop run' is now correctly executed.

- While using the Character Animator to animate a program, if its stack overflows, the debug session no longer stops - it now returns you to your source code and displays an error message.

- Whilst debugging, examining variable values by hovering over the variable no longer causes an error.

3179385 (1116025)

## Dialog System

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- An issue which prevented character mode Dialog System from recognizing ctrl-J and other key combinations has been resolved.

3189921 (1116908)

## Documentation

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- The documentation for the compiler option -rc has been updated.

3184345 (1116419)

- Result precision has been added to the following built-in functions topics in the LRM: INDEX, MAXLENGTH, SEARCH, SEARCHR, VERIFY, VERIFYR.

3183332 (1116336)

- The product help now includes a clarification in the topic "To run a native COBOL application from a network server". It states that you must remove any individual copies of run-time system modules (for example, cblrtsm.dll) that might have been copied into your application's working directory. This is to avoid issues with running the application such as "245 no valid licenses found" as the run-time system is not loading from the expected location, or where the copied run-time modules are from other versions of the product versions. Removing such modules ensures that any run-time system modules are only loaded from the Enterprise Server instance installed on the server.

3176098 (1116309)

- The Software Requirement on UNIX topic in the docs and in the Release Notes now specifies that SafeNet licensing requires that you have glibc-locale-32bit library installed on 64-bit machines.

3167672 (1115010)

- The UNIX syntax example for the MAKESYN Compiler directive has been corrected in the documentation.

3164533 (1115496)

- Depending on the environment, you need to export (UNIX) or set (Windows) environment variables in a script. See "To specify environment variables for an application" for more information.

3164533 (1116625)

- The documentation now includes the instruction that when deploying a subset of Run-time System files, you must include run.cfg in a sub-directory named 'etc'.

3160902 (1114441)

- The syntax example, listed in the documentation for the ILPARAMS Compiler directive, has been corrected.

3154632 (634308)

- When performing a sort that specifies more than one input file, you cannot specify one of those same files as the output file unless it is the first input file specified.

3153333 (1113833)

- Details of how to use ILBOABN0 have been added to the documentation.

3148996 (1113634)

- The documentation (in the COBOL Language Reference) has been updated to clarify the use of the OPTIONAL keyword, and the use of (managed) optional parameters within the Procedure Division Header.

2883545 (1107792)

- The National Locale Support (NLS) Library Routines section of the documentation now contains all available NLS routines.

- The *Significant Changes in Behavior* section of the documentation now includes the default change for FASTINIT. (This change occurred in version 3.0, as stated in the release notes on release.)
  - The documentation has been improved for the CBL\_LOCATE\_FILE library routine concerning the use of space- and null-terminated strings.
  - The Rebuild syntax differs between UNIX and Windows platforms. For any of the Rebuild options, UNIX platforms use a hyphen (-) prefix before the letter, and Windows platforms use a forward-slash (/) before the letter.
  - The recommended method of high availability for VSAM files in Enterprise Server is to use standalone Fileshare. The documentation has been changed to reflect this.
  - The documentation has been updated to reflect that 'DEFAULT' is a reserved word when running under an ENTCOBOL dialect.
  - In the documentation, the code example given in the 'Thread-specific Data Handling Routines' topic now compiles cleanly.
  - The called program search order, as documented in the 'Backward Compatibility' section of the documentation, has been corrected for Windows platforms.
  - The parameter definition for OOCTRL"+/-W" has been clarified in the documentation.
  - The documentation now contains a topic - Using a File Handler in JVM COBOL - detailing how to manually configure the File Handler that a JVM COBOL project uses.
  - A link to the IBM documentation added to the 'DSNRLI Functions used for RRSAP' topic - this is to enable you to locate full details on required parameters, and to give examples of its use.
- 3184952 (1116524)
- The documentation now states that the section heading when adding environment variables through the Enterprise Server UI is case sensitive.
- 3177135 (1115979)
- The CICS Support section of the documentation, under Mainframe Programming, now contains a sample XWBAUTH program that can be adapted when users create their own user exits.
- 3164415 (1114826)
- The documentation explaining the scope for the HOST-NUMCOMPARE directive has been simplified.
- 3156368 (1114075)
- The "To specify the location of application files" topic has been updated to clarify the location of IMS copybooks.
- 3111136 (1109993)
- Documentation for all Java API classes is now provided in HTML format and contained in an archive file located by default in the %ProgramFiles(x86)%\Micro Focus\<product name>\javaee-ccl\docs directory. See the Java API Classes topic in your product documentation for details.
- 3109273 (1109725)
- Documentation for all Java API classes is now provided in HTML format and contained in an archive file located by default in the %ProgramFiles(x86)%\Micro Focus\<product name>\javaee-ccl\docs directory. See the Java API Classes topic in your product documentation for details.
- 3109271 (1109724)
- The documentation on setting up an SMS data class has been improved, which now includes a working JCL sample.
  - The sample code listed in the CBL\_DIR\_SCAN\_READ documentation has been formatted to enable you to copy and paste the code, ready for compilation.
  - The sample in the documentation on 'Using FHRedir and an allocation override rule' has been corrected to show the spool filenames in their correct case (upper case).
  - The documentation now includes a definition for the system abend code S913 (which is "Security Violation - the user is not permitted to access the resource").

## Embedded HTML Pre-Processor

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- An issue that caused the embedded HTML preprocessor to display incorrect banner information has been corrected.  
3160255 (1114437)

## File Handling

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- Under certain circumstances, opening a sequential file in the editor could result in the editor throwing an exception during close-down. This has now been resolved.  
3145420 (1113132)
- Warning messages when checking disk space for Fileshare advanced logging are now only displayed when necessary. Previously, a disk space warning was given even if sufficient space was available.  
3174510 (1116078)
- A Fileshare server shutdown no longer leaves files opened or users remaining logged on.  
2837526 (1108076)
- CFLE updating large record no longer results in an RTS252 error with the HA-VSAM configuration.  
3167973 (1115057)
- You will no longer receive an RTS114 error when a failing primary node is restarted and attempts to re-join the HA group (as a standby node), as long as it closed all files successfully before the failure.  
3159872 (1114360)
- Rollback recovery will no longer hang when processing a bad log entry during a scan of the transaction log file.  
3168055 (1115049)
- A new MFJSORT option allows input LSEQ files to be treated as FB through setting the environment variable MFJSLSEQFB=ON.  
3190089 (1116876)
- SORT operations no longer compare field data that is outside of the current record length.  
3187044 (1116633)
- MFJSORT now ignores the RECORD TYPE value if the SORTIN dataset is non-VSAM.  
3163293 (1114669)
- During a SORT, the SUM statement now correctly handles 8-bytes BI fields.  
3161349 (1114540)
- An internal SORT program no longer returns a COBRT252 error for cataloged files when being compiled with AMODE"31" and dialect"entcobol".  
3161100 (1114586)
- SORT no longer produces an RTS114 error when both outfil and sortout datasets are not defined.  
3154290 (1113901)
- MFJSORT now correctly honors MFJ\_INPUTDS\_ERROR=N on missing physical concatenated datasets.  
3153313 (1113826)
- MFJSORT OUTREC now applies the correct length for EDIT patterns.  
3145526 (1113484)

## IBM Language Environment for OS/390 & VM Support

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- Calling CEEGTST routine in LE support under JVM COBOL could sometimes result in an RT198 error. This is now resolved.  
3193016 (1117082)
- An issue resulting in an RTS 173 error when using LE370.jar and 'Dynamic calls' has been resolved.

## IDE

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- Multi-dimensional arrays are now displayed correctly in the Expressions view.  
3188114 (1116718)
- We have resolved an issue where sources using \$set P(cobsql) \_and\_ a directives file were not correctly background parsed  
3187247 (1116715)
- An issue with parsing comments between parameters in JCL statements and an issue where text matching JCL keywords caused parsing of DD parameters to fail have been fixed.  
3186771 (1116601)
- The Show Console Log menu item in Server Explorer now works correctly for servers that have a 'Configuration information' property larger than 1024 characters.  
3186091 (1116545)
- References to .dir files that are located on a separate drive from that containing the project now resolves the correct drive.  
3185960 (1116529)
- You can now configure the Eclipse Content Assist to list proposal in alphabetical order. You can do this from Window > Preferences > Micro Focus > Editor > Content Assist, and from the Proposal order section.  
3185289 (1116494)
- Data items which contain XML or HTML data during debugging now display correctly in hover popups.  
3182322 (1116238)
- Text search errors caused by Eclipse's File Search functionality being multi-threaded and being designed for local projects only have been fixed. File Search might now sometimes be slower but this is unavoidable due to limitations in how third-party code can be modified.  
3182272 (1116231)
- Error messages were sometimes displayed on the wrong line when background parsing using the AWM Remote Preprocessor. This has now been fixed.  
3181225 (1116179)
- You could experience an issue with starting Eclipse where Java Tooling would fail to initialize. This was a result of a known issue with JNA and installing certain Windows updates.  
3179471 (1116030)
- SQL Include files were not always resolved when background parsing using the AWM Remote Preprocessor. This has now been fixed.  
3178446 (1115943)
- COBOL Copybook project references in .cobolBuild files could be lost after importing the project in Eclipse.  
3177566 (1115903)

- Users who have configured ESF passtoken generation can now access certain pages from the Server Explorer view in Eclipse without having to reauthenticate. These include the spool and catalog pages of regions, and the administration pages of directory servers.  
3177270 (1115887)
- It is now possible to compile individual programs within a COBOL JVM project, provided that the "Use Dynamic Call" option is set within the project's properties.  
3176560 (1115882)
- Information about variables is now displayed correctly when debugging JVM COBOL using a Remote Java Application debug configuration.  
3173978 (1115582)
- we now support `#{ipaddress}` and `#{hostname}` in the display preference, the latter is now used in the default value  
3170934 (1115477)
- The environmental variables `IDE_IMSCONFIG` and `IDE_IMSDATA` no longer include a trailing semicolon in the enterprise server regions created in Eclipse.  
3169831 (1115303)
- Smart Edit functionality has been updated to linewrap text, with new line characters pasted into the editor correctly.  
3168633 (1115534)
- The PL/I preprocessor attempted to load versions of `libxml2.dll` which were not part of the Enterprise Developer product, when invoked from Eclipse. This has been fixed.  
3168065 (1115329)
- Visual COBOL for Eclipse now starts correctly, with no errors.  
3165560 (1114888)
- When debugging a remote application via a DevHub server it is now possible to use Remote File System Directory entries in the Source Lookup search path. Previously, they were ignored unless a remote project was selected in the launch configuration.  
3165087 (1114802)
- When debugging a remote application using source code held in local COBOL projects, program sources were not found if the folders containing them were not included in the project's Copybook search path. This is now fixed.  
3165086 (1114804)
- It is now possible to cancel the launch of a "COBOL Wait for Application Attachment" (that uses a specified host and port).  
3164766 (1114784)
- The Terminate and Remove menu item is now correctly handled for wait for attachment debug sessions that have not yet attached.  
3164766 (1115747)
- A message to clarify the behavior of the environment script location field was added.  
3164533 (1116627)
- It is now possible to specify the default `cobdebugremote` port in Eclipse preferences. See "Preparing Remote Projects for Debugging" in your product Help for more information.  
3164533 (1114754)
- The X Server font can now be set on the Debug preference page.  
3164533 (1115214)
- The "Server port, replaces `#{port}` in command" remote connection attribute has been added to enable the configuration of the DevHub server port value when launching the server using the SSH daemon.

See "To launch a server on the remote host using a Secure Shell daemon process" in your product Help for more information.

3164533 (1114753)

- The COBOL Explorer filter facility is no longer disabled when the view is configured to exclude COBOL Elements such as the COBOL Programs category.

3164096 (1114782)

- Compilation of assembler files now respects the file specific settings when compiling individual files.

3162115 (1114600)

- You can now right-click on a data item name anywhere in the working-storage or procedure division, and click "Toggle Watchpoint". This adds a watchpoint to the breakpoints view in the same way as selecting it from program outline. For CICS EXEC Interface Block (EIB) items, this means you can right-click on the usage of a data item in the source, toggle the watchpoint and it will be added to the list of watchpoints.

3161772 (1114579)

- There is now a Compile option in the context menu for folders in the COBOL Explorer and the PL/I Explorer views.

3161499 (1114526)

- Opening a project properties page in AWM without a project selected in the Application Explorer view no longer throws a NullPointerException.

3160690 (1114434)

- The "Inherit values from the build environment of the associated project" option in the project properties (Micro Focus > Run-time Configuration > Environment Variables) was not being honoured. This has been fixed.

3159999 (1114419)

- Paths to dependent projects are now stored using relative paths if they can be determined.

3159506 (1114321)

- The PL/I include dependency view did not always show the correct files if the macro pre-processor was enabled.

3158083 (1114846)

- A workspace with several projects that share an output directory no longer rebuilds projects infinitely in a case when one of the projects compiles unsuccessfully.

3155067 (1113970)

- Double-clicking on file search results now correctly jumps to the line containing the result.

3154115 (1113894)

- Linked resource entries in .cobolBuild are now stored using relative paths.

3153143 (1113836)

- Micro Focus project types now correctly translate copy paths to the new pasted project location.

3152826 (1113856)

- Copying and pasting remote projects has changed its behavior. A new "Copy Micro Focus Project" dialog box is displayed asking you to confirm the remote details. Note: Micro Focus only support pasting projects to the same remote connection as the project being copied.

3151350 (1113648)

- When running the Remote Connection Diagnostics function, an unhandled exception was intermittently logged. This has now been fixed.

3151350 (1114547)

- This release includes initial support for formatting COBOL code. Access the formatting preferences from Window > Preferences > Micro Focus > Editor > Formatter.

3146261 (1113549)

- END-EXEC and CALL-CONVENTION are now correctly highlighted as keywords in COBOL programs.

3146260 (1113238)

- Hit count and conditions are now supported for COBOL watchpoints.

3128708 (1113196)

- Invoking the PL/I macro pre-processor multiple times while background parsing is now supported when the option to background parse using the Open PL/I compiler is enabled in the workspace preferences.

3103429 (1109346)

- The COBOL Run-Time System container has been updated to include a reference to mfle370.jar.
- Copybooks and include files were not found during background parsing of remote COBOL programs if they were located in a directory specified by the COBCPY environment variable before the DevHub daemon was started. This has been fixed.

3165397 (1114851)

## IMS Support

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- The correction to SI 2847064 (RPI 1103584) caused the DBDGEN directive SXRBAFORMAT(2) to behave as SXRBAFORMAT(0). SXRBAFORMAT(1) was unaffected.

3186315 (1116562)

- An issue that caused enforcement of segment delete rules when deleting a virtual logical child (VLC) segment via an ACCESS=LOGICAL DB view has been fixed.

3183252 (1116497)

- An issue that caused a GE error has been fixed. With this fix, the position on a database that supports POS=M or multiple hierarchical paths is flushed only when the current position on that segment is different than the previous position, or when the segment being processed is the lowest-level segment in a GU/GHU/ISRT call.

3167069 (1114975)

- The PCB segment level after an unsuccessful GNP call (status GE) did not always match that of IBM IMS.

3156252 (1114067)

- An issue that caused multiple hierarchical database fields to show in incorrect positions on the screen when the PCB for the database specified POS=M has been fixed.

3155761 (1114070)

- An issue that sometimes occurred when a GN or GHN that was either completely or partially unsuccessful caused the return of an incorrect segment level in the PCB feedback, depending on call SSAs and prior DB position. This has been fixed.

3153595 (1113843)

- IMS BTS tracing was not available for CICS. This is now supported via the ES\_SSTM\_CICS environment variable.

3152981 (1113795)

- An issue when using a virtual logical child (VLC) with multiple defined sequence fields sometimes produced incorrect results when using those fields in a segment search argument (SSA) boolean operation. This has been fixed.

3151898 (1113783)

- In some circumstances, a DX status code (DLET rule violation) might have been issued in error or not issued when it should have been. This has been corrected.

3149186 (1113582)

- A new IMS-specific environment variable, ES\_IMS\_OPEN\_TIMEOUT, has been added to define the wait period in seconds during which IMS retries the opening of a database file that is in use by another task. Default is 30 seconds.  
3105263 (1109307)
- The EQU macro is now accepted for PFK values. If the EQU value is a literal spanning more than one line, then it must be coded such that the value goes all the way into column 71 with a continuation character in column 72.  
3184467 (1116451)
- An issue with MFS map output caused storage violations in CASTMC. The size of the output buffer has been increased to correct this problem.  
3180502 (1116197)
- An issue that caused incorrect formatting on print output with multiple DPAGES has been fixed.  
3178841 (1116049)
- When compiling the MFS source for EBCDIC, some conditional literal values were erroneously stored in the generated control block as ASCII, causing a print output error. This has been fixed; however, previously generate MFS must be regenerated to pick it up.  
3178841 (1116848)
- An issue that caused screen values to be lost when moving NULL to output fields has been fixed; however, to restore the screen values, you must regenerate the MFS.  
3174377 (1115708)
- An issue that caused a loss of input data when the PF5 key was pressed repeatedly and rapidly, or when the keyboard was locked, for an MFS screen set to clear all unprotected screen fields upon output. This has been fixed.  
3157814 (1114455)
- An issue that prevented dynamic debugging from working correctly when switching to a second IMS transaction has been fixed.  
3180027 (1116094)
- When XA was enabled, an IMS BMP that issued a STOP RUN instead of a GOBACK caused unpredictable errors depending on the XA resources defined. This has been corrected.  
3165313 (1114838)
- IMS Connect has been updated to support the IRM header to be in either EBCDIC or ASCII. In addition, system messages returned in the response are now in EBCDIC when the input IRM header is EBCDIC or the header's IRM\_F5 "translation done by client" bit is set (x'40'), indicating the client expects the response to be EBCDIC. This is consistent with non-system output messages, which are in EBCDIC when this bit is set.  
3179210 (1116368)
- When trying to print during a TN3270 session, the terminal could hang waiting for a response. This no longer occurs.  
3177584 (1116002)
- A program-to-program message-switch to a non-response-mode transaction sometimes caused a DFS2082 message to appear erroneously. This has been fixed.  
3172148 (1115425)
- A message inserted by a response-mode transaction to an express PCB sometimes causes a DFS2082 message to appear erroneously. This has been fixed.  
3168150 (1115053)
- A limitation with MQ Writer prevented it from automatically reconnecting to MQ after losing the connection. MQ Writer has been updated to automatically reconnect to MQ if it should lose the connection.

3164352 (1114745)

- An issue that occasionally caused CASTMC RTS200 (ID: 9c12) errors has been fixed.

3159168 (1114303)

- To correct An issue with routing MQ-IMS Bridge output messages, these messages can now be routed to a reply queue based on LTERM, as configured via the new OTMA destination-descriptors environment variable (ES\_IMS\_OTMA\_DEST).

3154367 (1113959)

- IMS support has been updated to include program-to-program message switches from OTMA-submitted transactions.

3153840 (1113862)

- An issue that caused a GN call to fail on a message segment that used an alternative PCB when the segment was not the first in the message, and its insert was immediately preceded by an insert to a different PCB, has been fixed.

3153486 (1113857)

- Two new Enterprise Server environment variables, ES\_IMS\_SINGLE and ES\_IMS\_LTERM\_PREFIX, have been added that enable you to configure support for multiple sign-ons by a single user across multiple LUs.

3146936 (1113313)

- New IMS print exit functionality allows data destined for a printer to be redirected to the DFSPRINT exit routine prior to any printing.

3140423 (1112727)

- Enterprise Developer now increments the task number for "Wait for Input" transactions where the input message is not the MPP initial schedule message and not a message returned immediately for a COMMIT/GU request.
- An intermittent issue that could result in receiving an incorrect output, RTS 114 error messages and TM message queue corruptions has been resolved.

## Interface Mapping Toolkit

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- For clients and services generated from WSDL, generated copybooks are no longer missing declarations for complex WSDL fields with duplicate names.

3188506 (1116761)

- A problem that caused invalid xsd:date types in a CICS Web Service WSBIND file generated from a WSDL file has been fixed. xsd:date types are now generated as collapsed fields.

3184571 (1116456)

- A limitation in the Interface Mapper that prevented the simultaneous editing of Field Properties for all selected fields of a like field type has been fixed.

3164533 (1115571)

- An issue that prevented manually created field mappings from correctly matching IMTK behavior has been fixed.

3164533 (1115657)

## JCL Support

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- mfjctlbp has been enhanced to include the return code, reason code and the return type from a call to an executable.

3190808 (1116938)

- An issue that prevented jobs from being started when an initiator was available has been fixed.  
3184852 (1116450)
- The incorrect removal of commas between parameters passed to the REXX interpreter, introduced in release 4.0 Patch Update 5, has been corrected.  
3184475 (1116418)
- An issue that prevented the MSGCLASS JOB CLASS, and the setting of ES\_JESYSMSG\_OUTPUT and restrictions, from being honored for SSTM jobs has been fixed.  
3183255 (1116438)
- The "Job Completed" date and time for SSTM jobs is now set when the a job is marked as completed.  
3183255 (1116764)
- MFFTP APPEND processing has been enhanced to accept the abbreviations AP and APPE, and to correctly process quoted dataset names.  
3182125 (1116215)
- The next generation indexing for a relative generation following a sweep delete of GDG generations has been improved, to be more consistent with mainframe behavior.  
3181663 (1116195)
- An issue that prevented auditing in 64-bit COBOL processes has been corrected.  
3180251 (1116090)
- Performance in retrieving the next JCL job to run has been improved.  
3179792 (1116151)
- You no longer experience performance issues with Data File Tools when the editor is displaying PO entries hosted in Enterprise Server.  
3178780 (1116139)
- When opening a data set from the Data File Editor, you can now filter the catalog contents further by using the 'Disable Additional Qualifiers' check box. This is the same option as is available in ESMAC; it emulates the effect of disabling the 'Include Additional Qualifiers' option on the mainframe.  
3178780 (1115991)
- Within an MFFTP CD command, directories contained within single quotes will no longer have double quotes added around the single quotes.  
3178420 (1115998)
- The incorrect step COND CODE of zero when a PL/I program abends because the OUTLIM value has been exceeded, has been corrected, and will now be correctly reported as S722.  
3177778 (1115902)
- An error was incorrectly being reported when a symbolic parameter substitution split over multiple lines.  
3177166 (1115863)
- An error when trying to rename a data set where its location was identified using an environment variable in the allocation override, coupled with ES\_ALLOC\_EXPAND=N, has been corrected. The environment variable is now resolved to the correct physical location.  
3176747 (1115832)
- An error when using an in-stream SYSIN dataset in IBEDG, stored in a user catalog, has been corrected.  
3175437 (1115735)
- A lock on a dataset is now removed correctly when using mvscatpb.  
3174350 (1115610)
- You no longer received an "Index out of bounds" error message when exporting a catalog using MFCATXML.  
3173762 (1115550)

- If a job abends because it timed out (S322 abend code), any SYSOUT files from the job that were 'active' will now be moved to either the OUTPUT or the OUTPUT HOLD queue.  
3173743 (1115562)
- In MFFTP, the data conversion module name, specified by MBDATACONN or SBADATACONN, is now parsed correctly and the module called to perform the data translation.  
3173596 (1115776)
- Program parameters changed by the user exit, MFJUXIT, are now applied correctly. An invalid parameter passed to IKJEFT01 is reported as such, but does not set a COND CODE of 12. Commands not found by IKJEFT01 do not set a COND CODE or stop processing. Commands not found by IKJEFT1A or IKJEFT1B are reported, give a COND CODE of 12, and stop further processing.  
3173270 (1115511)
- Assembler run-time support for SSTM under Enterprise Server is now available. The Assembler run-time now performs a check for Enterprise Server run-time environments with JCL enabled or with SSTM enabled for IMS and CICS online environments. If found, Assembler attempts to merge its own MVS control block emulation with the MVS control block emulation being done in the JCL component.  
3172585 (1115455)
- If DSNRLI makes a TX call that does not return the expected value, the return code is reported in a message to the job log and the return code from DSNRLI is 8. The reason code reflects where the issue occurred.  
3171133 (1115345)
- Following a TERMINATE IDENTIFY call, DSNRLI now return a return code 4, with a reason ERR-NOT-IDENTIFIED on a call for the same XA resource until a new IDENTIFY call is made.  
3171131 (1115360)
- When an SMS DATACLAS is used, the relevant values are now used from the DATACLAS when a new GDS is created unless explicitly defined otherwise.  
3170401 (1115293)
- An issue with the spool housekeeping utility (MVSSPLHK), which failed to find some data sets when ES\_ALLOC\_EXPAND=N was configured, has been resolved.  
3169705 (1115264)
- When a the value associated with a PARM within a JCL job is quoted and spans multiple lines, the white space at the end of the lines is now correctly retained.  
3166752 (1114968)
- SYSPRINT DD DUMMY is now supported within an IEBPTPCH step.  
3166633 (1114931)
- The spool file (-)create-date and (-)create-time fields are now correctly populated in the printer exit interface.  
3165857 (1114871)
- The console log message MVSER0995U now reports the file status code.  
3164710 (1114774)
- The 'mfpubcat.inc' PL/I file now contains the same declarations as its equivalent COBOL file 'mfpubcat.cpy'.  
3164527 (1114777)
- MFCATXML now returns both any records of datasets from user catalogs as well as the main system catalog.  
3162870 (1114667)
- An error when deleting a job on the Input queue, which resulted in a SYSZJOBID lock being left, has been corrected.  
3162806 (1115022)

- The IDCAMS ALTER GDG processing now includes support for the EMPTY|NOEMPTY, SCRATCH|NOSCRATCH and LIMIT parameters.  
3161965 (1114592)
- If the current highest bias of a GDG is removed outside of a JCL job, for example via the ESMAC catalog view or the public catalog API, the high bias value of the GDG model is recalculated to reflect the remaining biases.  
3161796 (1114520)
- SHAREOPTIONS settings in a MODEL cluster are now applied correctly to a newly-defined CLUSTER.  
3161763 (1114517)
- An RTS114 error, reported when closing down a region containing an allocation override file that contains an unsupported condition, has been rectified.  
3161604 (1114655)
- The missing PL/I include file, mfpubspl.inc, has been added to the product.  
3161446 (1114489)
- A failure to create archive catalog records when using spool housekeeping with a user catalog has been corrected.  
3161437 (1114485)
- An issue translating the received FTP file when the working files were under the control of Fileshare has been corrected.  
3160811 (1114484)
- A performance improvement in the job recovery processing has been made by removing some additional unrequired reading of spool job records.  
3156375 (1114147)
- MFFTP now encloses anything that follows a 'cd' command with double quotes, unless the quotes are already present.  
3154403 (1113925)
- If the association of an XA Switch module with a unit of work fails, DSNRLI now reports appropriate error codes for functions that require the association.  
3151780 (1113682)
- A security PHYSFILE check is now only performed when the physical file or directory does not exist.  
3150380 (1114031)
- A new option for MF\_UCC11 processing is now available. Use MF\_UCC11\_DYNCLEAN=N to prevent the cleaning of dynamically allocated datasets when restarting a job.  
3149990 (1113815)
- Allocation Overrides can be applied to the new path and name of a physical dataset when the IDCAMS ALTER NEWNAME command is used and the environment variable MF\_PC Rename\_LAX=D is set.  
3149083 (1113510)
- An issue that occurred when submitting JCL jobs using the CICS WRITE API and the Internal Reader has been fixed. The environment variable ES\_CAS\_API=ON is now set automatically in the process that submits the job.  
3148986 (1114840)
- A 'Catalog Duplicate Exists' error, reported when creating a new GDG bias and the GDG Model resides in a user catalog, has been corrected.  
3148698 (1113498)
- A fault, reported as 'not found' or 'attribute mismatch', when using ES\_ALLOC\_EXPAND=N and opening a VSAM file, has been corrected.  
3144287 (1113057)

- An issue with tab characters in the allocation override configuration file, when the EXTFH configuration setting EXPANDTAB=OFF is set, has been corrected.  
2876194 (1106812)
- When a job with a RESTART parameter on the JOB CARD is first submitted, the SYSOUT files will now have names based on the job submission time rather than the job run time. When a job is restarted, the new SYSOUT files will have names based on the restart time.  
2856323 (1108461)
- A catalog error when deleting a dataset from a directory that is also the target of a Dynamic PDS has been fixed.
- VSAM SHAREOPTIONS options are now passed correctly when getting and setting VSAM records using the public Catalog API, MVSCATPB.
- A failure when reading the VSAM file header when a file was under the control of Fileshare has been fixed.
- Removing a lock on a dataset when using mvscatpb now works.
- An issue with multiple VSE \$\$LST entries, where previous entries were being overwritten, has now been corrected.  
3169047 (1115308)

## Licensing

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- cesadmintool.sh now searches for " version" string in the Java version and ignores any additional output that might appear.  
3185425 (1116559)
- In Docker environments, the license administration program, MFLicenseAdmin, now copes with longer-than-usual license strings. These occur with longer pieces of customer information embedded in the license.  
3174371 (1115634)
- There is no longer an entry in the Uninstall column for licenses installed on remote machines.  
3131570 (1112101)

## Mainframe Access

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- MFDAS now supports importing IMS and DB2 types to the local catalog.  
3184718 (1116546)
- The /CATLOG option on MFDAS commands is no longer ignored.  
3131397 (1111830)
- MFDAS now correctly respects connection information specified by the caller.
- The MFDAS command line now supports submitting QSAM or PDS members remotely.
- MFA no longer fails to return information about data sets on extended addressing volumes (EAVs).  
3173574 (1115901)
- Expanding a job in JES Explorer to view the SYSOUT data sets now also displays the input data sets. This corresponds to the SDSF INPUT ON command.  
3168184 (1115117)
- MFA no longer abends if the AUDIT feature is enabled. The AUDITRPT utility has been fixed.  
3160243 (1114378)

- MFA no longer shuts itself down after session time-out because of a system wait.  
3158778 (1114316)
- If an external job gets an enqueue on an Endeavor resource while MFA is using it, then MFA no longer receives multiple abends and halts when the resource is released.  
3149517 (1113490)
- When an application server job name sequence number reaches the maximum specified number for that group, the sequence number will wrap to 1.  
2860257 (1104402)
- SyncMon2 will now display characters correctly when the console output is redirected to a file.  
3184737 (1116484)
- The MFA server no longer omits the member separator record when performing a bulk member import for Endeavor.  
3161685 (1114507)
- Syncmon2 GUI has been redesigned to make it easier to understand when adding different types of sync items. For example, it is now clearer what information is needed when syncing against Endeavor.  
3147936 (1113476)
- ALLOW\_REGEX is now optional for all sync types.  
3147936 (1113422)
- SyncMon2 will now correctly accept EXT= or EXTENSION= for specifying a file extension to be used for the sync.  
3183101 (1116324)
- When SyncMon2 was unable to contact MFA Server it would try and print an error message and crash. This has been fixed and will now correctly display the error message.  
3174011 (1115779)
- MFA Drag and Drop now supports passphrases of up to 100 characters.

## Micro Focus Batch Scheduler Integration

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- When MFBSI basic substitution is used, any characters (not just numerics) in cols 73-80 are now ignored.  
3189187 (1116795)
- When using MFBSI Basic or Control-M substitution, the submitted resulting JCL file was sometimes automatically deleted when "Keep-Subst-JCL=NO" was set via an environment variable or in mfbsi.cfg. This has been fixed.  
3188547 (1116737)
- When a Control-M %%INCLIB statement using an %%IF/%%ELSE sequence is used in JCL in-stream data, invalid /\*CTM INCLIB is no more outputted in the JCL data.  
3183202 (1116321)
- The Control-M variable %%JOBNAME takes its value from the JOBname found on the JOB card, and will now honor variable substitution. In the following example, %%JOBNAME will be resolved to "TESTQA".  

```

//* %%SET %%ENV=QA
//TEST%%ENV JOB (101, 'ES JCLS'), CLASS=A,
//          MSGCLASS=H, COND=(4,LT)

```
- When using CASAPI, JobNumber for JOBnnnnnnn.log is no longer truncated (to 5 chars).  
3171321 (1115408)

3153191 (1113827)

- When the Control-M autoEdit facility is used, the character "~" (tilde) is no longer replaced by a space.

3150693 (1113624)

## Micro Focus Common Client

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- Applications which use the Micro Focus Common Client (MFCC), such as the Interface Mapping Toolkit (when deploying a COBOL web service or EJB to Enterprise Server), can now specify credentials when binding to the Micro Focus Directory Server. This provides additional security. If credentials are not configured, MFCC will use an anonymous bind, as it did in earlier product versions. Credentials are specified using the mf-client.dat configuration file.

## Micro Focus Directory Server

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- The Enterprise Server Administration Web UI will only display user session details if the logged in user is authorized.

3190235 (1116886)

- Additional Enterprise Server Administration Web UI server-side checks were added to guard against non-editable field value changes for started Enterprise Server instances and active security configurations.

3185626 (1116719)

- Establishing a connection to a TLS-enabled MFDS process if non-default (non-DemoCA) certificates were used now works as expected.

3174276 (1115675)

- The MFDS journal data format has been enhanced to be platform and bitism independent.

3169565 (1115249)

- Improved validation of data input to Enterprise Server Administration Web UI.

3163386 (1114693)

- Adding or editing TCP listener-requested endpoint values using the Enterprise Server Administration web UI so that a port clash may occur now gives a warning rather than being disallowed and treated as a user input error.
- If the Enterprise Server Administration Web UI is hosted in a Docker container, the displayed hyperlinks to reach the Micro Focus Communications Process web pages can now be configured to use an address which is valid outside the container.
- URLs to SSL-enabled MFCS Control Channel addresses displayed in the Enterprise Server Administration HTML UI now use an https prefix.
- A new field, "Server CA Root Certificate", is available in the Communications Process Control Channel page (id: c400). The value specified here is used unless the MFDS\_server\_CAROOT environment variable was specified as it takes precedence. You must specify the server CA root certificate if the Communications Process Control Channel is SSL/TLS-enabled and if communications with the MFDS process are required such as to respond to keepalive and any other administration control requests.
- Enterprise Server Administration Web UI would sometimes display the successful logon splash screen instead of a logon error message.
- The MFDS process could terminate when copying the definition of an Enterprise Server instance if it contained a very long description text.
- Trying to view or edit the properties of a Security Manager that is not in the Directory Server Security Manager list now results in receiving an appropriate warning message instead of an HTTP 404 error.
- MFDS now saves any changes made to the Communications Process immediately instead of at shutdown.

## Micro Focus Server Administrator

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- If Enterprise Server Administration was set to restricted access, some MQ listener configuration pages would not be displayed.  
3152874 (1113782)
- The Enterprise Server Administration HTML UI no longer displays the IP address but only the host name used by the Web administration server process.  
3140974 (1112912)

## OpenSSL

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- Visual COBOL, Enterprise Server, and Enterprise Developer now include an updated collection of public Certification Authority root and intermediate certificates (CARootCerts.pem) derived from the public collection maintained by Mozilla.org.

## PL/I Support

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- An issue resulting in a SIGSEGV during compilation has been resolved. The compiler is now rejecting declarations of controlled variables outside of external procedure scope (which Enterprise Developer does not support yet).  
3163627 (1114683)
- Programs using SQL code and labels now compile cleanly.  
3163626 (1114682)
- The PL/I compiler now accepts named constants with the BIGENDIAN attribute.  
3186448 (1116580)
- The optimization problem related to character literals has been fixed.  
3185930 (1116534)
- An issue which caused a run-time system failure on ALLOCATE <structure with REFER> SET(<offset>) has been fixed.  
3184177 (1116414)
- The Open PL/I compiler now supports XML tags using the case of declaration and attributes enclosed in double quotes. See the new compiler options -xmlcase and -xmlattr. The \*PROCESS XML directive is also supported.  
3180475 (1116120)
- The Open PL/I compiler now supports new command-line options -dummy aligned and -dummy unaligned. In addition, \*PROCESS DEFAULT(DUMMY(ALIGNED|UNALIGNED)) is also supported.  
3180244 (1116091)
- An issue with DEFAULT RANGE (\*) used in combination with a variable of type OFFSET has been fixed.  
3179782 (1116065)
- The NOINIT attribute is no longer ignored.  
3179191 (1116008)
- An issue causing the compiler to recursively loop during Restricted Expression Evaluation has been fixed.  
3178664 (1116009)

- Named constants of numeric PICTURE type are now supported in static structure dimensions and initializations.  
3176071 (1115764)
- The PL/I compiler now has increased limits to help prevent occurrences of the diagnostic message "MFPLI02012A: Internal IL overflow".  
3175119 (1115684)
- An issue with the SIZE and STORAGE built-ins returning an incorrect result for elementary data items of type CHAR ALIGNED has been corrected.  
3174904 (1115665)
- Comparison of an OFFSET variable with SYSNULL() or NULL() was erroneously producing a diagnostic message MFPLI00277.  
3172702 (1115461)
- You no longer receive incorrect error messages when compiling code which includes string array parameters.  
3172570 (1115453)
- An issue with the ONCODE built-in used with a condition prefix has been fixed.  
3171821 (1115390)
- Internal compiler storage limits have been increased to allow for more complex expressions within DECLARE statements.  
3171124 (1115349)
- Open PL/I now supports passing structures and arrays using a dummy argument and you no longer receive an MFPLI00109S error message.  
3165677 (1114857)
- The diagnostic message MFPLI00064S now includes the argument number that would help to diagnose the application code. Any additional diagnostics have been modified in the same way.  
3165344 (1114877)
- An issue initializing an ENTRY variable having a RETURNS descriptor with an INIT clause has been corrected.  
3165047 (1114792)
- An issue where DEFAULT RANGE(\*) was applied to descriptors has been fixed.  
3164843 (1114799)
- You no longer receive a diagnostic message MFPLI04450S when using the WEEKDAY built-in function.  
3164263 (1114732)
- PL/I now raises a diagnostic message MFPLI00445I, "OPTIONS(REORDER) is parsed but ignored".  
3163949 (1114779)
- \*PROCESS OPT(TIME) is now supported.  
3163624 (1114681)
- The Open-PLI compiler now recognizes PROCEDURENAME and PROCNAME as built-in functions when parenthesis, (), are not used.  
3163166 (1114661)
- You could receive compiler errors if a macro generated code that caused a PL/I built-in function name to be split at the right margin.  
3161895 (1114615)
- The Open PL/I compiler now diagnoses character-string lengths which exceed the implementation limit after Restricted Expression Evaluation.  
3157748 (1114289)

- An issue when using the procedure option BYVALUE with PUT DATA statement has been fixed.  
3156065 (1114057)
- A PL/I compiler optimization problem using the compiler options -opt -range causing incorrect execution behavior has been fixed.  
3151588 (1113704)
- The use of condition prefixes no longer causes diagnostic message MFPLI04042A.  
3151488 (1113713)
- An issue which caused a message "MFPLI04042A : Possible compiler error" has been resolved.  
3151486 (1113705)
- An issue with multiple passes of the macro preprocessor and -margins 2,72 has been corrected.  
3150661 (1113721)
- An issue with text beyond column 72 of a \*PROCESS statement as been fixed.  
3148585 (1113611)
- Th Open PL/I compiler now supports the INOUT, INONLY, and OUTONLY attributes.  
3141132 (1113175)
- The Open PL/I compiler now supports the REM built-in function.  
3140471 (1112890)
- The MEMINDEX built-in function is now supported.  
3140469 (1112888)
- The ALLOCATE and PLIFREE built-in functions are now supported.  
3140465 (1112960)
- The REPLACEBY2 built-in is now supported.  
3140463 (1112947)
- MEMCONVERT built-in function is now supported.  
3140462 (1112866)
- Open PL/I now supports the INDEXR built-in function.  
3140461 (1112879)
- ONCONDCOND built-in function is now supported.  
3140460 (1112878)
- Open PL/I now supports the BETWEEN, BETWEENEXCLUSIVE, BETWEENLEFTEXCLUSIVE, and BETWEENRIGHTEXCLUSIVE built-in functions.  
3140459 (1112876)
- Named constants in structures are now supported.  
3139140 (1112775)
- Open PL/I now supports the HEX built-in with scalar and structure expressions. Restriction: Array expressions are not yet supported in this context.  
3139123 (1112586)
- The GET DATA facility is now supported.  
3139120 (1113154)
- The Open PL/I compiler now issues a W-level diagnostic when a bit operator (& |) is applied to a non-BIT operand.  
3137262 (1112381)
- The Open PL/I compiler now generates a Warning-level diagnostic when a character string passed as an argument is longer than the corresponding parameter descriptor.  
3137230 (1112370)

- The Open PL/I source listing map has been enhanced to show array dimension information. In addition, the listing map has been reformatted from 80 to 132 columns.  
3130920 (1111804)
- An issue causing the SQL preprocessor to abort has been fixed.  
3118614 (1110627)
- Previously, if recovering from a hardware generated signal, it was not possible to catch a second hardware generated signal. This has now been fixed.  
2866118 (1105344)
- Previously, named constants allowed modification of the named constant when passed by reference.
- An issue with using the FREE statement with the IN clause has been fixed.
- When debugging applications using the EBCDIC charset, the PL/I debugger in Eclipse did not display variable values correctly.  
3177744 (1115891)
- Setting a variable watch on EIBCALEN in a CICS application should now work as expected.  
2843455 (1102176)
- The PL/I debugger now displays the correct line number when stepping on a statement which has an existing user breakpoint.
- It is now possible to view the output of PL/I applications running on remote machine under X Server, and to add input to them.
- You now receive a message, "<error(s)\_during\_the\_evaluation>" to the value field of a variable, when the variable name contains an asterisk (\*). An asterisk field name is typically not designed to be addressable or usable. It is not possible for the debugger to evaluate it by name either. See the PL/I Language Reference in your product Help for more details.
- This release supports program breakpoint setting in PL/I programs. In order for breakpoints to work properly, the name of the shared library for the breakpoint must have the same name as the PROC statement for the main procedure of the shared library itself. This means that a program breakpoint request for the shared library FOO must have a primary entry point similar to FOO - e.g. PROC OPTIONS(FETCHABLE). Also, a file extension in the program breakpoint name is not needed or supported. To set a program breakpoint for FOO.dll or FOO.so, you only need to type "FOO". Name matching is not case sensitive and all names will be folded to upper case.
- This release includes support for breakpoints on executable statements in PL/I include files.
- In the Expressions view, if selected, the columns Declared Type and Actual Type now show the type of the variable or the expression being evaluated.
- When debugging PL/I code in Eclipse, a program started from the command line and attached to by the debugging will be terminated abruptly when you choose Terminate. You need to use the Disconnect option to enable the application to continue executing after detaching the debugger.
- The debugger would crash due to a buffer overflow when trying to evaluate a larger varying variable.
- In Eclipse, when starting to debug a non-Enterprise Server based PLI program which caused a stack check error to be raised, debugging would immediately terminate with message "Program stopped due to signal 11 segmentation violation". A stack check occurs when the stack needed by a user program was larger than the current stack that was reserved during the link process. This is now fixed.
- When setting an expression on a breakpoint, any CONVERSION conditions which occur when binding the breakpoint are ignored due to uninitialized storage. This means that the edit might not catch all user errors entered in an expression value.
- Improvements have been made for displaying large variables and structures in the Variables and Expressions views within Eclipse while debugging PL/I programs.
- If your project was missing some DC files, the debugger would still call the DC API when searching for an include file id.
- When evaluating a referenced variable (p->v) which is a struct member, its latest instance was returned. Now, the reference is preserved and the correct value is returned.

- The XMLDEMO example as shipped failed on the call to the PLISAXA API because the events structure passed to it was not using the required data type of ENTRY LIMITED. The examples have been updated to match the XML support.  
3191102 (1116960)
- This release includes new sample programs for PL/I on UNIX. Refer to the readme file in the \$COBDIR/demo/open-pli directory.
- The source code in the example and other similar variations are now processed correctly.  
3177673 (1115886)
- Long path names for include files are now handled correctly.  
3148758 (1113423)
- Previously, when the macro preprocessor generated diagnostic MFPP09226E it did not correctly set the maximum error level upon exit. This has now been fixed.  
3181674 (1116183)
- The emulation of the ANSWER built-in function in the Micro Focus Macro Preprocessor now defaults to a starting position equal to MACCOL.  
3180174 (1116113)
- Previously, if invalid syntax for a macro was entered which resulted in a scan forward for a single block that exceeded 65535 bytes, then the macro preprocessor would fail without issuing a diagnostic indicating the cause. This no longer happens.  
3180037 (1116093)
- When running multiple macro passes using -margins 2,72 against a structure which contains structure level declarations in column 2, and commas terminating structure elements in column 72, a second macro pass caused a portion of the data structure to not be present in the output deck.  
3178876 (1116005)
- Previously, if emitting preprocessed code within margins 2,72 and a single byte delimiter occurred at exactly the right margin boundary, then it was erroneously placed in column 73.  
3172770 (1115467)
- Closing paren and semi-colons are no longer discarded in complex INIT statements.  
3168558 (1115071)
- Previously, the macro preprocessor would not correctly parse a WHEN statement that contained multiple expressions in which the expressions contained commas. This has now been fixed.  
3159116 (1114375)
- The PL/I Macro Preprocessor now supports the DO LOOP and DO FOREVER syntax.  
3158083 (1114215)
- Previously, if a macro variable caused the replaced text to be larger than the length of the macro variable, a %LINE was injected immediately following the next end of line marker. The new %LINE is now immediately injected after the next semi-colon.  
3152196 (1113737)
- Previously, when making an assignment to a file variable prior to establishing an ON unit for the file, and then attempting a comparison of the file variable to the FILE, the comparison would fail.  
3186873 (1116621)
- The enhancement for SI 3175398 (RPI 1115722) was not being honored in some scenarios when the Open PL/I Run-Time System was not unloaded between job steps in the batch initiator.  
3184952 (1116523)
- An issue where UNDEFINEDFILE was not raised for SYSIN when SYSIN utilized directly for record input has been fixed.

- 3184839 (1116458)
  - Previously, if a single character value was surrounded by two character references, the single character would not be emitted to the PLISAXA E15 event.
- 3179171 (1116017)
  - Previously, if a PL/I program which executed under Enterprise Server attempted to write to SYSPRINT DD without a SYSPRINT DD defined you received an error message that indicated FILE=stdout instead of FILE=SYSPRINT.
- 3178595 (1115953)
  - Previously, if using PLISAXA to parse an XML Structure, only attributes that were multiples of five were passed to the attribute callback routines.
- 3177690 (1115889)
  - Previously, if FILE declarations of differing DCB (RECFM, RECSIZE, etc.) were used to OPEN for OUTPUT the same DD defined in a JCL Jobstream the attributes of the datasets all matched the DCB of the first FILE opened using that JCL DD.
- 3175398 (1115722)
  - DATETIME patterns that previously raised an ERROR condition no longer do so.
- 3174344 (1115647)
  - Previously, if code was written which did a GET EDIT into a FIXED BIN variable specifying that the incoming data was in PIC format, a trap could occur. This has now been fixed.
- 3168420 (1115138)
  - Previously, if a PL/I application called a COBOL subroutine and the COBOL subroutine caused a COBOL Run-Time System Error, the PL/I ON ERROR units were not driven.
- 3168339 (1115084)
  - Non-local GOTO statements positioned outside of ON ERROR blocks used to reset the behavior of the ON ERROR SYSTEM; statement.
- 3154846 (1116079)
  - Previously, the FETCH statement would fail if the TITLE option was used in conjunction with a variable containing trailing spaces. This has now been fixed.
- 3152827 (1113779)
  - Open PL/I now supports dynamic allocations of z/OS datasets utilizing optional expressions in the TITLE option of the OPEN statement.
- 3143632 (1112999)
  - Previously, if operating in a mixed language environment of COBOL and PL/I, if a COBOL program triggered a hard error such as a SIGSEGV, there was no way to generate a Windows mini dump. See the documentation for MFPLI\_MINIDMP environment variable for directions on how to enable the new functionality.
- 3142342 (1112998)
  - PLIDUMP output can now be configured using PLIDUMP\_CONFIG environment variable
- 3130920 (1111853)
  - An issue causing the SQL preprocessor to abort has been fixed.
- 3188874 (1116775)
  - Execpp has been enhanced to allow very large PL/I statements.
- 3184447 (1116396)
  - Previously, if a macro was used to generate a parameter to a CALL statement, the EXEC preprocessor would erroneously omit an error message indicating that the CALL had mismatched parenthesis.
- 3177094 (1115846)

- A comment immediately following a quoted string with no intervening characters used to cause an unbalanced parenthesis diagnostic.  
3177085 (1115842)
- Previously, when using the EXEC or INCLUDE preprocessors, if the number of %INCLUDE(d) or EXEC SQL INCLUDE(d) files exceeded 1000 then a severe error message was issued and processing terminated.  
3176715 (1115820)
- An SQL variable declaration of type BLOB having an underlying (1) dimension has been fixed.  
3174584 (1115631)
- Use of CONTROLLED variables in EXEC SQL statements no longer causes compiler failures.  
3171842 (1115395)
- The DB2 pre-compiler incorrectly generated swap logic for SQLCA numeric fields if not defined in the main section of PL/I program. This has now been fixed.  
3159844 (1114354)
- Trying to precompile a PL/I program containing both EXEC SQL and utilizing the PL/I package language construct produced an error.  
3134798 (1112169)

## Run-Time System

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- Under certain circumstances, if a file was opened multiple times and an error occurred, then any physical locks on the file could be lost.  
3177819 (1116043)
- In a threaded environment, when using critical-sections and simultaneously loading/unloading shared-objects, a race condition would sometimes create a deadlock. This no longer occurs.  
3177711 (1116154)
- The use of the P(COBSQL) Compiler directive in a Visual Studio or Eclipse project no longer causes the IDE to crash intermittently at termination.  
3133807 (1112077)
- The COBRT243 Class could not be loaded error message now contains the name of the class that could not be found.  
3104988 (1109420)
- Calls to CBL\_MEM\_VALIDATE might not have given the full memory corruption details if the corruption occurred in freed memory. This is now fixed.
- When using the Character Animator, you can enter Ctrl+C to interrupt the running process you are debugging. This would sometimes fail to stop the running process, but should now behave as expected.
- When setting the out-length parameter of the CBL\_STRING\_CONVERT API to zero in order to get the size of the buffer required for the conversion, the API no longer fails with a ArgumentNullException when running on the .NET environment. Under JVM COBOL, this API no longer corrupts the output buffer if the output length has been set to 0.
- In managed COBOL, for a very small set of cases for exponentiation and DIVIDE ROUNDED, performance was very poor. Also, for some of this set of cases, the result of DIVIDE ROUNDED could round in the wrong direction. These issues have been fixed.  
3185807 (1116589)
- Within JVM COBOL, a MOVE operation from a COMP-2 item containing a negative value to an unsigned COMP-5 item now gives the correct result.  
3175547 (1115719)

- Under JVM COBOL, RunUnit GetEnvironmentVariable() is now case insensitive on look-up of environment names.  
3161925 (1114545)
- CALL "SYSTEM" in a JVM COBOL program that is executed from a run unit in Java no longer produces a COBRT200 error if RunUnitStartupOptions.UseSingleThreadedRuntime is set.  
3151448 (1114573)
- JVM COBOL only. An issue has been resolved whereby some arithmetic expressions using a binary item (COMP, COMP-5) that had the value -2147483648 ( - 2\*\*31 ) could result in stack overflow.

## Setup Issues

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- The Data File Tools AddPack can now be installed alongside Enterprise Server.  
3158290 (1114230)
- The installer error handling has been extended to cater for certain conditions.  
3152023 (1113706)

## SQL: COBSQL

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- COBSQL now handles "ELSE EXEC SQL" correctly when it is all on the same line in the source file.  
3176046 (1115778)
- The XAID option did not work properly for COBSQL when CHARSET(EBCDIC) was used.  
3174070 (1115697)
- A compilation error that was caused by the COBSQL preprocessor incorrectly handing sections declared inside of a copybook has been fixed.  
3164533 (1116863)
- An unreadable copybook caused COBSQL to loop when stacked with the CP preprocessor. This has been fixed.  
3156374 (1114103)
- An unreadable copybook caused COBSQL to loop when stacked with the CP preprocessor. This has been fixed.  
3156374 (637041)
- An issue that caused a compilation error when COBSQL encountered inline comments in an EXEC SQL statement has been fixed.  
3123025 (1111044)
- COBSQL messages have been updated to provide more information when failure is due to a missing list file, and when the list file is missing due to use of the LTYPE=NONE directive.  
2883514 (624749)
- To prevent exceeding the COBSQL directive buffer size, the maximum directive buffer size has been increased to a maximum of 8000 characters.  
2852872 (1104084)
- To prevent hanging or a compilation error, COBSQL has been updated to properly handle conditional statements in the same line as EXEC SQL statements.  
2804004 (1097225)
- An issue that sometimes caused SQL error text to display as truncated on the command line has been fixed by increasing the maximum error length to 250 characters, and updating the logic used to construct the message.

- An issue that caused an error when a space was present between an END-EXEC statement and a period has been fixed.
- The COBSQL precompiler interprets the SOURCETABSTOP COBOL compiler directive as SOURCETABSTOP(8) in all cases. This is due to Pro\*COBOL honoring only SOURCETABSTOP(8), and is a permanent restriction for COBSQL.

### SQL: HCO for DB2 LUW

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- An optional 'FROM' keyword in SQL statements such as 'FETCH FROM <cursor-name>' used to cause compiler errors.  
3191635 (1116976)
- There is no longer an issue with negative line numbers being generated in the .bnd file when the COBOL source file has more than 32700 lines of code.  
3188178 (1116814)
- An issue with the DB2 preprocessor caused it to incorrectly classify PL/I variables greater than 4000 bytes as LONG VARCHAR when it should have classified PL/I variables less than 32767 bytes as VARCHAR as it does for COBOL variables. This has been fixed.  
3185976 (1116539)
- DB2 XA switch source is now shipped for Linux ppc64le platforms.  
3184287 (1116424)
- The DB2 pre-compiler incorrectly generated a compile error when hyphen was used in SQL command without a space between the hyphen and host variable name. This has now been fixed.  
3180089 (1116102)
- DB2 LUW now supports dashes in cursor names, so the DB2 pre-compiler no longer changes dashes to underscores in cursor names.  
3177271 (1115912)
- The DB2 pre-compiler incorrectly passed COBOL variable names to PL/I programs when generating code to handle EXEC SQL SET CURRENT PACKAGE PATH statements.  
3175885 (1115744)
- The DB2 and OpenESQL pre-compilers now qualify generated code that uses SQLSTATE to qualify SQLSTATE similar to this one: SQLCA.SQLSTATE.  
3173295 (1115512)
- An issue that caused the DB2 preprocessor to incorrectly reject FILLER as a valid host variable name in PL/I programs has been fixed.  
3164600 (1114767)
- An issue that occurred with user personalization on user names exactly eight characters long has been resolved.  
3156639 (1114163)
- When a DBCS database is used with CHARSET(EBCDIC), the data of a char field following a varchar field will no longer be corrupted.  
3155499 (1114065)

### SQL: HCO for SQL Server

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- An issue that prevented SQL Server from releasing all resources at the end of a CICS transaction has been corrected.  
3184561 (1116409)

- HOCSS applications that use DBRMLIB but are not bound before execution will now report runtime errors with SQLCODE -808 for all statements executed, and the possibility of a cursor open and subsequent fetch not returning any errors has been fixed.  
3155911 (1114082)
- The HCOSS Transfer Data tool user interface has been updated to clarify SQL Server requirements in cases where the SQL Server versions differ between the server and the client.
- An issue that occurred when using read-only WITH HOLD cursors, and when SQL(DBRMLIB) and SQL(ODBCV3) were both specified has been fixed.  
3168191 (1115275)
- The OpenESQL runtime has been updated to return a connection error when calling a stored procedure in a program compiled with the SPCALLLOCAL directive, and no connection exists.  
3154238 (1113896)

## SQL: MBDT Utilities

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- There is no longer an issue with using more than one "AND/OR" statements in the WHEN clause for SQLUTB UNLOAD. An issue with the JCL parser in SQLUTB where parsing JCL input for SQLUTB UNLOAD has been fixed.  
3181572 (1116360)
- Space padding to the maximum length no longer occurs when loading EBCDIC data into VARCHAR fields if the "EBCDIC" option is specified on the LOAD card. The actual lengths of the loaded data are used in inserting data into the columns.  
3179487 (1116036)
- An issue with unintentionally submitting a JCL job to run SQLUTB when the XA is disabled has been resolved. The SQLUTB program now verifies the status of opening the XA connection before it proceeds.  
3178489 (1116084)
- In SQLUTB loads, formatted PIC X(8) - PIC X(10) fields that contained char values resembling times had '.' chars transformed to ':' incorrectly. For example, for "99.99.99" the result table would show "99:99:99". This is now prevented.  
3174745 (1115676)
- SQLUTB now returns COND CODE 8 (rather than 0) when it encounters an invalid DSN connection.  
3169290 (1115166)
- An issue that caused an SQL0007N error when loading data into a table with child relationships to empty tables has been fixed.  
3166222 (1115027)
- An issue that prevented the SQLUTB utility from extracting views and tables from DB2 LUW has been fixed.  
3163010 (1114645)
- When SQLUTB was run with input DD DUMMY, it returned an error message indicating that the input data had an LRECL of 0. This has been corrected so that SQLUTB now behaves as the IBM load utility, ignoring the DUMMY input LRECL.  
3161957 (1114698)
- An issue that occurred when using SQLUTB LOAD without field specifications in the JCL has been fixed.  
3157802 (1114247)
- The SQLUTB utility, when run on Linux Red Hat machines, failed to produce meaningful error messages. This has been corrected.

3155177 (1114016)

- There is no longer an issue with using synonyms to load data into the underlying tables for SQL Server with SQLUTB. An issue with truncating tables via synonyms in SQL Server has been fixed for SQLUTB.  
3152952 (1113855)

## SQL: OpenESQL

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- JDBC now returns SQLCODE=+1 when the fetched value is NULL and NULL indicator is not used.  
3191192 (1116953)
- Decimal value is now inserted correctly into Oracle DB when DECDEL=COMMA is set.  
3189836 (1116947)
- An issue that caused performance degradation when using a STATIC cursor has been fixed.  
3185894 (1116518)
- The OpenESQL run-time now handles the compiler directive SQL(NOAUTOFETCH) correctly.  
3177780 (1115994)
- OpenESQL has been updated to provide cobrhcdsn64.so for 64-bit only platforms.  
3174065 (1116801)
- HCOSS now accepts FOR READ ONLY clauses in cursors before FETCH FIRST clauses. This is undocumented behavior for DB2 z/OS but HCOSS now supports it to ensure mainframe compatibility.  
3173586 (1115528)
- An issue where WITH HOLD cursors could remain open after an IMS transaction had terminated for SQL Server, ODBC and PostgreSQL XA resources has been fixed. SQL(NOCHECKDUPCURSOR) can now be used to override duplicate cursor checking when SQL(DIALECT=MAINFRAME) is used.  
3172382 (1115430)
- A new SQL directive [NO]ALLOWSERVERSELECT supports server-specific SELECT statements that are not recognized by OpenESQL as valid ESQL SELECT ... INTO statements. This behavior was the default in Net Express.  
3165092 (1114866)
- An issue that caused the OpenESQL runtime to incorrectly handle binary parameter markers for PIC X(n) VARYING host variables has been fixed.  
3163759 (1114719)
- The SQL Directives dialog box that appeared for .NET project types in the Visual Studio IDE erroneously omitted the SQL(HSFTRACE) option for DBMAN=ADO. This has been fixed.  
3162428 (1114593)
- Data type information that was incorrectly mapped by the OpenESQL Assistant caused it to display column information improperly when using an IBM DB2 ADO.NET provider connected to a DB2 z/OS data source. This has been corrected.  
3161285 (1114478)
- An issue that occurred when the SQL BEHAVIOR compiler directive option was set to UNOPTIMIZED caused the OpenESQL runtime to generate an RTS 114 error when the COBOL application exited. This has been fixed.  
3158065 (1114288)
- Problems with SQL Server and PostgreSQL that surfaced when working with large binary columns have been fixed.  
3156215 (1114335)

- An issue that caused the OpenESQL preprocessor to generate an incorrect error message when SQL(DBRMLIB) was not set prior to specifying SQL(VERSION) has been fixed; the OpenESQL preprocessor now generates the correct error message.  
3155275 (1114004)
- SQL FETCH ABSOLUTE CURSOR was not returning rows. A COMP position value is now supported in the SQL FETCH ABSOLUTE/RELATIVE statement and it behaves as expected.  
3153738 (1113903)
- An issue that prevented HCOSS from correctly handling IS [NOT] DISTINCT predicates has been fixed.  
3152630 (1113764)
- An issue that caused HCOSS to incorrectly apply QUALIFIERS to common table expression names has been fixed.  
3152008 (1113714)
- The DSNRLI function SWITCH TO is now supported for Enterprise Server Mainframe Subsystem applications using DB2, Microsoft SQL Server, and PostgreSQL.  
3151779 (1113680)
- An issue that caused HCOSS to incorrectly handle FETCH FIRST ROW ONLY when no literal row count was present has been fixed.  
3151398 (1113734)
- An issue that caused the OpenESQL runtime to execute a core dump on exit when the MEMORY\_STRATEGY tunable was set has been fixed.  
3142107 (1113077)
- A program that contained zoned decimal host variables used in SQL statements and compiled using charset(EBCDIC) and dialect(MF) sometimes caused a run-time error. This has been corrected.

## SQL Option for DB2

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- The XDB pre-compiler incorrectly generated line and column number information used by the IDE to get COBOL information about field on EXEC SQL INSERT statements.  
3182574 (1116350)
- The XDB pre-compiler incorrectly tried to generate interface logic in nested COBOL routines without checking if a SQLCA copybook was defined. This resulted in an "Undefined ECM error" error message. This has been fixed.  
3168445 (1115099)
- An issue caused by an uninitialized stack variable that resulted in a server violation has been fixed.  
3168714 (1115237)
- A number of XDB components have been enhanced to better implement bulk INSERT/UPDATE/MERGE statements using both local XDB engines and XDB Link in dynamic and static mode to z/OS DB2.  
3175084 (1115695)
- XDB Link has been updated to support the invocation of stored procedures that return multiple result sets on z/OS DB2.  
3168036 (1115315)
- A memory leak in DRDA Continue Query Reply Message processing has been fixed.  
3160580 (1114426)
- An issue that prevented XDB Server configuration from allowing the full length of 16 characters in the Global Security Location text box has been fixed.

3168821 (1115106)

- An issue with SQL step processing related to CASE expression evaluation that caused the SQL COALESCE scalar function to return the wrong result has been fixed.

3160595 (1114413)

- Support has been added for the SOUNDEX() and DIFFERENCE() scalar functions.

3155733 (1114043)

- An issue that caused a buffer overflow when processing a very large UPDATE WHERE CURRENT OF in the XDB Link has been resolved.

3151725 (1113807)

- An problem with XUTLB (XDB emulation of DSNUILB) erroneously reporting an invalid isolation level has been resolved.

3134586 (1112183)

- An issue with join optimization using differing lengths of DECIMAL data has been resolved.

3131870 (1111903)

- An issue with a scalar query using a DATETIME value returning an error indicating that the value was invalid has been resolved.

3129637 (1111872)

- An issue with Query Descriptor mapping when performing XDB Server to Server connectivity has been fixed.

3112564 (1110514)

- An issue with an uninitialized stack space causing a thread abend in XDB SQLDA code page processing has been fixed.

2990360 (1108708)

## Web Service Client

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- When a generated Web service client executes, an additional optional user-supplied exit program, exit-http-resp-headers, is now called to provide access to any and all HTTP headers present in the response message from the service.

3172598 (1115452)

## XML Support

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- XML PARSE now handles "WITH ENCODING" clauses correctly.

3175231 (1115707)

- Data within the CDATA tag is now processed by the managed XML syntax support run-time.

3166588 (1114954)

- XML PARSE did not handle lengthy CONTENT-CHARACTERS correctly which caused the event to be returned twice.

3162231 (1114582)

- Literals positioned beyond column 72 in the editor are now being handled correctly and compile without any issues.

3152550 (1114087)

## z/Server

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- AWM tools of type "Execute ISPF Command" within the ISPF function package can make use of the ISPF table TAUTOJOB if the tool submits more than one job via the 'Tool Job' method or if the tool submits a job via the 'Tool Job' method and is used in a MassProcessing action.

3151143 (1113669)

# Other Issues Resolved in This Release

The numbers listed are the Support Incident Numbers followed by the Reported Problem Incident (RPI) number (in parentheses).

- 3177187 (1115851)
- 3181887 (1116201)
- 3177661 (1116118)
- 3134735 (1112201)
- 3170148 (1115245)
- 3171080 (1115373)
- 3161109 (1114775)
- 3160774 (1114530)
- 3187599 (1116668)
- 3176925 (1115833)
- 2802311 (1097060)
- 3140337 (1112673)
- 3175137 (1115685)
- 3170946 (1115402)
- 3128586 (1111526)
- 3105876 (1109394)
- 2990180 (1108737)
- 2854004 (1103682)
- 2851622 (1103230)
- 2844942 (1102368)
- 2841043 (1102369)
- 2590883 (1085717)
- 3181941 (1116211)
- 3103315 (1109252)
- 2990950 (1108778)
- 2865338 (1105207)
- 2597474 (1088223)
- 3164898 (1114811)
- 3150507 (1113583)
- 3122080 (1110968)
- 3122020 (1110949)
- 3114654 (1110269)
- 2887726 (1108356)
- 2885799 (1108108)
- 2873642 (1106416)
- 2835954 (1101265)
- 2795293 (1096771)
- 2652488 (1090826)
- 2587952 (1086146)
- 3123593 (1111108)
- 2642528 (1090004)
- 2594601 (1086032)
- 3181445 (1116188)
- 3168020 (1115032)
- 3164533 (1115215)
- 3162064 (1114546)
- 3161964 (1114569)
- 3158311 (1114231)
- 3158072 (1114399)
- 3141381 (1112770)
- 3164533 (1115570)
- 3193749 (1117140)
- 3158936 (1114346)
- 3156405 (1114097)
- 3152246 (1113749)
- 3157702 (1114217)
- 3157956 (1114290)
- 3127953 (1111577)
- 3159456 (1114310)
- 2867519 (1105516)
- 3191105 (1116958)
- 3174042 (1115569)
- 3176098 (1115962)
- 3172981 (1115501)
- 3127698 (1111446)
- 3189442 (1116934)
- 3188582 (1116744)
- 3178509 (1115958)
- 3160759 (1114427)
- 3150188 (1113906)
- 3177187 (1115851)
- 3181887 (1116201)
- 3177661 (1116118)
- 3134735 (1112201)
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- 3140337 (1112673)
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- 2841043 (1102369)
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- 3176098 (1115962)
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- 3189442 (1116934)
- 3188582 (1116744)
- 3178509 (1115958)
- 3160759 (1114427)
- 3150188 (1113906)

- 3161964 (1114569)
- 3172126 (1115445)
- 3103315 (1109252)
- 3187219 (1116640)

# Unsupported Functionality

This section includes information about features or functionality that are no longer supported.

- The HOSTSIGNS Compiler directive is no longer supported. Micro Focus recommends that you use the following Compiler directives instead: SIGN-FIXUP, HOST-NUMMOVE, and HOST-NUMCOMPARE. This is a change since version 3.0 of this product.

# Installation

## Before Installing

### Downloading the Product

1. Use the download links in your Electronic Product Delivery email.

For more information follow the links for the installation instructions and the End User License Agreement.

## On Windows

### System Requirements

#### Hardware Requirements

Enterprise Developer has the following requirements in addition to the requirements of Eclipse. See the Eclipse documentation for details of its requirements.

In general, most modern machines will have the required processor and available RAM to run the Micro Focus products under Windows effectively. For planning purposes, you should consider having a minimum of 2GB of RAM though Micro Focus recommends at least 4GB of RAM for optimal performance.

The disk space requirements for Windows are, approximately:

<b>Enterprise Developer</b>
3.5GB



**Note:** The disk space requirements include the size of the Eclipse IDE and the version of Java and the .NET Framework provided with the Enterprise Developer setup file. This includes the space needed to cache information locally so that you can modify the installation without the original source media.

#### z/Server requirements

z/Server has the following hardware requirements:

- IBM mainframe model zEC12 or later is required for installing and using MFA Server. If your hardware does not meet these requirements please contact Micro Focus support.

#### Operating Systems Supported

For a list of the supported operating systems, check the *Product Availability* section on the Micro Focus SupportLine Web site: <http://supportline.microfocus.com/prodavail.aspx>.



**Note:**

- Support for development on Windows 8 and Windows Server 2012 has been discontinued. These platforms are still supported for deployment. Windows 8.1 and Windows Server 2012 R2 are supported.

- Enterprise Developer installs fully only on 64-bit Windows platforms. On 32-bit Windows, the setup file does not install some of the components. See *Issues with the Installation* in *Known Issues and Restrictions*.
- Enterprise Developer enables you to produce both 64-bit and 32-bit applications on 64-bit operating systems.
- This product can be installed on earlier versions of Windows but it has not been tested on them.

## Software requirements

 **Note:** This product includes OpenSSL version 1.1.1b.

The setup file will check your machine for whether the prerequisite software is installed and will install any missing prerequisites and the product components.

## Eclipse requirements

- The setup file installs Enterprise Developer and the 64-bit Eclipse 4.8.  
Some earlier versions of Eclipse are also supported. See *Installing Enterprise Developer into other instances of Eclipse* in the *Advanced Installation Tasks*.
- Enterprise Developer installs fully only on 64-bit Windows platforms. On 32-bit Windows, the setup file does not install some of the components. See *Issues with the Installation* in *Known Issues and Restrictions*.
- Enterprise Developer supports both the 32-bit and the 64-bit Eclipse. You can use the 64-bit Eclipse to create both 32-bit and 64-bit applications.

## Software requirements on Windows

- Java 8 (64-bit) is required to run the Eclipse IDE. The minimum recommended version is AdoptOpenJDK's OpenJDK 8 (u202) with Hotspot, which the Windows product installs automatically. Java 8 (32 or 64-bit versions), and Java 11 (64-bit version only) are supported for executing JVM COBOL code and for native COBOL and Java interoperability. You can download AdoptOpenJDK's OpenJDK 8 with Hotspot from [AdoptOpenJDK's Web site](#) and unpack the archive anywhere on your machine.

 **Note:** Eclipse does not run using Java 11.

- Enterprise Developer requires:
  - A 32-bit Java installation if using the 32-bit Eclipse.
  - A 64-bit Java installation if using the 64-bit Eclipse.
- The setup file also installs Microsoft's Visual C++ 2012, 2013 and 2017 Redistributables.

See *Java Support Restrictions* in the product help for any considerations when using Eclipse and Java.

## Other Requirements

 **Important:** For local servers, you do not need to install the Micro Focus License Administration tool separately, as the setup file installs a new Enterprise Developer client and a new licensing server on the same machine.

If you have a network server, you must update the license server before installing the product as the client is not able to communicate with license servers of versions older than 10000.2.660. On Windows, you can check the version of your license server by clicking **Help > About** in the Micro Focus License Administration tool. To check the version of the license server on UNIX, run `/var/microfocuslicensing/bin/mfcesver` or `/var/microfocuslicensing/bin/cesadmintool.sh`.

If Micro Focus License Manager version 10000.2.02070 or older is installed, it must be uninstalled before the product installation or upgrade can continue.

You can download the new version of the license server software from the Micro Focus SupportLine Web site: <http://supportline.microfocus.com>.

## Supported Third Party Software

The table below lists some of the software requirements and Third Party Software this product is tested with.

For full details on the supported software, see *Software Requirements* and *Additional Software Requirements* in this product's install notes.

Software	Requirements
<b>Integrated Development Environment</b>	Eclipse 4.8 - installed with Enterprise Developer. Eclipse 4.7 is also supported.*
<b>Java</b>	64-bit Java 8 is required for running Eclipse. Java 8 (32 or 64-bit versions), 11 (64-bit only) is supported for running applications.
<b>Java application servers</b>	Tomcat 9.0 JBoss EAP 7.1 Oracle WebLogic 12c R2 IBM WebSphere 9.0
<b>Relational databases</b>	Oracle 12c R2 and 18c Microsoft SQL Server 2012, 2014, 2016 , 2017 IBM DB2 10.5, 11.1 Postgres 10.5 MySQL 5.7
<b>Middleware</b>	IBM's MQ series 8.0
<b>Platform support</b>	See <a href="http://supportline.microfocus.com/prodavail.aspx">http://supportline.microfocus.com/prodavail.aspx</a> .

\* See *Installing into other instances of Eclipse* in your Product Help.

## Additional Software Requirements on Windows

To ensure full functionality for some Enterprise Developer features, you might be required to obtain and install additional third-party software in addition to the prerequisite software installed automatically by the Enterprise Developer setup file.

[Click here](#) to see this information on the Product Documentation pages on Micro Focus SupportLine.

## Product Co-Existence



**Note:** The following applies to Windows only.

- Enterprise Developer and Enterprise Server (or Enterprise Test Server) cannot coexist on the same machine.
- Visual COBOL and Enterprise Developer cannot coexist on the same machine regardless of which IDE (Visual Studio or Eclipse) you install.

## Installation Restrictions and Requirements

Before starting the installation you should consider the following:

- Visual COBOL and Enterprise Developer cannot coexist on the same machine.
- You need to be logged in with a user-ID that has write access to the registry structure under HKEY\_LOCAL\_MACHINE, HKEY\_CLASSES\_ROOT, and HKEY\_CURRENT\_USER so the installation software can set the environment appropriately. You also need to be logged on with Administrator privileges.

## On UNIX

### System Requirements for Micro Focus Enterprise Developer UNIX Components

#### Hardware Requirements

The disk space requirements for Micro Focus Enterprise Developer UNIX Components are approximately:

Platform	Installer type	Setup file size	Disk space required for the installation	Disk space required for running the product	Sentinel RMS license server
POWER running AIX	Micro Focus	533 MB	2.13 GB	1.07 GB	41 MB
HP IA	Micro Focus	953 MB	3.81 GB	1.90 GB	79 MB
System Z running Red Hat Linux	Micro Focus	425 MB	1.70 GB	850 MB	39 MB
x86-64 running Red Hat Linux	Micro Focus	540 MB	2.16 GB	1.08 GB	50 MB
ppc64le running Red Hat Linux	Micro Focus	303 MB	1.21 GB	606 MB	1 MB
SPARC running Solaris	Micro Focus	519 MB	2.08 GB	1.04 GB	38 MB
x86-64 running Solaris	Micro Focus	472 MB	1.89 GB	944 MB	33 MB
System Z running SUSE SLES	Micro Focus	306 MB	1.22 GB	612 MB	39 MB
x64 running SUSE SLES	Micro Focus	384 MB	1.54 GB	768 MB	50 MB
ppc64le running SUSE SLES	Micro Focus	272 MB	1.09 GB	544 MB	1 MB

#### Operating Systems Supported

For a list of the supported operating systems, check the *Product Availability* section on the Micro Focus SupportLine Web site: <http://supportline.microfocus.com/prodavail.aspx>.

## Software Requirements for Micro Focus Enterprise Developer UNIX Components

These are the software requirements for Micro Focus Enterprise Developer UNIX Components:

- The "awk", "ed", "sed" and "tar" utilities must be installed and added to the PATH.
- The pax archiving utility is required by the setup file. Pax is distributed with most UNIX/Linux systems but, if it is missing, you must install it separately. To verify pax is installed, run `pax --help` or `pax --version` at the command line.
- Required libraries for Red Hat and SUSE Linux platforms - The installer checks that both the 32-bit and 64-bit libraries listed below are installed on both 32-bit and on 64-bit Operating Systems for this product to install and work correctly.

If installing on a 64-bit OS, the 32-bit libraries are not installed by default and must be installed before you start the installation.

Library	32-bit Library Name	64-bit Library Name	Platform			
			s390	SUSE 12	Red Hat 6x	Red Hat 7
glibc	glibc-*.i686	glibc-*.x86_64	glibc-*.s390		X	X
libgcc	libgcc-*.i686	libgcc-*.x86_64	libgcc-*.s390		X	X
libstdc++	libstdc++-*.i686	libstdc++-*.x86_64	libstdc++-*.s390		X	X
glibc-locale	glibc-locale-32bit	glibc-locale-2		X		
glibc-devel	glibc-devel-*.i686	glibc-devel-*.x86_64	glibc-devel-*.s390		X	X
elfutils-libelf	elfutils-libelf.i386 or elfutils-libelf.i686	elfutils-libelf.x86-64	N/A		X	X
libelf-devel	elfutils-devel.i386 or elfutils-devel.i686	elfutils-devel.x86-64	N/A		X	X
libelf-devel	libelf-devel-32bit-0.137-8.19	libelf-devel-0.137-8.19	N/A	X	x	
libelf1	libelf1-32bit-0.137-8.19	libelf1-0.137-8.19	N/A	X		
gcc <sup>2</sup>	gcc*.i686	gcc*x86_64	X	X	X	X
cpp <sup>2</sup>		cpp*x86_64			X	X
ld <sup>2</sup>	Binutils*.i686	Binutils*x86_64	X	X	X	X

- <sup>1</sup> On SUSE 12, you can only install the 64-bit version of Enterprise Developer. The glibc-locale-32bit library is still required by the SafeNet Sentinel licensed components.
- \* Additional libraries required to use the core\_on\_error runtime variable. The gdb packages (for the GNU Project Debugger) can be installed from the install media for your OS.
- \*\* Operating system libraries required for PL/I support on both SUSE and Red Hat.
- <sup>2</sup> On Red Hat, these libraries are required to enable COBOL and PL/I to compile.
- Libraries marked with an 'X' are not included in the platform and need to be installed separately.

Visit the [Red Hat Web site](#) for more information.

- Xterm, the terminal emulator for the X Window System, is part of your UNIX/Linux distribution but is not installed by default. Use your UNIX/Linux installation media to install it.
- Java 8 (64-bit) is required to run the Eclipse IDE. The minimum recommended version is AdoptOpenJDK's OpenJDK 8 (u202) with Hotspot, which the Windows product installs automatically. Java 8 (32 or 64-bit versions), and Java 11 (64-bit version only) are supported for executing JVM COBOL code and for native COBOL and Java interoperability. You can download AdoptOpenJDK's OpenJDK 8 with Hotspot from [AdoptOpenJDK's Web site](#) and unpack the archive anywhere on your machine.



**Note:** Eclipse does not run using Java 11.

Java 8 (64-bit) is required to run the Eclipse IDE. The minimum recommended version is AdoptOpenJDK's OpenJDK 8 (u202) with Hotspot, which the Windows product installs automatically. Java 8 (32 or 64-bit versions), and Java 11 (64-bit version only) are supported for executing JVM COBOL code and for native COBOL and Java interoperability. You can download AdoptOpenJDK's OpenJDK 8 with Hotspot from [AdoptOpenJDK's Web site](#) and unpack the archive anywhere on your machine.



**Note:** Eclipse does not run using Java 11.



**Note:**

- On AIX and zLinux, you need to have IBM's JDK. The earliest supported release of IBM's JDK is 7.0 Service Refresh 8. If you install IBM's JDK 8, on AIX you must install its latest fix - JDK 8 SR5 FP16. You can get IBM's AIX JDK from [IBM's Web site](#).
- On HP-UX, you need to have HP-UX JDK. The earliest supported release of HP-UX is JDK 7.0.11. You can get the HP-UX Java JDK from [HP's Web site](#).
- On Solaris platforms (both SPARC and Intel) only the 64-bit version of Java 8 and later is supported.
- To execute JVM COBOL code, you need to set the environment as follows:
  - You need to set the JAVA\_HOME environment variable. When installing the product, set this variable to a 64-bit Java installation or the installation terminates. For example, execute the following:
 

```
export JAVA_HOME=java_install_dir
```

 where *java\_install\_dir* is the path to the JAVA installation directory such as */usr/java/javan.n*
  - You need to add \$JAVA\_HOME/bin to your system PATH variable. To do this, execute:
 

```
export PATH=$JAVA_HOME/bin:$PATH
```
  - You need to set the LANG environment variable to pick up localized messages. The LANG settings are English and Japanese only.
- GNOME menus and buttons have been standardized across all applications so that icons are not displayed by default. To keep the icons and the look and feel of previous versions, enable the menus\_have\_icons property with the command:
 

```
gconftool-2 --type boolean --set /desktop/gnome/interface/menus_have_icons true
```

## Additional Software Requirements for Micro Focus Enterprise Developer UNIX Components

To ensure full functionality for some Enterprise Developer features, you might be required to obtain and install additional third-party software in addition to the prerequisite software installed automatically by the Enterprise Developer setup file.

[Click here](#) to see this information on the Product Documentation pages on Micro Focus SupportLine.

## UNIX and Linux Installer Issues

### Installing on Linux

On Linux, the RPM installer for Enterprise Developer for Eclipse installs a 64-bit version of Java. When you start the installation, if the 32-bit version of Java is already installed on your Linux machine, you might not be able to install Enterprise Developer. This is a *known issue* with the Oracle Java installers for Linux which prevents you from installing both the 32-bit and the 64-bit versions of Java on the same machine. To work around this problem:

- Download the 64-bit Java distribution in a compressed .tar format from the Oracle Web site.
- Untar the distribution into a location different from the one used for the 32-bit Java version. For example, untar in `/usr/local/java64` and not in `/usr/local/java`.
- Set `JAVA_HOME` and `LD_LIBRARY_PATH` to the 64-bit version of Java so that it is used to install and run Enterprise Developer.

### Installing while using AFS/Kerberos authentication

If you are using AFS/Kerberos authentication to log onto your Linux system then you need to ensure you have a local user ID which SOA and Enterprise Developer components of the product can use. This user ID must be set up prior to running the installer. When running the installer you need to specify - `ESadminID=[User ID]` on the command line so it is used by the installer.

### License Server

You need to configure the computer hostname to ensure the license server will start properly.

To avoid performance issues, "localhost" and the computer hostname must not both be mapped to IP address 127.0.0.1. You should only map "localhost" to IP address 127.0.0.1.

The following is an example of how to specify these entries correctly in the `/etc/hosts` file:

```
127.0.0.1 localhost.localdomain localhost
IP machinelonghostname machineshorthostname
```

where *IP* is the unique IP address of the computer in `xx.xx.xx.xx` format.

## Basic Installation

The instructions in this section apply when you are performing a basic installation of this product for the first time. If you are an administrator, you can perform a basic installation on a local machine before performing a more advanced installation when rolling out the product to developers within your organization.

For considerations when installing this product as an upgrade, for additional installation options or non-default installations and for installing the mainframe components, see *Advanced Installation Tasks* in your product Help.

# Installing on Windows



## Note:

- This version of the product is a full install.
- If you have an earlier version of Enterprise Developer installed on your machine, check *Installing as an Upgrade* before you start the installation - see *Advanced Installation Tasks*.

These are the steps to install Enterprise Developer:

1. Run the `ede_50.exe` file and follow the wizard instructions to complete the installation.

By default, this installs Enterprise Developer in the `%ProgramFiles(x86)%\Micro Focus\Enterprise Developer` folder and installs a full version of Eclipse 4.8 64-bit, with the Micro Focus plugins already installed, in the `C:\Users\Public\Micro Focus\Product Name\eclipse` directory.

The setup file installs any missing prerequisite software as listed in the topic *Software Requirements*.



**Note:** See *Advanced Installation Tasks* for information about non-default installation tasks.

# Installing Micro Focus Enterprise Developer UNIX Components



**Note:** Micro Focus offers two types of installers on UNIX and Linux - a proprietary Micro Focus installer for installing on UNIX and Linux and a standard RPM (RPM Package Manager) installer for installing on Linux. See your product Help for instructions on how to use the RPM installer.

These are the steps to install this product using the Micro Focus installer:

1. Give execute permissions to the setup file:

```
chmod +x setup_entdev_5.0_platform
```

2. Run the installer from the Process User ID login:

```
./setup_entdev_5.0_platform
```

When the installer starts it will prompt you to enter the superuser password so it can perform operations that require root permissions.

The COBOL environment is installed by default into `/opt/microfocus/EnterpriseDeveloper`, (COBDIR).

## SafeNet Sentinel considerations

- The installation of this product could affect the SafeNet Sentinel licensed components running on your machine. During installation licensing is shutdown to allow files to be updated. To ensure the processes running on your machine are not affected, you need to use the `-skipsafenet` option, which skips the installation of SafeNet:

```
./setup_entdev_5.0_platform -skipsafenet
```

- To protect the SafeNet Sentinel installation from accidental updating you can create an empty file named `SKIP_SAFENET_INSTALL` in `/var/microfocuslicensing/` as follows:

```
touch /var/microfocuslicensing/SKIP_SAFENET_INSTALL
```

While the file is present, the SafeNet installer does not make changes to the installation or shutdown the running license daemons. If licensing needs to be updated later, remove the file and install Sentinel RMS server manually.



#### Note:

During the installation process, the installer configures the product's Enterprise Server System Administrator Process User ID. The Process User ID will be the owner of all Enterprise Server processes except the one for the Micro Focus Directory Server (MFDS). The Directory Server process (Enterprise Server Administration) runs as root as this allows it to access the system files and ports.

All Enterprise Server processes you start from Enterprise Server Administration run under the Process User ID which can affect the file access and creation.

By default, the installer uses the login id of the user that runs the installer for the Process User ID. To change the user id after you complete the installation, execute `$COBDIR/bin/casperm.sh`.

## Advanced Installation Tasks

This section includes instructions about how to perform a non-default installation, install this product as an upgrade, or about how to install the additional components.

The advanced installation tasks include:

- *Installing as an Upgrade* - included in these Release Notes
- *Command line installation options* - included in these Release Notes
- *Installing using an RPM installer on Linux* - available in the product Help and on the Product Documentation pages on Micro Focus SupportLine
- *Installing and licensing Micro Focus Rumba* - available in the product Help and on the Product Documentation pages on Micro Focus SupportLine
- *Installing into other instances of Eclipse* - available in the product Help and on the Product Documentation pages on Micro Focus SupportLine
- *Installing the Mainframe Components*, - Mainframe Access Server, Application Workflow Manager into IDz, z/Server - available in the product Help and on the Product Documentation pages on Micro Focus SupportLine
- *Installing on Microsoft Terminal Server and Citrix* - available in the product Help and on the Product Documentation pages on Micro Focus SupportLine

[Click here](#) to see this information on the Product Documentation pages on Micro Focus SupportLine.

## On Windows

### Installing as an Upgrade

Installing this release as an upgrade will automatically uninstall any Patch Updates of the older version of the product you have installed on your machine.

- If you have been using the mainframe components of Enterprise Developer for z Systems, see *Installing z/Server as an Upgrade* for recommendations about how to upgrade your z/Server installation. Also, check *Backward Compatibility of AWM Models* for information about changes that affect your existing AWM models.
- Before installing this release as an upgrade, ensure you create a back-up of your Enterprise Server configuration. To do this, on the Enterprise Server Administration home page, click **Export** and then select **Export Enterprise Server configuration and Security Manager definitions**. This creates a backup folder in the `c:\programdata\micro focus\Enterprise Developer\MFDS`. You can restore the Enterprise Server configuration after installing this release - click **Import** on the Enterprise Server Administration home page.

## Enterprise Developer Installation Options

You can install Micro Focus products silently by specifying `/q` at the command line and using command line parameters to specify the installation directory (`installfolder=path`), user information, and which features to install. You must execute the command with superuser permissions.

To see what parameters you can use, execute the following from the command line:

```
install-file /help
```

where *install-file* for the following products is as follows:

**Enterprise Developer** ede\_50.exe

See the *Examples* section further in this topic for examples of some of the parameters you can use.

### Directory considerations

- You must have read and write access for every directory accessed during the installation.
- You can override the default installation folder using the `InstallFolder` parameter.
- Installing creates a group of log files prefixed `Micro_Focus_` in the `%temp%` folder, by default. To change the location or name, use the `/log` parameter on your Setup command line and specify the path and file name, for example:

```
/log drive:\path\LogFilename
```

### Installing silently

Use the `/q` parameter to install silently:

```
start /wait install-file.exe /q [parameters]
```

### Examples

- To silently install Enterprise Developer into a directory other than the default:  

```
start /wait ede_50.exe /q InstallFolder=c:\DirectoryName
```
- If you want to silently install the Eclipse IDE in a location other than the default, execute:  

```
start /wait ede_50.exe /q InstallFolder2=c:\EclipseInstallDirectory
```
- To silently install Rumba+ Desktop during the silent install of Enterprise Developer:  

```
start /wait ede_50.exe /q RumbaCheckbox=1
```

## On UNIX

### Installing as an Upgrade

This release works concurrently with the previous version of Micro Focus Enterprise Developer UNIX Components, so you do not need to uninstall it.

Install the latest version in a different location and set the environment to point to it. To do this, run the Micro Focus Enterprise Developer UNIX Components installer with the `-installlocation` option:

1. Execute the following command:

```
./InstallFile -installlocation="/opt/microfocus/EnterpriseDeveloper"
```

 **Note:** You can use variables when specifying an absolute path for `-installlocation`. For example, the following examples are equivalent:

```
-installlocation="/home/myid/installdir"
```

```
-installlocation="$HOME/installdir"
```

2. Execute `cobsetenv` to set the environment and point to the new install location:

```
. <product-install-dir>/bin/cobsetenv
```

 **Note:** `cobsetenv` is only compatible with POSIX-like shells, such as `bash`, `ksh`, or `XPG4 sh`. It is not compatible with C-shell or pre-XPG4 Bourne shell.

## Micro Focus Enterprise Developer UNIX Components Installation Options

### Installing into a different location

To install in a different location use the `-installlocation="Location"` parameter to specify an alternative directory location. For example:

```
./setup_entdev_5.0_platform -installlocation="full path of new location"
```

 **Note:** You can use variables when specifying an absolute path for `-installlocation`. For example, the following examples are equivalent:

```
-installlocation="/home/myid/installdir"
```

```
-installlocation="$HOME/installdir"
```

You can see details about which additional parameters can be passed to the install script if you enter the `-help` option.

### Configuring the Enterprise Server installation

You can use the following options to configure the Enterprise Server installation: [ `-ESsysLog="Y/N"` ] [ `-ESadminID="User ID"` ] [ `-CASrtDir="location"` ], where:

**-ESsysLog** Use this to enable ("Y") or disable ("N") Enterprise Server system logging. Logging is enabled by default. Log files are saved in `/var/mfcobol/logs`.

**-ESadminID** Sets the Enterprise Server System Administrator Process User ID from the command line - for example, `-ESadminID="esadm"`. The default user ID is the one that runs the installer.

**-CASrtDir** Specifies the location where the Enterprise Server run-time system files are placed - for example, `-CASrtDir="/home/esuser/casrt/es"`. The default location is `/var/mfcobol/es`.

### Installing Silently

You can install Micro Focus products silently by using command line parameters to specify the installation directory, user information, and which features to install. You must execute the command with superuser permissions.

You can use the following command line arguments to install silently on UNIX/Linux. You need to execute the commands as root:

```
-silent -IacceptEULA
```

For example, execute:

```
setup_filename -silent -IacceptEULA
```

# Installing on Microsoft Terminal Server and Citrix



**Note:** This document is a work-in-progress. Check the documentation for Enterprise Developer in the *Product Documentation* section of the Enterprise Developer SupportLine Web site for its most recent version.

Microsoft Terminal Server and Citrix (TS/Citrix) are environments for running multiple instances of a single user product. They are not platforms where a single-user product can be made to perform as a multi-user product.

When running Enterprise Developer on TS/Citrix machine, there might be some implications to components of Enterprise Developer which could cause potential conflicts between a 'per-user session' compared to the standard 'per machine' setup. The following components of Enterprise Developer require special configuration:

- Eclipse workspaces and projects
- The Enterprise Server component - the Run-Time System product for JCL, CICS and IMS operations
- The database management service

You can use Enterprise Developer with TS or with any Citrix version certified for use with Eclipse; however, a separate end-user license is required for each user who accesses Enterprise Developer, even if it is running on a single machine. See your *End User License Agreement* for clarification.



**Note:** Micro Focus Enterprise Developer does not officially support TS/Citrix. However, it will run on any prerequisite Operating System that is supported under TS/Citrix.

## Capacity planning

Multi-user capacity planning for TS/Citrix does not scale linearly, and the calculations required for this planning are not directly related or specific to any Micro Focus technology. Micro Focus recommends that you consult with Microsoft or Citrix Systems, respectively, about the server sizing and capacity planning, based on hosting the required number of "rich" Windows 7 or Windows 8 desktops (e.g. using a singleton desktop build as a baseline).

## Installing Enterprise Developer

To install Enterprise Developer for use with TS/Citrix:

1. Log on to the physical terminal or Citrix server with a user ID that has administrator privileges.
2. Use the download links in your Electronic Product Delivery email.
3. Follow the links for the installation instructions and the End User License Agreement.

## Configuring Enterprise Developer

Follow the links below for details on how to configure the individual Enterprise Developer components.

## Customizing the Installation, the Workspace and the Projects

### Using Enterprise Developer for Eclipse under TS/Citrix

For considerations about how to use Eclipse under TS/Citrix refer to the [Eclipse product help](#).

Micro Focus recommends you set up Enterprise Developer for Eclipse so that each user has their own configuration area and you make the `configuration` folder within the Eclipse installation read-only. (Enterprise Developer for Eclipse is installed on the TS/Citrix machine into `%ProgramFiles(x86)%\Micro Focus\Enterprise Developer` with the Eclipse installation stored in `C:\Users\Public\Micro Focus\Enterprise Developer\eclipse`.)

To ensure that each user will have their own configuration area, you need to set up Eclipse as follows:

1. On the TS/Citrix machine, start Enterprise Developer once, make any required customizations to the IDE and then close it.
2. Using Windows Explorer, navigate to `C:\Users\Public\Micro Focus\Enterprise Developer\ eclipse` and open the `eclipse.ini` file with an editor.
3. Add the following code before the `-vmargs` entry:

```
-configuration
@user.home\EclipseConfig
```

4. Using Windows Explorer, navigate to the Eclipse installation folder and from the folder properties make the `configuration` folder **Read Only** for the group that will work with Enterprise Developer for Eclipse.

This ensures that each user that starts Enterprise Developer for Eclipse under TS/Citrix can only see their own workspaces and that they have their own `EclipseConfig` folder specified by the `eclipse.ini` file.

### Eclipse workspaces

An Eclipse workspace is a folder on the disk where the project and application files are stored. The default location for an Eclipse workspace is in the user's area (for example, `c:\users\username\`). It is not possible to share workspaces so each user must have their own.

We suggest that you create Eclipse workspaces in an area on a shared network drive, naming each workspace folder with an individual user ID.

Also provide a startup script that maps the drive dynamically using share names derived from the user ID.



**Tip:** Use the `net use` command to connect to, remove and configure the connections to the mapped drives.

### Template projects

Create and configure template projects to distribute among your users. Templates must not include fully qualified paths. You can store the projects in a source control system and make them available so that individual users can import them into their own workspace.

## Enterprise Server Installation Options

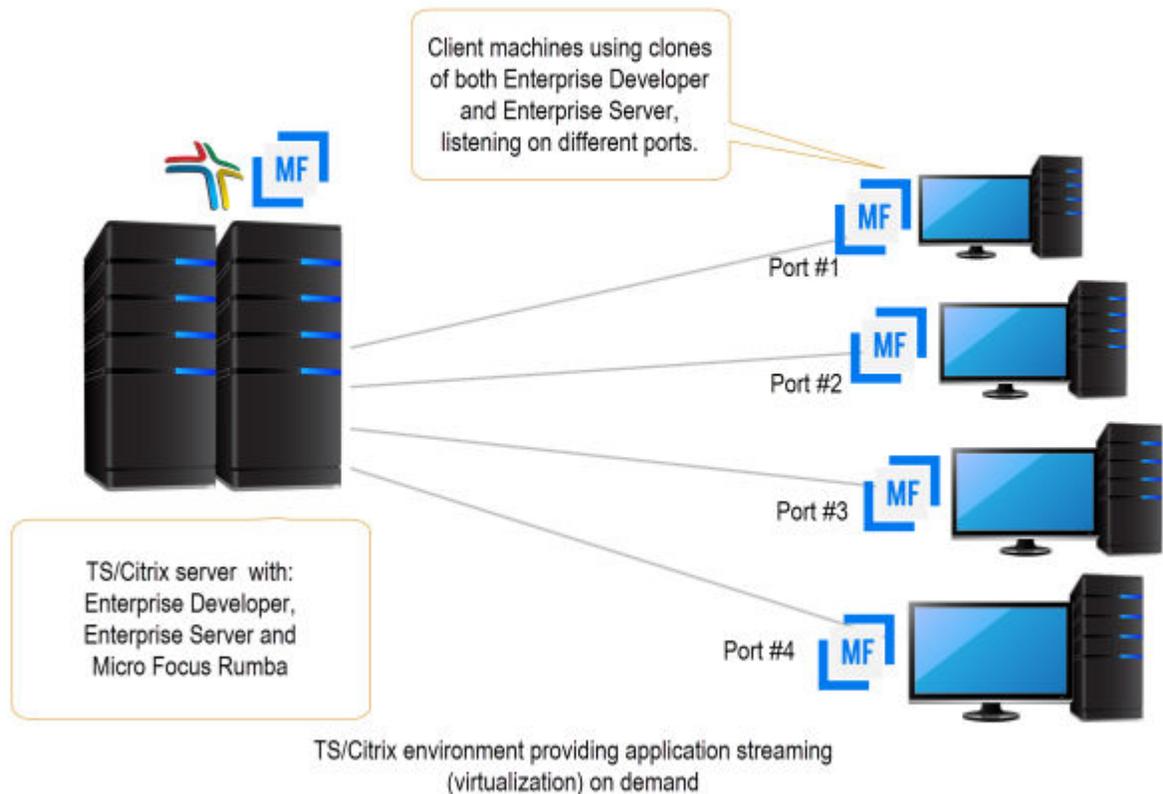
When you install Enterprise Developer, the setup file also installs the Enterprise Server component on the same machine. There are different ways in which you can configure and use Enterprise Server regions in TS/Citrix environments. This topic outlines two of the methods and explains what the implications of choosing them are:

- Use the Enterprise Server component as part of Enterprise Developer installed on the TS/Citrix machine
- Install Enterprise Server or Enterprise Test Server on a separate server

### Use the Enterprise Server component as part of Enterprise Developer installed on the TS/Citrix machine

On the client machines, the developers each use a clone of Enterprise Developer. They also use a clone of Enterprise Server to create and manage multiple server instances as required.

While this option provides the greatest flexibility, it also consumes the largest footprint per user.



### Install Enterprise Server or Enterprise Test Server on a separate server

You can install Enterprise Server<sup>2</sup> or Enterprise Test Server<sup>3</sup> on a separate server that does not have TS/Citrix installed. By default, Enterprise Server installs and runs as a single-instance product and, within an Enterprise Server, you can operate a number of server instances. Each server provides session and state management for COBOL applications, as well as optionally interfacing with external resource managers to coordinate resource updates.

There are two ways to provide server instances to the developers using Enterprise Developer on the TS/Citrix machine:

- Configure and configure one server instance per developer by specifying different ports. We recommend defining five-digit port numbers where digits one through three identify the developer and four through five identify a unique port. For example: port number 10123 defines a TN3270 listener for developer 1, and port number 10223 defines a TN3270 listener for developer 2.

<sup>2</sup> Micro Focus Enterprise Server provides full application server support for COBOL applications that require high-performance and mainframe subsystem emulation. Enterprise Server is designed as a multi-user environment.

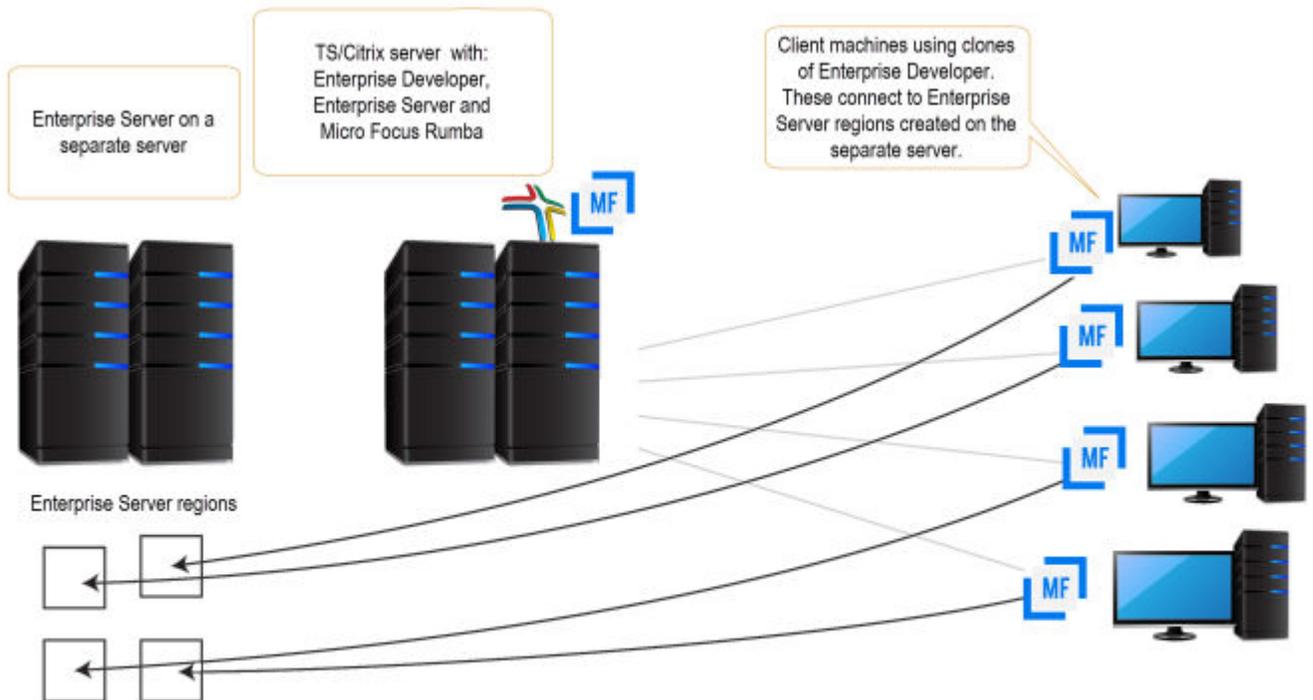
<sup>3</sup> Micro Focus Enterprise Test Server is an IBM mainframe application test execution environment on Windows. Enterprise Test Server enables mainframe IT organizations to perform a variety of pre-production testing on low cost commodity hardware, avoiding unnecessary cost and delay. Built on proven technology, Enterprise Test Server exponentially expands the test capacity and enables testing to scale up easily to meet delivery timelines and quality standards driven by today's business requirements.

This option provides a dedicated enterprise server for testing purposes for each developer, but restricts each developer to that one enterprise server instance.

This scenario creates the largest footprint per developer.

Or:

- Create and configure one server instance per application for use by a single development team. Use a different port number for each instance as explained above, using the first three digits to differentiate between applications.



## Configuring SQL Option for DB2 (XDB) for Multi-User Environments

SQL Option for DB2 in Enterprise Developer supports scenarios where multiple users use a single XDB Server installed on a TS/Citrix server. Typically, users in such environments would require their own private working locations so they can be isolated from each other's activity on the TS/Citrix server and might require different XDB configuration settings. SQL Option for DB2 provides support for this.

The configuration options for XDB Server are stored in the `xdb.ini` configuration file installed in the Windows protected area in `C:\ProgramData\Micro Focus\Enterprise Developer\mfsql\cfg`.

`xdb.ini` contains both client-side and server-side settings for the XDB tools.

### Changing the server-side settings

In most cases, it is not necessary to change XDB Server's server-side settings. If you need to change these settings, however, it is important that you use the XDB tools to modify the `xdb.ini` file as the tools run with administrator's privileges. This helps avoid some possible issues with Windows virtualizing files in the protected areas that you try to edit without administrator's privileges.

See *Changing the Main XDB Server Configuration File*.

### Changing the client-side settings

In multi-user environments such as TS/Citrix, it is important to provide individual users with their own client-side configuration options for XDB. To cater for that, Enterprise Developer provides a utility, XDBSetup, which creates a private XDB configuration file for each user in their local Windows folder on the TS/Citrix machine.

Users would run XDBSetup before they start using any of the XDB components on the TS/Citrix server. They can then use the XDB Client Options utility (XOPT40N) to customize their own version of `xdb.ini` and specify any required client-side run-time options and a temporary space for the client-side tools. For example, they might want to customize various options such as the isolation level, the lock timeout (for example, if they want a longer record lock timeout for testing), the data formats (if they want a different date format to test the software for internationalization issues), the SQLWizard configuration, and the private area for saved files.

XDBSetup also creates some entries in the user's specific area in the registry which point to the location of the private `xdb.ini` file. This ensures that XDB Server will use the main `xdb.ini` file installed under the `c:\ProgramData` folder, while any of the XDB tools that individual users start will use the private `xdb.ini` files that users might have customized according to their own preferences.

See *Creating a Private XDB Configuration File in a Multi-User Environment*.

### Configuring the private XDB Server options in batch

If all users must have the same environment and use a specific standard set of client-side options in their private `xdb.ini` files, a system administrator can set this up for them using a batch file. The batch file would execute XDBSetup to create the private `xdb.ini` files and then it would execute BOPT40N, the batch version of the XDB Client Options utility, to specify the same client-side options in each private `xdb.ini` file.

See *Changing the Private XDB Server Configuration Files in Batch*.

### Creating a Private XDB Configuration File in a Multi-User Environment

Before using XDB Server on a TS/Citrix machine, all users must first run the XDBSetup utility to create a private XDB Server configuration file, `xdb.ini`, in their local Windows folders.

To run the utility:

1. Log in to the TS/Citrix machine using the Windows Remote Desktop Connection.
2. Execute the following from an Enterprise Developer command prompt:

```
XDBSetup
```

See *Syntax of the XDBSetup command* for more details.

This creates a standard `xdb.ini` file in the user's Windows home directory, in `c:\Users\username\AppData\Roaming\Micro Focus\Enterprise Developer\mfsql\`, for which the user does not need administrator's credentials to change the file.

This also creates some registry entries in the user's specific area which point to the location of the private `xdb.ini` file. When any of the XDB tools are executed, they check the user's registry settings for whether there is a private configuration file before they check the local machine registry settings which store the location of the main XDB Server configuration file.

### Syntax of the XDBSetup command

The XDBSetup utility can run in either an interactive or unattended mode. Use the following syntax to execute the utility:

```
XDBSetup [-u|--unattended]
```

Where you can specify the following options:

**No options** XDBSetup executes in an interactive mode. You receive some pop-up windows confirming whether the operation completed successfully, prompting whether to overwrite a previously installed `xdb.ini`, and possibly showing any status or error messages.

**-u, --unattended** XDBSetup executes in an unattended mode.

Log files:

1. A log of the commands activity is output to the standard error output handle.
2. If you need to receive any standard errors, specify ">" to redirect the standard output. To redirect any standard errors, use "2>" as a redirection symbol. If this is not specified, any messages are displayed in the command prompt.

### Changing the Main XDB Server Configuration File

The XDB Server configuration file, `xdb.ini`, is installed in a Windows protected location - in `C:\ProgramData\Micro Focus\Enterprise Developer\mfsql\cfg`, by default. You need administrator's privileges to edit the file to help avoid some problems that Windows file virtualization can cause.

Micro Focus recommends that you use the XDB tools to edit `xdb.ini` because the XDB tools include a Windows manifest that requests administrative credentials for updating files in the Windows protected areas. You need to run the tools from the command line and specify `xdb.ini` as an argument. For example, if you use the XDB Client Options utility, execute:

```
XOPT40N /i"C:\ProgramData\Micro Focus\Enterprise Developer\mfsql\cfg\xdb.ini"
```

### Avoiding Windows virtualization issues

Files that reside in the Windows protected locations, such as `xdb.ini`, that reside in the Windows protected locations require that you edit them with administrative privileges. If you use utilities such as Notepad that do not request administrator's credentials, Windows file virtualization does not save the modifications in the actual file you edit but creates a copy of the file in the `%userprofile%\AppData\Local\VirtualStore` folder.

From then on, programs that run without administrative credentials use the file in the `VirtualStore` folder while those that run with administrative credentials use the actual `xdb.ini` file which can lead to some confusing results.

### Changing the Private XDB Server Configuration Files in Batch

The XDB Client Batch Options command, `BOPT40N`, is a batch version of the XDB Client Options utility, `XOPT40N`.

You can use `BOPT40N` to modify the options in the `xdb.ini` file in batch. The syntax of the command is as follows:

```
bopt40n /pSection.Variable=Value
```

Where:

*Section*, *Variable* and *Value* indicate a section in `xdb.ini`, a variable in that section and the value you want to set the variable to.



**Note:** If any of *Section*, *Variable* or *Value* include any spaces, you must use quotes around the entire argument. In the following example, the connection name has an embedded space in the section name so you need to use quotes around the entire argument in the command as follows:

```
bopt40n "/pConnection MYSERVER.CurrentLocation=MYLOC"
```

## Configuring Other Components

### Micro Focus Rumba+ Desktop

To use Micro Focus Rumba+ Desktop on a TS/Citrix machine, ensure you install a license for this type of environment. Contact Micro Focus Sales for more information.

### ViewNow Installation

To use ViewNow on a TS/Citrix machine, ensure you install a license for this type of environment. Contact Micro Focus Sales for more information.

## After Installing

- See *Changes in Behavior or Usage* in your product documentation and in the Release Notes for important information about changes in this release that might affect existing applications.
- Check the *Product Documentation* section of the [Micro Focus SupportLine Web site](#) for any updates to the documentation which might have been uploaded.

## Configuring Enterprise Developer

If you have used Eclipse from the same workspace before, the Eclipse perspective settings are not reset after installing any Micro Focus product. To pick up any new features, you must reset the perspective you are working with after installation:

1. Open the existing workspace with this product.  
You may receive some warnings or errors which you can ignore.
2. Make sure you are in the perspective you need to reset by clicking **Window > Perspective > Open Perspective > Other**.
3. From the **Open Perspective** dialog box, click the perspective you want to reset.
4. Click **OK**.
5. Click **Window > Perspective > Reset Perspective**.
6. When prompted, click **Yes**.
7. Reapply any customizations.

## On Windows

### Installing X Windows on Windows

Some features of Enterprise Developer for Eclipse on Windows require an X Windows installation, hence Micro Focus ViewNowX is provided with the product.

To install ViewNowX:

1. Using Windows Explorer, navigate to the folder that contains the ViewNowX executable. By default, this is `%ProgramFiles(x86)%\Micro Focus\Enterprise Developer\ViewNowX`.
2. Execute `ViewNow_X_Server.exe` and then `vnx_HF_11327.msp` in that folder.

ViewNowX requires that your client machine has Microsoft Visual C++ 2008 SP1 Redistributable Package (x86) installed. If it is missing from your machine, the ViewNowX installation will offer a link to download the package.

## Repairing on Windows

If any product files, registry settings or shortcuts are accidentally removed at any point, you can perform a repair on the installation to replace them.

To repair your installation on versions of Windows Vista or later:

1. From the **Control Panel**, click **Uninstall a program** under **Programs**.
2. Right-click your Micro Focus product and select **Repair**.

## Uninstalling

To uninstall the product, you cannot simply delete its files from your hard disk. To uninstall the product:

1. Log in with the same user-ID as you used when you installed the product.
2. Click **Uninstall a program** under **Programs** in **Control Panel**.
3. Select the product and click **Remove** or **Uninstall** as appropriate.

When you uninstall, the only files deleted are those that the installation software installed. If the product directory has not been removed, delete any unwanted files and subdirectories within it using Windows Explorer.

 **Note:** The installer creates separate installations for Micro Focus Enterprise Developer and Micro Focus License Administration. Uninstalling only Enterprise Developer does not automatically uninstall the Micro Focus License Administration or any of the prerequisite software.

To completely remove the product you must uninstall the Micro Focus License Administration as well.

You can optionally remove the prerequisite software. For instructions, check the documentation of the respective software vendor.

Some registry entries are not removed by the uninstallation process and you need to manually delete them.

The following folders might not be removed:

- The *Micro Focus Product Name* folder in the Start menu - you can delete it manually.
- %systemdrive%\Users\Public\Documents\Micro Focus - includes the binaries and the log files of the samples which you have built.
- %ProgramData%\Micro Focus - includes some data files used by the Micro Focus licensing system.
- %Program Files%\Micro Focus - you can delete it manually.

To silently uninstall the product, you need the setup file and you need to execute the following at the command line:

```
start /wait install-file.exe /quiet /uninstall
```

In addition, the following registry entries are not removed. These are created the first time that an Enterprise Server that has been enabled for performance monitoring starts up:

- Micro Focus Server\Performance\Active Servers
- Micro Focus Server\Performance\PerfIniFile

## On UNIX

### Configuring the Remote System Explorer Support

 **Note:** The following only applies if you are using Micro Focus Enterprise Developer UNIX Components with Enterprise Developer for Eclipse.

The remote development support from the Eclipse IDE relies upon Enterprise Developer running on the UNIX machine and handling all requests from the IDE for building and debugging programs. Enterprise

Developer provides a UNIX daemon, the Remote Development Option (RDO) daemon, which initiates the RDO as Eclipse clients connect to it. Whichever environment is used to start the RDO daemon will be inherited for all servers and hence all build and debug sessions.

## Configuring the Environment

You may need to configure some aspects of the environment before you start the daemon. This is because when a build or debug session is initiated from one of the Eclipse clients, the environment used will be inherited from whatever was used to start the daemon. A typical example of the kind of environment that might need to be set up would include database locations and settings for SQL access at build/run time.

## Starting the Daemon

 **Important:** Before starting the daemon you must have the following on your UNIX machine:

- A version of Perl.
- A version of Java 8 or later.
- The `as` (assembler) and `ld` (linking) programs on the path, as specified by the `PATH` environment variable.

To start the daemon on the default port (4075) as a background process, perform this command with superuser authority:

```
$COBDIR/remotedev/startrdodaemon
```

The daemon will now listen for any Eclipse client processes connecting to that machine on port 4075. If you want to use another port, specify another port number on the `startrdodaemon` command.

The daemon can also be configured to instantiate the servers on a specified port or range of ports. This is particularly relevant when you want to only open certain ports through a firewall. To do this, perform this command with superuser authority:

```
$COBDIR/remotedev/startrdodaemon [<port> | <low port>-<high port>]
```

where:

- `<port>` is the port number the daemon should use to listen for connections from Eclipse on the client machine. If no value is given, it will be assigned a default value of 4075. This value matches the value assigned within the Eclipse installation.

For example,

```
$COBDIR/remotedev/startrdodaemon 4999
```

This command will start a daemon listening on port 4999 and will use random server ports.

- `<low port>-<high port>` is the range of ports on which the servers (launched by the daemon) should use to communicate with Eclipse on the client machine.

For example,

```
$COBDIR/remotedev/startrdodaemon 4080 4090-4999
```

This command will start a daemon listening on port 4080 and server ports will be in the range 4090 to 4999.

## Stopping the Daemon

To stop the daemon, type the following command with superuser authority:

```
$COBDIR/remotedev/stoprdodaemon <port>
```

## Repairing on UNIX

If a file in the installation of the product becomes corrupt, or is missing, we recommend that you reinstall the product.

## Uninstalling



**Note:** Before you uninstall the product, ensure that the Enterprise Server instances and the Micro Focus Directory Service (MFDS) are stopped.

To uninstall this product:

1. Execute as root the `Uninstall_EnterpriseDeveloper5.0.sh` script in the `$COBDIR/bin` directory.



**Note:** The installer creates separate installations for the product and for Micro Focus License Administration. Uninstalling the product does not automatically uninstall the Micro Focus License Administration or the prerequisite software. To completely remove the product you must uninstall the Micro Focus License Administration as well.

To uninstall Micro Focus License Administration:

1. Execute as root the `UnInstallMFLicenseServer.sh` script in the `/var/microfocuslicensing/bin` directory.

The script does not remove some of the files as they contain certain system settings or licenses.

You can optionally remove the prerequisite software. For instructions, check the documentation of the respective software vendor.

# Licensing Information



## Note:

- If you have purchased licenses for a previous release of this product, those licenses will also enable you to use this release.
- If you are unsure of what your license entitlement is or if you wish to purchase additional licenses, contact your sales representative or [Micro Focus SupportLine](#).

## To start Micro Focus License Administration

### Windows

#### Windows 8.1

- From the Windows **Start** screen, click the **License Administration** tile

#### Windows 10 and Later

- From your Windows desktop, click **Start > Micro Focus License Manager > License Administration**

### UNIX

Log on as root, and from a command prompt type:

```
/var/microfocuslicensing/bin/cesadmintool.sh
```

## Installing licenses

You need either a license file (with a `.mflic` extension) or an authorisation code which consists of a string of 16 alphanumeric characters.

## If you have a license file

### Windows

1. Start Micro Focus License Administration.
2. Click the **Install** tab.
3. Do one of the following:
  - Click **Browse** next to the **License file** field and select the license file (which has an extension of `.mflic`).
  - Drag and drop the license file from Windows Explorer to the **License file** field.
  - Open the license file in a text editor, such as Notepad, then copy and paste the contents of the file into the box below the **License file** field.
4. Click **Install Licenses**.

Alternatively, you can install the license file from within the IDE as follows:

1. Start Enterprise Developer.
2. Click **Help > Micro Focus > Product Licensing** to open the **Product Licensing** dialog box.
3. Ensure **I have a full Enterprise Developer Team Edition license** is checked.

4. Click **Browse** next to the **License file** field.
5. Select the license file (which has an extension of `.mflic`), and then click **Open**.
6. Click **Finish** to install the license.

## UNIX

1. Start the Micro Focus License Administration tool and select the **Manual License Installation** option by entering 4.
2. Enter the name and location of the license file.

## If you have an authorization code

### Authorizing your product when you have an Internet connection



#### Note:

- It is not possible to install licenses remotely. You must be logged into the machine on which you are installing the licenses.

The following procedure describes how to authorize your product using a local or network license server. The license server is set up automatically when you first install the product.

## Windows

1. Start Micro Focus License Administration.
2. Click the **Install** tab.
3. Type the authorization code in the **Enter authorization code** field.
4. Click **Authorize**.

If you change the name of the machine running your license server after it has granted licenses, the licenses stop working.

## UNIX

1. Start Micro Focus License Administration.
2. Select the **Online Authorization** option by entering 1 and pressing **Enter**.
3. Enter your authorization code at the **Authorization Code** prompt and then press **Enter**.

### Authorizing your product when you don't have an Internet connection

This method of authorization is required if the machine you want to license does not have an Internet connection or if normal (automatic) authorization fails.

## Windows

1. Start Micro Focus License Administration.
2. Click **Manual Authorization** on the Install page.
3. Make a note of the contents of the **Machine ID** field. You will need this later.
4. Do one of the following:
  - If your machine has an Internet connection, click the SupportLine Web link in the Manual Authorization Information window.
  - If your machine does not have an Internet connection, make a note of the Web address and type it into a Web browser on a machine that has an Internet connection.

The Micro Focus SupportLine Manual product authorization Web page is displayed.

5. Type the authorization code in the **Authorization Code** field. The authorization code is a 16-character alphanumeric string supplied when you purchased your product.
6. Type the Machine ID in the **Machine ID** field.
7. Type your email address in the **Email Address** field.
8. Click **Generate**.
9. Copy the generated license string (or copy it from the email) and paste it into the box under the **License file** field on the Install page.
10. Click **Install Licenses**.

## UNIX

In order to authorize your product you must have the following:

- Access to a computer which is connected to the Internet.
- Your authorization code (a 16-character alphanumeric string).
- The machine ID. To get this, start the Micro Focus License Administration tool and select the **Get Machine Id** option by inputting 6. Make a note of the "Old machine ID".

If you have previously received the licenses and put them in a text file, skip to step 6.

1. Open the Micro Focus license activation web page <http://supportline.microfocus.com/activation> in a browser.
2. Enter your authorization code and old machine ID and, optionally, your email address in the **Email Address** field.
3. Click **Generate**.
4. Copy the licenses strings from the web page or the email you receive into a file.
5. Put the license file onto your target machine.
6. Start the Micro Focus License Administration tool and select the **Manual License Installation** option by inputting 4.
7. Enter the name and location of the license file.

## To obtain more licenses

If you are unsure of what your license entitlement is or if you wish to purchase additional licenses for Enterprise Developer, contact your sales representative or Micro Focus SupportLine.

# Updates and SupportLine

Our Web site gives up-to-date details of contact numbers and addresses.

## Further Information and Product Support

Additional technical information or advice is available from several sources.

The product support pages contain a considerable amount of additional information, such as:

- The *Product Updates* section of the Micro Focus SupportLine Web site, where you can download fixes and documentation updates. Go to <https://supportline.microfocus.com/websync/productupdatesearch.aspx>
- The *Examples and Utilities* section of the Micro Focus SupportLine Web site, including demos and additional product documentation. Go to <https://supportline.microfocus.com/examplesandutilities/index.aspx>.
- The *Support Resources* section of the Micro Focus SupportLine Web site, that includes troubleshooting guides and information about how to raise an incident. Go to <https://supportline.microfocus.com/supportresources.aspx>

To connect, enter <https://www.microfocus.com> in your browser to go to the Micro Focus home page, then click **Support & Services > Support > Support Resources > All Support Resources by Product**. In the **Browse by Product** field, click the product you require, and then click **Log into SupportLine**.



**Note:** Some information may be available only to customers who have maintenance agreements.

If you obtained this product directly from Micro Focus, contact us as described on the Micro Focus Web site, <https://www.microfocus.com/support-and-services/contact-support/>. If you obtained the product from another source, such as an authorized distributor, contact them for help first. If they are unable to help, contact us.

Also, visit:

- The Micro Focus Community Web site, where you can browse the Knowledge Base, read articles and blogs, find demonstration programs and examples, and discuss this product with other users and Micro Focus specialists. See <https://community.microfocus.com>.
- The Micro Focus YouTube channel for videos related to your product - see <https://www.youtube.com/user/MicroFocusIntl>.

## Information We Need

However you contact us, please try to include the information below, if you have it. The more information you can give, the better Micro Focus SupportLine can help you. But if you don't know all the answers, or you think some are irrelevant to your problem, please give whatever information you have.

- The name and version number of all products that you think might be causing a problem.
- Your computer make and model.
- Your operating system version number and details of any networking software you are using.
- The amount of memory in your computer.
- The relevant page reference or section in the documentation.
- Your serial number. To find out these numbers, look in the subject line and body of your Electronic Product Delivery Notice email that you received from Micro Focus.

On Windows, if you are reporting a protection violation you might be asked to provide a dump ( `.dmp` ) file. To produce a dump file you use the **Unexpected Error** dialog box that is displayed when a protection violation occurs. Unless requested by Micro Focus SupportLine, leave the dump setting as `Normal` (recommended), click **Dump**, then specify a location and name for the dump file. Once the dump file has been written you can email it to Micro Focus SupportLine.

Alternatively, you might be asked to provide a log file created by the Consolidated Tracing Facility (CTF) - a tracing infrastructure that enables you to quickly and easily produce diagnostic information detailing the operation of a number of Micro Focus software components.

On Windows, you can use the Micro Focus SupportLine Support Scan Utility, `MFSupportInfo`, to create either:

- a `.log` file that contains the details about your environment, Micro Focus SupportLine products, and settings.
- a `.zip` archive that includes the same information as the `.log` file plus some product configuration files from `c:\ProgramData` and the product installation log files.

`MFSupportInfo.exe` is stored in `<install-dir>\bin`.

To run `MFSupportInfo`:

1. Start a 32-bit Enterprise Developer command prompt.
2. Enter `MFSupportInfo` at the command prompt to start the utility.
3. Create a `.log` file or a `.zip` archive as follows:

- a. To create a `.log` file, click **File > Save**.

This prompts to save the `.log` file, `MFSupportInfo_Log_MachineName_YYYY-MM-DD_HH-MM-SS.log`, in the `%temp%` directory.

- b. To create a `.zip` archive, click **Tools > Create Zip Package**.

This creates a `.zip` archive, `MFSupportInfo_Log_MachineName_YYYY-MM-DD_HH-MM-SS.zip`, in the `%temp%` directory.

4. Send the diagnostic information to your Micro Focus SupportLine representative:

The following requires an Internet connection and an Email client:

- a. Click **Tools > Email Log to SupportLine** to open the **Email Log** dialog box.
- b. Fill in the required fields and click **Send**.

If the machine is not connected to the Internet or if there are no Email clients installed, copy either the `.log` file or the `.zip` archive to a machine that is connected to the Internet. Use your Email client to email the files to Micro Focus SupportLine at [supportline@microfocus.com](mailto:supportline@microfocus.com) together with the Support Incident (SI) number, if available, and any additional details that might be useful to diagnose the issues that you are experiencing.

On UNIX, you can use the Micro Focus UNIX Support Scan Utility, `mfsupport`, to create a log file that contains the details about your environment, product, and settings. The `mfsupport` script is stored in `$(COBDIR)/bin`.

To run `mfsupport`:

1. Start a UNIX shell.
2. Set `COBDIR` to the product with issues.
3. Execute `mfsupport` from a directory where you have write permissions.

This creates a log file, `mfpoll.txt`, in that directory.

4. When the script finishes, send the `mfpoll.txt` file to your Micro Focus SupportLine representative.

**Note:**

If COBDIR is set to a location that does not contain `etc/cobver`, the script outputs the contents of `/opt/microfocus/logs/MicroFocusProductRegistry.dat` which keeps a list of the installed Micro Focus products.

If COBDIR is set to a location that does not contain `etc/cobver` or COBDIR is not set, `mfsupport` gives you the option to search your machine for possible product locations. Note that the search can take some time if you have a large amount of disc storage and files.

## Creating Debug Files

If you encounter an error when compiling a program that requires you to contact Micro Focus SupportLine, your support representative might request that you provide additional debug files (as well as source and data files) to help us determine the cause of the problem. If so, they will advise you how to create them.

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