



Micro Focus Enterprise Developer 8.0 for Visual Studio

Release Notes

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Micro Focus Enterprise Developer 8.0 for Visual Studio 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 Customer Support Documentation Web site](#) for any documentation updates.

Product Overview

Enterprise Developer enables you to develop COBOL applications within Microsoft Visual Studio. You use the Visual Studio integrated development environment (IDE) to edit, compile and debug COBOL applications. The IDE provides all the functionality to manage projects and build applications.

You can develop applications that have been migrated from the mainframe and that use mainframe technologies like CICS, JCL, and IMS. These compile to native COBOL code, as `.exe` or `.dll`. You then deploy and further debug the application under Enterprise Server.

The product is available in the following variants - Enterprise Developer for Visual Studio 2017, Enterprise Developer for Visual Studio 2019, and Enterprise Developer for Visual Studio 2022. The execution environment for applications created with any of these product variants is Enterprise Server.

Upgrading from earlier Micro Focus products

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 Visual Studio, you can configure the IDE to automatically check whether applications created with older releases must be relinked. If the application uses an older version of the C run-time system, Enterprise Developer can automatically relink the existing executable or `.dll` to the new version of the C run-time system without the need to recompile the application first. If a project needs relinking, Visual Studio displays a message in the status bar providing an option for you to choose and relink the project.

What's New

This *What's New?* document covers some of the new features and functions in the latest release of the Micro Focus Enterprise Product Suite. Updates apply to the following products:

- **Micro Focus Enterprise Developer** which provides a contemporary development suite for developing and maintaining mainframe applications, whether the target deployment is on or off the mainframe.
- **Micro Focus Enterprise Test Server** which provides a comprehensive test platform that takes advantage of low cost processing power on Windows environments, to supply scalable capacity for testing z/OS applications without consuming z/OS resources.
- **Micro Focus Enterprise Server** which provides the execution environment to deploy fit-for-purpose mainframe workload on Linux, UNIX and Windows (LUW) environments on IBM LinuxONE (IFLs), standalone servers, virtual servers, or the Cloud.
- **Micro Focus Enterprise Server for .NET** which provides the execution and modernization platform to deploy fit-for-purpose mainframe workload on a scale-out .NET infrastructure and the Azure Cloud.

This document helps you to quickly understand the new capabilities within the 8.0 release.

Enhancements are available in the following areas:

- [Micro Focus Enterprise Extension for Visual Studio Code](#)
- [.NET 6 Support](#)
- [COBOL Language Enhancements](#)
- [Code Analysis](#)
- [Compiler Directives](#)
- [Data File Tools](#)
- [Debugging](#)
- [Enterprise Server](#)
- [Enterprise Server Common Web Administration](#)
- [Enterprise Server Security](#)
- [JCL Support](#)
- [Micro Focus Database File Handler](#)
- [Micro Focus Unit Testing Framework](#)
- [Open ESQL](#)
- [PL/I Support](#)
- [Terminal Emulation](#)
- [Visual Studio Integration](#)

Micro Focus Enterprise Extension for Visual Studio Code

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The Micro Focus Enterprise extension for Visual Studio Code provides the following enhancements:

- The use of the Micro Focus Enterprise extension with Enterprise Developer 8.0 provides PL/I editor, compiler and debug support. The PL/I debug support includes data breakpoints, conditions, and signals.



Note: The Micro Focus Enterprise extension is available from the Microsoft Visual Studio Marketplace - [click here](#).

.NET 6 Support

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This release provides the following enhancement:

- You can create, build and run COBOL projects targeting .NET 6 in Visual Studio 2022. In all other supported environments, you can use the .NET 6 SDK or Visual Studio code to build .NET 6 COBOL projects.
- Support for .NET Core 3.1 has been discontinued.

COBOL Language

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The following enhancements have been made to the Micro Focus COBOL language:

- Further support for IBM Enterprise COBOL 6.3:
 - JSON PARSE and JSON GENERATE statements - for JSON GENERATE, anonymous objects can be generated using the OMITTED key word; the SUPPRESS phrase has been enhanced; the CONVERTING phrase is supported. For JSON PARSE, anonymous objects can be parsed using the OMITTED key word; the CONVERTING phrase is supported.
 - Intrinsic functions - the following list of functions is now supported: COMBINED-DATETIME, FORMATTED-CURRENT-DATE, FORMATTED-DATE, FORMATTED-DATETIME, FORMATTED-TIME, INTEGER-OF-FORMATTED-DATE, SECONDS-PAST-MIDNIGHT, SECONDS-FROM-FORMATTED-DATE, TEST-FORMATTED-DATETIME, and UUID4.
 - The AMODE Compiler directive has been enhanced to allow COBOL programs full access to the 64-bit address space (AMODE"64"). This emulates the LP"64" option in Enterprise COBOL.
 - The DYNAMIC LENGTH clause, introduced in the last product release, is now supported in .NET COBOL (as well native COBOL).
- .NET COBOL enhancements:
 - When no explicit type is declared for a variable, but the value is a non-integer numeric (for example `declare var1 = 1.23`), it is assumed to be of type float-long.
 - The NAME OF expression has been introduced. It returns the unqualified name of the type or member specified.

Code Analysis

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The Application Analysis Server enables you to access either Micro Focus Enterprise Analyzer or COBOL Analyzer from the IDE. This release includes the following enhancements to this feature:

- A generate code search report and a single code search reports are available.
- An improved Get Direct References report.

Enhancements to the Analysis Services include:

- An enhanced Program Flow Graph
- Support for displaying the Data Flow analysis as a Graph.

Enhancements in the Rule-Based analysis include:

- The **Micro Focus Code Analysis** project's properties page, and the **Micro Focus Code Analysis Manager** dialog box now support subfolders in the rulesets.

Compiler Directives

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The following Compiler directive is new in this release:

- DISPLAY-PICU - defines the way PIC U data items are displayed: either as ANSI or UTF-8.

The following Compiler directive has been enhanced in this release:

- AMODE - a new parameter "64" stores pointers in 64-bit format - see *COBOL Language Enhancements* for more details.

Data File Tools

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The following enhancement has been made to the Data File Tools:

- The Data File Editor now supports opening and editing KSDS VSAM files stored in an MFDBFH datastore.

Debugging Applications

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This release includes the following enhancement:

- **Locals** window support for native COBOL - during debugging, the **Locals** window now displays the names of the variables available on the current statement.

Enterprise Server

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This release provides enhancements in the following areas:

- EZ Sockets now supports up to 4096 sockets on Linux, up from 1024, and enhanced tracing.
 - EZ Sockets applications, including ones that use the CICS listener CSKL (EZACIC02), can have more simultaneous connections.
 - EZ Sockets tracing now has options for logging the recent history only when any error or one of a set of particular errors occurs. This makes it easier to use tracing to diagnose EZ Sockets issues.
- Enterprise Server dataset management - dataset maximum retention period with the ability to alter and create reports:
 - ES_JES_ENFORCE_EXPIRE_DATE - helps determine whether or not to check the expiration date when deleting a catalogued dataset, and if expired, delete the dataset. If it hasn't expired and the PURGE option has not been specified, the dataset is not removed. The PURGE keyword is required to delete non-expired datasets. PURGE removes the underlying physical dataset file unless it is referenced by another catalog entry. SMS MANAGEMENTCLASS now supports maximum RETAIN days. See *Using SMS MGMT Classes* and the %SMS example command in the same topic.
 - ES_JES_LISTCAT_YMD - helps determine the date format used in the HISTORY report generated when the IDCAMS LISTCAT command specifies the ALL option.

- The EXPDT entry in a DD statement must be a four-digit year (YYYY); otherwise 1900 is the default, which is in-line with the mainframe processing, and prevents unexpired datasets from being erroneously removed (as was the case with the previous default of 2000). The ALTER command now takes the TO and FOR options to enable specification of the retention period for the entry being altered. The maximum retention period might be limited by the management class. The IDCAMS LISTCAT command ALL parameter now generates a separate HISTORY report that shows the creation date time and job, the last changed date time and Job, and the expiration date.
- HTTP compression - the Communications Server supports compressing large HTTP responses with gzip, and handles gzip-compressed HTTP requests. The Common Client supports gzip-compressed HTTP responses. Some large HTTP responses are compressed automatically if the client supports it. Large HTTP messages can be compressed, saving network bandwidth and improving performance.
- Task-cleanup performance - the performance of post-processing for tasks in MFCS has been improved.
- ICETOOL emulation - now supports the COUNT+n and COUNT-n syntax during trailer processing, where n is a numeric between 0-999. This adds to or subtracts from the COUNT value.
- DSNRLI now implements one-phase commit optimization where appropriate.
- Listing DEQ errors - a new caspac action, CasDEQs, enables you to list all errors that might have occurred on DEQs either at the end of a task or while a job or a transaction was executing.
- Enterprise Server configuration - you can now change the recording directory of the dump, trace, HSF, and the `console.log` files of each region. See *Alternative Enterprise Server Output Locations* for more information.
- CICS API support - the CICS API GET CONTAINER option BYTEOFFSET is now supported.
- Compression on ECI calls via CASBNCCL Client - when using the Micro Focus External Call Interface (ECI) over TCP/IP, the request and response data flows are now compressed using RLE.

Enterprise Server Common Web Administration (ESCWA)

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This release includes the following enhancements:

- Oracle Coherence is now available as a PAC Scale-Out repository as an alternative to Redis.
- Reduced number of Redis instances required when a PAC incompatible upgrade is performed - it is now possible to have multiple PSORs in one REDIS instance. This allows for the REDIS instances provisioned in the PAC to be reused.
- Enhanced PAC diagnostics via CTF - a new option on the ES Control page is now available to enable or disable CTF for a running region without the need to recycle the region.
- ESCWA API, version 2 - includes updated versions of some of the existing API, version 1 endpoints, with improved JSON property names, more sensible URIs. The version 2 API is a single API standard across API endpoints. It includes a number of usability enhancements, has a better readability and discoverability, and includes an improved API documentation.
- Enterprise Server Configuration Manager
 - A variety of configuration options are available in ESCWA on the **General >Advanced** page for a region.

The property grid in ESCWA shows the full list of configurable properties, categorized by group, along with help text and some additional meta-information. Properties marked as dynamic in the property grid can also be updated in a running region.
 - A number of properties that were previously set with environment variables are now available in the ESCWA UI. The environment variables are still supported for backward compatibility.
- Accessibility enhancements - the ESCWA UI includes a number of improvements in the areas of usability with screenreaders, color contrast, and text and icon sizing and alignment. This is to give it an improved compliance with the 508 and WCAG 2.1 standards.

Enterprise Server Security

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This release includes the following enhancements:

- AWS Secrets Manager - support is available for using an AWS Secrets Manager, `mfsecretsaws`, as a remote vault. See *The mfsecretsaws Vault Provider*.
- Protection for sensitive data - some sensitive data is now protected in the memory. This helps reduce the risk of exposing sensitive data such as passwords in core dumps and similar scenarios.
- An option to update short names - the ESF Update mechanism enables you to change between OS users ("long names") and ES userids ("short names") in running regions. This requires a non-default configuration setting.
- Caching improvements - ESF caching now caches more types of requests. This helps improve the Enterprise Server latency and throughput when external security is configured with caching.
- Support for Argon2 in password history - when Micro Focus passwords are used with the MLDAP ESM Module and password history is enabled, use Argon2 password verifiers in the history to avoid the potential exposure of passwords via weaker verifiers. This helps improve the security of the password-history mechanism.
- The product Help includes a new section, *Securing Enterprise Server*, which provides guidance on improving the security of Enterprise Server installations and the applications they host. This includes information on security and how to reduce security exposure.

JCL Support

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This release provides the following enhancement:

- Support is available for the DSENQSHR JOB statement parameter with options of ALLOW, USEJC, and DISALLOW. You can configure the use of this parameter with the new `ES_DSENQSHR` environment variable for Enterprise Server.

The Micro Focus Database File Handler

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The Micro Focus Database File Handler offers the following enhancements:

- PostgreSQL and Microsoft SQL Server now support storing datastores, region databases, and cross-region databases in a single physical database, instead of storing them in separate databases.
- Configurations that use a single physical database can now use a single database connection to access all MFDBFH resources stored within.

Micro Focus Unit Testing Framework

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The following enhancement has been made to the Micro Focus Unit Testing Framework in the IDE:

- IDE support has been added for self-contained tests.

The following enhancement has been made to the command-line version of the Micro Focus Unit Testing Framework:

- You can now use the Micro Focus Unit Testing Framework to build and run test cases from within a .NET 6 environment. Install the NuGet package supplied with Enterprise Developer to enable the mfunite extensions to the dotnet command line utility.

OpenESQL

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This release includes the following enhancement:

- The new SQL Error Mapping feature enables you to customize how error information is returned in SQLCODE, SQLSTATE, SQLERR and MFSQLMESSAGETEXT. For details, see *SQL Error Mapping* in your product Help.

PL/I Support

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Enhancements are available in the following areas:

PL/I compiler compatibility:

Support has been added for the following:

- Decimal Floating Point (IEEE-754-2008) when running on Intel architectures. This enables data to be held in Densely Packed Decimal (DPD) format or in Binary Integer Decimal (BID) format. This feature is in Early Adopter Program (EAP) release status.
- NOEXECOPS when running under the control of JCL.
- PL/I built-in functions including: ENDFILE, EPSILON, EXPONENT, ISFINITE, ISINF, ISNAN, ISZERO, MAXVAL, MINVAL, PLACES, PRECV, PRED, RADIX, ROUNDAYFROMZERO, ROUNDTOEVEN, SCALE, SQRTF, SUCC, and XMLSCRUB.
- The IEEE attribute on a FLOAT DECIMAL variable declaration.

PL/I compiler listing enhancements:

PL/I compiler listings now include:

- Display of options in effect and option defaults
- Unreferenced variables
- The OPTIONAL attribute for parameters

PL/I debugging:

PL/I debugging now supports:

- Hardware breakpoints in the IDE.
- STEP out of a CICS LINK level
- Much larger call stacks

PL/I debugging in Visual Studio has been enhanced as follows:

- The debugger operates with PL/I code just as it does with other languages such as COBOL. The following features are included to enhance the PL/I debugging experience:
 - Add, modify, and delete monitors on PL/I signals and conditions
 - The **Wait for debuggable attachment** feature enables you to use the PLITEST() API in conjunction with the "wait for attach with ID" mode.
 - The setting of key/value pair environment variables in project properties

PL/I EXEC Preprocessor:

- Early adopter support for an EXEC SQL statement that specifies a compiler-generated exit.

PL/I Macro Preprocessor:

- COMPILETIME/COMPILEDATE builtin functions now output without %SDEBUG/%RDEBUG pairs
- New GETENV built-in function
- Support for CALL within a PL/I Macro
- Support for ITERATE, DEPRECATE, DEPRECATENEXT

PL/I Run-Time System:

- Improved performance of JSON builtin functions
- Improved PLIDUMP callstack accuracy on the newest Redhat and SUSE releases
- PLIDUMP Display of the offset within prologue code a signal is received within the prologue of a PL/I Procedure
- FIXEDOVERFLOW generated upon assignment to FIXED DECIMAL variables where truncation occurs
- Support for NOEXECOPS when running under the control of JCL
- PLIHSSR now allows for use of PCB in addition to PCB Pointer in call

Terminal Emulation

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- This release installs the Session Server component of Micro Focus Host Access for the Cloud (HACloud). HACloud provides browser-based HTML5 access to 3270 host applications on Windows and Linux for multiple connected users. HACloud is configured to work out-of-the-box with the default configuration for ESCWA and MFDS and might need to be configured before you start using it.

Visual Studio

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- Support is now available for Visual Studio 2022.
- Syntax coloring for COBOL in the editor had been improved for identification divisions, copybooks references using COPY... REPLACE statements, and EXEC blocks.

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.

The numbers that follow each issue are the Support Case Number followed by the Defect number (in parentheses).

- [Code Analysis](#)
- [Common Communications Interface](#)
- [Compiler](#)
- [Containers](#)
- [Enterprise Server](#)
- [Machine Administration](#)
- [Mainframe Access](#)
- [File Handling](#)
- [JCL Support](#)
- [Micro Focus Batch Scheduler Integration](#)
- [Micro Focus Communications Server](#)
- [Micro Focus Directory Server](#)
- [PL/I Support](#)
- [REXX Support](#)
- [Run-time System](#)
- [SQL: OpenESQL](#)
- [SQL Option for DB2](#)

Code Analysis

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- Rules in nested folders are now correctly processed, as well as rules with the same name.
(207020)

Common Communications Interface

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- For improved security, SSL/TLS connections are now restricted to TLS versions 1.2 and 1.3 by default. This is an industry best practice. If you need to use older, less-secure protocol versions with legacy clients or servers you should consult the product online help for instructions on configuring TLS protocol versions.

PSEC:103001 (87188)

Compiler

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- When a RELEASE or RETURN statement is executed in an input or output procedure of a sort statement, if the SORT-RETURN special register is found to contain a value of 16, then the sort should be aborted, even in a case where the RELEASE or RETURN statement is at a lower perform level than the input or output procedure itself. Previously, this was not happening for programs compiled to JVM or .NET COBOL, but this erroneous behavior is now fixed.

01723392 (104114)

- When a variable is defined in a DECLARE statement with no explicit type, but a value that is a non-integer numeric literal, the type is assumed to be float-long (i.e. a 64 bit floating point).

(148103)

Containers

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- The containers image build tool now supports custom Java run-times which helps to keep the size of Java-based applications smaller.

(182004)

Enterprise Server

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- The Security Manager passwords no longer appear in the `commonwebadmin.json` configuration file.
(203052)
- The X-XSS-Protection header will now be set on all requests instead of only on API requests.
01938835 (138176)
- In ESCWA, the colors and contrast have been adjusted to improve visual accessibility.
01995403 (158071)
- ESCWA now displays an improved message if there is an issue with loading the application, especially in the case where there is a browser incompatibility.
(241013)
- ESCWA now handles enterprise server regions that use character encodings other than windows-1252.
00370773 (11742)
- In ESCWA, the **Console Log** page now enables you to easily traverse and navigate the log. The new paging feature uses an API call from the Communications Server group documented in the Enterprise Server Administration Server API, typically located at `http://localhost:10086/docs/#/Communications_Server` on the machine where you have the product installed.
02085456 (191017)
- ESCWA now supports multiple PACs in a single Redis store.
(248003)
- ESCWA now handles enterprise server regions that use character encodings other than windows-1252.
(91001)
- In ESCWA, the IMS MPR Processes table on the Monitor > SEPs page now displays the new IMS Type and PROCLIM columns from MPR PWFI support.
(182066)
- In ESCWA, on the **Communications Process** page you can now specify a Requested Status for the communications process.
00669779 OCTCR50A69378 (69378)
- In ESCWA, the CICS DCT resource now displays all fields regardless of the type. See *Transient Data Queue* in your product Help for more information.
(173056)
- In ESCWA, the **Catalog DCB** page now displays the file size in bytes.
01909652 (138002)
- ESCWA now supports Circular Logging. On the **Tracing and Logging Settings** page you can now specify the **Log Max File Size** and the **Log File Count** fields. By default, these fields are set to 1024kB and 5 respectively. See *Tracing and Logging Settings* in your product Help for more information.

02083633 (191019)

- In ESCWA, a new optional **Logon security resource** has been added. This can be used to control users' ability to log on. See *Security Resources to Control ESCWA* and *API Access* in your product Help for more information.

01886579 (124022)

- CICS THRESHOLDS now support IMS. Notes modified in the following three topics: CICS Defined THRESHOLDThresholdActive Threshold

(246113)

- You can now define and install shared SOR Models. In the **SOR Model** dialog box, check **Shared** to enable the SOR Model to be shared between PACs.

(244088)

- CICS Resources can now only be created via the group if they are appropriate for the functionality of the enterprise server region.

01858819 (148068)

- For LDAP-based security in Enterprise Server, the processing of password changes has been modified to address security issues, inconsistencies among configurations, and other issues. See *Understanding passwords with LDAP-based security* in your product Help for more information.

(118088)

- Enterprise Server with LDAP-based security now denies a sign-on attempt by default if it includes a password-change request (a new password is supplied), and the password change fails. This was the existing behavior in some configurations but not in others. It is now consistent and configurable. See *MLDAP ESM Module Custom Configuration Information* in your product Help for more information.

(108046)

- A change has been made to the way that TS queues and TD queues are stored in a PAC. This was to ensure that deleting a 0TSQ did not also delete all queues that had a 0TSQ_ name prefix.



Note: After the update is applied you must cold start your PAC.

(183044)

- In a PAC, the SIT setting is now honored when a TS or TD is to be applied to the enterprise server region if the TS or TD is not under a SOR, MFDBFH, or Fileshare. This means that if a SIT has to cold start for TS or TD and the files are either in the workarea or on disk then the SIT settings will be applied, otherwise the PAC-wide settings will be applied.

02149316 (204020)

- EZASOKET traffic will now be assigned to Communications Process instance #1. You might need to consider this if you use load balancing.

02060014 (201009)

- When a PAC is cold started, the configuration file specified by MFDBFH_CONFIG will be uploaded to the PSOR and a temporary file created in the enterprise server region's workarea. This temporary file will be used by all the processes for that enterprise server region. Subsequent enterprise server regions joining the PAC will then create a temporary file in its workarea for the MFDBFH_CONFIG from the PSOR store. If an enterprise server region in the PAC is killed or is terminated abruptly than the restart of the enterprise server region will try to recover the previous UUID left in the PAC and DEQ all remaining ENQs in MFDBFH that were created from the previous run. New messages will be created in the `console.log` identifying if the recovery was initiated and successful, if the enterprise server region could not be recovered automatically, the region will stop. A log file will be created in the workarea with the following file naming convention:

```
Caspac_Recover_UUID_XXXXXXXXXXXXX.log
```

For example: CASCD4012W Region was not stopped properly, recovering previous region UUID 14BAAA87B4C010BFDE278A5F65B350C 18:15:17CASCD4014I UUID recovery file log C:\Users\mag.CORPDOM\Documents\Micro Focus User\Enterprise Developer\WORKAREA

\RAS1\Caspac_Recover_UUID_14BAAA87B4C010BFBDE278A5F65B350C.log 18:15:18. Using the `caspac` utility with the `-aStatus` parameter will display if the enterprise server region in a PAC has lost its connection to the PSOR. If you determine that the region is no longer in the PAC, then you can run the `caspac` utility with the `-aRecoverUUID` parameter to recover the enterprise server region. If the `-aRecoverUUID` parameter is used, then a file will be created in the current directory with the following file naming convention:

02081952 02123645 (182093)

Caspac_Recover_UUID_XXXXXXXXXXXXX.log.

See `caspac` in your product Help for more information.

- Functions have been added to `file_utilities` which check a given file name against either a default blacklist containing operating system reserved file names, or a passed blacklist. Read, write, and delete in AES and MSCPD use this function to disallow secret names which are inappropriate names.

OCTCR50A7844 (112022)

- The default users are now able to access only the corresponding areas:

`mfuser -- esmaccicsuser -- CICS and enterprise server region start and stop.`

`jesuser -- JES related operations and areas.imsuser -- IMS related operations and areas.`

01990931 (138369)

- Fileshare is no longer used to locate the Resource Definition and CNV file.

00468648 (69010)

- MQ updates did not rollback on step failure. This has been fixed.

01976727 02161235 (155010)

- PSOR stores are now prefixed by the PAC NAME and a version number enabling you to run multiple PACs in the same PSOR, simplifying the incompatible upgrade process. The `caspac` utility enables you to add the PAC Name as part of the command line parameters using `-pPACName` or if not specified using the `ES_PAC` environment variable. See `caspac` in your product Help for more information.

(202162)

- The XA reconnect mechanism now attempts to reconnect to all XA entries marked as "enabled" at the start up of the enterprise server region. To prevent the reconnect attempts, do one of the following:
 - Remove the XA manager from the enterprise server region definition.
 - Set the XA manager as disabled before starting the enterprise server region.

01991481 02003277 (151008)

- A new MLDAP ESM custom configuration section has been added. The `[Prefix Search]` option enables the Prefix Search wildcard optimization for limiting the scope of wildcard resource entities checked under a resource class. See *MLDAP ESM Module Custom Configuration Information* in your product Help for more information.

00726158 (73180)

- For LDAP-based security in Enterprise Server, the processing of password changes has been modified to address security issues, inconsistencies among configurations, and other issues. See *Understanding passwords with LDAP-based security* in your product Help for more information.

(118088)

- Enterprise Server with LDAP-based security will now by default deny a signon attempt if it includes a password-change request (a new password is supplied), and the password change fails. This was the existing behavior in some configurations but not in others. It is now consistent and configurable. See *MLDAP ESM Module Custom Configuration Information* in your product Help for more information.

(108046)

File Handling

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- The connection registration process has been enhanced to rectify a problem where XA registrations sometimes failed to register with MFDBFH in an Oracle RAC environment.



Note: This fix is dependent upon the Oracle XA switch module being recompiled with the latest XA switch sources.

02214893 (246077)

- SYMNAMEs support has been added to the ON operand in the SELECT statement of ICETOOL.

02040047 (167028)

- When using the SELECT operator of the ICETOOL emulation, a validation check has been implemented to ensure that when making use of the DISCARD operand, the data set opened for output does not have an LRECL greater than the LRECL that ICETOOL is expecting. If it does, the job will fail. This check may now cause jobs that previously ran successfully to now fail, but this behavior is now consistent with that of the mainframe.

01978959 (199001)

- Micro Focus' ICETOOL emulation now sends carriage control characters in the LIST data set by default. The RECFM of the LIST data set will be FBA. If NOCC is set, the carriage control characters are suppressed and the RECFM of the LIST data set will be FB.

01685295 (97066)

- There have been some performance improvements for files opened exclusively (i.e. DISP=OLD, DISP=NEW, and DISP=MOD), in batch jobs running under Enterprise Server.

00780741 (101034)

- The dbfhadmin utility has been enhanced to allow the integrity of a datastore to be verified, and optionally, fixed up: use the `dbfhadmin -verify -list|-recover` options. See *The dbfhadmin Command Line Utility* in your product Help for more information.

00778044 (90143)

- The dbfhadmin command-line utility has been enhanced to provide the capability for verifying and optionally repairing (cross-)region databases.

02123645 (193071)

- The cross-region database heartbeat interval can now be configured using the `dbfhconfig -add|-update -heartbeat interval-in-seconds` command. The default heartbeat interval remains as 5 seconds. A warning message is now output to the Enterprise Server console during region database start-up if the heartbeat interval is configured to be >15 seconds. The larger the heartbeat interval, the longer the time that is required to be able to recover (cross-)region database resources. Recovery can only take place for a process if its associated heartbeat record has not heartbeat within the last "heartbeat-interval + 5" seconds.

02155269 (202149)

- The performance of PostgreSQL optimized I/O has been improved. If you use the `psqlodbc` device driver, you will need to ensure that you are running with version 12.02.0000 or later. This change has been tested with version 13.01.0000. To take advantage of the performance benefits of this change, specify `BatchSize=100` for each of your ODBC DSNs. Using a version of the driver earlier than 12.02.0000 could result in a performance degradation when deploying large files to datastores.

(125032)

- Table record locking and database record locking are incompatible and may lead to data corruption if used together by separate processes when processing the same file. MFDBFH has been enhanced to ensure that if a file is already opened in a process with table locking, all other processes attempting to open the same file, even if requesting database locking, will also use table locking. However, if a process has a file opened using database locking, other processes attempting to open the file will only be allowed to do so if they are transactional files (i.e. database record locking can only be used for

transactional files). An attempt to open the file as non-transactional will fail. Refer to the *Record Locking Strategies* documentation for more information.

(102011)

- MFDBFH now enforces the existing requirement that a region database used by a PAC, or a region database used by an ES region configured to use ES_LOCK_DB, is not used by any other PAC or ES_LOCK_DB regions. This is necessary to avoid problems such as jobs with the same name submitted to two separate regions, but erroneously using the same region database, from being blocked by waiting on SYSZJOB and/or SYSZJOB ENQs. A check is now performed during region start-up to ensure that the region database is not already being used by another region. If it is, the region start-up will fail, with error messages indicating the cause of the failure output to the ES console. Existing ES PACs/regions will need to be stopped and restarted for these new region database state checks to take effect. The `dbfhadm -region -status [-reset]` command has been introduced to allow a region database's state to be displayed and, optionally, reset. See *Resource Locking* in your product Help for more information..

(121030)

JCL Support

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- The User Exit event has been updated to contain the date and time of the job submitted when the job-ready event occurred in the past. To make use of this functionality, you must recompile the CAS User Exit Event Manager. See *mfjdjevt.cpy* for more information.

(177018)

- A new environment variable, `ES_JES_ENFORCE_EXPIRE_DATE`, has been added to determine whether or not to check the expiration date when deleting a catalogued dataset, and if expired, delete the dataset. If it hasn't expired and the PURGE option has not been specified, the dataset is not removed. The PURGE keyword is required to delete non-expired datasets. PURGE removes the underlying physical dataset file unless it is referenced by another catalog entry. SMS MANAGEMENTCLASS now supports maximum RETAIN days. See the example of the %SMS command in the Using SMS MGMT Classes topic in your documentation. The EXPDT entry in a DD statement must be a four-digit year (YYYY); otherwise 1900 is the default, which is in-line with the mainframe processing, and prevents unexpired datasets from being erroneously removed (as was the case with the previous default of 2000).

3190103 00368441 (12368)

- A change in behavior of the evaluation of step COND CODES has been made. The new behavior is that step ABENDS now take precedence over normal return codes. This corrects a problem that caused a step that returned a higher decimal value than an earlier step ABEND code to take precedence and become the job COND CODE.

02210859 (244066)

- It was possible to run a job without required enques. To correct this, an error now occurs at the start of a job if the required enques are missing, and the job does not run.

02164345 (203249)

- SYSOUT datasets that were referenced in later steps were incorrectly marked as temporary, and therefore 'PASSED' on in the job. This caused them to be deleted at the end of the job. To correct this, those SYSOUT datasets are now 'RETAINED'.

00713567 (69460)

- The ALTER command now takes the TO and FOR options to enable specification of the retention period for the entry being altered. The maximum retention period may be limited by the management class.

3190103 00368441 (12249)

- The IDCAMS LISTCAT command ALL parameter now generates a separate HISTORY report that shows the creation date time and job, the last changed date time and Job, and the expiration date.A

new environment variable, ES_JES_LISTCAT_YMD, has been added to determine the date format used in the HISTORY report generated when the IDCAMS LISTCAT command specifies the ALL option.

3190103 00368441 (11429)

- The validation of configuration settings used by JES has been improved, together with more detailed error messages.

02041040 (165046)

- Support for DSENQSHR has been added to JES via the ES_DSNQSHR environment variable. See the *ES_DSENQSHR* topic in your product documentation for full details.

01818520 (111002)

- Two new spool housekeeping performance options, USE_DISK_HK and DISABLE_LOCK_FOR_BULK_DELETE, have been added to enable spool housekeeping to be processed on a local disk instead of the server. See *Configuring the MVSSPLHK Housekeeping Process* in your product Help for more information.

00367284 (79030)

- GDG model support has been updated to support the assignment of an empty subdirectory value in the allocation override configuration (see the *JCL - Allocation Override sample* in the Mainframe Samples Browser).

02177846 (209041)

- In a security-enabled region, the REXX SYSEXEC or SYSPROC dataset used by IRXJCL was not validated for user access. This has been corrected. If the user does not have permission to access (READ) the dataset, an S913 security violation abend is generated, and "MVSAF0222S Insufficient authority to read dataset '<DATASET NAME>'." is written to the SYSTSPRT. A message is also written to the job log: "**MSG User not authorised to access SYSEXEC <DATASET NAME>". This fix might require updates to the DATASET access rules.

02144158 (248013)

- In a security-enabled region, the dataset containing a REXX or TSO command was not validated for user access. This has been corrected. If the user does not have permission to access (READ) the dataset, an S913 security violation abend is generated, and "MVSAF0222S Insufficient authority to read dataset '<DATASET NAME>'." is written to the SYSTSPRT. This fix might require updates to the DATASET access rules.

02144158 (208030)

- A problem that erroneously caused some user-supplied parameters to translate from EBCDIC to ASCII when calling DSNRLI has been corrected. The *dsnrli.cpy* copybook and *dsnrli.inc* PL/I include file have been revised to have the full declaration of ACCOUNT-STRING. You must recompile copybooks that use either of these modules.

(161065)

- The JCL spool file has a new format. Starting with this release, you must use the *mfsp1cnv* tool to convert spool files created using a previous release from the old format to the new. See *Spool Files* and *mfsp1cnv Spool Conversion Utility* in your product Help for more information.

(113011)

- An excess of 999 duplicate DD statements per step caused a hang in JCL processing. This has been corrected and an error message indicating that this number has been exceeded is now generated (JCLCM0640U).

00775329 (90002)

- The new MFJ_LEX_LOCATION JCL environment variable enables you to specify an alternative location for the storage of JCL lexicographical files, which are created when a job is parsed, and stored in the same directory as the job log by default. The alternative directory location must be accessible by all regions that both submit and run jobs.

(116002)

- The layout, including the position of fields, in the `IHAPSA.MAC` and `IKJTCTB.MAC` copybook files used to hold information for the JCL control blocks for PLI programs has changed. To apply this fix to existing applications, recompile and validate all PLI programs that include these copybooks.
(105043)
- MFFTP now converts from EBCDIC to ASCII in PUTs and from ASCII to EBCDIC in GETs, for files cataloged as EBCDIC when a TYPE A or ASCII sub-command is issued and when the new environment variable `MFFTP_ASCII_CMD_XLATE` is set to Y (default is N).
02157927 (202176)
- JCL job behavior has been updated to address an issue that caused the generation of a `//SYSIN` entry when non-JCL statements, such as blank lines, preceded the first step. The generated `//SYSIN` entry is now marked as invalid, and a `JCLCM0642U` parsing error is issued.
00368443 (11497)

Machine Administration

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- A problem with using the .NET 3.5 framework has been fixed.
(204144)
- A problem with CPU conversion has been corrected.
(199042)

Mainframe Access

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- Previously when authenticating with the mainframe, login failure messages provided too much information which could potentially be exploited for username enumeration. Login failure messages will now only state that invalid credentials were provided. This applies to MFDAS, MFDASMX, Mainframe Explorer in Eclipse and Visual Studio, MVS Explorer in Eclipse, and SyncMon.
01868545 (119073)

Micro Focus Communications Server

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- When an enterprise server region is configured to use External Security, access to the Communications Server's "statistics" Web page is now restricted, just as access to the Communications Server log is. To permit access to this page for secured enterprise servers do one of the following:
 - Disable Communications Server control listener security by adding the following to the **Configuration Information** field for the communications server:


```
[security]control listener=noInstruct
```

Users must provide Enterprise Server credentials when prompted. This can occur when you attempt to view the page, and when **Allow unknown resources** is checked in the region security configuration (use this with caution)
 - Add a resource security definition named "Statistics" to the "Communications Server" class, with an ACL that grants READ permission to those users who should have access to the page
- 00368582 (11442)

Micro Focus Batch Scheduler Integration

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- The Micro Focus Batch Scheduler Integration (MFBSI) no longer hangs while waiting for a response from the license manager.

02006571 (162055)

Micro Focus Directory Server

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- The `mfd` `/s` option supports the specification of the optional Enterprise Server `user id` and `password` parameters using a configured Micro Focus Vault Facility location rather than using literal strings for credentials. For example:

```
mfd /s 1 mfsecret:user/user_001/id mfsecret:user/user_001/pwdwhere user/
user_001/id and user/user_001/pwd
```

Are secrets stored in the default-configured vault. These values can be populated and administered using the `mfsecretsadmin` utility. See *Vault Facility* in your product Help for more information. The `mfd` `/x` and `/g` command-line options also support credentials stored in the vault.

02131532 (193088)

- If MFDS is configured to store sensitive values in the vault (for example, XA openstring or autostart credentials), these values were not being included in legacy data format or XML export of Enterprise Server configuration information. Subsequently, these values could not be reimported. These sensitive values are now included in the exported data. Micro Focus recommends that you protect the exported files with appropriate access control.

(202272)

PL/I Support

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- Previously, if STRINGRANGE had been enabled by the `-prefix stringrange` compiler option, and a user program did not contain an `ON STRINGSIZE` statement, there was no message printed out indicating that STRINGRANGE had been triggered. The message now appears in this scenario.

00696776 (73031)

- Nested TYPEs (TYPE of TYPEs) are now supported.

00366179 (11649)

- Nested LIKEs (LIKE of LIKEs) are now supported.

00366181 (13419)

- A problem that prevented the `CONTROLLED` parameter from displaying correctly in the compiler listing has been fixed.

01916288 (130002)

- The compiler listing file has been updated to provide enhanced output when the `-xref` compiler option (cross-reference listing) is in effect. The listing file now indicates which variables and other identifiers, such as procedures and labels, are unreferenced, and where they are declared. This helps you to eliminate unnecessary declarations, thus reducing storage requirements and improving code readability. Where a member of a structure is referenced, this flags the entire structure as referenced. External variables and procedures are not flagged as unreferenced. To accommodate include files, the nomenclature for a definition (DEF) or reference (REF) in the cross-reference listing is a number of the form `n.m`, where `n` is the line number and `m` is a file identifier. A list of file indenters and corresponding file names is generated at the end of the cross-reference listing.

02159460 (203162)

- The compiler listing file has been enhanced to indicate which variables and other identifiers, such as procedures and labels, are unreferenced, and where they are declared. This helps you to eliminate unnecessary declarations, thus reducing storage requirements and improving code readability. Where a

member of a structure is referenced, this flags the entire structure as referenced. External variables and procedures are not flagged as unreferenced. To accommodate include files, the nomenclature for a definition (DEF) or reference (REF) in the cross-reference listing is a number of the form n.m, where n is the line number and m is a file identifier. A list of file indenters and corresponding file names is generated at the end of the cross-reference listing.

01858879 (120030)

- An application doing a WebSphere MQ SIGNON caused an invalid result from a PL/I exponentiation calculation if WebSphere MQ was using a locale other than C/Posix. This has been corrected for the de_DE or derivative locale.

01991479 (155012)

- I/O directed by PUT LIST now uses BX format for type OFFSET.

(195051)

- A problem with PLIDUMP prevented control from being returned to the ON ERROR after completing the dump when PLIDUMP was driven with the H option from an ERROR on unit that had established ON ERROR SYSTEM. This has been fixed.

02134496 (194112)

- The dumping of H(eap) memory in a PLIDUMP now checks for patterns of three or more identical lines and issues a "same as above" message indicating the memory range instead of printing the entire batch of lines.

02160703 (204151)

- When using the PLIDUMP facilities H option on a system that had an artificial limit on maximum file sizes, an infinite loop sometimes occurred if that maximum file size was reached. This has been corrected. The PLIDUMP is now truncated at its maximum allowed size.

02162046 (203155)

- Previously, when using PLISAXA, the document length as driven to the Start of Document event was incorrect if the XML document contained characters that exceeded hex 7F. This has now been fixed.

00381945 (61228)

- A new built-in function, SQRTF, has been added to generate an ERROR condition if its condition operand is negative. The SQRT function has been updated to do the same. Previously, SQRT sometimes returned a floating-point NaN.

(193100)

- In previous releases, FIXEDOVERFLOW was not raised when an attempt was made to assign a value to a FIXED DECIMAL variable that was too large, causing the value to be truncated. The behavior has been changed to raise an error if FIXEDOVERFLOW is not present.

02163371 (204181)

- The PL/I run-time system has been enhanced to honor the READ FILE(xx) IGNORE(x) syntax for sequential files.

02047425 (183067)

- The OPTIONS(NOEXECOPS) attribute of a procedure statement is no longer ignored, but is now honored for programs running under the control of JCL.

3238380 (11686)

- A new feature, PL/I data breakpoints has been added. A data breakpoint breaks execution when a specified memory location is written. Use of data breakpoints assumes expert-level knowledge of how memory works, how variables are allocated, and how data is written to memory. For complete details, see the Using Breakpoints topic in your product documentation.

00370003 (12178)

REXX Support

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- In a security-enabled region, the REXX SYSEXEC or SYSPROC dataset used by IRXJCL was not validated for user access. This has been fixed. You do not have permission to access (READ) the dataset, an S913 security violation abend is generated, and "MVSAF0222S Insufficient authority to read dataset '<DATASET NAME>'." is written to the SYSTSPRT. A message will be written to the job log: "*MSG User not authorized to access SYSEXEC <DATASET NAME>".Note: This fix might require updates to the DATASET access rules.
(247033)
- EXECIO * DISKW was stopping on the first line containing no characters, writing out no further records. Now after encountering an empty record, a line with only a linefeed is written and processing stops.
01991499 (158007)

Run-time System

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- The native COBOL multi-threaded demo is now available for Windows development products.
(3765)
- Basic support for xterm-256color has been implemented.
(57591)

SQL: OpenESQL

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- A performance problem in a SQL program using fixed-length character arrays when compiling a COBOL program and using array fetch has been resolved.
02152406 (203060)
- A new feature to assist migration between databases has been added. SQL error codes and messages may be mapped to different values or suppressed to match those expected by the application.
(193003)

SQL Option for DB2

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- An incorrect SQLCODE of -406, indicating a decimal value was too large, has been resolved by an update that ensures flag bits for query constants are full initialized within the query common space.
00739861 (86050)

Known Issues

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

In addition, note the following:

- Problems with Microsoft's Visual Studio 2022, release 17.2, might cause the following issues with Visual COBOL or Enterprise Developer for Visual Studio 2022. The issues do not exist in release 17.1. See the points below for the workarounds to these issues:

- An issue with Microsoft's Visual Studio installer might result in the IntelliSense and editor colorization not working. To repair your installation, execute the following command from a Visual Studio command prompt:

```
devenv /updateconfiguration
```

This issue is resolved by Microsoft in Visual Studio 2022, release 17.3. You need to update your Visual Studio installation.

- Mixed-language multi-project builds might fail as a result of the project dependencies not working correctly. This means that some projects might build in parallel when they should build in a specific order. As a result, the build might fail due to a dependency not always being available. To work around this issue, click **Tools > Options > Preview Features**, and check **Load projects faster (some features may be delayed)**.

This issue is resolved by Microsoft in Visual Studio 2022, release 17.3. You need to update your Visual Studio installation.

- The expanded copybook visualizations are missing. This includes breakpoint, current statement when debugging, and others. These features might not always function correctly in non-expanded source (in the main programs) if that program contains expanded copybooks. To work around this issue, you can disable inline copybook expansions.
- Visual Studio 2022 requires that the `global.json` file of .NET 6 projects is placed at the directory level of the solution file in order for the project to successfully open and build. In previous versions of Visual Studio, the file could be located in subfolders of the solution such as in the project folder.

This can affect existing .NET Core 3.1 COBOL projects that you upgrade from a prior release if the `global.json` file is not at the directory level of the solution file. It also affects .NET 6 COBOL projects that you add to an existing solution.

In these cases, you might receive the following error message if building from the MSBuild command line, or in the IDE Output window if the project fails to load:

```
"The SDK 'MicroFocus.Sdk' specified could not be found"
```

To work around this issue, you need to move the `global.json` file to the directory level of the solution file.

New .NET 6 COBOL solutions and projects created with VS2022 create the `global.json` file in the required location.

- It is not possible to upgrade from a 7.0 version of the Visual Studio-based product, if you are targeting a different version of Visual Studio. For example, it is not possible to upgrade from Enterprise Developer 7.0 for Visual Studio 2017 to Enterprise Developer 8.0 for Visual Studio 2019.
- The Server Core form of Windows Server 2019 is not supported.
- In Enterprise Developer 4.0 and 5.0 in an extremely small and limited set of cases, an issue could occur with running .NET executables and .dll files, or JVM .class files, created with an earlier version of the product. 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, then executed in Enterprise Developer 4.0 or 5.0.

In these rare cases, the IS NUMERIC test could provide the wrong answer.

In order to resolve this issue, in Enterprise Developer 6.0 and later, the .NET COBOL and JVM COBOL run-times reject any program using IS NUMERIC on a NATIONAL item which was compiled with a version 5.0 or earlier of the product. You receive a "missing method" exception. To resolve the issue, you need to recompile any programs that use this construct in the newer versions of Enterprise Developer.

Programs that do not use NATIONAL data, or those that have been recompiled in Enterprise Developer 6.0 or later are not affected.

Resolved Issues

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

- [Character Animator](#)
- [Code Analysis](#)
- [Common Communications Interface](#)
- [Compiler](#)
- [Data Tools](#)
- [Dialog System](#)
- [Debugger](#)
- [Documentation](#)
- [Enterprise Server](#)
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- [SQL: OpenESQL](#)
- [SQL Option for DB2](#)
- [Visual Studio Code](#)
- [Visual Studio IDE](#)

Character Animator

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- The `cobesdebug` command now functions correctly on s390 Linux machines.
02126702 (204053)

Code Analysis

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- Some memory leaks causing a crash in the process have been fixed.
00506227 (69251)
- An issue with Data Flow analysis has been fixed.
(245019)
- Visual Studio now supports analyzing COBOL Unit Test Projects.
(234009)
- Added support for analysis using the `ChildrenCount` attribute.
02068434 (174080)
- A new code rule has been added to general queries to identify COBOL statements ending with a period.
00488450 (204164)
- A new code rule has been added in general queries that identifies COBOL statements ending with a period.
00488450 (202186)

Common Communications Interface

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- Improvements have been made to the validation of server certificates for SSL/TLS connections.
(244007)

Compiler

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- 32-bit Intel x86 generated code only: when a statement of form 'set length of dynamic-item to var-a' is followed immediate by an arithmetic statement using var-a, incorrect code could be generated. This has been fixed.
(124033)
- The following code:

```
move address of item-1 to ptr-item
```


Where `item-1` is a group item, created incorrect code. This has been fixed.
02108263 (189014)
- The following command:

```
cob -x prog.cbl
```


Where `prog.cbl` contained user-defined functions, would create an executable with the wrong name, which did not behave correctly. This has been fixed.
(7760)
- Spurious background parse errors no longer occur when switching between DIALECT"ENTCOBOL" and DIALECT"MF" programs.
(246064)
- An EXEC statement containing incorrect syntax now receives a single appropriate error without additional spurious messages.
(5093)
- COPY statements specifying a filename with an extension longer than 10 characters are now successfully processed, as they were in earlier products.
02223965 (246061)
- A WRITE statement following a WRITE AFTER statement no longer produces extra, spurious blank lines.

- 02177282 02212276 02202768 (212006)
 - Use of ANY LENGTH arguments in user functions now work as expected.
- 00507152 (98059)
 - Generation of a program with implied linkage parameters now completes successfully.
- (202177)
 - Use of \$DISPLAY VCS = syntax in a multi-program source now compiles as expected.
- 02033283 (167013)
 - The NATIVE "EBCDIC" Compiler directive now works as expected for programs that have a CONFIGURATION SECTION header but no content.
- 02260605 (255016)
 - A syntax error for a statement appearing on the same line, and after a COPY statement, is now reported with the correct error location.
- (4795)
 - A syntax error for a statement appearing on the same line, and after a COPY statement, is now reported with the correct error location.
- (3860)
 - INSPECT REPLACING operands of unequal size now receive a run-time system error, thus preventing data corruption from occurring.
- (4667)
 - A STRING statement in a program with a large amount of data now executes as expected.
- 02132926 (202023)
 - When scrolling upwards in Character Animator, correct source lines for nested copybooks are now always shown correctly.
- 02209782 (246075)
 - A bracketed abbreviated condition with implied subject and leading 'NOT' now compiles as expected.
- (5249)
 - A program compiled with the CHARSET "EBCDIC" directive, with a VALUE OF FILE-ID clause on a file description entry, now executes with a correctly named file.
- (7258)
 - Non-ASCII characters in comment entries now appear correctly in EA reports.
- 00428434 (87204)
 - Compilation of a DECLARE statement that is missing the AS keyword now reports a syntax error and completes without looping.
- (202291)
 - A **Quick Browse** of data names containing DBCS characters now returns correct results.
- (2840)
 - Reference modification on the results of an intrinsic function now returns the correct result in all scenarios.
- (3877)
 - SSRANGE messages have been enhanced to show line and file information.
- 00732371 (91169)
 - The reference count for data items used in CALL statements is now shown correctly.
- 02130511 (193060)
 - A program using AS as a data name now compiles successfully and is processed correctly by EA when using an Enterprise COBOL dialect (where this is a context-sensitive reserved word only.)
- (221073)

- All currency sign values that are valid for Enterprise COBOL are now correctly accepted under that dialect.
(220072)
- In Visual Studio, **Find all references** for an ambiguous name that is the subject of a REDEFINES clause now shows expected results.
02093998 (190032)
- EA analysis is now correct for an item referenced in the COUNT clause of an XML GENERATE statement.
(222066)
- Non-ASCII characters in long comment lines are now correctly processed by Enterprise Analyzer tooling.
(120026)
- A SEARCH ALL operation that contains another SEARCH ALL operation inside of the AT END clause now evaluates its WHEN clauses correctly.
01829511 (110077)
- The EA and XMLGEN directives now produce separate XML files if the file name option in the EA directive and the path option in the XMLGEN directive are both used.
01726038 (110026)
- Reference information in the IDE for qualified paragraph names is now correct.
(73204)
- The insertion of large amounts of replacement text from the REPLACE statement no longer causes execution to hang.
01803571 (106074)
- A new directive, DISPLAY-PICU has been added to determine how PIC U items are displayed to the console: either as UTF-8 or ANSI.
(142003)
- The TYPEDEF clause cannot be used in conjunction with the DYNAMIC LENGTH clause.
(254008)
- When used with some formats of icon file, the ILICON directive could result in a system error during compilation. This is now fixed.
00733709 (87102)
- A new directive, ILLOADSTRING "1", has been implemented which, if specified, changes the way string loads are generated in a program compiled to .NET. This may be useful when compiling very large projects for which the error 'COBCH0857 System error - failure during ILASM phase' is returned.
00722937 (83144)
- The new NAME OF expression is now available in .NET COBOL, and returns the unqualified name of the type or member specified.
(158040)
- The IS GLOBAL clause is now permitted for Linkage Section items in .NET COBOL code.
(70254)

Data Tools

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- When a filter is set on a data file, records outside of the filter are no longer inadvertently deleted when deleting filtered records.
02151283 (204027)

- In the Data File Editor, records are now inserted correctly, even when the files are not stored on the C:\ drive.
02084190 (194028)
- Within the Data File Editor, when data files are opened through Enterprise Server, they will now close correctly when the related SEP is manually removed.
(235011)
- When working with data sets via ESCWA in the Data File Editor, if you attempt to filter the catalog without first logging in to ESCWA, you will now be prompted to log in instead of being shown an error. Also, entering correct login credentials after a previous failed login attempt no longer shows a 403 error, but will instead correctly log in and open the catalog.
01984967 02031391 (163059)
- Cosmetic changes have been made to some of the Data File Editor dialog boxes to ensure that all button/screen text is displayed correctly.
01984967 02031391 (162069)
- Within the Data File Editor, MFDBFH files (that is, those stored in a database) can now be opened as either shared or exclusive.
(234017)
- In the Data File Editor, hexadecimal values can now be used in the **Value** field when applying a filter to a data set.
02306658 (246107)
- In the Data File Editor, when the ruler is on, a vertical guideline is displayed down the page every 10 columns. Toggle the ruler off to remove the guidelines.
02306661 (246106)

Debugger

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- Opening a large core dump file in the debugger now displays an error if the file is too large to be debugged.
01872464 (124123)
- Core files larger than approximately 1.5Gb can now be debugged on Windows, provided enough memory is available to the debug process. If there is insufficient memory, error 1050 will be displayed by the debugger.
02166754 (220131)
- When remote debugging to Enterprise Server, with a 3270 terminal, it no longer hangs when connecting.
00379622 (40023)
- Level-78 items longer than 512 bytes no longer cause the debugger to crash when querying.
02096915 (185023)
- A new argument (`progbponly`) is available to allow program breakpoints to be used when dynamically debugging Enterprise Server applications - see *How to debug services and applications with Enterprise Server Dynamic Debugging* in the product Help for more details.
00468081 (70023)

Dialog System

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- The create-window, show-window and create-dialog-box events are now correctly handled when multiple versions of a dialog system application are running.

02074907 (181035)

Documentation

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- The definitions for the ASSIGN directive parameters have been corrected in the documentation.
(10604)
- A restriction has been added to the documentation stating that you cannot call COBOL programs containing COMP-1 or COMP-2 parameters specified BY VALUE, and conversely, you also cannot call a C program using a COBOL program containing COMP-1 or COMP-2 parameters specified BY VALUE.
(8415)
- The documented syntax for CBL_GET_ERROR_INFO has been corrected.
(124059)
- The parameter block for CBL_GET_OS_INFO has been updated. The `cblte-osi-rtscapabilities` flag now contains a bit that indicates MFDBFH enablement.
(118068)
- When debugging in the IDE, you cannot extend the length of dynamic-length variables beyond their current size at the point of execution. Any data beyond the current size is truncated.
(209031)
- The documentation has been updated to clarify that the PREPLIST directive only affects preprocessors. It will not produce additional content for external compiler modules (ECMs), such as the DB2 and CICS ECMs.
01717477 (97172)
- A note has been added to the `mfttrace.application` and `mfttrace.time` CTF documentation topics to state that these properties cannot be altered once the specified application has been started.
(4881)
- The documentation for the TEXTFILE and BINFILE Emitter properties has been updated to state when the LOCATION property is used.
(3896)
- The properties for the `mf.rts` CTF component have been updated/corrected in the documentation.
(195073)
- Additional links have been added to the documentation for 'dynamic length' items, to allow easier access to all information relating to this subject.
(230024)
- The documentation has been updated to better explain some of the options available when installing the Micro Focus License Manager.
(97130)
- A note has been added to the documentation to point out that the level numbers used in a segment layout file do not correspond to the level numbers that are used in the COBOL source (although the same group structure is maintained).
00778667 (97101)
- The Data File Tools restriction 'National data items are not supported in record or segment layouts' has been removed from the documentation.
(123088)
- The Large File Support for Fileshare documentation now points you towards the permissible file limits for indexed files.
(104263)

- The *Prerequisites* topic in the *Scale-Out Performance and Availability Clusters* section has been updated to include the support for Oracle 19c.
02038850 (167027)
- The *Application Server JCA support for Enterprise Server* topic has been updated to clarify support for 64- vs. 32-bit.
(161102)
- The *Configuring Security using Active Directory* topic contained a broken link to the video covering how to define an external security manager. This has been fixed.
02004032 (158052)
- The documentation has been updated with an example of how to initialize local-storage in exit programs used with MFJSORT. See *Exits* for more information.
00780225 (105099)
- Anonymous binds have been disabled by default on MFDS instances which use "Restrict administration access". This means that applications such as ESCWA and MFCS which query MFDS Enterprise Server configuration data will be required to specify some form of credentials based on the MFDS security configuration. See *Class - Enterprise Server Administration* in your product Help for more information.
02209662 (244017)
- Within the documentation, refinements have been made to the tutorial: *Developing a PL/I application in Eclipse*.
(236024)
- Slight amendments have been made to the documented *Running Unit Tests in the IDE* tutorial in Visual Studio products.
(231022)

Enterprise Server

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- Incorrect TS model could be used if a brief loss of connection to Redis occurred whilst writing to a queue. This has been fixed.
(202041)
- A write to a TS or TD queue could fail (returning IOERR) once reconnected to Redis following a loss of connection. This has been fixed.
(199057)
- The CPU Warning for a threshold incorrectly calculated that the process was using CPU. This has now been fixed.
00367274 (26052)
- An RTS 114 resulted when using the MQPUT1 with the ES_MQMONEX exit. This has been fixed.
02026475 (161077)
- CICS transactions that are started by the EZASOKET listener EZACIC02 no longer store START data in a TS queue. Instead the data is stored in memory as part of the interval control element. This improves performance, particularly in a PAC, because there is no access to the PSOR (or disk) by either the listener or the SEP running the STARTed transaction to retrieve the data.
01902124 (124038)
- CICS transactions that are started by the CKTI MQ listener no longer store START data in a TS queue. Instead the data is stored in memory as part of the interval control element. This improves performance, particularly in a PAC, because there is no access to the PSOR (or disk) by either the listener or the SEP running the STARTed transaction to retrieve the data.
(152001)

- In an HSF-enabled enterprise server region, a task that was killed for exceeding a threshold sometimes caused shared memory corruption if it was purged during a local trace table rollover. This would cause `casmgr` to trap and bring down the enterprise server region. This has been fixed.
02133017 (194118)
- A SEP could stop producing system traces. This has been fixed.
02068443 (195029)
- The list of SOR models was truncated if it exceeded 256 bytes for a given type (TS or TD). Previously, truncation could occur midway through a prefix, resulting in an incorrect prefix being applied to TS/TD processing. This has been fixed so that truncation occurs only after the last complete prefix. In addition, a warning message (CASSI9042W) is sent to the console log. If this message is detected, then the SOR models need to be reviewed and reduced to less than 256 bytes or, if not possible, then the user exit TSTDSRUE can be used instead.
(245129)
- A performance improvement has been made so that there is no attempt to access a TSQ during REQID generation in the START processing triggered by the EZASOKET listener.
(153017)
- A transient SEP in a PAC could hit a runtime error on process shutdown. This has been fixed.
(221080)
- The `casmgr` could crash after killing a process that exceeded a threshold and the enterprise server region was configured with a positive `dump_limit` value. This has been fixed.
(204106)
- When a terminal is installed without a `termtype` defined, and the `netname` is already in use, a new message "CASCL0002S Auto-install error, NETNAME xxxxx already in use" will be written to CSSL.
02166861 (221052)
- When using `casout` in a PAC, the PACNAME was not added as a prefix to the security call. This has been fixed.
02008463 (156097)
- A memory corruption when synchronizing a PSOR in shared memory has been fixed.
02211316 (245052)
- When using an assembler data table that contained the Assembler Compiler Directive RLD, the length returned by the EXEC CICS LOAD API was the total length of the data table including RLD fields and not the data length. This has been fixed.
02178769 (216004)
- If an application was compiled in EBCDIC, the CICS SIGNON GROUPID was not converted to ASCII before calling the ESM resulting in the specified group not being found and using the default group instead. This is now fixed.
02065465 (176051)
- If an alias transaction was marked disabled and used in a URIMAP, the transaction was still executed. This has been fixed.
02180247 (222112)
- The EZASOKET listener will now reject connections when no more sockets are available instead of terminating and waiting for new sockets to be available to continue working.
02049614 (170013)
- A timing issue that could have resulted in a SEP registered in the dispatch chain even after a registration error has been fixed.
02176557 (211023)
- An issue where a job could be dispatched after the enterprise server region had started to shutdown has been fixed.

02103857 (191022)

- Previously a dump of all the SOR stores was taken when a dump command was issued. In future, a dump of the SOR stores will only occur when a system dump has been requested. This will reduce the number of dumps generated in the system.

02131841 (193081)

- When using query security for TRANSATTACH the wrong class XPCT was used instead of XTRAN, this has been fixed.

02198966 (244051)

- In a PAC, if an enterprise server region could not be started and `casmgr` failed in initialization before connecting to the PAC, `cascd` could decrement the number of enterprise server regions contained in the PAC. This has been fixed.

02055658 (176012)

- A dead lock could occur if a process had been killed whilst in a third-party program by the threshold monitor thread. This has been fixed.

02064488 (175076)

- PCT block was not addressed under certain circumstances. This has now been fixed

02202935 (224016)

- If the entry point mapper was used to map MQ calls and the connection had been lost to MQ, a trap in `dfheibmq` could occur. This has been fixed.

02082822 (182086)

- When an enterprise server region is running in a PAC, certain locks that were unnecessarily stored in the database will now be stored in the enterprise server region's shared memory, improving performance.

01932670 (146018)

- Values returned in ESCWA/ESMAC for active TRANCLASS could be corrupted if CTF was active. This has been fixed.

(244052)

- When switching for MIQM from one MQSERVER to another MQSERVER, a network error could be returned by MQ resulting in an XA error code -5. If this happens the SEP will be recycled as the work cannot be processed in that state any longer.

02211334 (246063)

- If an error occurs when calling SAFMGR on SEP initialization after the enterprise server region was started successfully because the LDAP connection was lost, the SEP will now stop but the enterprise server region will not, and the next SEP will have a chance to reconnect to LDAP.

02031096 (174010)

- If the `casout` utility times out, it will now close the session enabling another request to reconnect to the server side.

01994995 (203057)

- If a TCLASS key contained the '@' character then Enterprise Server could not correctly read it. This has been fixed.

02287206 (260120)

- An issue where the group name specified on the `casstart` command line was not being passed and used correctly causing the region to not stay up has been fixed. The condition was that the default group associated with the user did not have permissions to start the region (`OPERCMD5 casstart`).

02163023 (245046)

- In a PAC setup, ENQ's on the pipeline and webservice resources are no longer stored in the DB. They are stored in SHM.

00775012 (91020)

- An issue with EXEC CICS DELAY API when compiling with DIALECT(OSVS) has been fixed.
02206914 (236048)
- The TABLE resource under MFESMAC now controls whether the user can modify the services in ESMAC or ESCWA.
02131841 (194095)
- Security checks were being performed against an incorrect resource when cataloged datasets were accessed using the data file editor. This has been fixed.
02160499 (203144)
- A mutex was taken too early resulting in a serialization of work been processed when a terminal disconnect was issued. This has now been fixed.
02068931 (181001)
- A link to a remote PPT was not correctly removing the PPT from the PAC resulting in a subsequent inquire to find the PPT local. This has been fixed.
02206930 (235037)
- Improve performance by opening spool files once at the start of the process and not open/close for each request.
01994995 (194119)
- Custom HSF fields now correctly handle the maximum data length of 255 characters.
(5794)
- In ESMAC, a Cross-Site Scripting (XSS) vulnerability has been fixed.
00376857 (104212)
- The very first record written by an initialized SEP to an extended variable length ESDS file gave an error of EIBRESP2=110 with EIBRESP=0. This has been fixed.
00367116 (86028)
- When using the Micro Focus External Call Interface (ECI) over TCP/IP, the request and response data flows are now compressed using RLE.
3207572 (13314)
- Under some conditions, when a security look up failed the administrative LISTRESOURCE request would be driven. If the target class contained a significant number of members, the time taken to complete this could impact performance. A change in the ESM interface means the LISTRESOURCE request is no longer being executed.
00748245 (88213)
- When a LINK explicitly or implicitly specifying a remote transaction ID, EIBTRNID would be incorrectly populated with the target transid. This has been fixed.
02250109 (252012)
- The wait time for an internal event has been reduced to 2 milliseconds improving the responsiveness when cancelling a blocking CICS API - for example DELAY.
01894081 (127029)
- When performing a dynamic remote LINK; that is, when using the SYSID option a PPT entry was being erroneously created in the local enterprise server region. This has been fixed.
02156790 (203165)
- The JCL user impersonation feature was returning an invalid long name length and value. This has been fixed.
00753324 (92042)
- Long running TN3270 (Terminal and Printer) conversations where data was sent to the device would result in a memory leak in the MFCS process. This has been fixed.
02055505 (182071)

- The response fields EIBRESP & EIBRESP2 returned by EXEC CICS QUERY SECURITY were not correct in all cases. This has been fixed.
00725682 (86163)
- When starting a debug session, particularly when remote, an internal shared memory lock would result in the enterprise server region becoming unresponsive until the session was established. This has been fixed.
02158284 02177256 (203215)
- Enterprise Server now appropriately populates the entity name when validating remote file access for `mfDataTools2`.
02111703 (191045)
- CASCD will no longer clear all remaining locks in the region database if it is being shut down while in quiesce mode.
(185025)
- A buffer insertion logic error resulting in a truncated Enterprise Server Environment has been fixed.
01920281 (142016)
- The ESMAC HTTP status codes have been updated to be more appropriate for certain errors.
(202271)
- Enterprise Server will no longer perform a recursive call while waiting for a TRANCLASS dispatch in a PAC.
02168754 (204246)
- The THRESHOLD CICS resource and its attributes are now prefixed by an underscore when exported with `casrdtex` as they are Micro Focus specific. The `casrdtup` import utility now also requires this underscore.
(245063)
- Parameters given to `mfconfigmanagerapi` calls were misaligned. The API was also using an incompatible library causing exception handling to fail when attempting to read the definition file. This has been fixed.
(194046)
- Dynamic debugging port operations are now under a Mutex.
02155297 (203227)
- Fixed an issue with the display of RTS error messages in the `console.log` file.
01838001 (116004)
- An issue where a SEP did not recycle on xa-start failure has been fixed.
01839273 (112032)
- The new user exit BKAUXTRC has been added. The BKAUXTRC exit will be called when a trace switch occurs in an enterprise server region. The current aux trace will be closed and renamed to `.bkp` and the BKAUXTRC exit is then called to archive the file so that trace is not lost in a busy system. See *Exit When a Trace Switch Occurs in an Enterprise Server Region* in your product Help for more information.
(162021)
- Processing of an FCT open was inefficient for catalogued files which could give performance issues in a PAC. This code has been improved to minimize catalog access at FCT open time.
02155752 (204036)
- If an enterprise server region is running in a PAC and a DCT is declared to be an Internal Reader, if the Disposition field value is set to SHR then the Internal Reader queue will be stored in the SOR. Otherwise, it will be stored on disk.
02016912 (174040)

- A new `RemShrQueues` action has been added to the `caspac` utility. This option enables you to delete all stores called `Shared_CasTSQ_RC`, `Shared_CasTSQ_NR`, `Shared_CasTDQ_RC`, and `Shared_CasTDQ_NR`. See *caspac* in your product Help for more information.

(217010)

- In ESCWA, a new option has been added to the **ES Control** page to enable CTF to be dynamically enabled/disabled on a started enterprise server region. See *ES Control* in your product Help for more information.

01926245 (142040)

- A new `caspac` action, `RemOldPAC`, has been added to enable the removal of old PAC stores not prefixed. See *caspac* in your product Help for more information.

(252007)

- You can now use the `caslock` command to view a list of locks for enterprise server regions that are members of a PAC. See *Lock Processing* in your product Help for more information.



Note: You cannot use `caslock` to remove locks in a PAC.

02205807 (236041)

- The CICS API GET CONTAINER option `BYTEOFFSET` is now supported.

02112217 (190050)

- The XA recovery transaction will now be triggered after a number of seconds specified by the `ES_XA_RECONNECT` environment variable. For example:

```
ES_XA_RECONNECT=Y,120
```

Where Y indicates that the reconnect processing is required, and 120 is the number of seconds before the XA recovery transaction is triggered after a two-phase commit failure. See *CICS-Specific Environment Variables* in your project Help for more information.



Note: The maximum delay is 300 seconds or 5 minutes.

01891785 01965103 (137135)

- The HTML document `lang` attribute now changes when the language of the ESCWA application changes.

02010059 (156074)

- In ESCWA, removing a dynamic debugging session was incorrectly returned from the API request. This resulted in a "Request Failed: Unexpected error processing request" message on the dynamic debugging request page in the UI. This has been fixed.

02135527 (193107)

- The ESCWA UI files are now included in Solaris builds.

(103080)

- An issue with ESCWA encoding when operating with SJIS encoding has been fixed.

02157606 (204076)

- The ESCWA Client Web API documentation has been corrected for two endpoints:
`/native/v1/regions/{host}/{port}/{region}/enqmodel/view/{resource}/discard` has been corrected to:
`/native/v1/regions/{host}/{port}/{region}/enqmodel/view/{resource}/uninstall`
 In addition:
`/native/v1/regions/{host}/{port}/{region}/tsmodel/view/{resource}/discard` has been corrected to:
`/native/v1/regions/{host}/{port}/{region}/tsmodel/view/{resource}/uninstall`

(259031)

- The `MfRequestedEndpoint` value in the ESCWA configuration file (typically `commonwebadmin.json`) was being set to an invalid endpoint. When the ESCWA server starts, it uses this value as the endpoint for it to start on; if it is invalid, the ESCWA server would error and fail to start. This issue has been fixed by added server-side validation for the `MfRequestedEndpoint` field: the value must be in the format `protocol:host:port`; protocol must be "tcp" or "tcpssl"; host must be a valid hostname, IPv4, or IPv6

address, or "*". The port must be a valid port number or "*". Any request attempting to set MfRequestedEndpoint to a value that does not meet these validation requirements is rejected with a 400 "Bad Request" HTTP error. If the ESCWA configuration file has already been set to an MfRequestedEndpoint value, the ESCWA server will still fail to start, but will now output a more specific error message. In this case, the issue can be resolved by either manually editing the MfRequestedEndpoint value in the ESCWA configuration file, or by starting the ESCWA server with the following command line options: BasicConfig.MfRequestedEndpoint=tcp:localhost:10086 --write=true Replacing "tcp:localhost:10086" with the required endpoint.

01983736 (148074)

- Timeouts and performance issues on initially loading the spool table have been mitigated by preventing the spool table from sending an automatic request upon visiting or reloading the page. The "List" button now needs to be pressed to trigger the load or to apply a filter. This enables you to avoid unnecessary requests that might timeout.

02152418 (203033)

- The ESCWA server now has improved handling of unexpected and unsupported properties in the configuration (commonwebadmin.json by default). An unsupported property in the default configuration file will result in the ESCWA server logging a warning, removing the property in question, and continuing. If an unsupported property is found and the configuration has been supplied or overridden using command line arguments, the ESCWA server will log an error and exit. This behavior can be controlled using the new --strict-config command line argument.

(143008)

- Safety checks for POST/PUT requests with empty bodies have been improved.

(178001)

- Improved usability of IMS API endpoints by expanding property descriptions in schemas to incorporate relevant sections and labelling from the product documentation. The improvements will enable you correlate API to relevant UI functionality, and to discern the purpose and relevance of schema properties in an endpoint from reading the descriptions.

00372390 (24044)

- The browser title is now set to the name of the selected enterprise server region.

00748187 (90012)

- In ESCWA, you can now download the information you can display on the JES Catalog Entry and Spool Job Output pages. The download functionality retrieves the values starting from page 1 and is not restricted to a page limit. Note: The download will use the Codeset and Details values as set on the page.

00366654 (12735)

- Issue where table row buttons could be moved past the right edge of the table and made inaccessible has been fixed. In addition, the cosmetic bug where table row separators and row highlighting did not extend to the right edge of the table in some circumstances has been fixed.

(237046)

- In ESCWA, to switch users you now need to logoff and then log back in using the appropriate credentials.

(101032)

- In ESCWA, incorrect instances of "Job Control Table" have been corrected to "Journal Control Table".

(87028)

- The spool table now caches the results of the last query executed and persists those results between pages, preventing the query from being unnecessarily rerun.

02198043 (221138)

- In ESCWA on the JES Catalog page, the RECFM list now has the VBS option.

00777434 (91091)

- In ESCWA, the catalog table now displays the error or information message when ESMAC would have display one, including when accessing a corrupt CATALOG.
00779645 (97184)
- There is no longer an issue with incorrect error/success messages when deleting a dataset without relevant permissions in ESCWA. In this case, ESCWA now correctly handles the response from ESMAC.
01810271 (123009)
- In ESCWA, modifying the SOR Connection Path(s) field in the Scale-Out Repository Configuration dialog box did not update the SOR connection information. This has been fixed.
01907342 (127044)
- In ESCWA, you can now resize the columns for the Spool table.
02022132 (162025)
- Errors in the ESAdminAPI.yaml file have been fixed.
(124111)
- In ESCWA, while submitting JCL through the browser, special characters are now correctly preserved.
(91119)
- The issue where the Apply button was left disabled when changing values on a Communications Process page has been fixed. The 'Client CA Root Certificates File' field is now correctly disabled when 'TLS Enabled' is unchecked. This will not have affected Communications Processes that had 'Client Authentication' set to "Accept all clients" before unchecking 'TLS Enabled' as the 'Client CA Root Certificates File' is removed under that condition.
02183154 (222089)
- In ESCWA, the **Spool** page no longer uses deprecated ESCWA API.
(71382)
- In ESCWA, the services table now auto resizes correctly when expanding tree elements.
(99075)
- In ESCWA on the **Services** page, the name fields in the Service table rows are now aligned correctly.
(62209)
- In ESCWA on the **Monitor** page, the graph now displays **Milliseconds** on the left y-axis label when it is set to display milliseconds.
(57469)
- In ESCWA, URIMAP creation is now possible when **Usage** is set to **Pipeline**. Previously, an issue with the field validation incorrectly set the form to be in an error state when **Usage** is set to **Pipeline**, which disabled the **Save/Apply** button; the validation logic has been corrected.
01858819 (118078)
- In ESCWA, the **Monitor Control** page has been fixed for an enterprise server region that does not have MSS enabled.
(203107)
- In ESCWA, error messages can now be read by the screen reader.
01995465 (162038)
- In ESCWA, the keyboard navigation of the add widget's dialog has been improved.
02010047 (157066)
- The ESCWA UI has been re-themed to conform to Micro Focus standards. This changes the font, and uses title case where appropriate along with many other style and color changes.
01995207 (157061)
- In ESCWA, the keyboard navigation of the tree has been improved.

- 02010055 (156075)
 - ESCWA now supports various accessibility technologies including text-to-speech voice readers and full keyboard-only navigation.
- 01995445 (163045)
 - A redundant error message, triggered when shutting down ESCWA, has been removed.
- 00370913 (126001)
 - ESCWA better reflects the status of enterprise server processes in error cases when starting and shutdown.
- 02229975 (246126)
 - ESCWA abended when an empty body was sent in a PUT or POST request. This has been fixed.
- (175064)
 - An error occurred in ESCWA when trying to log on to an enterprise server region when already logged on. This has been fixed.
- (231033)
 - In ESCWA, keyboard navigation issues with tree controls have been fixed.
- 01995458 (157059)
 - The German translation for ESCWA has been updated.
- (181003)
 - The Content Security Policy HTTP headers on ESCWA has been improved.
- (71455)
 - In ESCWA, it was not possible to kill running Jobs on JES Initiators via the SEPs page. This has been fixed.
- 02182889 (221070)
 - In ESCWA, once modifications for a security group had been saved you could not make subsequent saves till the page was refreshed. This has been fixed.
- (138140)
 - When creating an ESM user, specifying a group did not add them to that group. This has been fixed.
- (143028)
 - In ESCWA, the display of region trace has been fixed.
- (221090)
 - ESCWA will now display transient SEPs on the SEP List Page.
- (198051)
 - Setting the IMS Transaction Log Path field on an enterprise server instance though ESCWA has now been fixed.
- (246119)
 - In ESCWA, the Web Services field on CICS URIMap resources was being marked as required when it is not. This has been fixed.
- 01983729 (148077)
 - In ESCWA, the CICS URIMAP Cipher field now supports .xml filenames.
- (122016)
 - The URIMap **Cipher** field's validation now account for xml files as permitted input.
- (107003)
 - In ESMAC, a new option has been added to the **Control** page to enable CTF to be dynamically enabled/disabled on a started enterprise server region. See *Control* in your product Help for more information.
- (146114)

- ESCWA now supports displaying Queued Requests by TRANCLASS when the enterprise server region is a member of a PAC.
(189004)
- Support has been provided for Pseudo Wait-for-Input enablement in IMS MPRs. See *IMS Configuration* in your product Help for more information.
(70273)
- In ESCWA, on the **IMS Transaction** page the **SPA Truncate** list has been converted to a check box and the **ULC** list has been converted to the **To Uppercase** check box.
(194113)
- In ESCWA on the **Control** page, a warning has been added above the **Dynamic CTF File Location** field and to the API documentation informing you to set the CTF Action field to `All Off` before changing the **Dynamic CTF File Location** field or the file being referenced.
(244057)
- In ESCWA, check **mfc** on the **ES Control** page to trace the Configuration Manager. See *ES Control* in your product Help for more information.
(220010)
- The **Enterprise Server Administration Configuration** dialog now has an **External Communications Response Timeout** number picker, which is used to set the timeout for ESCWA requests that go through MFCC. This timeout is equivalent to setting the `MFC_TIMEOUT` environment variable, but is only applied on a per-request basis rather than an environment-level setting.
00502152 (76011)
- In ESCWA, on the **Monitor** page the graph's x-axis has been corrected to display time in order from oldest to latest from left to right.
(158066)
- UDP sockets are now closed when not required by MFDS communications.
02181946 02193815 (222040)
- An issue with newly created Communications Processes being set to the started state but not actually being started has been fixed.
(88221)
- The `mfscretsadmin` error callback formatting has changed to improve readability and remove unnecessary information.
(8552)
- Secrets written from now on are transferable across platforms with different endianisms.
(104103)
- In the ESMSSQL switch, version 17 calls to `SQLSetConnectAttr` now check both the `sqlrtn` code value and the status item of the `XACallParam`.
(110060)
- An extraneous MQ rollback for TM processes has been fixed.
(231005)
- The DB2 switch module now provides more traces regarding CLI failures.
02202803 (239025)
- XA switches now contain logic to trace XID in the Consolidated Trace Facility (CTF).
01965103 02055821 (162072)
- The logic to parse the Open String option `ESLOGGING` now works correctly.
02172047 (208024)
- The Oracle switch source now has the correct data alignment to prevent RTS 114 error when more than one Oracle XARs are specified in the enterprise server region.

01802747 (103172)

- When using ESF in Redundant mode and having multiple ESM in the relevant Security Manager List, even though a request was successfully handled by one of the first ESM, an event failure would be returned if the last ESM in the list reported a failure. This has now been fixed so that if the request is successfully handled by any ESM in the list then the last ESM will not return its failure status, instead it will be logged.

00372409 (11512)

- The MLDAP ESM, OS ESM, and PAM ESM modules now use the RACF password alphabet for encoding short passtokens rather than the base64 alphabet.

02168078 (202221)

- The `esfadmin` utility is now delivered in 32 and 64-bit versions.

02182768 (218011)

- The caching mechanism of Enterprise Server's External Security Facility (ESF) is now able to cache some requests it previously could not, such as Verify (signon) requests with long usernames or passwords, and Auth requests for some MQ-related resources. These changes make cache records somewhat larger, so fewer will fit in a cache of a given size. If you are using ESF caching you might want to increase the size of your cache by 20% to 40% to account for this change if you observe a decrease in the cache hit rate reported at enterprise server region shutdown.

02154022 (203072)

- In some configurations, Enterprise Server security could lose track of users' group membership information in a running region or instance of MFDS after an ESF Update request. This has been fixed.

00741997 02182494 (86057)

- The validation of server certificates for SSL/TLS connections in the Micro Focus Common Client has been improved. Specifically the standard PKIX (Public Key Infrastructure, X.509) rules are now followed except when connecting to the server using information obtained from the Micro Focus Directory Server (MFDS), if that information only contains an IP address and not a host name. In earlier product releases MFCC did not enforce PKIX when using information from MFDS regardless of whether the information included a hostname.

(52097)

- An invalid invocation of the SAFROUTE API under certain non-default configurations could cause a divide-by-zero trap. This has been fixed.

02016793 (163052)

- The performance of the optional "prefix search optimization" feature of the MLDAP ESM Module has been improved.

00726158 (142020)

- The External Security Facility can now optionally update the "short name" of signed-on users. See *Renaming ACEEs* in your product Help for more information.

00657507 (70355)

- A CICS ASSIGN incorrectly returned a STARTCODE of TD instead of SD for transactions started by EZASOCKET. This has been fixed.

02004784 (156016)

- HSF statistics for some hexadecimal TS/TD queue names could be incorrectly reported. This has been fixed.

(146013)

- HSF records for transactions PIP1, PIP2, SDP1, and SDP2 would not show a user. This has been corrected to be the user that started the enterprise server region (or the default CICSUSER) or the user specified by `ES_ESM_PLTPIUSR`.

02015176 (156099)

- HSF records would be missing when the task number rolled over from 99999. This has been fixed.
02026013 (165049)
- HSF records for transactions that were killed due to having exceeded a threshold would sometimes have a response time of 0. This has been fixed.
01687237 01817975 (97116)
- When the `casmgr` process was recovering locks in `mfdbfh`, it was holding the shared memory lock. While recovery was in progress, no other processes in the enterprise server region was able to access shared memory. This was unnecessary and `casmgr` now releases the lock before initiating the recovery.
02088479 02086462 02085808 (185024)
- An issue with EXEC CICS SECURITY where the the length of the entity could be passed as 0 has been fixed.
02016793 (162070)
- A memory corruption that could occur when the monitor thread killed a process under heavy load has been fixed.
02006375 (158087)
- New messages have been added to the `console.log` for startup sequences in order to be able to troubleshoot enterprise server region startup issues.
01935739 (138172)
- If a TSQ in the SOR contained a space `x'20'` in the name, then the delete of the queue failed. This is now fixed.
01829779 (182032)
- An RTS 173 occurred on an `ES_mF_write_record_in_store` entry point when an enterprise server region was not in a PAC and SSTM was used. This has been fixed.
01806033 (103156)
- If a transaction executing in a PAC environment with TRANCLASS max priority active was killed by the threshold mechanism, a hang could result on subsequent transactions executing in the same class due to the counter not being decremented. This has now been fixed.
02168754 (209029)
- If a queue name contained an `x'00'` in it, the queue name was truncated when using Redis as the repository. This has been fixed.
01872664 01890335 (123010)
- An RTS 114 occurred when a transaction had a TRANCLASS defined and the purge threshold was reached. This has been fixed.
02144961 (204147)
- When an application, compiled with EBCDIC, issued a CICS ENQ in a PAC, the resource name displayed in ESCWA was not correctly displayed. This has been fixed.
01965470 (148020)
- MFDBFH connections are now closed when a task is idle.
01984788 (150015)
- When a TRANCLASS is defined for a transaction, the Active Count was not being incremented when a CICS INQ TRANCLASS statement was performed. This has been fixed.
02094425 (189009)
- An RTS 200 that occurs when cancelling a job (that is waiting for a reply) has been fixed.
(204153)
- Enterprise Server now handles bundle manifest files that can contain multiple JSON transform resources.

01991361 (150057)

- Latency for queued transactions in a TRANCLASS was attributed to their response times, not latency. The latency is now correctly displayed in the latency field.

02176385 (209033)

- SCB was not being freed after normal shutdown of a transient SEP. Behavior modified to free the SCB after this occurs to avoid issues when a SEP with the same PID is launched.

02190327 (220061)

- Loading and calling the single-threaded version of support modules within a multi-threaded process was resulting in a hang. This has been fixed.

00779469 (92169)

- DSNRLI now implements one-phase commit optimization where appropriate.

00779302 (97165)

- Fixed an issue with CICS Web Service SOAP request handling if an invalid header is provided.

(204277)

- On an EXCI link, the COMMAREA is now returned after a user abend terminated the target CICS program.

02016643 (161056)

- An issue with parallel one and two-phase XA connections has been fixed.

00700923 (73098)

- The value of the COMMAREA is now correctly returned after an XCTL in an EXCI request. ECI/EXCI link to the target program is now secured, MCICSPP rules must be specified.

01827754 (111029)

- A new *caspace* action, *CasDEQs*, has been added to enable you to list all errors that might have occurred on DEQs either at the END of Task or while a Job or Transaction was executing. See *caspace* in your product Help for more information.

01941366 (157022)

- In a PAC, CICS resources could get out of synchronization in some enterprise server regions if the resource in the PSOR was locked at update time. Previously, 3 attempts were made to acquire the resource. The default is now 10. The environment variable *ES_SOR_RETRIES* can be used to modify the number of retry attempts to between 3 and 1000. See *Configuration Options* in your product Help for more information.

(143021)

- The *-b* option has been added to the *castran* utility, enabling a specified Assembler data table name that uses RLD to be reloaded from disk. See *castran* in your product Help for more information.

00485855 (70095)

- The XA recovery processing now supports a retry mechanism:

```
ES_XA_RECONNECT=Y,delay,retry_count
```

Where *retry_count* is the number of recovery retry attempts to be made if the XA verbs return an *xa-retry* (04) return code. In this case, messages are sent to the console. See *Environment variables in alphabetical order* in your product Help for more information.

02157658 (203087)

- The command-line utility *caspace*, now has the *RecoverUUID* action that enables you to specify the UUID of an enterprise server region that has left the PAC. The action will remove all entries related to that enterprise server region from the PSOR. See *caspace* in your product Help for more information.

(185013)

- The *casToken* and *csrf-token* security has been increased by increasing the token regeneration frequency.

00368452 (12551)

- The performance of the ESCWA Spool View has been improved when using a database hosted catalog file and when specifying a filter with a leading wildcard character.

01856008 (138119)

- An issue with the format of messages caused ESCWA to report success as a failure. This has been fixed.

(125020)

- The "job user" filter string entered in ESCWA or ESMAC were being folded to upper case and sometimes resulted in records not being displayed. This has been fixed.

00469828 (57335)

- Missing JSON properties have been added to the ESCWA active PCT API.

(222149)

- Character validation for HTTP cookie values in secure regions has been added.

02132269 (202051)

- IMS support for the THRESHOLD resource has been added.

(245086)

- The fix for OpenSSL Denial-of-Service (DoS) issue CVE-2022-0778 has been applied to the product.

(221130)

- When Enterprise Server's MLDAP ESM Module is used for security, with Micro Focus password hashes and password history enabled, history entries are now created with the correct type of hash (Argon2 by default).

(120086)

- In Enterprise Server, when using LDAP-based security, all-groups mode, and username mapping ("long names"), if a user's group membership was changed and the `esfupdate` utility was invoked with the `user` option to update information in the region for that user only, the user's new group membership is now calculated correctly. Previously some of the user's groups might have been missed when determining the set of groups.

(98040)

- For LDAP-based security with Enterprise Server, a new configuration option (password change failure) determines whether a failed attempt to change a password causes signon to fail. See *MLDAP ESM Module Custom Configuration Information* in your product Help for more information.

00736902 (99142)

- When a PAC uses Enterprise Redis, set up a custom hashing policy using the following rules:

- Rule 1: `. *? \{ (?<tag> . *?) \} . *`
- Rule 2: `(?<tag> . *)`

01872664 (152015)

File Handling

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- WRITE BEFORE/AFTER ADVANCING was incorrectly writing too many blank lines. This has now been rectified.

02168624 (203229)

- The performance of opening files in SQL Server datastores has been improved.

01993173 (160010)

- The performance of opening files in Oracle datastores has been improved.

(191061)

- SQL URLs are no longer being incorrectly constructed for data set names containing '\$' characters.
(245059)
- The `dbfhadmin -region -list -usedb` command now correctly lists SQL Server or PostgreSQL regions which have associated legacy database names; previously, it was not.
(252010)
- A problem when attempting to deploy files greater than 2GB in size, using the `dbfhdeploy` utility on Windows has been fixed. Previously, it would fail with a "file not found" error.
02047931 (165086)
- A 3/9 file status (key out of range) is now returned when an attempt is made to write to a (line-)sequential file that would result in it exceeding a 2GB relative byte address or a 4GB relative byte address for Oracle. Previously, it was possible to successfully write beyond the logical maximum file size, resulting in possible data corruption. A future enhancement will allow (line-)sequential files up to 18446744073709551615 bytes (max 64-bit unsigned integer).
01720653 (99160)
- DB2 optimized I/O performance enhancements have been made for file writes.
01809549 (109025)
- When using MFDBFH, the performance of SQL Server optimised I/O writes has been improved.
(176033)
- Performance improvements have been made for cataloged files opened by CICS.
02152603 (202044)
- If an individual PAC region was killed, any resource lock acquired on behalf of the Data File Editor for that region could not be recovered until all regions in the PAC had terminated and the PAC restarted. These resource locks will now be automatically recovered when a PAC region is (re-)started, or as part of the `dbfhadmin -casprocess -recover` processing.
02259996 (258002)
- Previously, when using SQL Server, file open operations could fail if a retrievable (e.g. deadlock victim), or transient (e.g. lost database connection) ODBC error occurred. This is now fixed.
(124075)
- A COBRT114 error that occurred intermittently when XA switch modules deregistered their MFDBFH datastore connections has been fixed.
(146067)
- The 'Open file' processing has been enhanced to verify that attributes specified in the FCD (such as maximum record length, file organization/format, and key definitions) are compatible with those of the physical file. A 3/9, or 9/139 (ANSI74), file status is now returned if incompatible attributes are detected.
(163060)
- Indexes were not being created for alternate keys associated with files hosted in SQL Server databases with record lengths greater than 8000 bytes. The `dbfhdeploy upgrade` command has been enhanced to create the required indexes for existing files with record lengths greater than 8000 bytes (e.g. JES `catalog.dat` files).
02038202 (167010)
- Various table record locking performance improvements have been made.
(104139)
- Enterprise Server region start-up will now fail if MFDBFH detects that the CSA record in the region database is missing. An error message will be output to the console indicating the cause of the problem and the `dbfhadmin -verify -recover -usedb server-name -name region-name` command that needs to be run to restore the missing record.
02193998 (220081)

- The `dbfhadmin -casprocess -list|-recover` command was failing to identify "in doubt" processes for Oracle Enterprise Server regions, which prevented the recovery of resources owned by non-active processes. This has now been resolved.

(148038)

- A COBRT114 error sometimes occurred when executing a WRITE AFTER ADVANCING PAGE statement. This has been fixed.

(182045)

- An ODBC error sometimes occurred when deleting a record from a recoverable TDQ hosted in a PostgreSQL database. This has been rectified.

(221126)

- Vaulted Oracle connection strings (not passwords) were not being un-vaulted at run time, resulting in database connection attempts failing with an "ORA-01005: null password given; logon denied" error. This has been resolved.

02089410 (187010)

- Sequential file record locking is now working as expected for files hosted on SQL Server.

(204131)

- Wildcard catalog searches are no longer failing for Oracle datastores that do not have the name "JES" and a datastore with the name "JES" does not exist in the same physical database.

02176630 (217008)

- UNLOCK RECORD (op-code 0x000F) was failing with file status 2/3 (key not found) or 3/0 (I/O error) if the previous READ operation was performed using an alternative key. This has been fixed.

(182033)

- When database record locking was enabled for Oracle datastores, COBOL READ operations on a transactional file's primary key would fail. This is no longer the case, and so it is now safe to set `MFDBFH_RECORD_LOCKING=database` again for Oracle datastores.

(99200)

- MFDBFH now supports embedded environment variables in SQL URLs. These can be specified by either of the following formats:

`$name` - for example, `sql://$MYSERVER/$MYDATASTORE/myfile.dat`

`${name}` - for example, `sql://${MYSERVER}/${MYDATASTORE}/myfile.dat`

When using the first format, the environment variable name is terminated by the next punctuation character, or end of string. When using the second format, the environment variable name is enclosed within curly braces.



Restriction: The second format is not supported if you are using a variable for SQL URLs within an Enterprise Server environment, for example, when defining the JES catalog location or file allocation folder.

00367109 (13342)

- The `dbfhadmin` utility's syntax display incorrectly specified `-outfile` instead of `-file` as the command-line option to be used to output diagnostics to a named file. This has been corrected.

(222151)

- `dbfhadmin -diags -usedb server-name -name region-name` can now be used to generate diagnostics for a region and its associated cross-region database.

02123645 (193072)

- The `dbfhadmin` utility has been enhanced to display the RNAME value of each of the held and queued ENQs in hexadecimal when using the following command: `dbfhadmin -region -list -usedb:db-name -name:region-name -hex`

01965470 02025132 (150030)

- Region and datastore recovery was not working with SQL Server databases that had been created with a case-sensitive or binary collating sequence. This is now fixed.
01989735 (148105)
- The `mfdbcattc` utility sometimes lost a directory element in a path when expanding an environment-based pathname. This is now resolved.
00707621 (69585)
- In response to a SORT215E error, an identifier has been included to locate the fail position when the reformatting error occurs; also, some OUTFIL variables are initialized.
01832594 (119050)
- Processing of SYMNames in OUTREC processing has been corrected. For INREC/OUTREC processing, a symbol for `p,m,f` should result in substitution of `p,m` unless `symbol,edit` or `symbol,to` or (`symbol`) is specified, or the symbol is part of an arithmetic expression.
02150120 (202029)
- When `FORMAT=f` is specified in an INCLUDE statement, and the `p,m,f` fields are specified using SYMNames, the symbol for `p,m,f` should result in substitution of `p,m`.
01685305 (98082)
- A memory corruption issue during syntax checking has been fixed.
02177251 (207055)
- A memory violation issue when checking for a syntax error in MFJSORT has been fixed.
02181342 (218006)
- DFSORT allows multiple values for both positive and negative PD sign indicators. MFSORT now correctly identifies these sign indicators, so that the sort order is not affected by a sign indicator of the same kind.
01919912 (138001)
- An issue which caused the TRAILER1 COUNT to be formatted in binary rather than in M10 format has been corrected.
02117640 (193004)
- ICETOOL Header strings no longer truncate to 16 characters. (The maximum string size is 50 characters.)
02108822 (191037)
- The intermittent crash in mfjsub after running ICETOOL has been fixed.
00487201 00700562 (69210)
- A fault causing memory corruption during SORT or ICETOOL operations has been fixed.
01843660 (157081)
- SORT now honors the DCB attributes specified in the JCL job, to calculate the record length of the OUTFIL.
00488474 02199053 02266620 (70115)
- An issue when editing numeric data has been corrected.
01981672 (148085)
- A problem where OVERLAY would not apply spaces when `nX` notation is used in INREC/OUTREC has been fixed.
02114313 (189049)
- When performing a SORT, low values are no longer converted to spaces for non-empty files.
02257313 (254001)
- Files are now close properly when called by an error routine.
(61223)

- MFJTOOL now supports multiple titles (a maximum of 3). A new error message is now displayed when the limit is exceeded.
01870335 (119075)
- When performing a SORT with an empty input file, spaces are now correctly displayed.
02149621 (203032)
- SORT now displays the same output as the mainframe when there are multiple blank lines in HEADER_n/TRAILER_n.
01960061 (138220)
- Trailer3 processing will now use the last record in a section, as opposed to the first.
01932820 (143055)
- MFSORT was not honoring the record format for LSEQ files. This has been fixed.
00670127 (73079)
- A new environment variable has been introduced: ES_ZOS_SYSPRINT_DCB, which when set to Y (default is N) enables MFJAMS SYSPRINT to have the same DCB attributes as the IDCAMS SYSPRINT.
02103788 (190021)
- ICETOOL emulation now supports COUNT+N and COUNT-N, where N is a numeric between 0-999, during trailer processing. Its effect is to add to or subtract from the COUNT value.
01932287 (175060)
- An error message is now Issued, and processing is stopped, when the SUM field length is greater than 8 for the formats FI, BI and FL.
00424363 (58155)
- The maximum line length of `fhredir.cfg` has been increased to allow for the full MFPORT/MFNODE to be set.
01971422 01970683 (138292)
- An issue with Fileshare performance has now been resolved.
(70294)
- An issue when trying to run Fileshare in background mode has been fixed.
(101104)
- An error where incorrect results may have been returned when a READ on an alternate index was attempted without first performing a START has now been fixed.
(138152)
- Temporary files should now be created correctly in the Data File editor when connecting to a remote file.
(92087)
- WRITE operations to variable-length output pipes are no longer being treated as fixed-record-length WRITE operations; previously, the variable length set by a program was being ignored.
02183108 (220017)

IMS Support

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- A problem that caused a transaction to sometimes hang when work was done after a QC has been fixed.
02035581 (165062)
- When an application abended without doing a GU, a problem sometimes caused a transaction to stop even when instructed by the NDM exit to continue running. This has been fixed.
02129687 (193084)

- A database no longer fails to close in certain situations when work has been done after a QC.
02030160 (166042)
- A problem with the IMS Bridge that caused excess MQ queue handles to accumulate has been fixed.
02215732 (245060)
- A problem with rollback processing that caused an RTS-114 error under certain conditions has been fixed.
01977420 (150037)
- A /START TRAN command no longer intermittently results in `castmc` (IMS TM) becoming unresponsive.
02079669 (183118)
- A problem that caused TM to crash when message queue data corruption was detected has been fixed.
02222345 (248001)
- The ACEE user ID and group ID are now passed to the MFS field exit.
01841414 (115018)
- A Signal 11 occurred when a PL/I application called AIBTDLI without an I/O area, and BTS tracing was enabled. This has been corrected.
01937633 (143070)
- MFS Input Field exits are now called for all mapped and unmapped input fields.
(112029)
- A problem that prevented the `pfkey` from being formatted correctly from some LPAGES of the MFS has been corrected.
02186348 (221012)
- A problem that prevented output fields from being terminated properly when they do not fill the output buffer has been fixed to terminate them with the fill character `PT` or `x'05'`. When populated, these output fields can now be right-justified and padded with a user-specified fill character.
02172291 (209056)

Interface Mapping Toolkit

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- The HWTJGTST API now returns a correct value in the `JSONType` parameter when invoked with the `objOrEntryValueHandle` parameter set to a value of null, indicating the top of the JSON tree being parsed.
02102661 (220107)
- For CICS Commarea-based service interfaces, the convention to exclude any field mapped to a COBOL depending-on item from the external interface has been changed to apply only to input fields, not output fields.
02167110 (204208)
- COBOL clients no longer have duplicate data names in certain scenarios when the WSDL or JSON field name is greater than 30 characters.
01815167 (111010)
- COBOL client data items now have the correct size for JSON fields with "int64" format.
01815173 (104242)

JCL Support

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- A problem that caused the expiration date for a dataset to be omitted when `EXPDT=1999/365` was set has been corrected to show the value in the catalog listing for the database.
00368441 02032294 (157025)
- A fault prevented the "Procedure Not Found" error message from inclusion in the JESYSMSG log when a nested procedure followed one that contained parameters, and the job exported all symbols. This has been corrected.
02168556 (220013)
- An error writing a `spldsn` record when output statements were included in a step that had the same name as the previous one has been corrected.
02146950 (203051)
- The file status of a failed IDCAMS DELETE operation is now displayed in the error message.
00742124 (86064)
- A failure to find the correct COND step reference when the step was in the main body of the JCL has been corrected.
01884928 (125006)
- A dataset that was originally defined with a disposition of PASS but later cataloged was incorrectly removed when a job restarted at a step after the catalog. This has been corrected.
00364057 (11790)
- A problem with the `IEBPTPCH` utility sometimes caused the instream data using the EBCDIC character set to print incorrectly as EBCDIC. This issue has been resolved.
(7973)
- The IDCAMS delete statement sometimes deleted the wrong file when using certain combinations of wild cards. This has been corrected.
02055802 (175033)
- An IEBCOPY command in JCL sometimes incorrectly accepted concatenated DD statements for input. This is now reported as an error as per IBM behavior.
02137404 (198009)
- The ALLOCATE command in TSO accepts some parameters that contain comma-separated properties enclosed in parenthesis. Some comma-separated properties were sometimes dropped when driving the ALLOCATE command from IDCAMS. This has been fixed.
01865028 (118071)
- Using ESMAC to modify an `sql://`-based PCDSN entry in the JCL catalog by adding illegal characters sometimes caused problems in reading the catalog. This has been corrected by validating the `sql://`-based PCDSN before opening the catalog for reading..
(8340)
- If a region faulted as a job was taken from the input stage and placed into the dispatch queue, a lock was sometimes left on the dispatch queue after the job was moved back to the input stage. This has been corrected.
(167105)
- A problem when starting a new region that sometimes caused a JCL job to be flushed from active, and to complete with the `RFLS` status has now been corrected.
02074499 (183034)
- In some situations when running an SSTM job within an enterprise server region in a PAC, the SSTM job could be left with an incorrect status when the enterprise server region was stopped. This has been fixed.
(109003)
- When inserting records into the SPLDSN file, the job number was sometimes incorrect. This has been fixed.

- 00713363 (104109)
 - FTP output messages now display correctly when the Input cards are of length less than 80.
- 00370940 02015165 (11489)
 - A problem that caused the SORT job to abend with S0C4 when the LRECL was greater than 8000 has been corrected.
- 01797625 02177172 (103071)
 - MFJTOOL SPLICE now adjusts the WITH fields so that the field extent is not beyond the LRECL of the input file.
- 01690153 (97113)
 - PROCLIB authentication should be done under the execution user ID instead of the surrogate user ID.
- (70094)
 - Error COBRT153 ("Subscript out of range") sometimes occurred when using SPLCONV. This has been corrected.
- 00364813 (11796)
 - When the JOBLOG operation fails, an error is now reported and processing stops.
- 00367377 (13595)
 - A problem that prevented datasets with DISP=(OLD,DELETE) from being deleted at the end of the abended step as per mainframe behavior has been fixed.
- 00373283 (11402)
 - An issue that caused an S913 error when using PROCLIB in JCL has been corrected.
- 01971349 (138306)
 - When running `splconv`, an index out of bounds error sometimes occurred when jobs had a large number of sysout datasets. This has been corrected.
- 01816834 (110027)
 - A fault that caused resolved symbol values to overwrite the trailing spaces of the value has been corrected. The system symbol values such as SYSJOBID, SYSJOBNM, SYSUID, SYS_CORR_CURRJOB and SYS_CORR_USRDATA, when exported and used as replacement values in in-stream data, incorrectly held trailing spaces in the value.
- 02169726 (221001)
 - Performance has been Improved by opening spool files once at the start of the process and not opening or closing on each request.
- (219035)
 - MFFTP generated a 550 error when more than one space occurred after the CD command. This has been corrected.
- 02038344 (165013)
 - The MFJTOOL now displays the BTITLE string correctly in EBCDIC mode.
- 02182489 (216015)
 - The MFJCTPBC utility program now provides the PL/I `mfjctpbc.inc` include file in the product include folder. You can use `mfjctpbc.inc` in PL/I programs to call MFJCTLBP to retrieve job and DD information.
- (244003)
 - Enterprise Server has been modified to process empty JCL files as is done on the mainframe, and no longer throws an error when the include member is empty.
- 02071741 (181030)
 - A fault that limited the number of JCLLIB entries loaded to 14 instead of the maximum of 15 has been corrected.
- 02195057 (220070)

- A fault that shut down an SSTM job when a SEP shut down, but failed to shut down the region has been corrected.
01979290 (148109)
- A problem in the VSAM Shareoption manager prevented changes of open intent within a job step. This has been corrected.
02013866 (161052)
- A problem with spool housekeeping prevented the archiving of SUBSYS records for spool datasets that were being archived. This has been fixed, and records from the active system are now removed when all references have been removed.
(218024)
- A problem that caused the system to hang when a step specified in a COND was not found has been corrected.
01993079 (156054)
- Spool housekeeping when run in a database environment sometimes unexpectedly reported file-status 42. This has been resolved.
02173606 (212002)
- In the scenario where multiple enterprise server regions in a PAC had active SSTM jobs running, those active SSTM jobs could be seen in the spool. When an enterprise server region was shut down its active SSTM job would stop and its status change to complete; however, its entry in the spool would remain as active. This has been fixed.
(161038)
- Because of conflicting character set values, the REPRO utility of the IDCAMS program occasionally reported an error if the source was a NULLFILE. This has been corrected.
02051297 (173028)
- In some situations, when an enterprise server region that is part of a PAC was restarted the active jobs might have been left running. This has now been fixed.
00372425 02006019 (71060)
- A problem that prevented SORT from executing correctly when the SORTIN had a concatenated NULLFILE has been fixed.
01925271 (148082)
- The GDG version is now cataloged correctly after a SEP crashes.
01805894 (104205)
- Output has been added to spool housekeeping to show time spent extracting and uploading spool files from MFDBFH. In addition, output has been added to show time cleaning up orphan spool files.
01947087 (156003)
- A problem that caused the ESMAC/ESCWA JCL submission module to make an invalid call to the job submission API has been fixed.
01900454 (124039)
- Additional messages have been added to to aid in diagnosing startup issues.
01935739 (141023)
- The number of library entries allowed in the **System Procedure Library** field on the **JES Configuration** page has been increased to 15, each separated by a semi-colon.
02192800 (222070)
- The SPOOL_TIMEOUT environment variable has been added to enable greater control over record-lock retries. SPOOL_TIMEOUT enables you to configure a timeout duration and an interval duration that allow more flexibility in managing the spool file access, and thus reduce the likelihood of record-locked

messages, especially during shutdown of a region with an SSTM job. Specify both the timeout and the interval in milliseconds as follows:

```
SPOOL_TIMEOUT=timeout:interval
```

The default is 500 milliseconds timeout at 100 millisecond intervals.

(165017)

Mainframe Access

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- MFA tools now tracks whether TSO calls have been done on a session and logs off when the session is closed.
(82103)
- MFDAS crashed when the database name, segment data, and name was not specified on an import command. This is now fixed.
00364590 (12425)
- Support for 10-byte Endeavor element names has been added.
(245075)
- MFDAS LOAD was previously failing to send the command to the mainframe. This has been fixed.
(218023)
- The MFDAS status of an empty filter now correctly returns an error.
(218033)
- MFA client now always sets the function code in the read loop.
(259001)
- Using `SyncMon2` to sync an Endeavor area with 10-character element names has been fixed.
02029940 (162102)
- The functions `ConvertMFA1252ToUTF8()` and `ConvertUTF8ToMFA1252()` now return correct error codes.
01941348 (148070)
- Executing an MFDAS `IMPORT` command with the `/NUMREC` parameter will now correctly limit the number of records downloaded for all types except for USS and ChangeMan which are not supported.
(118020)
- In AWM, "FCD protocol error" messages will no longer occur when importing some data sets.
02214785 (246095)
- An issue with source connect using a blank username and password has been fixed.
00736415 (87067)
- When using MFDASMX to submit remote JCL, it will now correctly detect when the job has completed.
(112015)
- Descriptions and default values have been corrected for Services and Application Servers. RIMS Services can no longer be through the Configuration GUI as it is unused.
(82112)
- MFDAS will no longer give a Return Code (RC) of 26 if a member is not found after an `mfdas dir end` command.
02029955 (163100)
- The server will send the correct keyword (`memberName`) and omit it for sequential data sets.
(258159)

- MFA has been modified to clean up its cross-memory termination so that linkage indexes are not left active.
(125050)
- The MFA server will now correctly process Endeavor elements with 10 byte names.
02029940 OCTCR50A162102 OCTCR50A245075 (173004)
- Using a passphrase will no longer cause MFA to abend 0C4.
02151118 (203101)
- FCD status indicating I/O errors will no longer get lost, leading to a 9/100 "FCD protocol error".
(258003)
- Logon failure error messages now include the MFA error code.
(260122)
- The Options function no longer does RACF checks.
(262005)
- MFA will no longer abend 806 when started under a z/OS 2.5 system.
02039175 (166055)

Micro Focus Batch Scheduler Integration

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- MFBSI sometimes went into a loop when the batch initiator processing the submitted job was terminated. This has been fixed.
(170044)
- MFBSI sometimes incorrectly issued a "Store for JOB not found in the PAC" message if the region to which the job was submitted suffered intermittent Redis connectivity. This has been corrected.
02100246 (163099)
- When MFBSI is unable to update the Redis store while processing a job as part of a PAC, it now reports this via an output message to the Enterprise Server console.
(167024)
- MFBSI Control-M substitution now correctly handles the %%OWDAY value.
02175786 (208029)
- When a cancel command was executed against MFBSI, the spool files were sometimes deleted when the job terminated. This has been corrected.
02168103 (203220)
- Control-M substitution sometimes corrupted some Chinese characters. This has been corrected.
02109673 (202121)
- Access to the MFBSIJCL execution log file (`SjobID.log`) is available again in the MFBSIJCL termination exit.
3243992 (11763)
- Support for advanced JCL job restart has been added for Micro Focus Batch Scheduler Integration (MFBSI). For details, see the *Advanced Job Restart* topic in your product Help.
(124021)
- When `JobStart-Lookup-Freq` or `JobEnd-Lookup-Freq` are set to `AUTO`, you can now use the parameter `Job-AUTO-Delay` to customize the delay used by `mfbsijcl` to switch from high lookup frequency back to the default values. Set the `Job-AUTO-Delay` to a value from 1 to 60 (minutes). The default value is 3 minutes.
3236074 (12709)

Micro Focus Common Client

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- The Micro Focus Common Client (used by COBOL web-service proxy programs) now supports the "gzip" content-encoding for HTTP messages. MFCC recognizes gzip'd response and request messages, respectively.
00370460 01901934 (12322)
- A 114 Attempt to access item beyond bounds of memory (Signal 11) no longer occurs during FST101A test.
(231036)

Micro Focus Communications Server

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- The MFCS resource leaked under certain circumstances. This has been fixed.
02257630 (254003)
- HTTP HEAD requests no longer cause a SIGSEGV in MFCS.
00780357 (99065)
- MFCS no longer crashes when no TLS 1.3 Ciphers are provided.
(110090)
- The `log.html` file now correctly rotates when multiple processes are writing to it.
02147299 (203103)
- ESMAC no longer hangs when TLS is enabled.
02175947 (207033)
- MFCS support for cipher suites contained in XML files has been added to the URIMap ciphers.
00371944 (27067)
- In some cases, garbage characters could appear before EZ Sockets trace messages in the Micro Focus Communications Server log. This has been fixed.
(182013)
- The Advanced TLS setting in ESCWA **Allow Certificate CN-IP Mismatch** now works correctly.
(124132)
- An issue that caused a connection authorization failure for TN3270 clients that use ELF or DCAS to connect to Enterprise Server has been fixed.
(260042)
- A memory leak in the Enterprise Server multiprotocol connector (used for ES listeners of the **Web Services and J2EE** conversation type) has been fixed.
02085456 (182114)
- The Enterprise Server EZ Sockets implementation of the IOCTL function with the FIONREAD command code has been fixed for big-endian 64-bit platforms (AIX, Solaris SPARC, and HP-UX). This corrects an issue with MFFTP client support on those platforms.
(9595)
- The Micro Focus Communications Server (MFCS) component of Enterprise Server now delays the addition of new tasks when the task queue grows excessively large. This prevents incoming conversations and CAS from flooding MFCS with work and preventing it from making progress.
2830699 02055505 (5144)
- Under Enterprise Server, on rare occasions tasks started by the CICS EZ Sockets listener task CSKL could receive the error code 113 (EBADF2) from the TAKESOCKET API call, even if invoked within

CSKL's "give timeout" period. This was due to a bug in the implementation of the SELECTEX API which could sometimes erroneously indicate a socket had been taken. This has been fixed.

02027700 (161101)

- The Micro Focus Communications Server (MFCS) component of Enterprise Server could sometimes become blocked while shutting down. This could result in Enterprise Server killing MFCS after a 2-minute delay when stopping an enterprise server region. MFCS has been modified to prevent or minimize this condition.

02096133 (191020)

- `-p` and `--shutdown` options have been added to ESCWA to enable you to stop a running instance.

00370913 (11789)

- A number of improvements have been made to thread-abend handling in the Micro Focus Communication Server (MFCS). Recovery from unexpected exceptions and signals in MFCS is now faster and more robust.

01828728 (104314)

- The Micro Focus Communications Server now supports the "gzip" content-encoding for HTTP messages. MFCS recognizes gzip'd response and request messages, respectively, and attempts to compress some large HTTP response messages with gzip if the client indicates it supports that encoding. Not all MFCS HTTP responses currently enable gzip encoding.

00370460 01901934 (12322)

Micro Focus Directory Server

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- The MFDS TLS redirect code has been hardened to improve security.

01938276 02124054 02232906 (157050)

- If a shortened hostname fails to resolve, then resolution of the full hostname is attempted.

02207755 (240012)

- If there is a problem resolving the machine local hostname the MFDS process will display the following startup failure message rather than a "Bind fail=136" message: "CCITCP2-0252E hostname resolution error."

(221047)

- On import of an MFDS repository, some configuration types (such as XRM, JES Initiator, JES Printer, IMS MPR and MQ Listener) were double-counted, which could result in the configured object limit being breached even though the number of imported items did not exceed it.

(202284)

- The status of whether the vault is enabled and in use by the MFDS process was not displayed in the MFDS Web user interface as it was in Visual COBOL and Enterprise Developer 5.0. This has been fixed.

(217031)

- The MFDS process could hang if too many enterprise server regions were defined and started. This has been fixed.

02190282 (222092)

- MPR PWF support has been added to MFDS via the `mfIMSMRPWFIDispatch` MLDAP API MPR property.

(80014)

- In ESCWA, an error would occur when trying to modify a listener on a communications server other than the first. This has been fixed.

02191654 (222078)

- There is no longer a long delay when attempting to shut down an enterprise server region that is retrying an ISC connection.

01689657 OCTCR50A193010 OCTCR50A181100 (101059)

Micro Focus License Administration

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- In a system where many licensed processes are attempting to get responses from the mfcemd daemon, it is possible for the underlying system kernel to constrain resources used by the UNIX domain sockets. This can cause the send response to fail with a resource unavailable temporarily error. This caused the ces daemon to lose its contact with the requesting client, resulting in a hung client process.

The CES daemon now recognizes this temporary constraint condition and throttles the connection slightly and retries. The daemon now always sends a response to the client process.

Micro Focus recommends that you also tune the kernel parameters shown below to allow more resources for a heavily used system, to prevent the underlying condition.

The following examples show the parameters to change and show very high values. Micro Focus recommends that a network expert or an administrator reviews these values and adjusts them to achieve a sensible balance:

```
# Increase number of incoming connections
net.core.somaxconn = 65535

# Increase number of incoming connections backlog
net.core.netdev_max_backlog = 65535
```

02196423 (245004)

- Before performing a Repair of the Enterprise Developer installer, Micro Focus recommends that you create backups of any configuration files of the product that you might have changed.

02084082 (227001)

Micro Focus Support

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- The mfpoll.txt file now includes a new section that has information about whether the machine the mfsupport script is running on is a Virtual Machine or a physical one.

00466174 (59146)

Panels

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- Windows 10 Console Windows resizing has different behavior than some previous releases where the screen buffer size was constantly resized. Some applications, such as a COBOL Accept/Display applications, depend on this behavior, which uses a fixed line and column format. To work around this problem, enable legacy mode in the Console's properties. This disables automatic window resizing. If legacy mode is not enabled, the screen buffer resize event is captured and the window is resized back to the original size, which causes some flickering.

02179388 (212008)

PL/I Support

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- A problem that caused the compiler to abort when converting between precisions of float decimal data under `-fdasdb` has been fixed.
02037669 (165002)
- The `-pmod` compiler option now supports fixed decimal and float binary data. This affects the output of the MOD built-in function, ensuring that it always produces a positive result. If the result would otherwise be negative, the absolute value of the second argument is added to the result, which produces a positive result.
00370007 (12593)
- When using the `-ctf` compiler directive with `-ebcdic`, the output 6/7 event pairs contained garbled unreadable text. This has been corrected.
02077150 (182052)
- When an implicit OPEN was attempted on a PRINT file after it had been explicitly closed, the subsequent LINESIZE used on the implicit open was one byte longer than necessary, resulting in skewed output in the JES SYSOUT DD. This has been corrected.
01906859 (131013)
- PL/I JSON has been updated to allow '0' as a numeric value.
01946685 (138232)
- A problem that caused the macro pre-processor to incorrectly evaluate IF statements with THEN as variable/entry has been fixed.
02053477 (173053)
- Macro built-in function PARMSET now matches the IBM behavior.
02090681 (186002)
- A problem that prevented the PL/I EXEC preprocessor to correctly strip comments that appeared immediately after string literals in an EXEC SQL statement has been fixed.
00778615 (97003)
- A problem related to the use of the ALLOCATION built-in function within an ALLOCATE statement has been fixed.
01940725 (143085)
- The DEFAULT RANGE alignment attribute was being incorrectly applied when a structure had an explicit attribute specified. This has been fixed.
01915640 (129002)
- Compiler listings now include details about compiler options when the `-options` compiler option is specified.
00368495 (12736)
- Freeing a non-allocated CONTROLLED variable now behaves the same as IBM z/OS.
(109039)
- A problem that prevented the compiler from issuing a warning for a non-repetitive loop due to a missing semicolon has been corrected.
00368492 (12685)
- A problem with the SUBSTR built-in function abort-on-structure assignment has been fixed.
02037667 (165001)
- The STRING built-in now supports the ALIGNED bits member as a parameter.
02048696 (165088)
- A problem that caused the compiler to abort on complex DECLARE statements has been fixed.
02054987 (174001)
- A problem related to include statements with leading and trailing spaces in the filename has been fixed.

- (8335)
 - An internal error related to the `STRING` pseudo-variable has been fixed.
- 01862678 (121043)
 - Block-level information in compiler listings has been enhanced.
- 00368496 (11723)
 - A problem when using the `-bigendian` compiler directive sometimes caused a MFPLI04450S compiler error because the code generator could not generate code for intermediate opcode `BRANCH_EQ`. This has been fixed.
- 02094187 (185020)
 - A compiler abort failure with `-zalign` has been fixed.
- 02053453 (167107)
 - The `STRINGRANGE` condition, if raised on a `SUBSTR`, now uses a revised length when the length of the first operand is less than the `SUBSTR` length.
- 02145179 (200040)
 - When `GET DATA` is used incorrectly, a more accurate diagnostic is returned.
- 02091547 (186004)
 - A problem that produced an inaccurate `UNSPEC` diagnostic has been fixed.
- 02053474 (167109)
 - A problem matching `GENERIC` entries has been fixed.
- 00777296 (92136)
 - A problem with `GENERIC` matching for the `BIGENDIAN` attribute has been fixed.
- 00777296 (158054)
 - The `IEEE` and `HEXADEC` attributes are now parsed with appropriate diagnostics; however, `HEXADEC` floating point format is not supported..
- 3218202 (11391)
 - The `HBOUND`, `LBOUND`, and `DIMENSION` functions now return a result type and precision of fixed bin (31). In previous releases, these functions returned a result type and precision of fixed bin (15) for constant values ≤ 32767 .
- (90096)
 - Macro preprocessor omits `%SDEBUG` and `%RDEBUG` tags when the replacement text of a built-in function fits the line. To correct this, use the `-tagmin` option.
- 00384329 (46037)
 - PL/I now supports the `XMLSCRUB` built-in function. See the `XMLSCRUB` topic in your product documentation for details.
- (182040)
 - The `ENDFILE` PL/I built-in is now supported.
- 00366172 (11598)
 - Open PL/I now diagnoses for semicolons within a comment when `-nolaxcomment` is specified.
- 00368493 (12662)
 - When printing out a stack trace in `PLIDUMP`, a PL/I frame on the stack in its `%ENTRY` line did not print the offset into the function to aid in debugging. This has been corrected.
- 02150748 (202027)
 - A new optimization has been added to significantly increase the speed of PL/I `SELECT` statements when selecting a `CHAR VAR` variable.
- 01945899 (138207)

- A problem with a CONTROLLED structure allocated with incorrect array bound has been fixed.
01976700 (146099)
- A compiler error caused by an SDK update has been fixed.
(200043)
- A problem that caused a stream LINE to be continued after ENDPAGE processing has been fixed.
02051016 (175007)
- An IMS program compiled/linked on Windows, and then executed outside the control of IMS returned a condition code of 0. This has been fixed.
02157836 (202143)
- A memory leak sometimes occurred when a program compiled with `-opt` used a PL/I built-in function as both the left and right side of a comparison in an IF statement on a parameter passed in as CHAR(*). This has been corrected.
02056033 (175011)
- A problem that prevented PL/I XMLCHAR built-in function from correctly closing member tags on subscript change has been fixed.
02266090 (259005)
- A problem with PL/I SQL-Descriptor-Area alignment has been fixed.
02191840 (225006)
- Macro GOTO statement to a label in a different file caused %FILE tag issues. This has been fixed.
02127833 (194051)
- The PL/I linker's limit for objects has been increased.
00696713 (71413)
- The OPTIONAL attribute has been added to the listing file.
02123565 (193019)
- An internal consistency error related to the SUM built-in function with another built-in function as an argument is now fixed.
02035926 (161118)
- A problem related to the ENTRY VARIABLE array with option `-dc` has been fixed.
01931912 (138145)
- A problem with a CONTROLLED argument incorrectly diagnosed as not matching its corresponding descriptor has been fixed.
01981698 (146128)
- A problem when using the OPTIONAL attribute applied to a parameter with star-extent has been resolved.
00475039 (61130)
- A problem with CONTROLLED structure mapping with CHAR VAR members and `-bigendian` has been fixed.
01981738 (146127)
- A problem with ALLOCATE of a CONTROLLED structure that caused erroneous diagnostics related to ambiguous references has been fixed.
01996245 (155008)
- The MFPLI00109W diagnostic is no longer generated when an empty function call with no parentheses is used in an AND or OR (& or |) expression.
02153429 (204045)
- A problem that caused the evaluation of elements for structures belonging to arrays to return the wrong information back to the IDEs and failed to correctly evaluate the element has been fixed.

(57331)

- A problem that caused disabled data breakpoints to be honored has been fixed.

(235033)

- A fix for the debug engine that was previously overlooked has now been applied.

(173030)

- When stepping on the last statement of a CICS program that was called via a CICS LINK, the debugger returned to the calling program and stepped to the next line after the CICS LINK statement. This has been corrected.

(124098)

- The maximum limit of debuggable shared objects whose symbols can be processed by PLIDUMP and Codewatch has been increased from 64 to 256.

00368468 (11668)

- When attempting to debug optimized code, the `%exit` line was sometimes incorrectly triggered when stepping past the end of a procedure or on a unit. This has been corrected.

(186001)

- Using `bit(1)` constants sometimes caused a comparison to fail under `-opt`. This has been resolved.

02285824 (258108)

- On 64-bit Windows and Linux platforms, an incorrect value was returned when comparing a character expression against a null string (aka ""). This has been fixed.

02258692 (258009)

- A problem that occurred when creating a PLIDUMP with the H option and triggered by a SIGSEGV caused the dump to be incomplete due to private memory segments, and to terminate early. This no longer occurs.

02134496 (202024)

- `PL/I execpp` now correctly identifies the `%SDEBUG` tag.

01885251 (123026)

- The macro pre-processor sometimes ended with SIGSEGV on a PARMSET statement. This has been fixed.

02148893 (202019)

- A problem related to `DEFAULT RANGE (*) ALIGNED` has been fixed.

02126973 (193073)

- A problem that caused a diagnosis of incorrect limited entry initialization for static storage class has been fixed.

00779817 (103024)

- A problem related to `DEFAULT RANGE` with externals has been fixed.

01856273 (121025)

- The `-nolaxtype` option incorrectly generated an error. This has been fixed.

01920392 (137140)

- A problem that caused the `PTRADD` built-in function to malfunction when PIC variables were used for the increment has been fixed.

01839882 (114013)

- A problem matching `GENERIC` attributes has been fixed.

00777296 (103042)

- A problem matching `GENERIC` attributes has been fixed.

00777296 (104046)

- A problem generating PL/I code using SQL array insert statements with varying length host variables with the DB2 ECM has been fixed.
01832992 (104312)
- Open PL/I has new compiler and EXEC pre-processor options, `-multiclose` and `-nomulticlose`, to allow or disallow multiple closure of blocks and groups, including automatic insertion of missing END statements. The default is `-nomulticlose`, which produces an E-Level diagnostic.
01848364 (118009)
- A problem that sometimes occurred in high load situations when an attempt was made to access 20 bytes beyond a protected heap memory block. This has been fixed.
01868066 (120049)
- Previously, if a file declared in JCL as DD DUMMY which contained no ENV attribute on the FILE declaration was opened, read to EOF and then closed, it would incorrectly fail on a subsequent OPEN with UNDEFINEDFILE() condition. This no longer occurs.
00368457 (13612)
- A locale change coded using the `uselocale()` API caused a cleanup failure in a SIGSEGV upon return to the routine as an attempt was made to free the PLI RTS locale. This has been corrected.
02049362 (167097)
- A performance issue with JSON strings has been optimized to provide better performance
02099805 (187016)
- Previously, PLIDUMP would not successfully emit an automatic variable that consisted of a multiple dimension structure that was larger than 92MB in size. This has been corrected.
00368470 (12613)
- A problem with PL/I condition handling related to a non-local goto inside ON UNIT has been fixed.
02207593 (238032)
- A problem that caused the PL/I source formatter to erroneously remove blank lines has been fixed.
(123055)
- The PL/I macro pre-processor now correctly adds a line-break instead of splitting keywords.
02160523 (202153)

REXX Support

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- MVSVAR('SYSNAME') now returns the value of SYSNAME if it has been set by JCL.
02177701 (217003)

Run-time System

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- There was an issue in the internal logic of the `cobutf8` utility, which could have resulted in a hang when a very large amount of data was converted to the application's input and the application was unable to process the data quickly enough. This has now been fixed.
02115599 (190051)
- If a shared object was created with `cob -z -d symbol_name -l shared_library`, where `symbol_name` is resolved in the shared library linked into the shared object, then a potential SIGSEGV sometimes occurred when the shared object was unloaded. This has been resolved.
01848664 (118012)
- Issues relating to MFDBFH after a recoverable error that occurs in Enterprise Server have been resolved.

(97119)

- The `-U` option of the Micro Focus Configuration Utility for the Microsoft Build Tools and SDK (command name: `cblms`) now works correctly if it specifies both a path and a version.

(86023)

- A memory stomp, which was caused by text wrapping code when multi-byte characters were used, has been fixed.

02175685 (208014)

- A memory leak caused by alias symbols has been resolved.

01912000 (146043)

- Code has been removed that assumed that `Disk space exhausted` was the only failure mode for a disk write operation. It has been replaced with a query of `errno` when a write operation fails to output the expected number of bytes (so the run-time system now copes as well as the operating system does).

01978959 (195086)

- Previously, it was not possible to use the old Microsoft bitmap fonts such as Courier, MS Serif and MS Sans Serif with the `PC_PRINTER_SET_FONT` library routine. This has now been corrected.



Note: Helvetica and Times fonts are no longer available on Windows, and Arial and Times New Roman fonts should be used instead.

02011925 (160003)

- When using the `PC_PRINTER_DRAW_RECTANGLE` library routine, if `box-style` is set to 1 (filled), and no pen has been set using `PC_PRINTER_SET_PEN`, the rectangle fill will be solid black.

(127027)

Setup

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- This release no longer requires Microsoft's Visual C++ 2013 redistributable.

00486278 (71117)

SQL: COBSQL

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- COBSQL now exits when the CA-DB precompiler is specified but not installed.

(9638)

- COBSQL has been modified to handle EBCDIC conversion of SQL variables in the same group level as redefined variables.

02074774 (190020)

- The `SQLBGP` option has been added to the IDE.

(138181)

- COBSQL has been modified to handle EBCDIC conversion of redefined variables that have inline comments next to them.

02102682 (189011)

- Modified COBSQL to handle EBCDIC conversion when `BEGIN DECLARE` sections are broken into multiple lines.

01780938 (104078)

- The COBSQL preprocessor has been modified to insert Procedure Division Initialization logic after each `ENTRY` statement.

01780938 (118075)

SQL: HCO for DB2 LUW

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- A new exit for `ESXACUSTOMEXT` has been added to the DB2 switch module. The build scripts have also been updated with some new options to enable this logic.
01688275 (104007)
- For custom exits, the XA-inquiry block must now be specified in the LINKAGE SECTION in the custom exit sources.
02170335 (204264)
- The DB2 ECM now correctly handles EBCDIC content in VARCHAR host variables.
02127808 (193043)
- A problem with compiling VARCHAR or LONG VARCHAR arrays in a COBOL SQL program sometimes has been resolved.
02105414 (152006)
- A COBOL or PL/I program using EXEC SQL INSERT or FETCH statements without a FOR N ROWS clause with arrays caused compiler errors. This has been resolved.
(155003)
- A problem that occurred when a VARCHAR host variable was defined as COMP and the length was not converted with `charset(ebcdic)` and `dialect(entcobol)` directives has been fixed.
02167287 (203243)
- A problem generating PL/I code using SQL array insert statements with the DB2 ECM has been fixed.
01820967 (104309)

SQL: HCO for SQL Server

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- The MFHCO utility can now create DB2 LUW tables with more than 300 columns.
02144864 (202130)
- In this release, HCOSS Database Migration now supports Azure SQL Database and Managed Instance in Azure.
(161030)
- A problem converting expression (CURRENT_TIMESTAMP - CURRENT_TIMEZONE) in an EXEC SQL statement when compiling with SQL(DIALECT=MAINFRAME) has been fixed.
01858569 (131017)

SQL: Mainframe Batch Database Tools

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- A problem retrieving DECIMAL data using SQLTP2 when the DECIMAL field was followed by other fields has been fixed.
02140073 (201007)
- A problem loading binary data in EBCDIC into a data set using MBDT SQUTB has been fixed.
(181081)
- A problem that prevented "SQLCODE: -9999, SQLSTATE: IM999" error to be returned without including the explicit underlying cause of the error has been corrected by additionally calling the `GetDiagnostics` function.
00780459 (95019)

- A comma (,) is now supported as a decimal separator when DSNTEP2 displays values of decimal columns.
02017265 (163008)
- An error occurred when DSNTIAUL unloaded a null value with its indicator set to a character other than "?". This has been fixed.
02228124 (245142)
- A problem using MBDT SQLUTB when the decimal separator was set to comma (,) in Oracle has been fixed.
(161097)
- A problem that occurred when the DATE reserved keyword was used as a table name but was specified without quotation marks has been fixed.
02059727 (175083)
- A problem with loading data into a partition of a DB2 LUW table using SQLUTB with the REPLACE option has been corrected by now deleting the data in the partition and displaying the the number of rows affected in the SYSPRINT.
01794378 (106059)

SQL: OpenESQL

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- A problem that prevented the ESMSSQL switch from detecting when the PIP1 transaction is occurring caused `setCurrentConnection` to be performed on the incorrect connection. This has been fixed.
01916096 (142006)
- OpenESQL has been modified to process RELEASE TO SAVEPOINT statements in non-HCOSS RDBMSs.
00370819 (13104)
- Non-DB2/SQL Server support is now enabled for DSNREXX.
02132700 (195090)
- A problem that caused the OpenESQL native runtime to incorrectly handle WITH HOLD FOR UPDATE cursor against Oracle in 64-bit has been fixed.
00745593 (121047)
- OpenESQL now supports a SYNC clause specified in a variable-length host variable declaration.
02169632 (204218)
- The default READ-ONLY cursor in SQL CLR Stored Procedures is now opened as a FAST FORWARD cursor.
01817107 (113027)
- A problem that prevented a properly executed EXEC SQL statement from returning the correct RETURN-CODE has been fixed.
02036138 (167041)
- The OpenESQL managed runtime now handles the EBCDIC/ASCII conversion correctly when the SQLDA descriptor is used for input/output host variables.
01852747 (118034)
- A problem that caused the OpenESQL runtime to incorrectly handle SQLDA when the .NET SQL application used the ODBC driver has been fixed.
01993609 (158003)
- A compilation error when using the ODBC ECM and the CHARSET(EBCDIC) directive in a .NET managed project using multiple COBOL SQL source files has been resolved.
02018148 (163009)

- A problem that sometimes prevented an XA connection used with dynamic registration from working properly with MFDBFH with has been fixed.
00779680 (146073)
- A problem with compiling an EXEC SQL statement of DECLARE CURSOR in which CTE starts with SELECT * has been resolved.
01798310 (105107)
- A problem that occurred when using CTE in SELECT INTO statement has been corrected.
02117758 (194003)
- When an error occurs, the get error loop now exits if the last error message retrieved is the same as the current one.
02172041 (209005)

SQL Option for DB2

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- Java BigDecimal host variables sometimes erroneously returned an "X004 Number value overflow" message. This has been corrected.
02035965 (166008)
- The clause EXCLUDE/INCLUDE NULL KEYS is now supported for a CREATE INDEX against a local XDB location.
00366732 (12313)
- The XDB optimizer provided an incorrect string to pattern match when using Unicode host variables with CHAR/VARCHAR field index searches. This has been corrected.
02031280 (163104)
- When using Unicode host variables such as those used by the XDB JDBC driver, the XDB engines incorrectly padded zero-length variable-length strings with blanks when inserting into CHAR fields. This has been fixed.
02013343 (162016)
- When using the Optimizer, an incorrect set of prequalified row IDs resulted due to an incorrect data type from the expression evaluation code. This has been corrected.
02080612 (185011)
- A problem that generated an error when using FOR UPDATE OF before ORDER BY has been fixed.
00371171 (12415)
- An issue with the creation of a trigger containing some concat scalar operations in the triggered statement has been resolved.
02169332 (204247)
- A memory access violation that occurred when a left outer on join of view to table was present in a query has been resolved.
(3934)
- An issue caused by a trailing space in a quoted table or column name in the XDB XUTILB emulation of DSNUTILB LOAD has been resolved.
01811482 (104199)
- A problem that prevented the SQL scalar function POSSTR to correctly find the hex binary value X'00' within text strings has been fixed.
00365823 (12474)
- A problem that caused an X352 server exception when using Unicode with scalar subqueries has been resolved.
00374928 (11375)

- A problem that caused an X352 server thread exception when running a query containing a LEFT and INNER JOIN has been resolved.
2700290 (11082)
- The SYSTEM reserved word now supports a CONSTRAINT name in Data Definition Language (DDL).
02181636 (211039)
- A problem that prevented an output argument from being returned by a stored procedure has been resolved.
02010981 (158137)
- An issue with casting the host variable used in a z/OS DB2 12 OFFSET clause has been resolved.
00474163 (61110)

Visual Studio Code

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- You no longer receive a Null Reference exception when running `MicroFocus.VSCodeJIT.exe /r` on machines that do not have Visual COBOL or Enterprise Developer for Visual Studio installed.
01855303 (120034)

Visual Studio IDE

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- PCIMS error codes are now returned in `Mfdasmx` and in the Mainframe Explorer error messages.
00364595 (11568)
- In Mainframe Explorer, when performing an import of an unloaded IMS database with the Drag and Drop, the `ES_IMSWRK` environment variable is now honored, and the `*.LST` file is generated in that location.
00364592 (12503)
- There is no longer an issue with setting the source format to Fixed for .NET COBOL Core and .NET COBOL Standard projects.
01763326 (104079)
- Right-clicking on an element in a group item or table in the **Watch** window in Visual Studio no longer results in an error.
(158134)
- The Windows system folder is now excluded from build dependency checking. This is to avoid full rebuilds from occurring when building projects after you have installed any Windows updates.
02173365 (222086)
- A performance issue when stepping through native code in the debugger when the memory window is visible and showing an invalid address has been resolved.
(182090)
- The console log for an enterprise server was not displayed correctly in Visual Studio when the server was started using different credentials, for example from the Enterprise Server Common Web Administration.
(236006)
- Dialog boxes displayed when using menu options in the **Micro Focus Servers** nodes in **Server Explorer** now display correctly when the environment font used by Visual Studio is changed.
(167021)
- The code analysis results highlighting is now shown in the correct position within source lines that contain tabs.

(91125)

- If the Determine Directives command cannot identify the dialect for a source file, any file-level dialect override for that file is preserved.

02191877 (246123)

- An issue that prevented debugging of 64-bit PL/I executables on Windows has been fixed.

(220065)

- The CoreDump profile for native COBOL projects now correctly launches the selected core file.

(124048)

- An issue with the case sensitive string check when attempting to launch an "Executable" debug profile of a .NET COBOL project has been resolved.

01906352 (132008)

- When debugging through .NET Code, an **Edit and Continue** dialog box could appear that never completed and could not be cancelled requiring the Visual Studio process to be terminated. This has been fixed.

(158107)

- You can now select multiple test cases (using the usual **Ctrl** and **Shift** techniques) and click **Run Selected** to perform a test run of specific test cases.



Note: This option is not supported for individual data-driven test cases.

(6435)

- The **Auto-generate binding redirects** project property is now supported for .NET Framework applications

01850991 (131016)

Other Issues Resolved in This Release

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

- 02150403 (203019)
- 02091353 (187001)
- 02121754 (202065)
- 02132897 02164401 (198046)
- 01995392 (158073)
- 02010044 (157065)
- 2836772 (7336)
- 02293789 (226006)
- 01912000 (142033)
- 01834420 (98086)
- 00620699 (71289)
- 01811748 (124010)
- 02135207 (193101)
- 02051091 (175018)
- 00725550 (92178)
- 01839124 02145513 (112009)
- 02045736 (166043)
- 01947033 (146111)
- 01994995 (195081)
- 02033743 (161099)
- 02110007 (191044)
- 02289051 (258146)
- 01794492 (105047)
- 00430214 (58005)
- 02254118 (253027)
- 02016027 (163039)
- 00367290 (31077)
- 01862519 (118040)
- 3188835 (11348)
- 00365049 (13049)
- 02161981 (204198)
- (259026)
- 00775199 (218016)
- (259059)
- (244058)

Unsupported Functionality

This section includes information about features or functionality that are not 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.

Additional Software Requirements

To ensure full functionality for some Enterprise Developer features, you might be required to obtain and install additional third-party software.

See this information on the Product Documentation pages on Micro Focus Customer Care, in the product help for Enterprise Developer for Visual Studio 2017 ([click here](#)), Enterprise Developer for Visual Studio 2019 ([click here](#)), or Enterprise Developer for Visual Studio 2022 ([click here](#)).

Installation

Before Installing

Downloading the Product

1. Log into the Software Licenses and Downloads (SLD) site at <https://sld.microfocus.com/mysoftware/download/downloadCenter>.
2. Select your account and click **Entitlements**.
3. Search for the product by using any of the available search parameters.
4. Click **Show all entitlements**.
5. Click **Get Software** in the Action column for the product you want to download or update.

In the **File Type** column, you see entries for "Software" for any GA products, and "Patch" for any patch updates.

6. Click **Download** on the relevant row.

On Windows

System Requirements

Hardware Requirements

Enterprise Developer has the following requirements in addition to the requirements of Microsoft Visual Studio. See the Visual Studio documentation for details of the Microsoft 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.

The maximum disk space requirements are, approximately:

Enterprise Developer	Sentinel RMS License Manager
2.3Gb	75MB

- This includes the space needed to cache information locally so that you can modify the installation without the original source media.
- The disk space requirements include the versions of JRE and .NET Framework supplied with the setup file.

Operating Systems Supported

For a list of supported operating systems, see *Supported Operating Systems and Third-party Software* in your product documentation.

Note:

- A 64-bit Windows is required. You can produce both 32-bit and 64-bit applications with Enterprise Developer installed on a 64-bit operating system.

Software Requirements

The setup file will check your machine for whether the prerequisite software is installed and will install any missing prerequisites and the product components. A supported version of Microsoft's Visual Studio must be installed in advance.

Besides the software listed below, the setup file also installs the 64-bit AdoptOpenJDK 11.0.8 (LTS) with Hotspot.

This product includes OpenSSL version 1.1.1n-mf6 (modified).

- [Visual Studio IDE](#)
- [Selecting the Visual Studio components to install](#)
- [Installing Visual Studio features that are not currently installed](#)
- [License Manager requirements](#)
- [Other Requirements](#)

Visual Studio IDE

You must have Microsoft's Visual Studio 2017 version 15.9 or a newer one, or 2019 version 16.11 or a newer one, or 2022 version 17.0 or a newer one installed in advance. SQL CLR in Visual Studio 2022 requires version 17.1 or newer.

 **Note:** Problems with Microsoft's Visual Studio 2022, release 17.2, might cause issues with some of the functionality in Enterprise Developer for Visual Studio 2022. See *Known Issues* for details.

You need one of the advanced versions of Visual Studio listed below:

Professional, Enterprise or Community Edition (for Visual Studio 2017) - see the next section for the Visual Studio components you must install.

Professional, Enterprise or Community Edition (for Visual Studio 2019) - see the next section for the Visual Studio components you must install.

Professional, Enterprise or Community Edition (for Visual Studio 2022) - see the next section for the Visual Studio components you must install.

Microsoft's Visual Studio Express Edition is not supported.

Important:

- When installing Visual Studio, ensure you select the Help Viewer component for installing if you want to view the Enterprise Developer product help inside Visual Studio. When you select components to install in the Visual Studio installer, click **Individual components** and check **Help Viewer** in the **Code tools** section.

The following software is also required:

- Microsoft .NET Framework 4.7.2. This is included with Visual Studio.

Selecting the Visual Studio components to install

The Visual Studio installer enables you to customize and only install the workloads and components that are most suitable for your area of development. For example, you can select the components that are required for .NET desktop development, ASP.NET Web or C++ development.

If not already installed, the Enterprise Developer setup file will install the following components:

- .NET Framework version 4.7.2.
- Debugger
- Data services

A number of workloads and components are optional and only required by specific types of applications or tasks:

- Azure, WCF, Web, WPF or SQL CLR application development.

If you require any of these, you can select them when you start the Visual Studio installer or, enable them after completing the installation - see the next section.

Installing Visual Studio features that are not currently installed

If a feature of Visual Studio was not installed during the Visual Studio installation, the respective functionality or the project templates for it are not available. You can install a missing feature in one of the following ways:

Rerun the Visual Studio installer:

1. Start the Visual Studio installer and choose to modify an existing Visual Studio instance.
2. Select the workloads and the components that are missing (for example, **ASP.NET and web development** or **Help Viewer**).
3. Start the Visual Studio installation.

Use the **Quick Launch** control in Visual Studio:

1. Start Visual Studio.
2. Type the name of the feature in the **Quick Launch** control - for example, type `ASP.NET` or `Help Viewer`.

A drop-down list with any features matching your search string appears. If the feature is not already installed, one of the search results will be an option to install it.

Use the `Install Missing Feature(s)` command in Visual Studio:

1. Start Visual Studio.
2. Click **Help > Micro Focus Product Help > Install Missing Feature(s) > Feature Name**.

Follow the instructions in the installer to install the missing feature.

3. Alternatively, if a Micro Focus project template requires a Visual Studio feature which is not currently installed, the IDE displays an information bar with instructions to install the feature.

License Manager requirements

- The Micro Focus License Administration tool requires Java to run. It supports Java 1.7 or later.
- 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 any network license servers, you must update them before you update the client machines.
- If you are upgrading from Enterprise Developer release 2.2 or earlier, uninstall the license manager before installing the product.

You can download the new version of the license server software by following these steps:

1. Log into the Software Licenses and Downloads (SLD) site at <https://sld.microfocus.com/mysoftware/download/downloadCenter>.
2. Select your account and click **Downloads**.
3. Select a product and a product version from your orders.
4. In the list of software downloads, locate the **License Manager**.
5. Click **Download** to download an archive with the installers.
6. Run the installer suitable for your Operating System to install License Manager on your machine.

Other Requirements

Various actions and operations within your COBOL development environment depend on certain files that Microsoft distributes in the following packages: the Windows SDK package and the Microsoft Build Tools

package. See *Microsoft Package Dependencies* for a full list of actions and operations that require one or both of these packages.

By default, the product installation installs the latest versions of the Microsoft Windows 10 SDK, and the Microsoft Build Tools for Visual Studio 2017, to their default locations.

If you need to use any other version of these packages, or use them installed to a non-default location, use the `cb1ms` command line utility post-installation to manage this; see *Managing the Microsoft Build Tools and Windows SDK Packages* for more information.

Product Co-Existence

- 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:

- If, when you install Enterprise Developer, the machine does not have Microsoft Visual C++ 2017 Redistributable Runtime already installed, it is installed as required by Enterprise Developer. The installation of Microsoft Visual C++ Redistributable Runtime adds a number of `.dll` files, without digital signatures, into the `winsxs` directory.
- 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.
- Various actions and operations within your COBOL development environment depend on certain Microsoft files distributed in the following packages: the Windows SDK package and the Microsoft Build Tools package. By default, a standard product installation downloads and installs these. Refer to *Microsoft Package Dependencies* to see if these packages are required. If you do not plan to use your development tool in a way that will depend on any of these packages, you can run a non-standard installation, which will skip their download and installation, thus saving disk space and time taken for installation. Refer to *Advanced Installation Tasks* for details on the available installation options.
- If you already have Microsoft Build Tools for Visual Studio 2017 installed, you must ensure that it contains the Visual C++ build tools workload (or at least the individual components contained in that workload) before you run this installation.

On UNIX

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	Licensing technology
POWER running AIX	Micro Focus	891 MB	3.56 GB	1.78 GB	41 MB
System Z running Red Hat Linux	Micro Focus	559 MB	2.24 GB	1.12 GB	39 MB

Platform	Installer type	Setup file size	Disk space required for the installation	Disk space required for running the product	Licensing technology
x86-64 running Red Hat Linux	Micro Focus	1.1 GB	4.4 GB	2.2 GB	50 MB
Red Hat for Docker	Micro Focus	863 MB	3.45 GB	1.73 GB	50 MB
Amazon x64	Micro Focus	885 MB	3.54 GB	1.77 GB	50 MB
Amazon for Docker	Micro Focus	885 MB	3.54 GB	1.77 GB	50 MB
SPARC running Solaris	Micro Focus	803 MB	3.21 GB	1.61 GB	42 MB
System Z running SUSE SLES	Micro Focus	568 MB	2.27 GB	1.14 GB	39 MB
x64 running SUSE SLES	Micro Focus	885 MB	3.54 GB	1.77 GB	50 MB
SUSE for Docker	Micro Focus	884 MB	3.54 GB	1.77 GB	50 MB
x64 running Ubuntu	Micro Focus	964 MB	3.86 GB	1.93 GB	50 MB
Ubuntu for Docker	Micro Focus	887 MB	3.55 GB	1.77 GB	50 MB
x86-64 running CentOS	Micro Focus	1.1 GB	4.4 GB	2.2 GB	50 MB

Operating Systems Supported

For a list of supported operating systems, see *Supported Operating Systems and Third-party Software* in your product documentation.

On some platforms, there is only a 64-bit version of this product. 64-bit versions of the product support compiling to and running 64-bit programs only.

Software Requirements for Micro Focus Enterprise Developer Unix Components

The following topic lists the software requirements for Micro Focus Enterprise Developer Unix Components.

- [Software required by the setup file](#)
- [Libraries required by the setup file](#)
- [Required environment variables](#)
- [License Manager requirements](#)

Software required by the setup file

- The "awk", "ed", "ps", "sed", "tar", "sed" and "which" "tar" utilities must be installed and added to the PATH.

- 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.
- 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
```

Libraries required by the setup file

The following table lists the required libraries for Red Hat and SUSE Linux platforms. The setup file 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 ¹	SUSE 15 ¹	Red Hat 6x	Red Hat 7	Red Hat 8	
glibc	glibc-*.i686	glibc-*.x86_64	glibc-*.s390				X	X	X
libgcc	libgcc-*.i686	libgcc-*.x86_64	libgcc-*.s390				X	X	X
libstdc++	libstdc++-*.i686	libstdc++-*.x86_64	libstdc++-*.s390				X	X	X
glibc-locale	glibc-locale-32bit	glibc-locale-2		X	X				
glibc-devel	glibc-devel-*.i686	glibc-devel-*.x86_64	glibc-devel-*.s390				X	X	X
elfutils-libelf	elfutils-libelf.i386 or elfutils-libelf.i686	elfutils-libelf.x86-64	N/A				X	X	X
libelf-devel**	elfutils-devel.i386 or elfutils-devel.i686	elfutils-devel.x86-64	N/A				X	X	X

Library	32-bit Library Name	64-bit Library Name	Platform						
			s390	SUSE 12 ¹	SUSE 15 ¹	Red Hat 6x	Red Hat 7	Red Hat 8	
libelf-devel**	libelf-devel-32bit-0.137-8.19	libelf-devel-0.137-8.19	N/A	X	X	X			
libelf1**	libelf1-32bit-0.137-8.19	libelf1-0.137-8.19	N/A	X	X				
gcc ²	gcc*.i686	gcc*x86_64	X	X	X	X	X	X	X
cpp ²		cpp*x86_64				X	X	X	X
ld ²	Binutils*.i686	Binutils*x86_64	X	X	X	X	X	X	X

- Libraries marked with an 'X' are not included in the platform and need to be installed separately.
- ¹On SUSE 12 and 15, 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.
- ²On Red Hat, these libraries are required to enable COBOL and PL/I to compile.
- * Additional libraries required to use the core_on_error run-time system 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.

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

Required environment variables

- To execute JVM COBOL code, you need to set the environment as follows:
 - 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`
 - 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. If you do not set it as specified here, the installation will run but you might experience unexpected behavior from the installer.

The LANG settings are English and Japanese only so set it to one of the following locales:

```
C, default, en_GB, en_GB.UTF-8, en_US, en_US.UTF-8
```

```
ja_JP, ja_JP.SJIS, ja_JP.UTF-8, ja_JP.eucJP, ja_JP.eucjp, ja_JP.sjis, ja_JP.ujis, ja_JP.utf8, japanese
```

You can set LANG before running the setup file as follows:

```
export LANG=C
```

Alternatively, add it to the start of the setup command line:

```
LANG=C ./setupfilename
```

See *Using the LANG Environment Variable* for details.

License Manager requirements

- The Micro Focus License Administration tool requires Java to run. It supports Java 1.7 or later.
- 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 any network license servers, you must update them before you update the client machines.
- If you are upgrading from Enterprise Developer release 2.2 or earlier, uninstall the license manager before installing the product.

You can download the new version of the license server software by following these steps:

1. Log into the Software Licenses and Downloads (SLD) site at <https://sld.microfocus.com/mysoftware/download/downloadCenter>.
2. Select your account and click **Downloads**.
3. Select a product and a product version from your orders.
4. In the list of software downloads, locate the **License Manager**.
5. Click **Download** to download an archive with the installers.
6. Run the installer suitable for your Operating System to install License Manager on your machine.

Issues with the Installation on UNIX and Linux

Installing on Red Hat 8.x s390

On Red Hat 8.x s390, the RPM non-root install method is not supported due to errors given by cpio. You receive the following messages:

```
error: unpacking of archive failed on file /usr/lib/.build-id/lb/af99f26c6b4c00ca499a3199a574b73aeb3854;6092b79c: cpio: symlink failed - No such file or directory
error: Micro_Focus_cobol_server-7.0.0.0-100700.s390x: install failed
```

As a result, the installation in this scenario is incomplete.

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



Note:

- This version of the product is a full install.
- See *Before Installing* first for important information. Also, see *Installing as an Upgrade*, if you have an earlier version of Enterprise Developer installed on your machine.

To install this product:

1. Run the `edvs2017_80.exe` file (or `edvs2019_80.exe` for Visual Studio 2019, or `edvs2022_80.exe` for Visual Studio 2022) and follow the wizard instructions to install the prerequisite software and the product.

The installer installs Enterprise Developer, Enterprise Server for .NET, and Micro Focus Analysis Services Integration and offers to install Micro Focus Rumba+ Desktop. The setup file will also install any missing prerequisite software as listed in the topic *Software Requirements*.



Note: If you intend to use the Enterprise Server for .NET feature to run CICS or JCL applications in a .NET environment, the Rumba+ Desktop product is a prerequisite. We recommend that you install it at this time.

2. After installing the Visual Studio 2022 product, you need to execute the following command from a Visual Studio command prompt:

```
devenv /updateconfiguration
```

This fixes an issue with Microsoft's Visual Studio installer in Visual Studio 2022, release 17.2.n, that might result in the IntelliSense and editor colorization not working.



Note:

- If you are installing onto a machine that has an existing Micro Focus product that uses an older Sentinel RMS License Manager, you might be prompted to remove it and install the Micro Focus License Administration. By doing this you maintain the existing Sentinel RMS license files while adding the Micro Focus License Administration. If you are unsure about existing licenses on your computer or removing the Sentinel RMS License Manager, consult your System Administrator. If you want to proceed, remove Sentinel RMS License Manager by using **Program and Features**, and rerun the installation file.
- Depending on how you plan to use the product, there could be dependencies on the Microsoft Windows SDK and Microsoft Build Tools packages. The installer will install the latest versions of the Microsoft Windows 10 SDK, and the Microsoft Build Tools for Visual Studio 2017, to their default locations. Refer to *Microsoft Package Dependencies* to see if you will require these packages, and if not, you can configure the installer to skip download and installation (see *Advanced Installation Tasks* for more information).
- If you choose not to install Rumba+ Desktop at this time, but decide you want it later, you must then uninstall Enterprise Developer, and then rerun the installer with the Rumba+ Desktop option

checked. As an alternative, you can use a different emulator, but be aware that instructions in this documentation often assume that you are using the embedded Rumba+ Desktop emulator.

- Trial licenses cannot be used with remote desktop services. If you want to use your product in this way, please contact Micro Focus Customer Care to obtain a relevant license.
- We recommend that you install any updates for Visual Studio and the .NET Framework that are available at the [Microsoft Download](#) site.
- If you install JDK you might be prompted to install the latest update. The latest update is not required for use with Enterprise Developer but you can install it if you wish.

Installing Micro Focus Enterprise Developer Unix Components

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.

Before starting the installation, see *Software Requirements*.

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_8.0_platform
```

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

```
./setup_entdev_8.0_platform
```

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

 **Note:** On Ubuntu, the prompt for superuser password is not available. On this platform you must either log in as root or use the `sudo` command to get root permissions before you run the installer.

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

Enterprise Server System Administrator Process

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.

You must supply the user ID at the command line - specify `-EsadminID=[ID]` as part of your command.

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` and follow the onscreen instructions.

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_8.0_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, you can rerun the `MFLicenseServerInstall.sh` from within the `COBDIR/safenet` folder with the force command line option:

```
cd $COBDIR/safenet
./MFLicenseServerInstall.sh force
```

AutoPass Licensing considerations

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

```
./setup file -skipautopass
```

- To protect the AutoPass installation from accidental updating, you can create an empty file named `SKIP_AUTOPASS_INSTALL` in `/opt/microfocus/licensing` as follows:

```
touch /opt/microfocus/licensing/SKIP_AUTOPASS_INSTALL
```

While the file is present, the AutoPass installer does not make changes to the installation or shutdown the running license daemons. If licensing needs to be updated later, you can rerun the `MFLicenseServerInstall.sh` from within the `COBDIR/safenet` folder with the force command line option:

```
cd $COBDIR/safenet
./MFLicenseServerInstall.sh force
```

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 and licensing Micro Focus Rumba* - available in the product Help and on the Product Documentation pages on Micro Focus Customer Care
- *Installing the Mainframe Components* - available in the product Help and on the Product Documentation pages on Micro Focus Customer Care
- *Installing on Microsoft Terminal Server and Citrix* - available in the product Help and on the Product Documentation pages on Micro Focus Customer Care

See this information on the Product Documentation pages on Micro Focus Customer Care, in the product help for Enterprise Developer for Visual Studio 2017 ([click here](#)), Enterprise Developer for Visual Studio 2019 ([click here](#)), and Enterprise Developer for Visual Studio 2022 ([click here](#)).

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.

- This release can be installed as an upgrade to Enterprise Developer 7.0.
- 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

To install Enterprise Developer you run `edvs2017_80.exe` which contains a number of product `.msi` files (Windows Installer packages). When run, `edvs2017_80.exe` performs some initial system checks then sequentially installs the `.msi` files.

 **Note:** The following applies to `edvs2019_80.exe` when installing the product for Visual Studio 2019, and to `edvs2022_80.exe` when installing the product for Visual Studio 2022.

`edvs2017_80.exe` can take a number of parameters, enabling you to specify a number of different types of installation:

- Standard Installation

Format:

`edvs2017_80.exe`

Summary:

Full installation including License Manager and Enterprise Developer. During installation you can specify options including the location to which the components are installed.

- Non-standard Installation

Format:

`edvs2017_80.exe skipmstools=1`

Summary:

Full installation, minus the Microsoft package dependencies. A standard installation downloads and installs the latest Microsoft Build Tools (for Visual Studio 2017) and Windows SDK packages. Refer to *Microsoft Package Dependencies* to see if you will depend on these packages, and if not, use the option above to skip installation of the packages, thus reducing the footprint and duration of the installation process.

- Non-interactive Installation

Format:

`edvs2017_80.exe /passive`

Summary:

Full installation, but the components are installed non-interactively using default options and directories.

- Silent Installation

Format:

`start /wait edvs2017_80.exe /q`

Summary:

Full installation, but the components are installed non-interactively with no user interface, using default options and directories.

- Modified Silent Installation

Format:

`start /wait edvs2017_80.exe /q InstallFolder=d:\otherdirectory`

Summary:

Full installation, but the components are installed non-interactively with no user interface, and Enterprise Developer is installed to `d:\otherdirectory`.

Format:

```
start /wait edvs2017_80.exe /q RumbaCheckbox=1
```

Summary:

Full installation of Enterprise Developer and of the Micro Focus Rumba+ Desktop component. All components are installed non-interactively with no user interface.

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

```
edvs2017_80.exe /?.
```



Note:

- Log files that are created during installation are saved in the folder specified by the TEMP environment variable. To change the location or name of the files, use the `/log` parameter on your setup command line and specify the path and file name, for example: `filename /log d:\temp \log.txt`. This creates a log file, named `log.txt`, in the `d:\temp` directory.

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.

Preserving the MFDS and Enterprise Server region configuration

The following information applies when you are upgrading from releases 6.0 or 7.0.

If you install this release to the same install location as release 6.0 or 7.0, the product in the current location is moved to a backup directory name.

For example, if the 7.0 product is installed in the default install location, `/opt/microfocus/EnterpriseDeveloper`, during the upgrade it is moved to `/opt/microfocus/EnterpriseDeveloper.BKP.YYYY-MM-DD.HH:MM:SS`. The new release will be installed in `/opt/microfocus/EnterpriseDeveloper`.

Note that your original installation might include some files that you changed or added to, and you need those changes preserved in the new installation.

During the upgrade, the installer moves a number of changed files to a different configuration location and symbolically links them back into the new release install location. The configuration location is one of the following:

- The default config location is `/opt/microfocus/config/`.
- For non-root installation, the default location is `$HOME/microfocus/config/`.
- To specify your own configuration location, run the setup file with the following command-line option: `-mfconfiglocation=[location]`

The setup file creates a directory in the configuration location using the sum of the value of the `$COBDIR` path. This is so that each configuration area is unique to each product installation. The configuration files and directories are then placed in this `COBDIR` hash-numbered directory. In the examples below, the install location generates a hash of 12345.

The file `/opt/microfocus/config/12345/COBDIRlocation.txt` details the `COBDIR` the configuration area is associated with.

Currently, the setup file only moves the following files and directories:

Source	Destination
secrets	<code>/opt/microfocus/config/12345/secrets/</code>
commonwebadmin.json	<code>/opt/microfocus/config/12345/escwa/commonwebadmin.json</code>
mfdscfg.xml	<code>/opt/microfocus/config/12345/mfds/mfdscfg.xml</code>
mfds	<code>/opt/microfocus/config/12345/mfds/mfds/</code>


If you have changed any other files in the original installation, you need to be copy these manually from the backup directory, `/opt/microfocus/EnterpriseDeveloper.BKP.YYYY-MM-DD.HH:MM:SS`, into the install location after the upgrade installation is complete.

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_8.0_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
```

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 Customer Support Documentation Web site](#) for any documentation updates.

On Windows

Starting the Product

You are now ready to run Enterprise Developer - for example, for Visual Studio 2017:

- Windows 10** • From your Windows desktop, click **Start > Visual Studio 2017**.
- Windows 11** • Click the **Start** button in the Task Bar. Use the search field in the Start menu to find and start **Visual Studio 2017**.

Managing the Microsoft Build Tools and Windows SDK Packages

There are a number of COBOL development features that depend on the Microsoft Build Tools and Windows SDK packages. By default, the product installer downloads and installs these packages to their default locations. The installer then sets your COBOL environment to depend on those downloaded versions.

You can use the Microsoft Build Tools and Windows SDK Packages configuration utility - `cb1ms` - to view which versions are in use, and also configure your COBOL environment if you require something other than the standard usage.

For example, some project types (for example, .NET Core) require a different version of the Microsoft Build Tools (the Visual Studio 2019 version) than the one installed (the Visual Studio 2017 version). If you have already installed the correct version for *.NET*, run `cb1ms` after product installation, to update your environment to use the correct package.

There is an option within the product installer to skip the installation of the default packages (`skipmstools=1`); however, this does skip both packages, so make sure that you do already have the package(s) that you require before setting this - see *Microsoft Package Dependencies* for details on the package(s) you may require.

The Microsoft Build Tools and Windows SDK Configuration Utility

Use the `cblms` command line utility to view and set the package versions in effect for your COBOL environment.



Important: If you are updating or clearing package versions, you must run this utility from a command prompt with administrative privileges.

Syntax:

```
cblms <option>
```

Parameters:



Note: `<option>` settings are case insensitive.

`<option>` can be one of:

-U

Updates the COBOL environment to use the latest versions of the Microsoft Build Tools and SDK packages that are located in the default folders. Any open IDE instance or command prompt must be restarted before these changes take effect.

-U<ms-pkg>

Updates the COBOL environment to use the latest version of the particular package type that is located in the default folder. Any open IDE instance or command prompt must be restarted before these changes take effect.

-U<ms-pkg>:<version>

Updates the COBOL environment to use a specific version of the particular package type that is located in the default folder. Any open IDE instance or command prompt must be restarted before these changes take effect.

-U<ms-pkg>:<path>

Updates the COBOL environment to use the latest version of the particular package type that is located in the (non-default) folder specified. Any open IDE instance or command prompt must be restarted before these changes take effect.

-U<ms-pkg>:<path>?<version>

Updates the COBOL environment to use a specific version of the particular package type that is located in the (non-default) folder specified. Any open IDE instance or command prompt must be restarted before these changes take effect.

-L

Lists all versions of the Microsoft Build Tools and SDK packages that are located in the default folders.

-L<ms-pkg>

Lists all versions of a particular package type that are located in the default folder.

-L<ms-pkg>:<path>

Lists all versions of a particular package type that are located in the (non-default) folder specified.

-Q

Displays the versions currently in use by the COBOL environment.

-Q<ms-pkg>

Displays the version of the selected package type that is currently in use by the COBOL environment.

-R

Clears all version information. (Only use this option when instructed to by Customer Care.)

-H

Displays the available command line options.

Legend:

<ms-pkg> *<ms-pkg>* can be one of **S** or **SDK** for the Microsoft SDK, or **B** or **BT** for the Microsoft Build Tools.

<path> *<path>* is the path in which to locate packages that are not installed to the default location for their package type.

<version> *<version>* is the package version with which to update when the latest version is not the one required. When specifying *version*, it must be in the form:

- *n.n.n.n* for a Windows SDK
- *n.n.n* for Build Tools
- *n* for list ID - the list ID is displayed using `cb1ms -L`.

The following example updates the COBOL environment to use version 10.0.17134.0 of the Windows 10 SDK, installed in `C:\WinSDK\10`.

```
cb1ms -USDK:C:\WinSDK\10\10.0.17134.0
```

Viewing the Product Help

Enterprise Developer is configured to display the product help available online on the Micro Focus Customer Care website: <https://www.microfocus.com/support-and-services/documentation/>.

You can view the product help in one of the following ways:

Online help (default)



Note:

- Your Visual Studio must be configured to show online help by default. Make sure **Help > Set Help Preferences** in Visual Studio points to **Launch in Browser**.
- Ensure that you have an up-to-date version of your browser.

You can access the Help in one of the following ways:

- Click **Help > Micro Focus Product Help > Product Documentation**.
- Alternatively, press **F1** inside the editor or from a UI part.

This opens the Enterprise Developer help or Microsoft's MSDN depending on which keyword in the editor or part of the UI you are querying.

Local help



Note: If you've had an earlier version of Enterprise Developer installed on your machine, you need to uninstall any older version of the documentation as follows:

1. Click **Help > Add and Remove Content** inside Visual Studio.

This starts the Microsoft Help Viewer.

2. Click the **Manage Content** tab and click **Disk**.
3. Click **Remove** next to the line for the Enterprise Developer documentation.
4. Click **Update**.

The local help is not shipped with the installer. If you prefer to view the help locally on your machine, you need to download and install it manually as described below.

1. Download the local help files:

- a. Find the download link for local help in your Electronic Product Download email or in the **Product Updates** section on the Micro Focus Customer Care website and save the files on your machine.
- b. Expand the archive on your machine. Ensure that the `.msha` and the `.cab` files are in the same folder.

2. Ensure that the Visual Studio Help Viewer is installed:

- a. Click **Help** inside Visual Studio.

If no **View Help** command is available, you need to install the Help Viewer manually. See *Installing missing components of Visual Studio* in *Software Requirements* for instructions on how to install it.

3. Install the help in the Help Viewer:

- a. Click **Help > Add and Remove Content** inside Visual Studio.

This starts the Microsoft Help Viewer.

- b. Click the **Manage Content** tab and click **Disk**.
- c. Click the browse button next to **Disk** and navigate to the folder in which you extracted the local help files.
- d. Select `helpcontentsetup.msha` and click **Open**.

This loads the Enterprise Developer documentation.

- e. Click **Add** and then **Update**.

After the installation is complete, the Enterprise Developer product Help appears in the Help Viewer.

4. Configure Visual Studio to use local help:

- a. Start Visual Studio.
- b. Ensure that the Visual Studio Help Library is pointing to local help - from the Visual Studio menu click **Help > Set Help Preferences > Launch in Help Viewer**.
- c. Click **Help > View Help**.

This opens the product help in Microsoft's Help Viewer.

For full details of the Visual Studio Help system, see the MSDN.



Note: On some Windows versions, an issue with Microsoft Help Viewer and Internet Explorer's security being turned on can cause the Help content to be displayed as raw HTML code. To resolve the issue, you need to turn off the Internet Explorer Enhanced Security Configuration (IE ESC) for both administrators and users. Check the Microsoft Windows help for more information on how to do this.

Repairing

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:

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.

During the uninstall process, only those files added during the installation (to the installation and Samples directories) are removed. If the installation installed the Microsoft Windows 10 SDK or Microsoft Build Tools packages, these are left in place, although the Micro Focus-related registry entries for these packages are removed.

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, Enterprise Server for .NET, Micro Focus Analysis Services Integration, and Micro Focus License Administration. Uninstalling only Enterprise Developer does not automatically uninstall Enterprise Server for .NET, the Micro Focus License Administration or any of the prerequisite software.

Enterprise Server for .NET must be uninstalled before you remove Enterprise Developer. 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

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_EnterpriseDeveloper8.0.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.
- The latest version of the SafeNet licensing software is required. See the *Software Requirements* section in this document for more details.
- 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 Customer Care](#).

To start Micro Focus License Administration

To start the GUI Micro Focus License Administration

Windows 10 From your Windows desktop, click **Start > Micro Focus License Manager > License Administration**.

Windows 11 Click the **Start** button in the Task Bar. Use the search field in the Start menu to find and start **License Administration**.

To start the command-line Micro Focus License Administration tool

1. At a command prompt, navigate to:

```
C:\Program Files (x86)\Micro Focus\Licensing
```

2. Type `cesadmintool.bat`, and press **Enter**.

Installing licenses

You need either a license file (with a `.mflic` extension for Sentinel RMS licenses or an `.xml` extension for AutoPass licenses) or an authorization code which consists of a string of 16 alphanumeric characters (Sentinel RMS licenses only). You need to install AutoPass licenses into the existing Micro Focus License Administration tool, and not in the AutoPass License Server.

If you have a license file

To use the GUI Micro Focus License Administration

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` or `.xml`).
 - Drag and drop the license file from Windows Explorer to 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 Help > 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 either `.mflic` or `.xml`), and then click **Open**.
6. Click **Authorize** to install the license.

You should see a dialog box with a confirmation that the licenses have been installed successfully.

To use the command-line Micro Focus License Administration tool

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

If you have an authorization code



Note: Authorization codes are only available with Sentinel RMS licensing.

Authorizing your product when you have an Internet connection



Note:

- This topic only applies if you have an authorization code. Authorization codes are only available with Sentinel RMS licensing.
- 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.

To use the GUI Micro Focus License Administration

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.

To use the command-line Micro Focus License Administration tool

1. Start the command-line Micro Focus License Administration tool.
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



Note: This topic only applies if you have an authorization code. Authorization codes are only available with Sentinel RMS licensing.

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.

To use the GUI Micro Focus License Administration

1. Start Micro Focus License Administration.
2. On the **Install** tab, click **Manual Authorization**.
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 Customer Care 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 Customer Care 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**.

To use the command-line Micro Focus License Administration tool

In order to authorize your product from the command-line Micro Focus License Administration tool 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 entering 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 entering 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 Customer Care.

Updates and Customer Care

Our Web site provides up-to-date information 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:

- Product Updates on [Software Licenses and Downloads](#), where you can download fixes and documentation updates.
 1. Log into the Software Licenses and Downloads (SLD) site at <https://sld.microfocus.com/mysoftware/download/downloadCenter>.
 2. Select your account and click **Entitlements**.
 3. Search for the product by using any of the available search parameters.
 4. Click **Show all entitlements**.
 5. Click **Get Software** in the Action column for the product you want to download or update.

In the **File Type** column, you see entries for "Software" for any GA products, and "Patch" for any patch updates.
 6. Click **Download** on the relevant row.
- The *Examples and Utilities* section of the Micro Focus Customer Care 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 Customer Care 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/en-us/home/> in your browser to go to the Micro Focus home page, then click **Support & Services > Support**. Type or select the product you require from the product selection dropdown, and then click **Support Login**.



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 [Micro Focus Channel on YouTube](#).

<https://www.microfocus.com/en-us/resource-center/webinar>

Information We Need

If your purpose in contacting Micro Focus is to raise a support issue with Customer Care, you should collect some basic information before you contact us, and be ready to share it when you do.

See the *Preparing to Raise a Support Case* topic on the Product Documentation pages on Micro Focus Customer Care, in the product help for Enterprise Developer for Visual Studio 2017 ([click here](#)), or Enterprise Developer for Visual Studio 2019 ([click here](#)), or Enterprise Developer for Visual Studio 2022 ([click here](#)).

Creating Debug Files

If you encounter an error when compiling a program that requires you to contact Micro Focus Customer Care, 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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