



# Micro Focus Visual COBOL Development Hub 6.0

Release Notes

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2020-06-04

# Contents

<b>Visual COBOL Development Hub 6.0 Release Notes</b>	<b>5</b>
<b>What's New</b>	<b>6</b>
COBOL Application Console Size	6
COBOL Language Enhancements	6
Compiler Directives	7
Containers	7
Database Access - DB2 ECM	7
Database Access - XA Switch Modules	8
Data File Tools	8
Enterprise Server	8
Enterprise Server Security	8
Enterprise Server Common Web Administration (ESCWA)	9
File Handling	10
Library Routines	10
The Micro Focus Unit Testing Framework	10
Multi-Threaded Applications	11
New Platform Support	11
Problem Determination	11
<b>Significant Changes in Behavior or Usage</b>	<b>12</b>
<b>Resolved Issues</b>	<b>16</b>
<b>Known Issues</b>	<b>36</b>
<b>Other Issues Resolved in This Release</b>	<b>37</b>
<b>Unsupported Functionality</b>	<b>38</b>
<b>Installing Visual COBOL Development Hub</b>	<b>39</b>
Before Installing	39
Downloading the Product	39
UNIX and Linux Installer Issues	39
System Requirements for Visual COBOL Development Hub	39
Basic Installation	42
Installing Visual COBOL Development Hub	42
Advanced Installation Tasks	43
Installing as an Upgrade	43
Visual COBOL Development Hub Installation Options	44
After Installing	45
Setting up the product	45
Configuring the Remote System Explorer Support	45
Enabling SHIFT-JIS	46
Repairing on UNIX	47
Uninstalling	47
<b>Licensing Information</b>	<b>48</b>
To buy and activate a full unlimited license	48
To start Micro Focus License Administration	48
Installing licenses	48
If you have a license file	48
If you have an authorization code	48
To obtain more licenses	49
<b>Updates and SupportLine</b>	<b>50</b>
Further Information and Product Support	50
Information We Need	50

Creating Debug Files .....	51
<b>Copyright and Disclaimer .....</b>	<b>52</b>

# Visual COBOL Development Hub 6.0 Release Notes

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



**Note:**

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

# What's New

Enhancements are available in the following areas:

- [COBOL Application Console Size](#)
- [COBOL Language Enhancements](#)
- [Compiler Directives](#)
- [Containers](#)
- [Database Access - DB2 ECM](#)
- [Data File Tools](#)
- [Enterprise Server](#)
- [Enterprise Server Security](#)
- [Enterprise Server Common Web Administration](#)
- [File Handling](#)
- [Library Routines](#)
- [Micro Focus Unit Testing Framework](#)
- [Multi-Threaded Applications](#)
- [New Platform Support](#)
- [Problem Determination](#)

## COBOL Application Console Size

[Back to Top](#)

The maximum console size of a COBOL application has increased. It can now be 255 lines by 255 columns, configurable using the `screen_lines` and `screen_cols` run-time tunables.

## COBOL Language Enhancements

[Back to Top](#)

The following enhancements are available:

- **Enterprise COBOL 6.2 Update** - new syntax, library routines, and the respective analysis tooling are available for compatibility with IBM's Enterprise COBOL 6.2 Update:
  - New intrinsic functions are supported: BIT-OF, BIT-TO-CHAR, BYTE-LENGTH, HEX-OF, HEX-TO-CHAR, NUMVAL-F, TEST-NUMVAL, TEST-NUMVAL-C, TEST-NUMVAL-F, and TRIM
  - A number of intrinsic functions now support national data (especially surrogate pairs): REVERSE, ULENGTH, UPOS, USUBSTR, USUPPLEMENTARY, UVALID, and UWIDTH.
  - A LOC phrase has been added to the ALLOCATE statement to define whether memory is allocated above or below the 16MB line.
- **CONSTANT qualifier** - it is now possible to define data items as constants. This improves the code readability and usability, and helps detect programming errors. The ability to create constant items is already in .NET COBOL and JVM COBOL, and many other languages.
- **Local variable declarations in native COBOL** - it is now possible to declare data items inline in the code and not only in a separate DATA DIVISION. This provides better locality of data, making the source code easier to reason about.

- **Native data type to hold strings of utf-8 characters** - in native COBOL, support is now available for the PIC U data type as introduced by IBM in Enterprise COBOL version 6.3. Direct support is available for utf-8 data.
- **Performance improvements** - this release provides various performance improvements, most significantly on 32-bit Intel x86 platforms. When using the highest optimization level, opt(4), the performance of native code generated by the COBOL Compiler has improved. A number of cases are affected, most particularly those where it is beneficial to locate PERFORM ranges inline.

## Compiler Directives

[Back to Top](#)

The following Compiler directives are new in this release:

- DISPLAY-AT - specifies a default foreground and background color for DISPLAY AT and ACCEPT AT statements that do not specify any color attributes.
- DPC-IN-DATA - controls whether the DECIMAL-POINT IS COMMA clause (if specified) is applied to the output from the XML GENERATE and JSON GENERATE statements.
- ILCONDITIONPARAM - switched on by default. Enables the support for conditional expressions as method parameters.



**Important:** Applications that use the old COBOL syntax for specifying named parameters as custom-attributes will not compile with the ILCONDITIONPARAM specified. This can result in any older applications failing to compile in the current version of the product. See *ILCONDITIONPARAM* for details about how to work around this issue.

The following Compiler directives have new options:

- CHECKREFMOD - now takes an additional parameter (NOZEROLENGTH), which acts as CHECKREFMOD, but does not permit reference modifier lengths of zero.
- PROTOTYPE - now supports options that specify whether prototypes are required, and the severity of error messages issued for prototype mismatches.

## Containers

[Back to Top](#)

Support has been added to enable you to work with containers from the IDE. In particular you can now create a Dockerfile for a COBOL project, and build, debug and run a COBOL project in a container, all from the IDE.

Support has been added to enable the use of tools that are compatible with the Open Container Initiative (OCI) on platforms where they are supported. This is currently available on Red Hat Enterprise Linux 8.

## Database Access - DB2 ECM

[Back to Top](#)

Support for the following has been added to this release:

- Multi-row fetch (MRF) and insert (MRI) statements with or without the FOR ROWS clause
- Array update and delete statements



**Notes:**

- These new features are supported for DB2 LUW version 11.1 Mod 4 Fix Pack or newer. Currently, IBM does not support either of these features with DB2 LUW 11.5.
- For coding examples, see the IBM DB2 LUW documentation: [Embedded SQL/COBOL Support for MRI and MRF](#).

## Database Access - XA Switch Modules

[Back to Top](#)



**Restriction:** This feature applies only when the Enterprise Server feature is enabled.

Support for the following has been added to this release:

- XA switch modules have been enhanced to enable storage of sensitive information in the Micro Focus Vault Facility. This new functionality includes a customizable program, ESXAEXTCFG.CBL, you can use to obfuscate xa-open strings by storing them as secrets.

## Data File Tools

[Back to Top](#)

The following enhancements have been made to the Data File Editor:

- Double-byte character sets are now supported within the editor.
- Insert mode is now available when editing a formatted record, except for numeric fields.
- When editing DBCS data in EBCDIC files, the required Shift-out and Shift-in characters are automatically added when editing a formatted record and you are editing in Insert mode.
- You can now load and unload structure files for an open data file.
- A ruler at the top of the editing pane can be toggled on/off.

## Enterprise Server

[Back to Top](#)

The following enhancements are available:

- **IPv6 support (EAP)** - This feature is in Early Adopter Program (EAP) release status. Some Enterprise Server components and features now support Internet Protocol version 6 (IPv6) network addressing and connectivity. Due to limitations with IPv4, IPv6 is becoming more common within corporate networks and on the public Internet. In some cases, the use of IPv6 can improve interoperability and simplify network configuration.
- **Administrative Commands** - the `add` command in `cascertreg` now contains new options (`-cwi` setting, `-dcas` setting, `-issuer`, and `-subject`).

## Enterprise Server Security

[Back to Top](#)

This release provides the following enhancements:

- **Micro Focus Secrets file storage permissions**

The Micro Focus Secrets feature (also known as the Vault feature) provides centralized storage for sensitive information such as passwords, with some protection against accidental disclosure or discovery by unauthorized users. Prior to this release, the only supported storage mechanism was a



conventional file containing encrypted data. In this release, the permissions on the storage file and on the Secrets configuration file are set more restrictively to help protect the secrets.

- **Certificate wildcard support**

The X.509 digital certificates used to identify servers when making TLS (SSL) connections permit the use of fully-qualified domain names with wildcards for some parts of the name. This enables administrators to use a single certificate issued to, for example, \*.mycorp.com for any number of servers with fully-qualified names like www.mycorp.com, server1.mycorp.com, and so on. These wildcard-bearing certificates are now supported by client programs using Micro Focus communication technology when validating a server's certificate.

- **Improved ACL wildcard support**

In the Access Control Lists used for resource access control with LDAP-based security in Enterprise Server, the ".\*\*" wildcard sequence now behaves more similarly to mainframe RACF. A number of additional options for wildcard processing are also available.

- **PAM ESM module**

On Linux platforms, Enterprise Server now includes an External Security Manager module which integrates with the Pluggable Authentication Modules (PAM) operating system feature. The PAM ESM module can be used to authenticate Enterprise Server users with the same mechanism used for Linux users, or with any other mechanism available through PAM.

- **PKIX compliance for TLS certificate validation**

The standard for using X.509 digital certificates to authenticate servers when making TLS (SSL) connections is known as PKIX, for Public Key Infrastructure (X.509). It is defined by a series of IETF RFC documents, currently RFC 5280 and others. In previous releases, the certificate validation performed by this product did not conform to PKIX in a number of ways, most notably in using DNS address-to-name resolution in an attempt to match a certificate to a host. With this release, clients using Micro Focus Common Client technology, such as COBOL web service proxy programs, CAS utility programs, and customer applications that use the CICS Web Services Interface feature, will by default, use stricter procedures for validating certificates which more closely conform to PKIX. This improves TLS security and interoperability.

- **Security improvements for XML parsing**

In this release the third-party components used for parsing XML data have been updated, or have had bug fixes integrated into the version used by Micro Focus, to address published security vulnerabilities. Also, XML external-entity support has been disabled except where it is required by a particular product feature; this prevents XML External Entity (XXE) attacks on customer systems by attackers who can trick a customer application into parsing a malicious XML document.

## Enterprise Server Common Web Administration (ESCWA)

[Back to Top](#)

This release offers the following new features and improvements:

- **MFDS User Interface functionality replacement** - ESCWA can now communicate with remote MFDS instances, and displays the equivalent pages of MFDS. Configuring regions, and their IMS, PL/I, MQ, and XA options, and security, is now available.
- **ESMAC User Interface functionality replacement** - ESCWA can communicate with remote ESMAC instances, and can replicate functionality and display all the information provided by ESMAC.
- **Configurable User Interface access** - you can now configure the ESCWA security manager to control user and group access to certain aspects of the user interface, such as, native, and security menu items.
- **Usability improvements**
  - Starting and stopping regions from the navigation tree.

- The native menu items are not displayed if the region features are not configured correctly.
- Configuration of the display colors for MFDS hosts and regions to distinguish them with ease.
- **Scale-Out support** - ESCWA has improved the way it displays a Scale-Out Repositories (SORs) association with its PAC and member regions.
- **Redis support** - Redis is supported as a SOR when running this product in a PAC. Features include:
  - Redis cluster support
  - A Mfredis configuration file - enables you to configure reconnection when any network errors occurs. You can also use the file to configure Lua scripts tracing on servers.
  - Authentication support for the standalone Redis server.
- **Kubernetes support** - when ESCWA is run in a Kubernetes cluster, it is now possible to configure it to automatically discover the pods hosting MFDS within the cluster, and display them in the ESCWA user interface.

## File Handling

[Back to Top](#)

Fileshare password files can now be stored in the Vault Facility, ensuring that sensitive user credentials are encrypted. Firstly, create the password file in the usual way, and then upload it, with a path of `microfocus/fh`, using the `mfsecretsadmin` utility.

To ensure the Fileshare server uses the file stored in the vault, start the server with the `/uv` option.

## Library Routines

[Back to Top](#)

The following library routines are new:

- **MFU\_GET\_FILE** and **MFUGETF** - both these routines are used with data-driven tests in the Micro Focus Unit Testing Framework. If the `.csv` file under test references external data in one of its cells (using the `@file-name` notation), use either of these routines to load that external file into memory before such tests are run.

The following library routine contains new functionality:

- **CBL\_GET\_EXIT\_INFO** - this library routine has been enhanced to better detect the circumstances in which an exit procedure has been invoked.

## The Micro Focus Unit Testing Framework

[Back to Top](#)

The following enhancements have been made to the Micro Focus Unit Testing Framework:

- You can now run unit tests against an executable file from the command line. Before you run such tests from the command line, you must initially rebuild the executable in order to link it into the testing framework.
- The `.csv` source files used in data-driven tests can now reference external data: use the `@file-name` notation in a cell to use the contents of `file-name` in the tests. The external source files must be loaded into memory, using the `MFU_GET_FILE` or `MFUGETF` library routines, before the tests are run.
- Two new elements are available for data-driven tests: a data-driven setup and a data-driven teardown. Conventional setup and teardown entry points would run multiple times during a data-driven test; these two entry points run only once per test run.

## Multi-Threaded Applications

[Back to Top](#)

This release includes the following improvements:

- Improved validation of detached threads on UNIX - the reliability for applications with many threads, when using the CBL\_THREAD\_KILL routine and during abnormal process termination, such as when an error occurs, has been improved.
- Thread local storage optimizations - the thread termination in applications with many threads has been optimized.

## New Platform Support

[Back to Top](#)

Support is now available for Development Hub for the following additional platforms to the same level that other UNIX platforms (different than Linux) are supported:

- Ubuntu Linux 18.04.x (LTS) on 64-bit Intel (x86-family)
- CentOS v7 and v8 on Intel x86-64

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

## Problem Determination

[Back to Top](#)

The following enhancement is available:

- **Consolidated Tracing Facility (CTF) on UNIX** - CTF is now always present during process termination, such as when an application, or a third-party code, calls exit() directly.

# 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 Incident Numbers followed by the Reported Problem Incident (RPI) number (in parentheses).

- [Adis](#)
- [Call prototyping in library routines](#)
- [Common Communications Interface](#)
- [Database Access - OpenESQL](#)
- [Data Tools](#)
- [DB2](#)
- [Documentation](#)
- [Early warning of compatibility issues with current operating systems](#)
- [Enterprise Server](#)
- [Enterprise Server Common Web Administration](#)
- [Enterprise Server Security](#)
- [File Handling](#)
- [Micro Focus Directory Server](#)
- [National data items in JVM COBOL code](#)
- [Run-Time System](#)
- [SQL Option for DB2](#)
- [VALUE clause not permitted to follow items that use the OCCURS DEPENDING ON clause when ODOSLIDE in effect](#)

## Adis

[Back to the list](#)

- In RM/COBOL, the ACCEPT of a screen with an input field beyond the end of the screen would operate as if the field was at the last character of the screen. Previously, ADIS would ignore any fields past the end of the screen. Now, with Dialect"RM" set and the appropriate ADISCTRL settings, behavior will now match RM/COBOL in this case.

3138718 (1112690)

## Call prototyping in library routines

[Back to the list](#)

The copybooks `cbltypes.cpy` and `cblproto.cpy`, provided by this system for call prototyping in library routines, include features of the latest syntax, specifically the CONSTANT keyword. If these files are used in conjunction with the MF directive, it should be set to the current level, 21; otherwise, you should remove the directive, or do not use these copybooks.

## Common Communications Interface

[Back to the list](#)

- The default TLS Security Level has been increased from 0 to 1. This change will not affect any user that has specified their own security options. Users relying upon the default TLS security options might find that some old clients that are restricted to the use of weak ciphers will no longer be able to connect.

See "Security Levels" and "Specifying a Server Protocol and Cipher Suite Preference" in your product Help for more information on the change to Security Level 1.

## Data Tools

[Back to the list](#)

- You are no longer able to modify data in a structured record that is identified as comp-2 floating point - an alert is displayed if attempted. This is in order to prevent the data becoming corrupted.  
3213037 (1118867)
- Data File Tools now utilizes the configurable codesets facility to use a variety of character sets - see 'Working with Different Character Sets' in the documentation for more information.  
3161243 (1114482)

## Database Access - OpenESQL

[Back to the list](#)

Just like other DBMS SQL COBOL precompilers, OpenESQL now follows embedded SQL standards and disallows the use of group host variables in WHERE <column> = :hostvar clauses. In the past, this was not flagged at compile-time, and would lead to unpredictable results when executed.

## DB2

[Back to the list](#)

- There is no longer a problem using an XML CLOB host variable in COBOL and PL/I program SQL statements when compiling with the DB2 ECM Compiler directive.  
3204413 (1118115)

## Documentation

[Back to the list](#)

- The information about the -flag and warn compiler options has been updated.  
3190928 (1120000)

## Early warning of compatibility issues with current operating systems

[Back to the list](#)

In order to better support modern operating systems, we are aligning closely with their operability guidelines. We now detect previously-undefined behavior when interacting with OS level functions.

Error RTS096 alerts you to any calls to the operating system's fork() API, in a process that has directly or indirectly called COBOL functionality, in your code.

The error gives you an early diagnosis of a situation which, if left unchecked on modern operating systems, could lead to deadlocks, crashes or other failures at run time. These problems would often occur intermittently and be very challenging to track down.

See the KB article <https://community.microfocus.com/t5/Visual-COBOL-Knowledge-Base/fork-rt64-Error-96-encountered-in-child-process/ta-p/1771191> for more details.

## Enterprise Server

[Back to the list](#)

- IF an XA open string uses the BATCHONLY option, CRCN will not monitor the XA connection to the resource manager. If the BATCH SEP encounters a severe XA error, the batch SEP will be recycled until the connection is recovered. This emulates the previous version of the XA reconnect feature when

ES\_XA\_????\_NB\_RETRIES=-1 was set. Consequently, if an open string contains BATCHONLY, only a batch SEP will be able to access the resource manager and, as CRCN is a CICS transaction, it will not monitor this entry.

3213379 (1118913)

- The initPac option for the caspac command line utility has a change in behavior. Prior to PU5, if the command detected that there were active regions in the PAC, the command would return an error and not initialize the PAC. This only occurred when: 1. There are active regions in the PAC. 2. There are no active regions in the PAC, but a region has shutdown without notifying the PAC SOR (PSOR), for example, if the region was killed. In this case, it was not possible to cold start a PAC without manually correcting the appropriate value in the PSOR. The initPac option will now prompt for confirmation on whether you really wants to initialize the PAC, giving you the option to cancel. CAUTION: Only use this option for scenario 2, ensuring that no cas\* or mfcs processes remain for regions within the PAC. If it is used when there are active regions in the PAC, the regions will no longer function correctly.

(642125)

- Enterprise Server now supports Redis Cluster as a SOR. See "Prerequisites" in the "Scale-Out Performance and Availability Clusters" chapter in your product Help for more information.
- When compiled with the XAID Compiler directive, JCL batch SQL applications now work correctly when MFDBFH is enabled.

3223257 (1119804)

## Enterprise Server Common Web Administration

[Back to the list](#)

- By default, ESCWA now runs on port 10086.
- When using the Vault Facility, the ESM passwords are now accessed by the ESM's Universal Unique Identifier (UUID) which makes the key for the vault. If this UUID cannot be found it uses the old name based mechanism as the key for the vault. Note: All new ESMs have a UUID that conforms to 4122 RFC. The earlier ESM UID standard is still supported.
- PAC names are now limited to eight characters or fewer in ESCWA.
- The default ESCWA configuration file now sets ESCWA to run in loopback-only mode.

## Enterprise Server Security

[Back to the list](#)

- The MLDAP ESM Module for Enterprise Server now interprets the ".\*" wildcard sequence in a manner closer to that of mainframe RACF. This behavior is configurable. See "Wildcards for Resource, User, and Group Names" and "MLDAP ESM Module Custom Configuration Information" in your product Help for more information.

3206992 (1118359)

## File Handling

[Back to the list](#)

- The supervisor password is no longer displayed when cobfsclose is executed from the command line.

3195772 (1117571)

- Usernames in the Fileshare password file are no longer obfuscated; they are shown in plain text.

3120656 (641976)

- Fileshare can now read a password file stored in the Vault Facility. Use the /uv option when starting Fileshare to read the specified password file from the vault. Note: You must have uploaded the password file to the vault before starting Fileshare.

- File and folder names that are deployed to PostgreSQL datastores are now case-insensitive. This ensures consistency of behavior with DB2 and SQL Server datastores.

### **Micro Focus Directory Server**

[Back to the list](#)

- UNC paths are no longer supported when importing or exporting to MFDS by default. To re-enable them, set the environment variable MFDS\_ALLOW\_UNC to 'Y'.

### **National data items in JVM COBOL code**

[Back to the list](#)

JVM COBOL code that uses IS NUMERIC tests on NATIONAL or NATIONAL NUMERIC data items, or uses NATIONAL NUMERIC data items in programs compiled with the CHECKNUM Compiler directive must be recompiled in this release. Compiled code from earlier products that uses such constructs will generate a `MissingMethodException` error when run under this release.

### **Run-Time System**

[Back to the list](#)

- Previously, the value of the fill character and the option to use it were ignored in the RM window control block. With this fix, the character will be used if `Dialect"RM"` is set and an appropriate ADISCTRL configuration is used.

3138692 (1112552)

### **SQL Option for DB2**

[Back to the list](#)

- The XDB Service name has been shortened.

3195822 (1119897)

### **VALUE clause not permitted to follow items that use the OCCURS DEPENDING ON clause when ODOSLIDE in effect**

[Back to the list](#)

If your Working Storage contains a data item with the OCCURS DEPENDING ON phrase, and ODOSLIDE is in effect, any subsequent data items at the same or higher level must not contain a VALUE clause. If they do, an error (COBCH1962) is now generated.

If you cannot remove the VALUE clauses from your source code or remove ODOSLIDE, contact SupportLine.

# Resolved Issues

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

- [Adis](#)
- [Character Animator](#)
- [Common Communications Interface](#)
- [Data Tools](#)
- [Dockerfiles](#)
- [Documentation](#)
- [Enterprise Server](#)
- [Enterprise Server Auditing](#)
- [Enterprise Server Common Web Administration](#)
- [Enterprise Server Security](#)
- [File Handling](#)
- [Form Designer](#)
- [Header-to-Copy Utility](#)
- [Licensing](#)
- [Micro Focus Common Client](#)
- [Micro Focus Directory Server](#)
- [MF Server Administrator \(GUI\)](#)
- [Run-Time System](#)
- [Setup](#)
- [SQL: COBSQL](#)
- [SQL: DB2](#)
- [SQL: Mainframe Batch Database Tools](#)
- [SQL: OpenESQL](#)
- [SQL Option for DB2](#)
- [XML Support](#)

## Adis

[Back to the list](#)

- A single field is no longer padded to the right when the SIZE clause data-name is greater than the PIC clause and all the other fields have the PROTECT attribute.  
3223862 (1119916)
- An ACCEPT on SECURE fields no longer produces unwanted characters.  
3221450 (1119807)
- Using JUST and ZERO-FILL in a CONTROL clause with ADISCF option 16 set to 3 no longer causes an RTS 114.  
3198021 (1117521)
- ACCEPT ON ESCAPE KEY and ACCEPT ON ESCAPE data-item now return the correct key-code in RM/COBOL for function keys and escape. Note that the complete list of the returned key codes are not 100% compatible with RM/COBOL for all keys.
- You no longer receive an RTS 114 error when the UNIX environment variable COLUMNS > 164 for DISPLAY AT LINE COLUMN syntax.



## Character Animator

[Back to the list](#)

- A Perform Step of a CALL statement in INT code, after using the Do function, and then changing the execution point with the Reset function, now steps over the CALL correctly.  
3222172 (1119750)
- When detaching the debugger from a process on Solaris, the process no longer crashes.  
3213587 (1118926)
- Two new command line options for Animator can be used to speed up the Animation of coredumps for applications with a large number of programs. Specifying these new options "FASTLOAD" and "FASTEXIT" on the command line will result in Animator starting and stopping significantly quicker. See the documentation for details on these new options.  
3212276 (1118852)
- CBL\_EXIT\_PROC routines can now be debugged correctly.  
3208380 (1118433)
- Querying an OCCURS ... DEPENDING ON ... where the item is zero is now treated as an invalid query and the item is not shown.  
3201182 (1117795)
- When zooming and using Perform Step/Out over applications with many programs which have many COPY statements, performance is improved.  
3197159 (1118692)

## Common Communications Interface

[Back to the list](#)

- When CCI shared memory was processing multiple simultaneous broken connections and data at the same time, it was possible that the data could not be read.  
3195698 (1117370)
- ssltrc.txt is no longer created with an extra character in the file extension.

## Data Tools

[Back to the list](#)

- The dfconv command line utility now supports a new option "-s" - this option skips DBCS checking during conversion, in order to improve performance. This option should only be used from within a DBCS locale, and only when you are sure that the data you are dealing with is from a SBCS.  
3213092 (1118872)
- When running the DFCONV command line batch interface, a new option -F (or -f) allows only the fixed text output to display; no dynamic updates are displayed to the console after each record is processed.  
3163542 (1115730)
- Trying to open a PDS file in DFED no longer results in out-of-bounds exceptions.  
3214578 (1119499)
- On UNIX, opening empty structure files no longer fails and produces an RTS 114 error message.  
3208560 (1118685)
- Structure files can now be loaded and unloaded after a data file has been opened.  
3181265 (1116352)
- On UNIX, using the Up and Down buttons to navigate the records no longer causes Data Tools to hang and loop at several rows.

3208560 (1118686)

- Conditional structure now work with EBCDIC files where the condition field is not at the beginning of the record.

3204158 (1118166)

## Dialog System

[Back to the list](#)

- The Export process in Dialog System no longer fails with RTS164 error.

3200921 (1117781)

## Dockerfiles

[Back to the list](#)

- esadm is the default user for all the different container images.

## Documentation

[Back to the list](#)

- The documentation has been updated to explicitly state that the FOLDER tag, used in extfh.cfg, only supports the use of local folders; it does not support the use of networked folders.

3212247 (1118782)

- The documentation has been corrected in relation to the supported data types allowed in a stored procedure definition file.

3207946 (1118435)

- The note at the head of the list of run-time tunables, stating that the tunables are for native code only, has been removed. Any native-only restrictions for tunables are mentioned in the topics of each tunable.

3207815 (1118381)

- The error message description for the warning message COBCH1237 has been corrected. It also now contains a link to the Compiler directive topic (REENTRANT) that it relates to.

3205344 (1118169)

- The product Help for the software requirements has been updated to indicate that on 64-bit Red Hat 7 you only need to install glibc-2.17\*.x86\_64 and glibc-2.17\*.i686.

3201443 (1118038)

- The cblink option -s has been correctly removed from the documentation.

3200100 (1117719)

- To create an EXTENDEDES file, the docs now state that you must use a combination of IDXFORMAT"15" and the EXTENDEDES option.

3195595 (1117298)

- The syntax diagram for indexed file formats (format 4) has been updated in the documentation - topic: The File Control Entry. It now indicates that WITH [NO] DUPLICATES can be specified on the record key, as an MF extension.

3177534 (1115898)

- The documentation on the FILE\_TRACE configuration variable (used within Database Connectors) now includes details on the level of tracing that is possible.

3164533 (1117209)

- The RM/COBOL compatibility documentation now makes it clear that the DIALECT"RM" directive should not be applied to managed COBOL.

3139755 (1112643)

- The documentation now includes the sequence in which the Run-Time System will attempt to locate a requested .lng file - see 'Compiling and Deploying a Message File'  
2869115 (1106127)
- The context-sensitive reserved words, particularly those relating to the ACU dialect, have been relocated to the Context-Sensitive Reserved Words topic. (They previously resided in the Reserved Words Table topic.)
- If you are building a self-contained callable shared object on a Linux platform, and will be calling COBOL modules built to .int or .gnt files, you must specify the following additional options when you link the main (non-COBOL) executable: -Wl,-zexecstack For example: gcc -m32 -o mymainexe mymain.o -g -ldl -Wl,-zexecstack
- The documentation has been updated to clarify the default behavior when the ALIGN directive is specified without either OPT or FIXED.
- The documentation for the Micro Focus Database Handler now clarifies when a region and cross-region database is required (in the Configuration Requirements section).
- The sample code listed in 'Typedef - User Defined USAGE or Structure' has been corrected.
- The documentation has been corrected for the TYPEDEF clause - the list of clauses not permitted for use when TYPEDEF is specified is now accurate.
- The documentation has been updated to state that the maximum number of PERFORM ranges in a program (65535) is also applicable to .NET and JVM COBOL programs.
- All erroneous references to the TRUNC, BS2000-OFFLOAD, and INFORETURN directives have been removed from the documentation.  
3223245 (1119786)
- All erroneous references to the FLAGCD directive have been removed from the documentation.  
3223242 (1119785)
- All erroneous references to the [NO]OLDSTRSUB directive have been removed from the documentation.  
3223240 (1119783)
- On UNIX, MFDS can run as a non-root user on a port number equal or greater than 1024. See "To Run the Directory Server as a Non-Root User" in your product Help for more information.  
3213301 (1118928)
- The documented example for the mf.mfdbfh CTF component now contains the correct settings in order for the trace to be successful.  
3203127 (1118015)
- The documentation has now been updated with the correct definition for the CCITCPS\_fsname variable, used within Fileshare.  
3192544 (1117368)
- The DD Statements topic has been updated to include correct values for XTEP2 and its alias DSNTTEP2.  
3168080 (1115120)
- The documentation now correctly states that the CBL\_CREATE\_CORE library routine is for native COBOL use only.
- Ensure that you back up your secrets configuration file, secrets.cfg. Before you install a new version of your product. By default, the secrets.cfg file is located in the %ProgramFiles(x86)%\Micro Focus \Enterprise Developer\etc (Windows) or \$COBDIR/etc (UNIX) directory. Restore the backed up configuration file once the product installation is complete.  
3216092 (1119162)
- The documentation now includes details of the MFJ\_STRICT\_CASE environment variable, which can be used to maintain the case of physical file names passed to MVSCATIO by the catalog API, and other utilities.

## Enterprise Server

### [Back to the list](#)

- TS queues that were created with an expiry interval and stored in Redis would have their expiry interval corrupted when a subsequent READQ TS was performed on that queue. The expiry interval is no longer modified during the life of the queue.  
3221103 (1119598)
- In a PAC, when a JES initiator was terminated, if the job was in the Dispatch queue the lock was not removed for the dispatch queue SYSZJOB.D.  
3226274 (1120084)
- It is now possible to use casfile -p to change the current path of a closed file or, if the file is cataloged, to change the DSNNAME from the specified DD NAME.  
3224800 (1119969)
- An issue causing an RTS 114 on DFSRRC00 related to disabled xa entries has been resolved.  
3223838 (1119845)
- You can now set the environment variable ES\_PAC\_NO\_GLOBAL\_LOG=Y if you do not want all the messages from all console.log files for all the regions in a PAC to be stored in the PSOR CasPacLog.  
3222549 (1119714)
- CICS Web requests greater than 32 Kb to secure regions no longer incorrectly receive a 403 (Forbidden) response.  
3222308 (1119752)
- Switching on the active HSF file could cause a thread in the castrc process to go into a tight loop and use a lot of CPU.  
3219692 (1119546)
- A MalformedResponseException error when using channels and containers on ECI calls has been resolved.  
3217992 (1119653)
- Strings with special characters were sometimes being truncated or causing a malformed XML error. The whole string is now being returned without any truncation or errors.  
3217170 (1119681)
- A CCSID Error 0002 could occur when converting certain strings to UTF-8, if the strings contain characters that expand from single to multi-byte during the conversion. The reason for this was that the converted string was longer than the maximum length specified for the field. Instead of resulting in an error, the data is now truncated. This matches the behavior on the mainframe.  
3217170 (1119262)
- The Historical Statistics Facility (HSF) post-processor utility casfhsf has been enhanced to output time intervals of from 1 to 9999 seconds. An option is now provided to optionally split the date/time output column into a date column and a time column. The maximum number of columns has been increased to 172,800 for 32-bit systems, and to 1,296,000 for 64-bit systems. The number of transactions within an interval that meet its specified system response time criteria is now reported correctly.  
3214504 (1119179)
- Calling into an entry point on an already loaded program no longer causes memory leaks.  
3214021 (1119003)
- An empty XML element in the SOAP response message no longer results in an ARRAY\_TOO\_SMALL error.  
3212477 (1118802)
- Tranclass MaxActive is now honoured in PAC configurations.  
3209901 (1118571)

- The command line help for casstart now includes information about the /m option.  
3208071 (1118414)
- The initialization of a Service Execution Process could be interrupted by a request which provoked a security call before the local ESM context had been established. This resulted in an error which would cause the server to shutdown immediately. This has been fixed.  
3208021 (1118431)
- An issue on a START TRANSID with TERMID executed from an EBCDIC program has been fixed.  
3206507 (1118272)
- The permissions for resources (such as TSQUEUE) were being checked every time they were used in a transaction. Now they are checked once per transaction and the result of that check is used on subsequent requests.  
3206471 (1118690)
- All BATCHONLY MQ resource managers accessed from the same DSNRLI program are now security checked. Note that DSNRLI is limited to opening only one MQ resource at a time.  
3205339 (1118173)
- If one or more jobs had a shared lock on a dataset (DISP=SHR) and another job was waiting for exclusive access (DISP=OLD) on the same dataset, the latter would be granted the lock when any one of the other jobs completed. The file would not be available for exclusive use and this would result in a 9/65 error, file locked status on open. This has now been resolved and the exclusive lock is not granted until all shared locks have been released.  
3201463 (1117839)
- Previously, INQ TRANCLASS could fail and return a TCIDERR response code if CASTSC was handling a heavy load.  
3200414 (1117738)
- ITR requests (such as file requests) are not sent to the transient SEP running the EZASOKET CICS transaction.  
3200370 (1117767)
- Invoking any of the CAS\* utilities (such as casout) against an enterprise server instance running on a machine with a host name which exceeds 40 characters in length no longer results in a failure to find the service.  
3200011 (1117816)
- Previously, a high volume of events in the system could cause shared memory constraints. This was because the system generated the events irrespective of what the event manager exits were checking for. It is now possible to avoid this by setting the filter strings in the event manager exits. This ensures that only the required events are generated and helps to avoid any further shared memory constraints.  
3199174 (1117679)
- Previously, a high volume of events in the system could cause shared memory constraints. This was because the system generated the events irrespective of what the event manager exits were checking for. It is now possible to avoid this by setting the filter strings in the event manager exits. This ensures that only the required events are generated and helps to avoid any further shared memory constraints.  
3199174 (1117680)
- ESCERTPAS can now return spaces as the passphrase to allow for certificates that do not have a passphrase.  
3196872 (1117431)
- The following APIs are now supported: MQCRTMH, MQBUFMH, MQMHBUF, MQDLTMH MQSETMP, MQINQMP, and MQDLTMP.  
3196430 (1117373)
- The performance when accessing PPTs for a program that has already been invoked in the same task has been improved.

3195445 (1117554)

- In the case of OPERCMD5, you need to call the security exit only if the esm-input-parms pointer has been provided. This helps to avoid receiving an RTS 114 error message.

3195205 (1117377)

- An issue where a process recovery caused the entire region to crash has been resolved.

3192471 (1117060)

- Sysout output from the casout utility larger than 64K is now displayed correctly on the screen.

3192406 (1117734)

- Previously, console.000 was always overwritten when console.log max size was specified.

3192214 (1117565)

- In MQ series support, the MQCSP block which can be passed on an MQCONN call and carries user credentials, was not being converted. This resulted in MQ connection failures.

3191698 (1117032)

- When an alternate user ID is supplied on an MQ call, it is now authorized against the server's active ESMs.

3183523 (1117005)

- Under certain circumstances, a batch job which used EZSOKET calls could abend for exceeding its job card's TIME parameter before that period had expired.

3181745 (1116242)

- The association of a XA switch module with a batch unit of work now returns an error if the XAR cannot be associated. This change might affect DSNRLI, DSNALI, and TSO in Batch(IKJEFTxx) processing.

3178489 (1118208)

- The fixed transaction property for a terminal resource was not being honored correctly.

3176086 (1115790)

- An intermittent issue with SSTM jobs not running after the region has started has been resolved.

3175925 (1115789)

- HSF records following a date rollover are no longer intermittently recorded as occurring on the previous day.
- An issue which caused a memory corruption on shutdown when using JCL HSF has been resolved.
- Hexadecimal prefixes can now be defined in Scale-Out Repository (SOR) models. See "PAC and SOR Environment Variables" in your product Help for more information. A new exit, TSTDSRUE, has been provided to determine whether or not to direct a TS or TD access request to a SOR at queue access time. Usage of this exit causes any SOR models that have been defined to be ignored. See "Configuring TS and TD Queues for SOR Storage" in your product Help for more information.
- The XML export of resource definitions now ignores any resources that are in groups that have names starting with "DFH".
- Security Fix: A vulnerability within ESMAC which made the Web UI more susceptible to reverse tabnabbing has been removed.

3216053 (1119150)

- If MFDS\_DNS\_RESOLVE=Y is set, the resolved hostname of the requested address for a listener is used for the ESMAC URL from MFDS, even if the listener is specified with an IP address in the listener definition.

3194907 (1117388)

- Some issues with sorting jobs on the spool page have been resolved.

3194166 (1117179)

- ITRs are now routed to the target SEP via castsc.

3193937 (1117152)

- An issue with Reply to console page in ESMAC has been fixed.  
3192888 (1117078)
- The ESXDBOPC RM switch module has been updated to provide further clarification for optional open-string customization.  
3223990 (1119899)
- A new XA Switch build option - mssql17 - allows the use of the SQL Server ODBC 17.3 driver (and later versions).  
3220548 (1119748)
- APPLNAME is now set when DSNRLI SIGNON is called with an argument.  
3219384 (1119464)
- After a SRRCMIT/SRRBACK call, the connection is now being set correctly.  
3218880 (1119427)
- The ODBC XA switch now initializes and starts correctly when MFDBFH is enabled.  
3218343 (1119410)
- There is no longer an issue with running an XA job after cancelling an XA job in ESMAC.  
3218095 (1119496)
- New functionality now enables you to store all or part of an XA open string in a vault using the Micro Focus Vault Facility.  
3217806 (1119289)
- The ODBC switch now handles IMS BMP jobs correctly when the BATCHONLY=T option is specified.  
3212998 (1119040)
- XAR now uses the long username for connections during user impersonation if the new open string option LNAME=T is specified.  
3203042 (1117973)
- The XA module for XDB now builds without any issues in the Enterprise Developer 5.0 products.  
3199440 (1117649)
- XA switch modules now recognize IMS transactions correctly.  
3198981 (1117710)
- The DB2 XA switch module now handles user impersonation and the packagepath option correctly.  
3166472 (1118325)

## Enterprise Server Auditing

[Back to the list](#)

- Enterprise Server auditing no longer hangs if auditing is enabled for the External Security Facility but no audit configuration file is present, and the Audit Manager is not running.

## Enterprise Server Common Web Administration

[Back to the list](#)

- An issue with viewing regions in ESCWA using an MF Directory Server process secured with the Micro Focus Internal Security has been resolved.
- The ESCWA user interface now performs validation in the same way as the Enterprise Server MFDS.  
3194067 (1117163)
- It is now possible to add a color to a directory server's region through its General > Appearance drop-down list. This enables you to change the color of the region in the tree, and the background color of the region's pages. This setting overrides the directory server's colors, if they were already set.

3132670 (1111980)

- It is now possible to add a color to a directory server from the server's General > Appearance drop-down setting. Use this setting to change the color of the directory server in the tree, in the background color of the directory server pages and all of its region pages.

2869809 (1105847)

- The Monitor > Properties page now displays the list of Pending Requests under counts. This represents any type of pending requests for the region.

## Enterprise Server Security

[Back to the list](#)

- mfsecretsadmin no longer fails on HP-UX platforms.
- The mfsecretsadmin utility now supports specific secrets configuration files.
- Invalid keys in mfsecrets no longer result in a crash.
- mfsecretsadmin no longer incorrectly displays an error message when writing to a directory that does not exist.
- The secrets.cfg file has been moved to the default vault location.
- Enterprise Server mainframe-style passtickets, used by the ELF and DCAS features, are now supported when LDAP bind-mode verification is used.

3223436 (1119810)

- In Enterprise Server, the External Security Facility's OS ESM module now supports the Enterprise Server Digital Certificate Authentication Service (DCAS).

3222786 (1119760)

- An Enterprise Server region running in a PAC and using MFDBFH for the region database with the database "reslocking" feature supported, and with the External Security Feature enabled, would periodically log messages similar to "ESFEV0331E Unable to unlock shared memory".

3218610 (1119357)

- An additional configuration option related to retrying on failure, retry bind, has been added to the MLDAP ESM Module. See MLDAP ESM Module Custom Configuration Information topic in your product Help for more information.

3215526 (1119267)

- The Enterprise Server External Security Facility's rule-substitution feature now supports the token \$ {user\_long}, which is replaced with the user's "long name".

3210400 (1118613)

- In the Enterprise Server External Security Facility's administration, in rare circumstances, a one-byte buffer overflow could occur when processing a list-user request, potentially resulting in heap corruption.

3209383 (1118627)

- In an Enterprise Server security configuration with two or more security managers using the MLDAP ESM Module, all-groups mode enabled, and group federation enabled, certain ESF Update requests including the "Update All" button in the Enterprise Server Administration web interface could result in users losing group membership information. This has now been fixed.

3208297 (1118513)

- Enterprise Server's MLDAP ESM Module has a new option, "maximum qualifiers for initial check", which enhances the existing "check TLQ first" option. See "MLDAP ESM Module Custom Configuration Information" in your product Help for more information.

3201021 (1117790)

- The Enterprise Server MLDAP ESM Module's tracing of the effective rule and result for Auth/XAuth requests now includes the resource class as well as name.

3200710 (1117799)



- In Enterprise Server security configurations using multiple Security Managers with the MLDAP ESM Module, where all-groups mode is enabled and federation is disabled, user group membership is now maintained correctly.  
3194825 (1117275)
- The MLDAP ESM Module no longer generates "invalid search filter" errors when using OpenLDAP to search for users with special characters in their LDAP Distinguished Names.  
3194796 (1117268)
- Enterprise Server on Linux now includes a PAM ESM Module, which can authenticate users using the Pluggable Authentication Modules mechanism included with the operating system.  
3176983 (1115874)
- An issue with modifying Enterprise Server user groups with names beginning with the hash character ("#") has been corrected.
- An issue with some identifiers that contain the equals sign character ("=") when using LDAP-based security in Enterprise Server has been resolved.
- es\_default\_ldap\_openldap.ldf no longer deletes entries from the specified LDAP server. Instead, if you are performing an upgrade you can use the new es\_default\_delete\_ldap\_openldap.ldf to delete these old entries.

## File Handling

### [Back to the list](#)

- An OPEN OUTPUT operation on an ESDS file, with directive NOFCD3 set, now correctly returns a 00 status.  
3224463 (1119982)
- A file status of 9/41 was sometimes incorrectly reported when a file was accessed by many users, under intensive file I-O. This has now been fixed.  
3214504 (1119352)
- Any 9/41 additional status errors will not be logged to XFHLOG if /dev/null or NUL is used.  
3214504 (1119652)
- The File Handler running under Enterprise Server no longer returns a file status 500 when trying to retrieve the next DD.  
3211622 (1119086)
- Specifying OUTDD"SYSOUT 121 R" when MF\_CBLQDA=ON is set could cause a file locked status for SYSOUT to occur.  
3201420 (1117813)
- Fileshare no longer crashes when run in background mode and signal is processed.
- Rebuild now correctly reports the permitted number of duplicates for idxformat 12.  
3201916 (1117985)
- Enterprise Server XA reconnections failed to register with MFDBFH following the loss of the original connections - for example, through the use of the Db2 FORCE APPLICATIONS ALL.  
3226856 (1120160)
- Error messages are now reported to the Enterprise Server console, and the region start-up fails, if an attempt is made to warm start a region using a region database that had not previously been cold started.  
3226448 (1120167)
- A trace event is now output each time an I/O operation occurs that requires an XA connection and no XA connection for the underlying datastore has been registered. This is designed to help with diagnosing any file access problems.

3222022 (1119691)

- Specifying "localhost" as the hostname to recover when using "dbfhadmin -openfiles -recover -host:localhost" or "dbfhadmin -casprocess -recover -host:localhost" failed to resolve to the current machine name, resulting in the command failing.

3221354 (1119628)

- dbfhdeploy was not reporting the underlying ODBC error that resulted from a database connection failure.

3221103 (1119661)

- If a single Db2 database hosted a datastore and a region with the same name, database operations would fail for the region if the datastore had been accessed first (and vice versa) due to the same database connection and schema being used for both the region and the datastore.

3219905 (1119487)

- The Micro Focus Database File Handler (MFDBFH) documentation now includes a reference topic listing the database permissions required to create new databases, and to handle data files stored in a database. Administrators can use this information when setting up roles within their database instances.

3217410 (1119273)

- DB2 support has been added to MFDBFH.

3203127 (1117981)

- dbfhdeploy can now be used to download files that are opened for read-only access by other processes. Previously, you could only download only files that were not open by other processes.

3202402 (1117910)

- When using a Db2 MFDBFH datastore, an exception occurred when attempting to lock an already locked record.
- dbfhadmin did not output an error message to indicate that the specified datastore URL (specified by the -datastore: command-line option) did not have a corresponding configuration entry in the MFDBFH.config file.
- When using PostgreSQL, when a KSDS file was deleted, the associated rewrite stored procedure was not being removed.
- CAS processes using database resource locking no longer crash with a primary key constraint error when attempting to create global locks.
- An RTS 114 error occurred when copying a database-hosted file to another database-hosted file if either the source or destination file URLs specified a datastore for which there was not an MFDBFH configuration file entry.
- "dbfhadmin -openfiles -recover" was incorrectly reporting that no files had been closed when the open files were in the root folder.
- Deleting a large number of files in a single operation sometimes failed due to the database's transaction log becoming full when using a DB2 MFDBFH datastore.
- An error message RTS 114 could occur during CASCD termination when the ES\_DB\_SERVER environment variable had been set, but no associated region database was configured.
- The "dbfhdeploy delete" command has been enhanced to allow the deletion of a folder (and all of its sub-folders and files), and to allow the deletion of multiple files in a folder using a filename filter (such as replacing characters in a file name using a wildcard, '\*', and/or a question mark, '?').
- Reading a record from a transactional file hosted in a PostgreSQL would hang if that record had previously been written within the same CICS transaction.
- The dbfhadmin command line utility now allows you to list/free region resources that are still locked after a system failure. Use dbfhadmin -region -list|-recover
- Active TDQs hosted in MFDBFH datastores were not displayed by ESMAC if they had records locked by a concurrently running transaction.
- CASSI processes would sometimes hang on termination, following a previous soft kill of a job, when Db2 datastores were being used.
- A new command line utility - dbfhconfig - enables you to build and maintain a database configuration file, meaning that you are no longer required to hand-craft the file. You can also use a secrets vault to

store sensitive logon credentials , instead of these being on view in a configuration file. Finally, a CTF trace can be configured to trace ODBC and vault-related operations.

- This product now includes the dbfhconfig utility. It enables you to create and maintain an MFDBFH configuration file eliminating the need to manually edit the XML file. Optionally, you can use dbfhconfig to add any passwords and connection strings associated with DSN entries to the product's secrets vault.
- Cancelling a job which was waiting for an ENQ did not always remove the ENQ request from the (cross-)region database.
- MFDBFH no longer fails if the MFDBFH\_SCRIPT\_DIR and/or MFDBFH\_CONFIG environment variables specify a quoted path name.
- Unpredictable results could occur for applications with files open in two or more datastores due to a clash of file handles.
- It is now possible to switch on/off I/O file optimization when deploying files via the dbfhdeploy command. Also, file optimization is now available for ESDS, KSDS, and RRDS files hosted in a database, that are opened for input - add optio="+oi" to mfdbfh.cfg to enable.
- MFDBFH now automatically reconnects the Db2 datastore and any (cross-)region database connections when they are lost.
- Intermittent ODBC errors could occur during JES initialization after the termination of an initiator process running a job in a previous session.
- dbfhdeploy incorrectly reported that a datastore did not exist for SQL Server operations when the "master" database had not been configured. A similar issue occurred for PostgreSQL datastores when the "postgres" database had not been configured.

## Form Designer

[Back to the list](#)

- 64-bit versions of nmcnvrti.obj and nmcnvrt0.obj have been added.  
3207452 (1118373)

## Header-to-Copy Utility

[Back to the list](#)

- h2cpy could produce an RTS 114 error if the number of DEFINES was greater than 167.  
3220579 (1119558)

## Licensing

[Back to the list](#)

- Windows Server 2016 machines might need to be restarted regularly because of a large number of open handles on the mfcesd (Micro Focus Compliance Enforcement daemon) process. The open handles are now freed correctly and will no longer accumulate.  
3213000 (1118881)
- The product Help now includes instructions for how to manually enable an Automatic Restart of the SafeNet License Daemons on Linux using SystemD.  
3210607 (1118628)
- During installation, the directory structure of /var/microfocuslicensing will now have the correct and secure permissions set.  
3179691 (1116046)
- An application being deployed using the CESDYNAMIC option of a Runtime Launch Configuration file now succeeds in getting a licence when executed for a second time.  
3160922 (1114454)

## Micro Focus Common Client

[Back to the list](#)

- Memory-access errors no longer occur in MFCC (mclient.dll/ cobmclient.so/libmclient.so) when certain malformed messages are received from the server. MFCC now detects these conditions and logs an error message.  
3213653 (1119419)
- cassub and other Enterprise Server utilities now support host names of up to 255 characters long.  
3196153 (1119249)

## Micro Focus Directory Server

[Back to the list](#)

- MFDS CA server root certificate and TLS client options are now available via the ESCWA UI.  
3218442 (1119593)
- The Shared Memory Cushion entry field in the Enterprise Server Administration UI now accepts five digits.  
3210200 (1118594)
- If external security is configured for the Micro Focus Directory Server (MFDS), then a user attempting to import region configuration using the "mfds -g" command now requires "Add" and "Delete" permissions for the "Repository Access" resource under the "Enterprise Server Administration" resource class.  
3209555 (1118581)
- The mfds -g command line waits to time out rather than receiving an immediate fail as a result of an import error.  
3209555 (1118572)
- In some circumstances, the Micro Focus Directory security settings were not being saved. This has been fixed.  
3209389 (1118705)
- If the MFDS process is not TLS-enabled, setting the MF\_ROOT\_CERT environment variable could cause region startup to fail. This has now been fixed.  
3205462 (1118274)
- The Micro Focus Directory Server KEEPALIVE and some other connections to a TLS-enabled Communications Process Control Channel listener were failing to connect. This was because they were using the IP address rather than the hostname which the certificate requires.  
3204824 (1118193)
- If the MFDS -o option is used to override the options file location, option changes were not successfully saved. Use the same location when saving option changes, and this problem does not occur.  
3171825 (1115391)
- ESDEMO64 is now in the standard MF Directory Server startup repository together with ESDEMO. If the MSSIVP repository is imported it contains MSSDEM64 together with MSSDEMO.  
3168860 (1115116)
- On UNIX, if the MFDS "Default process user ID" value is set, from either the GUI or with the "mfds -f" command line option, before the MFDS process starts, it will change its effective uid to the specified value after it has started listening on its configured endpoint. This enables the MFDS process to run using a non-root uid while still using the default privileged port 86. If the uid specified is invalid, the MFDS process terminates.  
3122797 (1119862)

- If the environment variable MFDS\_DNS\_RESOLVE=Y is set, then the Enterprise Server Administration web interface's HTTP response headers will not return the MF Directory Server IP address in HTTP cookie values.  
2863212 (1104835)
- Previously, changes made to the listener configuration in the Enterprise Server Administration Web UI were not becoming active for a started region.
- The MF Directory Server process could abnormally terminate if the listener description text input via the Enterprise Server Administration Web GUI was greater than 64 characters in length.
- A number of XSS vulnerabilities in the Enterprise Server Administration have been resolved.
- Under some circumstances, it was possible to set MFDS restricted access with improper credentials checks.
- Any region auto-start credentials and XRM open string values are now stored in the MF secrets vault facility if the Micro Focus Directory Server is configured to use it.
- When the Micro Focus Directory Server is running in a container, the region status is set to started only when all expected listeners are started.
- The mfd -l schema export command-line option now supports the OpenLDAP OLC (on-line processing) LDIF file format (use option 4).
- When adding a listener using the Enterprise Server Administration Web UI, the initial listener state was incorrectly set to "Invalid".
- In the Enterprise Server Administration Web UI, the service namespace values of the deployed REST services were incorrectly displayed.
- MFDAS XML import can now import more than one comms process.
- The ESCWA API would reject adding a listener to a region if there was already a listener with the same requested fixed port value defined in the target MFDS.

## MF Server Administrator (GUI)

[Back to the list](#)

- There is no longer an issue with using the mfd -g option to import an XML region definition with services that reference listeners.  
3219549 (1119459)

## Run-Time System

[Back to the list](#)

- The NUMVAL intrinsic function no longer produces an error at run time when used with national data in a program compiled with a mainframe COBOL dialect.  
3191506 (1117099)
- The CBL\_GET\_EXIT\_INFO library routine has been further enhanced to detect the circumstances in which an exit procedure has been invoked. It can now better distinguish between normal and abnormal terminations.
- In .NET and JVM COBOL code, under numproc(acos), some instances of illegal data in a USAGE DISPLAY field did not produce an RT163 error when should have.  
3215249 (1119051)
- .NET and JVM COBOL only. An issue has been resolved in arithmetic statements where the target item is a binary item 9 bytes or larger (19 decimal digits or larger) and the result has magnitude which is greater than or equal to 2\*\*64.
- A statement of the form "compute item rounded = expression" where expression includes at least 1 comp-1 or comp-2 item sometimes gave the wrong result because it did not perform the rounding. This has been fixed.  
3224247 (1119910)

## Setup

### [Back to the list](#)

- When installing on UNIX, the MFDS and SSL configuration files are stored under /opt/microfocus/config and symbolically linked back to the installation location. When Patch Updates are installed to the same location, the configuration is now preserved.

3212913 (1118927)

## SQL: COBSQL

### [Back to the list](#)

- COBSQL now supports EBCDIC conversion for FETCH statements with more than ten host variables.
- Informix now handles cases in which comments were included inside EXEC SQL statements or variable declarations were broken into two lines inside EXEC SQL statements.

3225338 (1120132)

3220792 (1119585)

- OpenESQL now correctly handles calling Stored Procedures with output host variables which use the dynamic SQL method.

3212664 (1118834)

- A problem that prevented COBSQL from reporting errors to the checker when the precompiler file was missing has been fixed.

2867407 (1105864)

## SQL: DB2

### [Back to the list](#)

- An issue with ODBC and DB2 ECM generated code not having uniquely named sections has been resolved.

3224210 (1119896)

- XML data is now correctly sent to the DB2 server.

3220909 (1119685)

- DB2 ECM now handles the CLOB value in EBCDIC correctly when DIALECT(ENTCOBOL) is specified.

3217813 (1119335)

- There is no longer a problem compiling programs with host variable arrays if they are used with the SELECT INTO statement. A problem with the output host variable array processing where array HVs or a mix of array and individual HVs were being processed incorrectly has been fixed.

3216314 (1119188)

- The MFHCO tool now takes login credentials from the command line for remote database access without asking for user inputs through a pop-up window.

3212431 (1118968)

- A ddl command which contains a number of characters greater than 32K could cause a hang condition in the HCO for DB2 LUW ddl generation tooling.

3205207 (1118168)

- The DB2 ECM was incorrectly handling floating point conversion when runtime option MAINFRAME\_FLOATING\_POINT was enabled. This has been fixed.

3198121 (1117644)

- DB2 ECM now supports multi-row FETCH/INSERT/UPDATE, which includes but is not limited to the usage of the FOR nn ROWS clause.

3155753 (1114251)

## SQL: Mainframe Batch Database Tools

[Back to the list](#)

- When starting the MBDT/ESQL Configuration UI, the registry key entries are now processed correctly.  
3227324 (1120217)
- There is no longer an issue with unloading NULL values from DECIMAL fields using SQLUTB if the enterprise server region is running in ASCII mode. An issue with the data overflow which occurred during decimal data conversion where NULL values were being processed incorrectly has been resolved in SQLUTB.  
3223817 (1119860)
- There is no longer an issue with submitting and executing jobs after canceling a SQLUTB job. An issue with a duplicate connection name which resulted from a SQLUTB job cancellation where the ODBC connection was being handled incorrectly has been resolved.  
3219445 (1119442)
- There is no longer an issue with counting the number of records loaded into the table if the data set contains duplicated records. An issue with the loaded record counting where multiple counters were being processed incorrectly has been resolved.  
3218617 (1119413)
- There is no longer a problem making XA connection if only the XA ID is given in the SQLUTB utility parameters. A problem with the SQLUTB utility parameters parsing where the XA ID in the absence of utility id was being processed incorrectly has been fixed.  
3214354 (1118975)
- There is no longer an issue with emulating the Fujitsu mainframe feature of checking LRECL of SYSREC against the row size if "Check LRECL" is enabled in the MBDT Configuration Tool. An issue with the SQLUTB LOAD processing where LRECL of SYSREC being greater than the row size was processed incorrectly has been resolved.  
3210919 (1118703)
- SQLUTB now supports multi-tables load.  
3207120 (1118344)
- An issue with the SQLUTB loading where duplicated keys or indexes were being processed incorrectly has been fixed.  
3205697 (1118320)
- There is no longer an issue with loading data into a DB2 table if the table has more than 400 columns. The limit has been extended to 1000 columns. Previously, you would receive an error (SQLCODE: -99999, SQLSTATE: S1009) if the table had more than 400 columns.  
3205384 (1118203)
- Loading data into a table with Implicitly Hidden columns now works as expected in DB2 LUW. An issue with the SQLUTB loading and unloading from and into DB2 LUW where Implicitly Hidden columns were being processed incorrectly has been fixed.  
3205262 (1118244)
- Loading data using SQLUTB no longer results in an error SQLCODE=-803 when the REPLACE option is specified. An issue with the SQLUTB LOAD processing where the REPLACE option was being processed incorrectly has been fixed.  
3194416 (1117254)
- There is no longer an issue with loading data using SQLUTB with REPLACE option in a middle job step when the JCL is submitted using a third party software Control-M. An issue of SQLCODE 2627 with the JCL loading multiple tables via Control-M being processed incorrectly has been resolved.  
3194381 (1117469)

- There is no longer an issue with using SQL Server synonyms without a schema qualifier in SQLUTB LOAD. An issue with the SQL Server object name delimiter "[]" processed incorrectly has also been resolved.

3194381 (1117202)

## SQL: OpenESQL

[Back to the list](#)

- The OpenESQL run-time system now handles WITH-HOLD cursor correctly when using FETCH FIRST orientation.

3225154 (1120007)

- You no longer receive an error in the OpenESQL Assistant when trying to run a query that used the same column referenced by an alias in two or more tables.

3223933 (1119902)

- The SQL Server datetime values are no longer returned with trailing zeros to a host variable of PIC X(26). An issue with the OpenESQL processing of datetime of SQL Server where padding characters were being processed incorrectly has been resolved.

3220692 (1119579)

- When calling stored procedures with null indicator host variables, the OpenESQL Run-Time System now executes correctly without returning an SQLCODE -10000 error.

3219732 (1119869)

- When multiple dynamic XA switches that use OpenESQL technology (such as MSSQL, PostgreSQL, and ODBC switches) are specified in an Enterprise Server instance, they are now started without an error in xa-prepare.

3218857 (1119445)

- The sqlerrd(3) in SQLCA now returns the correct number of rows affected by command INSERT and DELETE.

3217469 (1119456)

- OpenESQL runtime now handles the @@NESTLEVEL function correctly.

3211849 (1118757)

- An issue with how the SQL managed runtime handles char, varchar, nchar, and nvarchar types in SQL Server CLR stored procedures where a host variable size is greater than 8,000 has been resolved.

3211090 (1118718)

- The OpenESQL parser now handles SQL statements inside parenthesis correctly.

3210644 (1118643)

- The OpenESQL run-time now handles Informix ODBC errors correctly.

3208869 (1118722)

- The OESQL managed runtime now handles FINAL TABLE statements correctly.

3208718 (1118469)

- An issue with having to perform an ALLOCATE after every OPEN CURSOR to avoid an error has been resolved.

3206739 (1118395)

- Nested programs with the same PROGRAM-ID now insert records correctly.

3204730 (1118134)

- Native COBOL programs with multiple program id sections no longer failed to compile in 32-bit compilation. Previously, this failed with redefine symbol error messages.

3204730 (1118842)



- Closing a Windows Forms application compiled with DBMAN=ADO no longer fails with a NullReferenceException.  
3202426 (1117914)
- An issue during COBOL compilation where incorrect error messages (such as "Access plan load error" or "DBRM not found in plan") could appear no longer occurs. This could happen in release 4.0 or later.  
3202086 (1118511)
- OpenESQL now handles long column names without causing a truncated data warning.  
3200934 (1117832)
- There is no longer an issue with expanding host variable groups regardless if whether the GEN-HV-FROM-GROUP directive is applied. An issue problem with the host variable group processing where non-sibling host variables were being processed incorrectly has been resolved.  
3200753 (1117808)
- OpenESQL now handles and recognizes SQL Server's square brackets correctly.  
3199039 (1117614)
- The OESQL JDBC run time now retrieves data correctly via the READ ONLY cursor.  
3193117 (1117107)
- The DB2 SQL scripts for the following samples now include database creation - "OO WPF Book", "OO WPF Book EXEC ADO", and "WPF Book". Check the samples' readmes for instructions.

## SQL Option for DB2

[Back to the list](#)

- When the XDB directive option IGNORE-NESTED is used without a parameter, XDB ECM now generates code in the outermost program only.  
3218881 (1119399)
- XDB ECM now handles multi-level group host variables correctly.  
3215815 (1119114)
- XDB ECM now handles user-defined SQLCODE data items correctly.  
3215357 (1119066)
- XDB ECM now handles group host variables in the IN predicate correctly.  
3213813 (1118991)
- A new property has been added to the XDB JDBC driver that enables byte array data to be treated as if it were encoded in the EBCDIC code page of the connection.  
3203249 (1119097)
- XDB XA Switch logic now supports z/OS DB2 thread timeouts at XA\_START time and reconnects stale connections but only at XA\_START.  
3221852 (1119701)
- A problem with XDB XA that caused a z/OS DB2 SAVEPOINT error when a program rolled back to the SAVEPOINT has been fixed.  
3216066 (1119149)
- A thread abend in the XDB Link on Diagnostic Information DRDA flow has been resolved.  
3199003 (1117688)
- A problem retrieving the value of the CURRENT PACKAGESET special register from the XDB Link DRDA/AR client to z/OS DB2 has been resolved.  
3186735 (1116600)

- A problem that caused z/OS DB2 to return an error when using packages bound with DYNAMICRULES=BIND in addition to specifying COMMA as the Decimal Delimiter in the Options dialog has been fixed.  
3204116 (1118276)
- The warning pop-up dialog box for an invalid connection no longer appears when connecting with the XDB ODBC Driver.  
3208889 (1118496)
- A problem when using the XDB V11 emulation engine that caused the SQLWizard to improperly build UPDATE statements that update result sets has been fixed.  
3209886 (1118568)
- A problem with the XDB CREATE USER SQL statement's SECONDARY ID clause has been resolved.  
3206448 (1118263)
- Previously, the V11 radio button was not visible in the About tab of the XDB Server Configuration Utility even when the V11 engine DLL was available.  
3198729 (1117593)
- A problem with recalculating field values during the projection of the result for SUBSTR/SUBSTRING scalars with parameters 2 and/or 3 that contained field values has been resolved.  
3196219 (1117383)
- A problem caused by a case expression built in reverse order has been resolved.  
3195822 (1117449)
- The XDB Link DRDA/AR has been enhanced to process z/OS DB2 diagnostic information in all modes.  
3187411 (1116687)
- When a location was successfully closed, a problem that prevented it from being marked as closed caused an error to be generated when subsequently setting a location off-line. This has been fixed.  
3184848 (1116525)
- An issue with labeled duration arithmetic or row change timestamps using timestamps with precision greater than six has been resolved.  
3181837 (1116189)
- An issue causing an empty result set where index queues used to optimize correlated subqueries were reset when the correlated subquery contained an IN predicate with a list of values has been resolved.  
3199958 (1117713)
- The XUTLB grammar that processes LOAD statements now supports a NUMRECS clause between the INTO TABLE clause and the column definition list.

## **XML Support**

### [Back to the list](#)

- XML PARSE now handles ISO-8859-15 encoded strings correctly in 64-bit mode.  
3220045 (1119568)
- The XML run time now handles namespace prefixes correctly in the output XML document.  
3219503 (1119447)
- XML PARSE now returns XML EVENT correctly without repeating the same event.  
3219154 (1119556)
- The XML run-time system now detects and outputs the special xsi namespace correctly.  
3201811 (1117879)
- The PREXML preprocessor now handles the COBOL source correctly, and prevents an unhandled exception appearing in the IDE.

3200436 (1117735)

- If an environment variable is used in the ASSIGN TO clause, the XML runtime now returns the end-of-file status correctly.

3220566 (1119552)

- The managed XML syntax support runtime now cleans up all the unwanted empty XML tags.

3209096 (1118515)

- XML PARSE now parses the subsequent parts of an XML document correctly.

3201432 (1117819)

# Known Issues

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

In addition, note the following:

- In Visual COBOL 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 Visual COBOL 3.0 or earlier, then executed in Visual COBOL 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 Visual COBOL 6.0, 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 Visual COBOL 6.0.

Programs that do not use NATIONAL data, or those that have been recompiled in Visual COBOL 6.0 are not affected.

- The chapter *Mainframe Access Installation Guide* has been included with the product Help, however, this feature is not part of the Visual COBOL product.

# Other Issues Resolved in This Release

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

- 3220454 (1119529)
- 3205144 (1118152)
- 3216998 (1119233)
- 3168018 (1115086)
- 2868839 (1105831)
- 3222038 (1119767)
- 3184732 (1116467)
- 3224515 (1119919)
- 3136118 (1112519)
- 2885283 (1108043)
- 3211043 (1118683)
- 3119471 (1110898)
- 3201628 (1117842)
- 2820860 (1099521)
- 3222960 (1119817)
- 3220991 (1119565)
- 3208034 (1118409)
- 3221354 (1119662)
- 3208854 (1118475)
- 3224700 (1119954)
- 3214528 (1119048)
- 3165853 (1114869)
- 3208489 (1118495)
- 3196128 (1117344)
- 3133097 (1112263)
- 3167774 (1115016)
- 3222951 (1119971)
- 3221465 (1119695)
- 3208613 (1118449)
- 3208093 (1118467)
- 3207104 (1118323)
- 3204665 (1118597)

# Unsupported Functionality

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

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

# Installing Visual COBOL Development Hub

## Before Installing

### Downloading the Product

1. Use the download links in your Electronic Product Delivery email.  
For more information follow the links for the installation instructions and the End User License Agreement.
2. Alternatively, you can download the product from the *Product Updates* section of the [Micro Focus SupportLine](#) Web site.

### UNIX and Linux Installer Issues

#### 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 Visual COBOL 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 machinehostname machineshorthostname
```

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

## System Requirements for Visual COBOL Development Hub

### Hardware Requirements


The disk space requirements are approximately:

Platform	Installer type	Setup file size	Disk space required for the installation	Disk space required for running the product	Sentinel RMS license server
POWER running AIX	Micro Focus	530 MB	2.12 GB	1.06 GB	41 MB
HP IA	Micro Focus	911 MB	3.65 GB	1.83 GB	79 MB
System Z running Red Hat Linux	Micro Focus	437 MB	1.75 GB	875 MB	39 MB
x86-64 running Red Hat Linux	Micro Focus	615 MB	2.47 GB	1.23 GB	50 MB
SPARC running Solaris	Micro Focus	498 MB	2.00 GB	996 MB	42 MB
x86-64 running Solaris	Micro Focus	469 MB	1.88 GB	938 MB	33 MB
System Z running SUSE SLES	Micro Focus	319 MB	1.28 GB	638 MB	39 MB
x64 running SUSE SLES	Micro Focus	435 MB	1.75 GB	870 MB	50 MB
x64 running Ubuntu	Micro Focus	440 MB	1.77 GB	880 MB	50 MB
x86-64 running CentOS	Micro Focus	615 MB	2.46 GB	1.23 GB	50 MB

## Operating Systems Supported

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

## Software Requirements

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

- On SUSE 12, you can only install and use the 64-bit version of Visual COBOL.

Before installing this product, you must have the following software installed on your computer:

- 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.
- The "awk", "ed", "ps", "sed", "tar", "sed" and "which" "tar" utilities must be installed and added to the PATH.
- `pax` - the `pax` archiving utility is required by the setup file. `Pax` is distributed with most UNIX/Linux systems but, if it is missing, you must install it separately. To verify `pax` is installed, run `pax --help` or `pax --version` at the command line.

On Red Hat 8.1, `pax` is no longer installed by default. You must install the `spax` version found in the OS ISO. Use the `yum install spax` command.



- On Red Hat, if SELinux is installed, the "SELINUX" configuration must be disabled. To do this, set SELINUX=disabled in /etc/selinux/config.

This enables the Micro Focus License daemons to start when the machine is booted and the Micro Focus tools and programs to run correctly.

- Required libraries for Red Hat and SUSE Linux platforms - the installer checks that both the 32-bit and 64-bit libraries listed below are installed on both 32-bit and on 64-bit Operating Systems for this product to install and work correctly.

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

**Table 1: Default Libraries**

The following table shows which of the required libraries are not installed by default on the specified platforms - X indicates the libraries are missing.

Library	32-bit Library Name	64-bit Library Name	s390 Library Name	Platform			
				SUSE 12 <sup>1</sup>	SUSE 15	Red Hat 7	Red Hat 8
glibc <sup>2</sup>	glibc-*.i686	glibc-*.x86_64	glibc-*.s390			X	X
libgcc	libgcc-*.i686	libgcc-*.x86_64	libgcc-*.s390			X	X
libstdc++	libstdc++-*.i686	libstdc++-*.x86_64	libstdc++-*.s390			X	X
glibc-devel	glibc-devel-*.i686	glibc-devel-*.x86_64	glibc-devel-*.s390			X	X
gcc <sup>3, 4</sup>	gcc*.i686	gcc*x86_64	X	X	X	X	X
cpp <sup>3</sup>		cpp*x86_64				X	X

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

- <sup>1</sup> On SuSe 12 or 15, you can only install the 64-bit version of Visual COBOL. The glibc-locale-32bit library is still required by the SafeNet Sentinel licensed components.
- <sup>2</sup> On 64-bit Red Hat 7, you only need to install glibc-2.17\*.x86\_64 and glibc-2.17\*.i686.
- <sup>3</sup> On Red Hat, these libraries are required to enable COBOL to compile.
- <sup>4</sup> On Red Hat, only the 64-bit gcc libraries are required.
- Java 8 (32 or 64-bit versions), and Java 11 (64-bit version only) are supported for executing JVM COBOL code and for native COBOL and Java interoperability. You can download AdoptOpenJDK's OpenJDK 8 with Hotspot from [AdoptOpenJDK's Web site](#) and unpack the archive anywhere on your machine.



**Note:**

- On AIX and zLinux, you need to have IBM's JDK. The earliest supported release of IBM's JDK is 7.0 Service Refresh 8. If you install IBM's JDK 8, on AIX you must install its latest fix - JDK 8 SR5 FP16. You can get IBM's AIX JDK from [IBM's Web site](#).
- On HP-UX, you need to have HP-UX JDK. The earliest supported release of HP-UX is JDK 7.0.11. You can get the HP-UX Java JDK from [HP's Web site](#).

- On Solaris platforms (both SPARC and Intel) only the 64-bit version of Java 8 and later is supported.

To execute JVM COBOL code, you need to set the environment as follows:

- You need to set the JAVA\_HOME environment variable. When installing the product, set this variable to a 64-bit Java installation or the installation terminates. For example, execute the following:

```
export JAVA_HOME=java_install_dir
```

where *java\_install\_dir* is the path to the JAVA installation directory such as `/usr/java/javan.n`

- You need to add \$JAVA\_HOME/bin to your system PATH variable. To do this, execute:

```
export PATH=$JAVA_HOME/bin:$PATH
```

- You need to set the LANG environment variable to pick up localized messages. The LANG settings are English and Japanese only.



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

If you have a network server, you must update the license server before installing the product as the client is not able to communicate with license servers of versions older than 10000.2.660. To check the version of the license server on UNIX, run `/var/microfocuslicensing/bin/mfcesver` or `/var/microfocuslicensing/bin/cesadmintool.sh`.

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

You can download the new version of the license server software from the [Micro Focus SupportLine](#).

## Additional Software Requirements for Visual COBOL Development Hub

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

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

## 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, see *Advanced Installation Tasks* in your product Help.

## Installing Visual COBOL Development Hub



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

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

1. Give execute permissions to the setup file:

```
chmod +x setup_visualcobol_devhub_6.0_platform
```

2. Run the installer with superuser permissions:

```
./setup_visualcobol_devhub_6.0_platform
```

If you don't run this as superuser you will be prompted to enter the superuser password during the installation.



**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/VisualCOBOL`, (`COBDIR`).

### SafeNet Sentinel considerations

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

```
./setup_visualcobol_devhub_6.0_platform -skipsafenet
```

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

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

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



#### Note:

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

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

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

## Advanced Installation Tasks

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

The advanced installation tasks include:

- *Installing as an Upgrade* - included in these Release Notes
- *Command line installation options* - included in these Release Notes
- *Installing using an RPM installer on Linux* - available in the product Help and in the Micro Focus Infocenter

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


## Installing as an Upgrade

This release works concurrently with the previous version of Visual COBOL Development Hub, 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 Visual COBOL Development Hub installer with the `-installlocation` option:

1. Execute the following command:

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


 **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.

## Visual COBOL Development Hub 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_visualcobol_devhub_6.0_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

- Check the *Product Documentation* section of the [Micro Focus SupportLine Documentation Web site](#) for any updates to the documentation which might have been uploaded.

## Setting up the product

If you have installed the product to a directory other than the default one, you need to set the environment as described below.


 **Note:** The default directory is `/opt/microfocus/Visual COBOL/`.

1. To set up your product, execute:

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


2. To verify that your product is installed, execute:

```
cob -V
```

 **Important:** These commands set the environment only for the current shell. You need to execute them for each new shell that you start.

To avoid having to run `cobsetenv` for every shell, add these commands to the shell initialization files (such as `/etc/profile`, `/etc/bashrc`).

Note that `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.

 **Note:** If there are two or more products installed on the machine or the products are installed in non-default locations then the `/opt/microfocus/logs/MicroFocusProductRegistry.dat` data file can be used to find the product locations.

The file contains the following entries:


```
[ Install Location ]#[ Date of Installation ]#[ Product Name ]
```

For example:

```
/home/user1/VisCobol30#2017-01-20#Micro Focus Visual COBOL Development Hub  
3.0
```

```
/home/user1/CobolServer30#2017-01-20#Micro Focus COBOL Server 3.0
```

## Configuring the Remote System Explorer Support

 **Note:** The following only applies if you are using Visual COBOL Development Hub with Visual COBOL for Eclipse.

The remote development support from the Eclipse IDE relies upon Visual COBOL Development Hub running on the UNIX machine and handling all requests from the IDE for building and debugging programs. Visual COBOL Development Hub provides a UNIX daemon, the Remote Development Option (RDO) daemon, which initiates the RDO as Eclipse clients connect to it. Whichever environment is used to start the RDO daemon will be inherited for all servers and hence all build and debug sessions.

### Configuring the Environment

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

## Starting the Daemon



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

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

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

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

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

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

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

where:

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

For example,

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

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

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

For example,

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

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

## Stopping the Daemon

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

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

## Enabling SHIFT-JIS

By default, support for the character encoding for the Japanese language, Shift-JIS, is not available on Ubuntu and on RedHat OS version 8 or later.

You need to generate the Shift JIS locale on your machine to be able to execute Shift-JIS applications on these platforms. You can do this as follows:

1. On RedHat 8, ensure that the `glibc-locale-source` package is installed.
2. Execute the following command with superuser rights in order to generate a Shift-JIS locale using the charset:

```
sudo localedef -f SHIFT_JIS -i ja_JP ja_JP.sjis
```

3. Set the `COBUTF8` environment variable to the generated Shift-SJIS locale and `LANG` to a UTF8 locale:

```
export COBUTF8=ja_JP.sjis
export LANG=ja_JP.UTF-8
```

#### 4. Run the cobutf8 utility:

```
cobutf8 <command>
```

See your product documentation for more details about cobutf8.

## 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_VisualCOBOLDevelopmentHub6.0.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 SupportLine](#).

## To buy and activate a full unlimited license

To buy a license for Visual COBOL, contact your sales representative or Micro Focus SupportLine.

For instructions on using the Micro Focus Licensing Administration Tool, see *Licensing* in the Visual COBOL help.

## To start Micro Focus License Administration

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

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

## Installing licenses

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

### If you have a license file

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

### If you have an authorization code

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



## Note:

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

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



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

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

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

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

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

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

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

## To obtain more licenses

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

# Updates and SupportLine

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:

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

To connect, enter <https://www.microfocus.com/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](#).

## Information We Need

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

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

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

## Creating Debug Files

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

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