

# What's New in the Enterprise Suite Version 4.0

This "What's New" document covers new features and functions in the latest release of the Micro Focus® Enterprise Product Suite.

# Guide

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**Solution Guide**

Mainframe

## About This Guide

This covers updates to the following products:

- **Micro Focus Enterprise Analyzer®** which provides a comprehensive code analysis, reporting and visualization environment for enterprise applications
- **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. Includes Enterprise Developer Connect, Enterprise Developer, and Enterprise Developer for z Systems variants.
- **Micro Focus Enterprise Test Server®** which provides a comprehensive test platform that takes advantage of low cost processing power on Windows environments to provide 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 Z systems, standalone servers or a hybrid cloud environment

## Detail Categories: Modernization

The information contained herein is subdivided according to the scenarios for which the additional capabilities were designed. We have broken out the categories as follows:

- **Application Modernization**—capabilities to support the improvement or evolution of core applications.
- **Process Modernization**—capabilities to support the acceleration of the processes involved in delivering applications
- **Infrastructure Modernization**—capabilities to augment the breadth of the range of platforms and environments supported by this Micro Focus solution
- **Core Technology**—the underpinning technology of this Micro Focus solution which may be leveraged in one or more forms of modernization as listed above

## Highlights

This release includes key new capabilities:

- **Application Modernization**—Comprehensive modernization analysis reports; project migration utility; major IDE enhancements; major debugging enhancements; additional Web Services support facilities

- **Process Modernization**—Project upgrade and project build enhancements; major Workflow Modelling enhancements; Significant updates in PL/I usability across development, testing and deployment capabilities; usability, installation and efficiency improvements; a greatly enhanced analysis web client
- **Infrastructure Modernization**—Platform support added for new Web Application Server releases; new support added for COBOL and Docker
- **Core Technology**—improvements in mainframe PL/I compatibility and code analysis

Read on for further details. For additional information please see the product data sheets and product release information.

## Application Modernization

| Feature Summary                         | Feature Detail  |
|---|---|
| <b>New Analysis Reporting framework</b> | <p>To accelerate application modernization planning, this release includes a highly customized framework for creating reports on modernization projects, coding standards, quality metrics and more. Capabilities include:</p> <ul style="list-style-type: none"> <li>■ Numerous built-in code searches for detecting code quality issues, defects, performance hits etc.</li> <li>■ Application-wide statistics and information (inventory, data usage, system programs etc.)</li> <li>■ Ability to add and customize code searches to reflect company coding standards and highlight project specific items</li> <li>■ Report automation and comparison facilities</li> <li>■ Specific tools to report on Mainframe to Open PL/I and Enterprise COBOL 6.1 migration projects</li> </ul>   |
| <b>Editing and Code Refactoring</b>     | <p>To improve how applications are developed and enhanced, we have provided further IDE and editor improvements, including:</p> <ul style="list-style-type: none"> <li>■ Inline rename refactoring—overwriting a variable name directly in the editor now invokes rename refactoring so you no longer need to select Refactor from the editor context menu.</li> <li>■ Extract to section—a new quick action (Visual Studio 2015 and later only) is available in the editor. It enables you to refactor your code by adding more sections in the code. This can help you create more entry points that you can use during unit testing.</li> <li>■ Automatic insertion of END-EXEC, END-TRY and END-PERFORM statements—the closing statements are now automatically inserted after you have typed the opening statements.</li> <li>■ IntelliSense filters (Visual Studio 2017 and later only)—when IntelliSense displays a list of suggestions, a number of icons at the bottom of the IntelliSense window now enable you to filter the suggestions.</li> <li>■ You can use the Limit IntelliSense Search Scope setting in Tools &gt; Options &gt; Text Editor &gt; Micro Focus COBOL &gt; Advanced that helps improve the editor performance.</li> </ul> |

| Feature Summary                                | Feature Detail  |
|--|---|
| <b>File navigation and management</b>          | <p>To provide additional support for managing source code artifacts, we've added the following improvements:</p> <ul style="list-style-type: none"> <li>■ Copybook graphs—a context menu command, Show Copybook Graph, in Solution Explorer enables you to display the graphical representation of the copybook dependencies of COBOL programs.</li> <li>■ Open Folder mode (Visual Studio 2017 only)—support is now available for editing, compiling and debugging files opened in Solution Explorer in Open Folder mode without having to create projects.</li> <li>■ The file property pages now display a list of all Compiler directives that apply to the file.</li> </ul>  |
| <b>Eclipse Framework Support</b>               | <p>To support the latest iterations of IDE releases, we have added the following:</p> <p>Support for Eclipse 4.7 Oxygen (64-bit) and 64-bit project templates—Project templates are available for both 32-bit and 64-bit applications; the 64-bit Eclipse 4.7 is now installed by default.</p> <p>You can set a default project template (either 32-bit or 64-bit) to use so that all future new projects will use that as the preference. On platforms only capable of building to 64-bit, the 64-bit templates are the default ones.</p> <p>The 32-bit Eclipse is still supported on 64-bit Windows platforms; however you need to manually install it and a 32-bit Java.</p> <p><b>Note:</b> Support for SUSE 12—only the 64-bit SUSE 12 platform is supported and you can only use the 64-bit Eclipse with 64-bit projects on it.</p>   |
| <b>JVM COBOL projects and package handling</b> | <p>To provide further improvements in how applications are developed and enhanced, we have provided further IDE, managed code environment and editor improvements, including</p> <ul style="list-style-type: none"> <li>■ New wizards for creating ENUM, DELEGATE and VALUETYPE types.</li> <li>■ Additional code snippets for Method-Id and Property-Id.</li> <li>■ Showing and grouping packages in the COBOL Explorer view—use the COBOL JVM Project Presentation command from the View menu in the explorer to either display COBOL categories or packages.</li> <li>■ Refactoring by renaming the package name—available from the context menus in the COBOL Editor and in COBOL Explorer.</li> <li>■ Refactoring by moving source folders, packages or compilation units—available from the explorer context menu.</li> <li>■ Support for switching off the package name mapping using the “Each part of the package corresponds to a subdirectory” setting in the Build Configuration page.</li> <li>■ Support for packaging .class files in a .jar file when building COBOL JVM projects.</li> <li>■ Support for creating a .jar file from the .class files built from a JVM COBOL project.</li> <li>■ Open Type Hierarchy and Open Call Hierarchy context menu commands—available in the COBOL editor, COBOL Explorer and in the outline views while seeing the packages presentation in the IDE.</li> </ul> |

| Feature Summary  | Feature Detail   |
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| <b>Enhanced .NET debugging</b>                                   | <p>To Improve debugging functionality for .NET COBOL applications, this release provides a number of enhanced debug features for COBOL under the .NET environment:</p> <ul style="list-style-type: none"> <li>■ Performance tips</li> <li>■ Backwards debugging</li> <li>■ An expression evaluator</li> <li>■ Integration with the Diagnostic Tools window</li> <li>■ Support for IntelliSense in the debug windows (Immediate, Watch, QuickWatch, etc.)</li> <li>■ Remote debugging of .NET COBOL applications</li> </ul> <p><b>Note:</b> These capabilities are available in Visual Studio 2017 only.</p>  |
| <b>Incremental CICS web services and CICS containers support</b> | <p>CICS Web services using SOAP and JSON rest are now fully supported for development, test and deployment so you can create, test and then deploy either back to mainframe or onto Enterprise Server. Specifically, this release provides support for debugging CICS COBOL applications that use channels and containers. The debugger has been updated to enable you to view the contents of channels and containers, and to change content as you debug.</p> <p><b>In Eclipse:</b><br/>The debugger now displays and enables you to select CICS channels/containers to debug. This enables you to:</p> <ul style="list-style-type: none"> <li>■ View the CICS channel(s) associated with a program and see the containers that are in it.</li> <li>■ Change the contents (as raw bytes) of the currently viewed CICS container.</li> <li>■ Select a container from the channel and view the contents in a usable format.</li> <li>■ Select a container from the channel and see the contents in the memory view.</li> </ul> <p><b>In Visual Studio:</b><br/>There is a new debug window, “CICS Channels”—see Debug &gt; Windows &gt; CICS Channels. The window is automatically invoked when you debug an EXEC CICS statement that references a channel and/or container such as EXEC CICS PUT CONTAINER CHANNEL.</p> |
| <b>Native to managed code project conversion</b>                 | <p>To support rapid conversion of native COBOL applications into managed code equivalents, Enterprise Developer for Visual Studio includes a new wizard that enables you to convert native MSS projects to managed MSS ones. The wizard is invoked from the context menu on a native MSS project in Solution Explorer using the “Create Managed Mainframe Project” command.</p>  |
| <b>Reverse Debugging</b>   | <p>To provide increased productivity when tracing hard-to-find bugs, Reverse Debugging is now fully supported, including:</p> <ul style="list-style-type: none"> <li>■ Reverse debugging and live recording have been enhanced significantly, and are now considered GA products. You can now debug using watchpoints and conditional breakpoints, and reset execution points. Debugging multi-threaded applications is now supported, and so are programs that contain OSVS performs and nested programs.</li> <li>■ A command line utility, cobeslr, has been introduced to enable you to configure live recording for particular services or application instances of an enterprise server region.</li> <li>■ You can now use the CBL_DEBUG_START and CBL_DEBUG_STOP library routines to start and stop a live recording session.</li> </ul>  |

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|---|---|
| <b>Live Recorder</b>                              | To provide increased productivity when tracing hard-to-find bugs, Live Recorder is now fully supported. The functionality is now supported on SUSE Linux and RedHat.  |
| <b>Enhancements to Web Service Client feature</b> | Improvements to the Web Services Client feature have been added to improve the capability and efficiency. Specifically, this release offers an improved support for larger, more-complex WSDLs including: <ul style="list-style-type: none"> <li>Configurable generation of variable arrays and repeated structures (with Inline-Array-Size-Limit parameter)</li> <li>Generation selectability of Service, Port and Operation(s).</li> <li>Web services that use SOAP 1.2 are now fully supported.</li> <li>Keeps programs generated from large WSDLs down to a manageable size, alleviates compile issues, and uses runtime storage more efficiently.</li> </ul> |
| <b>COBOL XML Support</b>                          | Additional support in XML extensions has been introduced in this release: <ul style="list-style-type: none"> <li>Two new state management statements have been introduced, XML GET WHITESPACE-FLAGS and XML SET WHITESPACE-FLAGS, that enable you to control how whitespace is handled when importing data; refer to the topic <i>Handling spaces and whitespace in XML</i> for more information</li> </ul>   |

## Process Modernization

| Feature Summary                                     | Feature Detail   |
|---|--|
| <b>Rapid Analysis repository setup</b>              | To accelerate the analysis process, the following improvements have been added in this release: <ul style="list-style-type: none"> <li>Automatic creation of repository from Enterprise Developer for Visual Studio projects</li> <li>Automatic detection of compiler directive files</li> <li>Automatic installation and setup of the analysis web client</li> <li>Improvements in COBOL and PL/I verification process</li> </ul>   |
| <b>Analysis web client enhancements</b>             | To improve the efficiency of analysis tasks, the following additional features have been added to the Analysis Web client: <ul style="list-style-type: none"> <li>Ability to run code search reports over selected files</li> <li>Fully featured repository browser that allows exploring of relationships between all objects in the application</li> <li>Cross program impact analysis and data flow analysis</li> <li>General usability improvements</li> <li>Colorization of code</li> </ul> |
| <b>Mainframe Call efficiency</b>                    | To improve the process of calling mainframe routines from the Micro Focus Enterprise products, the Mainframe Call Generator facility now runs in an independent address space. Previously, it was possible for code run in the Mainframe Access address space to enter a supervisor state. MCGLIB is now the new address space's STEPLIB. This enables other user modules to be called without placing them in MFA's STEPLIB, as was previously necessary.                                       |
| <b>Simpler Mainframe Access Server Installation</b> | There is now one single installation distribution for Mainframe Access and the Mainframe Access z/Server support, making it easier to install both Mainframe Access and the Mainframe Access z/Server support. You no longer have to upload and extract two separate distributions.  |

| Feature Summary   | Feature Detail   |
|---|--|
| <b>IDE Customization and Development Process Efficiency updates</b> | A variety of enhancements have been applied to simplify the customization of the Eclipse IDE and support rapid integration of tools and processes. <ol style="list-style-type: none"> <li>To further speed up the task of modelling and managing workflow, new features have been added to the AWM, including: <ul style="list-style-type: none"> <li>A new Edit action. Enables you to edit any model component instead of working with the Properties view. The new action enables you to change the attribute values of several model components at a time.</li> <li>An Outline and a Relationship Hierarchy view.</li> <li>Improved backwards and forwards navigation in the model.</li> <li>Automated sequence numbering in the model.</li> <li>The context menu of the model editor has been restructured for more clarity.</li> <li>Context help.</li> <li>Tool creation has been improved. Dependent components are generated derived from the function package tool definition.</li> </ul> </li> <li>To simplify the task of getting started with AWM model development, the following facilities have been added to this release: <ul style="list-style-type: none"> <li>New empty models that you create now contain all categories. The new models also validate without any errors or warnings.</li> <li>A new AWM system type, "Custom System", is available. This system type supports the model development process by facilitating the creation, change, load and reload of a model</li> </ul> </li> <li>To support additional use cases requested by customers, the following AWM tools and features are now available: <ul style="list-style-type: none"> <li>The "Return Property Value" tool in the function package now supports several additional use cases.</li> <li>The "Transfer File" tool in the function package offers an improved support for mass processing.</li> <li>Support for properties with an application-wide scope.</li> <li>A modelling capability to structure the local file cache for copybooks and include files downloaded by the background parser in the editor. Additional tools are provided to check the existence of the file cache for copybooks and includes and to clear this file cache. By structuring the copybook/include file cache, certain inconsistencies in remote edit scenarios can be avoided</li> </ul> </li> <li>To use the AWM features in regions where National Language Support is required, we have enabled NLS support in this release. <p>To provide the model administrator with useful AWM reference material, more samples and tutorials have been added to this release, including:</p> <ul style="list-style-type: none"> <li>Several new tutorials showing how to create a model and how to add functionality to an existing model have been added to the product Help.</li> <li>A number of template models are now available and can be used as a base to develop your own models.</li> </ul> </li> </ol> |

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| Feature Summary   | Feature Detail   |
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| <b>IDE Customization and Development Process Efficiency updates continued</b> | <p>e. AppMaster Builder available in the Application Explorer view (Technology Preview).</p> <p>For users of AppMaster Builder, and those who also use Endeavor, we have added some new capabilities to the Workflow Modeller facility in this release:</p> <ul style="list-style-type: none"> <li>■ Developers can interact with AppMaster Builder Application view (Online Express, Program Painter, Screen Painter, generation, etc) in the Application Explorer view</li> <li>■ AppMaster Builder processes can be customized as part of the AWM model.</li> <li>■ Users can perform Endeavor Add and Retrieve operations directly from AppMaster Builder in the Application Explorer View</li> <li>■ Project files for an AppMaster Builder object are added/retrieved as appropriate (for example an Endeavor add of an AppMaster Builder program will add the program APSPROG and APRPROG project files to Endeavor)</li> <li>■ Single and Mass add/retrieve operations are supported</li> </ul> <p>(This is technology preview status for this release.)</p> |
| <b>Build Tools for Windows</b>  | <p>This release includes new features to accelerate the process of building applications under Windows:</p> <ul style="list-style-type: none"> <li>■ To support streamline development processes such as Continuous Integration (CI), Visual COBOL Build Tools for Windows includes all of the functionality that is available in Visual COBOL for building, running and deploying COBOL applications but does not include an IDE. This lightweight, easy-to-install development environment that is well-suited for use in Docker containers and CI systems.</li> </ul>   |
| <b>Editor improvements</b>  | <p>To provide further improvements in how applications are developed and enhanced, we have provided further IDE and editor improvements, including:</p> <ul style="list-style-type: none"> <li>■ A Properties context menu command—enables you to access a file's properties directly from the editor.</li> <li>■ A Show In context menu command—enables you to locate the file in the COBOL or the PL/I Explorer.</li> <li>■ Edit &gt; Convert Tabs to Spaces command—enables you to convert any tabs in your COBOL source files to a specified number of spaces.</li> </ul>  |
| <b>Enhancements in Code Coverage support inside the IDEs</b>                  | <p>To further improve the code coverage facility for testing application changes, the following has been introduced in this release:</p> <ul style="list-style-type: none"> <li>■ In Eclipse, support has been added for code coverage for procedural copybooks.</li> <li>■ In Visual Studio, the Micro Focus Code Coverage window now offers a File View in addition to the existing Program view.</li> </ul>   |
| <b>Enhanced Unit Testing support</b>  | <p>In this release, support of COBOL Entry Points (as opposed to just the main program) has been added to the MFUnit feature.</p> <ul style="list-style-type: none"> <li>■ It is now possible to generate unit test stubs for selected entry points within your program.</li> <li>■ In addition, support has been added to Visual Studio for managed procedural projects.</li> </ul>   |

| Feature Summary  | Feature Detail   |
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| <b>Rapid creation of new Enterprise Server/Test Server regions</b> | <p>To further improve the rapid creation of Enterprise Server or Test Server regions, the Import/Export facility has been enhanced to support IMS regions. Enterprise Server configuration data for IMS regions can now be exported or imported in the Visual Studio or Eclipse IDEs. The cloning and creating of Enterprise Test Server or Server is faster as they can be kept as source and configured/started automatically.</p>   |
| <b>Usability Enhancements</b>                                      | <p>The following usability improvements have been added to streamline the development process.</p> <ul style="list-style-type: none"> <li>■ Remove File Directives—a context menu command in the explorer view enables you to reset a file's directives.</li> <li>■ Managing Remote projects—IVP diagnostic tool enhancements—it is now possible to run the server-side IVP diagnostic tool for diagnosing issues with a remote connection from within Eclipse installed at the client side. The IVP tool now also performs a check for whether XTERM is installed on the remote machine. This makes setting up a remote project from Windows easier.</li> </ul> |

## Infrastructure Modernization

| Feature Summary                                   | Feature Detail  |
|---|---|
| <b>Platform Support additions</b>                 | <p>Forwards compatibility and platform flexibility remains an integral characteristic of this Micro Focus product set. This release provides ongoing support for the documented supported environments (<i>see the Product support pages for the latest details</i>).</p> <p>New platforms supported in this release include:</p> <ul style="list-style-type: none"> <li>■ Docker containers</li> <li>■ Updated releases of MS SQL Server (<i>see later</i>)</li> </ul>   |
| <b>Additional JAVA Application Server support</b> | <p>To ensure we continue to provide support for the latest versions of Java Application Servers, the following resource adapters are supported for COBOL:</p> <ul style="list-style-type: none"> <li>■ WebSphere 9.0 and WebLogic 12.2.1</li> </ul> <p>For Tomcat 7.0, servlet generation with J2SEBeans is also supported.</p>   |
| <b>Database Connector Support</b>                 | <p>This release enhances the breadth of support provided in our Database Connector technology on both Visual COBOL and Enterprise Developer. Specifically:</p> <ul style="list-style-type: none"> <li>■ Database Connectors can now access ODBC data sources for supported drivers.</li> <li>■ Database Connectors for Microsoft SQL Server (MSSQL) is now available on UNIX/Linux platforms where MSSQL server is supported (see the Microsoft SQL Server support web pages for an up-to-date list of specific supported platforms).</li> <li>■ With Database Connectors for Microsoft SQL Server, you can connect to an instance running on a Linux machine, or an instance running on a Windows machine. You can also use it to connect to an instance of SQL Server running on Linux from a Windows client. (Note that setting up SQL Server on a Linux machine is beyond the scope of our documentation.)</li> </ul> |

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| Feature Summary                                       | Feature Detail   |
|---|--|
| <b>Database Connector Support</b><br><i>continued</i> | <ul style="list-style-type: none"> <li>Database Connectors for MSSQL now supports connecting to a Microsoft SQL Server running a multi-subnet failover cluster. To use this feature requires changes to the connection string sent to the server, which is accomplished by using the following four new configuration variables:                             <ul style="list-style-type: none"> <li>A_MSSQL_MULTI_SUBNET_FAILOVER—set to TRUE to enable a connection that supports multisubnet failover support. If set to FALSE (the default) support is not enabled, and the other configuration variables have no effect.</li> <li>A_MSSQL_FAILOVER_PARTNER—the name of the failover partner used. Refer to your SQL Server documentation for valid values.</li> <li>A_MSSQL_FAILOVER_PARTNER_SPN—the name of the failover partner SPN used. Refer to your SQL Server documentation for valid values.</li> <li>A_MSSQL_SERVER_SPN—the name of the Server SPN. Refer to your SQL Server documentation for valid values.</li> </ul> </li> <li>Supports columns of type GUID for existing SQL tables. A new configuration variable, A_MSSQL_IGNORE_GUID_COLUMNS, determines the behavior when handling existing tables that contain a column of this type.</li> <li><b>Note:</b> Database Connectors for MSSQL cannot create a new column of this type.</li> </ul> |
| <b>Docker support</b>                                 | <p>To provide support for a growing customer interest in COBOL and PL/I application deployment in Docker, we have provided Docker support in this release. Specifically:</p> <ul style="list-style-type: none"> <li>Support is now included that makes it easy to create Docker containers to work with COBOL and PL/I applications. Developing or deploying COBOL and PL/I applications in Docker containers offers users the portability, performance, agility, isolation and scalability of the Docker model.</li> </ul>  |
| <b>Enterprise Server Security</b>                     | <p>A range of features have been added to this release to enhance the Security of the Enterprise Server environment:</p> <ul style="list-style-type: none"> <li>Simple firewall facility—The Enterprise Server Communications Process (MFCS) can now restrict access to listeners by client address. You can specify any permitted or forbidden addresses either by IP address, network mask, or domain name, and use wildcards. Filters can be applied to individual listeners, communications processes, or entire regions. More specific filter rules override any general ones.</li> <li>Administrators can now add/delete/modify XA resources in the Enterprise Server Administration Web UI while a region is active, without having to stop the region first.</li> <li>A new Communications Server resource class enables you to control the access to the Enterprise Server Console Log and Communications Server Log when external security is in effect for an enterprise server region</li> </ul>   |

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| Feature Summary                                       | Feature Detail   |
|---|--|
| <b>Enterprise Server Security</b><br><i>continued</i> | <ul style="list-style-type: none"> <li>For communications with TLS (formerly SSL), additional certificate and key file formats are supported. Servers may now be configured with both an RSA and an ECC key and certificate. Certificate and key management is more flexible and TLS-enabled servers can support both RSA-based and ECC-based key exchange.</li> <li>For communications with TLS (formerly SSL), the permitted cipher suites and their preferred order can now be configured. The minimum size of Diffie-Hellman groups for DH key exchange can also be configured. Defaults have been made more secure. TLS-protected communications are more secure by default. Customers with specific requirements for cipher suites and DH group size can enforce them. Customers who need more-permissive settings for compatibility with older systems can enable those.</li> </ul> |

### Core Technology

| Feature Summary                            | Feature Detail   |
|--|--|
| <b>New and updated Compiler directives</b> | <p>To further enhance the IBM mainframe and other dialect compatibility, the following COBOL Compiler directives are new in this release:</p> <ul style="list-style-type: none"> <li>DISPSIGN—determines the display output of numeric fields with included signs, under an IBM mainframe dialect only.</li> <li>GNTLITLINKSTD—stops the suppression of call-convention 8 when both call-convention 2 and call-convention 8 are in effect for a .gnt file in an Intel x86 32-bit environment.</li> <li>ILSMARTANNOTATE—adds attributes to the items generated by ILSMARTLINKAGE, based on their data type, which can be used to identify the size or range of the item in COBOL.</li> <li>ILSMARTTRIM—trims any trailing spaces from a string item returned by the get property associated with an alphanumeric item processed by ILSMARTLINKAGE.</li> <li>MAINFRAME-FLOATING-POINT—specifies the format of a program's floating point data items: either IBM hexadecimal format or IEEE format. This directive is supported in managed code only.</li> </ul> <p>The following Compiler directives contain new parameters in this release:</p> <ul style="list-style-type: none"> <li>CHECKDIV—a new parameter 'ACOS' now emulates a divide by zero operation on an ACOS mainframe system: the quotient and the remainder are set to the value of the dividend.</li> <li>OOCTRL—a new parameter, L, specifies whether to include directory location comments in .cls and .ins inheritance files.</li> <li>NUMPROC—a new parameter 'ACOS' provides partial compatibility with the behavior of NEC ACOS COBOL processing of invalid data in USAGE DISPLAY data items and invalid sign information in USAGE COMP-3 data items. This directives helps match more closely the behavior of COBOL on ACOS mainframes and makes it easier to migrate from ACOS mainframes to Micro Focus COBOL.</li> </ul> |

| Feature Summary                                      | Feature Detail   |
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| <b>Enhanced Data File editing</b>                    | To improve the efficiency of the data administration task, the Data File editor now supports filtering of the records in a file based on a set of criteria. The feature enables you to: <ul style="list-style-type: none"> <li>■ Save the filtered records to a new file.</li> <li>■ Save the records that match the specified filter (e.g., customer information/orders).</li> <li>■ Download a subset of the data from a remote file.</li> <li>■ Save a small portion of the data for testing purposes.</li> </ul>   |
| <b>A new Communications Server resource class</b>    | A new Communications Server resource class enables you to control the access to the Enterprise Server Console Log and Communications Server Log when external security is in effect for an enterprise server region.   |
| <b>Improved catalog availability</b>                 | Improved resilience to temporary communication issues with the catalog and error reporting enabling a region to stay active if a region has multiple catalogs defined and one of the catalogs is not available.  |
| <b>New support for TLS (SSL)</b>                     | Supporting customer need for improved communications security, encryption, message integrity, and optional authentication, this release includes the following: <ul style="list-style-type: none"> <li>■ TN3270 and MFBINP listener channels can now be configured for TLS (SSL). The seout command-line utility and the JES public class API also now support TLS.</li> <li>■ For communications with TLS (formerly SSL), the permitted cipher suites and their preferred order can now be configured. The minimum size of Diffie-Hellman groups for DH key exchange can also be configured. Defaults have been made more secure</li> </ul>   |
| <b>IMS MFS Light Pen</b>                             | To support application improvements that require the Light Pen facility, Light Pen support has been added to IMS MFS such that 3270 emulator light pen support can be used to interface with IMS applications that support it.   |
| <b>IMS Database Recovery efficiency</b>              | The IMS Recovery Utility now enables users to specify a point in time at which to recover a database.  |
| <b>Enterprise Server administrative enhancements</b> | The Enterprise Server environment has been updated to include a range of administrative efficiency improvements. Updates include: <ul style="list-style-type: none"> <li>■ For COBOL resource adapters, the NullSearch utility helps locate NULL fields in mappings presented to Enterprise Server.</li> <li>■ In the FTP utility, You can now configure MFFTP to not process trailing blank spaces for a GET command</li> <li>■ The public catalog API, MVSCATPB, has been enhanced to better report on file errors when opening catalog files</li> <li>■ The new API MVSSPLPB, has been introduced. This API enables you to search all job information held in the JES spool control files</li> <li>■ A number of new environment variables have been introduced that enable you to configure the JES startup behavior with regards to opening user catalog files</li> </ul> |

| Feature Summary   | Feature Detail   |
|---|--|
| <b>Eclipse Debugger usability enhancements for PL/I</b> | To improve the efficiency and functionality available to PL/I application developers, we have broadly extended our PL/I debugging support in this release. The following enhancements are available: <ul style="list-style-type: none"> <li>■ New breakpoint types for PL/I ON Unit's and Signals.</li> <li>■ Improved experience when modifying the values of CHAR VARYING and CHAR VARYINGZ variables in the Expressions Pane.</li> <li>■ Improved capability to display complex data structures and arrays in the Expressions Pane.</li> <li>■ Enhanced functionality for breakpoints to allow conditional breakpoints.</li> <li>■ Improved feedback to the user's when a program being debugged encounters errors and warning situations.</li> <li>■ Enhanced functionality for data breakpoints so that they can persist between debugging sessions.</li> <li>■ Enhanced functionality for breakpoints to allow a given breakpoint to be skipped a user specified number of times before execution is stopped.</li> </ul> <p>Simplification of requirements to utilize debugger notifications of ON units, etc. The notification mechanism used by the debugger and the Run-Time System to communicate important information has been simplified. You no longer need to set the MFPLI_CONFIG_DIR environment variable and use the CWNOTIF.DAT file with appropriate permissions.</p> <ul style="list-style-type: none"> <li>■ This speeds up the notification mechanism, simplifies the generated tracing data for problem determination, and allows for ease of setting up in more complex environments such as DB2 stored procedures where setting environment variables and obtaining appropriate permissions can be problematic.</li> </ul> |
| <b>Improved compatibility with IBM PL/I</b>             | To improve the efficiency and functionality available to PL/I application developers, we have broadly extended our PL/I compilation and runtime capabilities. Support has been added for the following: <ul style="list-style-type: none"> <li>■ The XMLOMIT and XMOLATTR attributes on variable declarations.</li> </ul> <p>Support for the following built-in functions:</p> <ul style="list-style-type: none"> <li>■ CHARVAL() built-in function.</li> <li>■ COMPARE() built-in function.</li> <li>■ CURRENTSIZE() built-in function.</li> <li>■ Additional DATETIME() format strings.</li> <li>■ EDIT() built-in function.</li> <li>■ FLUSH FILE(*) statement.</li> <li>■ ITERATE statement.</li> <li>■ MARGINI compiler option.</li> <li>■ PICSPEC() built-in function.</li> <li>■ RESIGNAL statement.</li> <li>■ SIZE and STRINGSIZE prefix conditions.</li> <li>■ SOURCELINE() built-in function.</li> <li>■ SOURCEFILE() built-in function.</li> <li>■ Improved support for the repeat factor on arrays of AREA variables.</li> <li>■ Improved pointer arithmetic on 64-bit platforms.</li> <li>■ Where appropriate MFPLX now recognizes selected *PROCESS statements and passes them to appropriate preprocessors.</li> </ul>   |

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| Feature Summary                                       | Feature Detail   |
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| <b>Improved compatibility with IBM PL/I continued</b> | <p>PL/I Test Coverage Report</p> <ul style="list-style-type: none"> <li>The PL/I Compiler and Run-Time System have been modified to allow for the capture of information showing which lines in the program have been executed, and to generate human-readable reports at the conclusion of a run. Enables customers to identify changes needed to their testing to more thoroughly exercise their code.</li> </ul> <p>(Note: this feature is available as Early Adopter level software)</p> <ul style="list-style-type: none"> <li>A new compiler option is available which enables Open PL/I to interact with 370 Assembler, and with COBOL programs compiled with AMODE.</li> <li>The PL/I EXEC preprocessor now honors the <code>-margins</code> setting for the output MDECK in addition to the input file providing a better IDE experience using the Outline view</li> <li>The Micro Focus macro preprocessor has been modified to provide a new default behavior that mimics IBM's RESCAN(ASIS) behavior. In addition, a new option, <code>rescan_upper</code>, has been introduced to enable customers to optionally mimic IBM's RESCAN(UPPER) behavior, thereby reducing the effort of moving from IBM PL/I.</li> </ul> <p>Additional macro preprocessor compatibility enhancements have been made:</p> <ul style="list-style-type: none"> <li>Allow OTHER as an acceptable abbreviation for OTHERWISE on a macro SELECT statement.</li> <li>Supports the SCAN/NOSCAN option on declaration of macro variables.</li> <li>Implement NOSCAN option on ANSWER statement.</li> <li>The %NOTE message format has been modified to match IBM's behavior.</li> <li>The SYSVERSION built-in function has been modified to always return a value of 22 bytes in length. (Space padded if necessary.)</li> <li>Relaxed diagnostics for scenarios where Enterprise Developer is generating a warning message and IBM does not.</li> </ul> |
| <b>Data Support—OpenESQL changes</b>                  | <p>To support users wishing to connect COBOL applications to RDBMS systems through OpenESQL, the following improvements are available in this release:</p> <ul style="list-style-type: none"> <li>The OPTIMIZECURSOR Compiler directive has been enhanced for JVM support, providing consistent readonly and unupdateable cursor support. This means JVM programs now provide optimal support for all cursor types, consistent with ADO.NET and native applications that use ODBC.</li> <li>The NOWHERECURRENT directive enables updateable cursor and select statements to specify that no positioned updates or deletes will occur. Database locks will still be acquired so searched updates or deletes can be successful. When positioned updates or deletes are not required, NOWHERECURRENT enables PostgreSQL and MySQL applications to not rely on tables containing pseudo columns <code>oid</code> or <code>_rowid</code> respectively.</li> <li>The TRANSACTION directive has been enhanced to clearly define UOWs within a SQL application. Instead of using the AUTOCOMMIT directive, which is confusing in certain applications, TRANSACTION clearly defines transaction boundaries for all SQL applications.</li> </ul>   |

| Feature Summary                            | Feature Detail  |
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| <b>Relinking existing applications</b>     | <p>In order to accelerate the update process from predecessor products, you can now configure Enterprise Developer to check whether applications created with older releases must be relinked. If the application uses an older version of the C runtime, Enterprise Developer can automatically relink the existing executable or .dll to the new version of the C runtime without the need to recompile the application first.</p> <p>If a project needs relinking, Visual Studio displays a message in the status bar (Visual Studio 2015 and 2017) or a dialog box (Visual Studio 2013) providing an option for you to choose and relink the project.</p> |
| <b>Automatic relinking of applications</b> | <p>In order to accelerate the update process from predecessor products, Enterprise Developer 4.0 can automatically relink existing projects created with Enterprise Developer 3.0 that have executable link artefacts. Eclipse displays a warning in the Problems view that the project requires relinking. It then offers a Quick Fix action for you to execute that will link your project with the most recent version of the run-time system.</p>   |

For more information, a list of all features added to this release is available in the Release Notes within Enterprise 4.0.

Additional contact information and office locations:  
[www.microfocus.com](http://www.microfocus.com)

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