

## Micro Focus Server Enterprise Edition

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Micro Focus Server Enterprise Edition™ is a deployment environment for hosting applications that have been migrated from mainframes. It provides the infrastructure to support the integration of migrated applications with contemporary technology to deliver new capabilities faster.

## OVERVIEW

Micro Focus Server Enterprise Edition™ is a high performance, scalable, deployment environment for hosting applications that have been migrated from IBM mainframes. It provides the infrastructure to support the integration of migrated applications with technologies such as .NET, J2EE, or SOA to satisfy evolving business requirements.

Micro Focus Server Enterprise Edition is built around a batch execution and transaction environment that supports IBM COBOL, IBM PL/I<sup>1</sup>, IBM JCL job streams, common batch utilities including IDCAMS and SORT, IBM CICS and IMS TM transactions, and Web services. It also includes support for IBM DB2, IBM IMS-DB and IBM mainframe file formats.

The result is a single integrated deployment environment which provides the batch and transaction processing environment to execute migrated mainframe applications on Linux® (x86-32/64-bit or System z), UNIX® and Windows® servers<sup>2</sup>. This enables core online and batch application logic that has evolved over decades to define unique business processes and deliver competitive advantage, to be reused with minimum modification, on any of these lower cost more flexible environments.

While Server Enterprise Edition supports the deployment of the migrated application, its companion product Micro Focus Studio Enterprise Edition™ supports the entire development lifecycle and the continuous improvement of these applications into the future.

## BENEFITS

- Cut annual operating costs by up to 77% through reductions in hardware and software costs
- Replicate discrete functions, like pricing quotes, to service new market requirements better, e.g. aggregator market quote fulfillment
- Provide continuous service during scheduled mainframe downtime
- Contain or reduce mainframe costs over time by embarking on a gradual migration strategy by moving or replicating discrete applications or parts of applications
- Bring disaster recovery implementations in-house instead of using costly outsourcing services
- Complete migration projects faster by migrating application functionality with minimum changes to a well defined target reference environment
- Reduce risk by reusing the logic defining existing online and batch business processes, so applications behave as they did on the mainframe
- Exploit the price/performance ratio of modern, powerful, competitively priced processors
- Shrink batch windows by taking advantage of the processing power of modern processors
- Deliver current Quality of Service levels at reduced cost
- Utilize mainframe compatible security models for authentication and authorization
- Provide mainframe level Reliability, Availability and Serviceability (RAS) cost-effectively
- Increase end user efficiency with more productive web or graphical user interfaces that reuse traditional interfaces
- Improve agility, as proven business functions can be exposed and executed as Web services for easier reuse within strategic architectures such as .NET, J2EE or SOA<sup>3</sup>
- Increase flexibility and future-proof business assets by moving applications to popular Linux, UNIX or Windows (LUW) environments to simplify business process integration demands
- Explore the potential benefits of deploying applications into cloud environments.

## HIGHLIGHTS

- Ability to run critical COBOL or PL/I applications on alternative environments
- Unsurpassed breadth and depth of mainframe compatible capabilities
- Remote access to mainframe data during partial or gradual migration projects
- IMS DL/I compatible database on Linux, UNIX or Windows
- Support to simplify the migration of DB2 data to DB2 LUW or SQL Server
- High performance and scalable deployment engine
- Infrastructure for Reliability, Availability and Serviceability (RAS)
- RACF compatible application and system level security options
- Architected to support modernization on 32-bit and 64-bit servers
- Access to mainframe transactions and data during partial or gradual migration projects
- Ability to run COBOL/CICS applications within Microsoft's .NET framework and Azure
- Integration with popular third-party scheduler, output management and SORT products
- A well defined target reference environment and reference implementation
- Market leading product support

## RUN COBOL AND PL/I APPLICATIONS ON ALTERNATIVE ENVIRONMENTS

For decades organizations have used traditional development tools to compile and build COBOL or PL/I applications for deploying on an IBM run-time infrastructure on IBM mainframe hardware. While mainframes are renowned for their dependability, the costs and flexibility of the environment can be an issue for many organizations or for specific applications or business functions.

For example, smaller organizations are often concerned with how much the mainframe operating costs as a whole are impacting their overall bottom line. Other organizations may be more concerned with how operating costs related to a specific application on the mainframe, like closed book insurance, are impacting profitability of that product line. A variety of organizations are looking at how the advent of the online aggregator market is driving up mainframe costs when price quotation functions are using expensive mainframe resources.

Server Enterprise Edition offers organizations an alternative. They can use the development tools from Micro Focus to compile and build the same COBOL or PL/I applications for deployment on low cost Linux, UNIX or Windows servers using the run-time infrastructure Server Enterprise Edition provides.

## UNSURPASSED BREADTH AND DEPTH OF MAINFRAME COMPATIBILITY

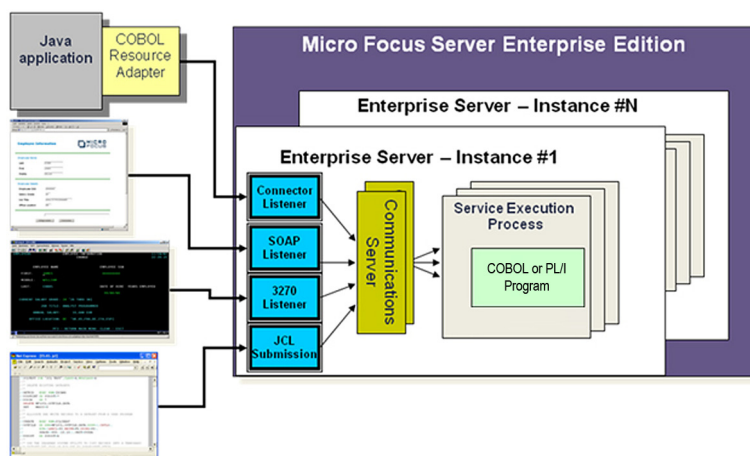
Companies that have successfully migrated and deployed mainframe applications using Server Enterprise Edition have achieved the same level of reliability experienced on IBM z/OS while seeing significant benefits such as:

- Reduced operating costs
- Improved performance
- Better modernization options

The key to successful migration projects lies in minimizing change to avoid unnecessary risk during the initial project.

Server Enterprise Edition's integrated COBOL and PL/I application execution environment, with its unparalleled level of mainframe compatibility, ensures that changes to applications are kept to the absolute minimum.

The language execution environment is integrated into Micro Focus' Enterprise Server technology that is core of Server Enterprise Edition. Enterprise Server provides the infrastructure for executing JCL and COBOL or PL/I applications which exploit CICS, IMS-TM, DB2, IMS-DB and all mainframe file formats.



Micro Focus Server Enterprise Edition – Architecture Diagram

Figure 1: The Micro Focus Server Enterprise Edition run time infrastructure

### COBOL and PL/I run-time environment

Server Enterprise Edition is designed with performance and scalability in mind. When coupled with the ability to run COBOL and PL/I via optimized native machine code instructions, the full performance capabilities of the chosen deployment platform can be fully exploited.

Key Features:

- Platform specific optimized native code for maximum performance
- Same source code can be deployed on any supported platform
- Built-in diagnostic tools
- Integration with popular Application Servers
- Connectivity to leading databases and ODBC drivers

### CICS and IMS TM On-Line Transaction Processing (OLTP) support

Server Enterprise Edition provides a production-level OLTP environment which offers compatibility with both CICS and IMS TM. This unique capability supports the execution of either CICS or IMS transactions, utilizing BMS or MFS screens, so online systems can be rehosted on alternative platforms with minimum changes to application code or user interfaces.

Server Enterprise Edition also enables reuse of CICS or IMS transactions in a SOA environment, delivering the advantages of new technology to meet the new demands of the business.

Key Features

- Support for command level CICS
- Support for standard IMS TM callable interfaces
- Real-time monitoring and control of active tasks
- Emulation of key utility transactions
- Database integration and two-phase commit protocol support through XA standard interface
- Ability to execute in ASCII or EBCDIC<sup>3</sup>
- Support for tn3270 clients with native 3270 commands or BMS maps or MFS screens
- Multiple concurrent task support with reliable resource management
- Integration between CICS/IMS and the batch/JCL system
- Inter-System Communication (ISC) support for connecting with other CICS systems
- Browser based Monitoring and Control facility for CICS and IMS administration tasks

## Job Execution System (JES) engine

Batch applications form a key element of mainframe systems, and the Job Control Language (JCL) is often more than simply a method for executing programs. It helps define the relationship between components of a system and important application logic can be contained within Job Control scripts.

The batch/JCL support in Server Enterprise Edition is provided by a robust JES engine that supports the submission, prioritization and execution of batch initiators and key IBM utilities such as DFSORT, ICEGENER, IDCAMS, IEBGENER and IKJEFT01.

Support is also provided for the z/OS internal reader in batch, CICS and IMS environments (JES2 and JES3 job delimiters). Batch support is provided via SYSOUT INTRDR DD, while CICS support is provided via Transient Data queues, SVC99 (CICS/IMS) and the EXEC CICS SPOOL API.

This makes it possible to avoid the extra effort and risk involved with converting JCL into a scripting language and rewriting any IBM utilities the JCL uses. In addition any programs that built JCL dynamically and submitted it to the JES engine on the mainframe can also stay intact, further simplifying any migration.

A JCL restart capability enables jobs to be restarted while retaining prior step completion codes and GDG Relative Bias resolution while, at the same time, automatically massaging dataset dispositions to prevent jobs from abending as datasets have already been cataloged by the prior job execution.

Batch applications deployed with Server Enterprise Edition can interoperate with third-party schedulers for job management and control. These scheduler products not only support the typical batch scheduling functions such as starting/restarting a job after 1-n jobs have completed, (as they can trigger processes from a wide range of events such as a file arriving on an FTP site, an email, or the completion of a process), they also provide many new options for improved automation of existing business workflow.

Batch printers can be configured using facilities within the administration tool to enable integration with the chosen printing subsystems. JCL printing support captures/parses all elements of the OUTPUT statement and all information is presented to the batch printer exit for processing. Third party printing vendors have integrated with Server Enterprise Edition to provide full emulation of the Distributed Resource Scheduler (DRS) and CA-SPOOL API layers along with support for printing via a JES Subsystem replacement. They also have the ability to handle mainframe standard printing facilities such as Advanced Function Printing.

### Key Features

- Support for z/OS and VSE JCL
- Spool facility for job output
- Batch printer support
- Support for REXX via IRXJCL
- Ability to execute in ASCII or EBCDIC<sup>3</sup> environments
- Support for TSO in batch via IKJEFT01
- SUBSYS support including ability to express interest in monitoring all DD activity
- Support for up to 255 GDG Bias' within a single GDG model
- JCL restart capability
- Exits for integration with third-party schedulers, output management systems and monitoring tools
- Browser-based console for job administration tasks

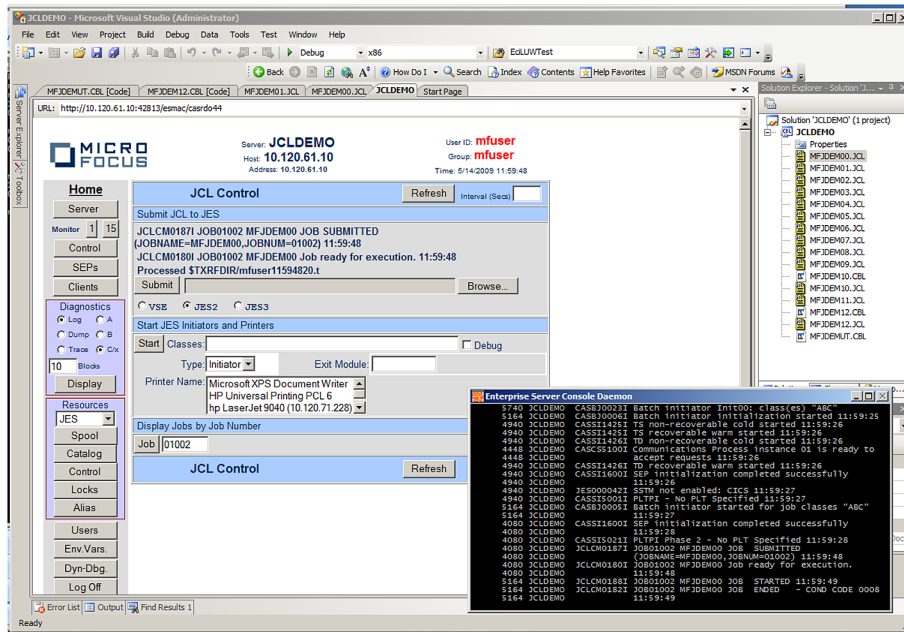


Figure 2: Monitoring JCL submission with Micro Focus Server Enterprise Edition

### Administration, Monitoring and Control

Command line access to administration facilities allows automation of common tasks, and a more comprehensive set of capabilities is available through a browser-based interface to the Monitoring and Control console. This is the primary mechanism to control the production COBOL, PL/I, CICS, IMS and JCL environment.

The console enables users to monitor and control all instances of the Enterprise Server environment including service execution processes, CICS, IMS and JCL resources, services, packages, etc.

The user interacts with the JCL engine largely by 'submitting' jobs to the system. Once finished, the job writes its output and results to the 'spool' output for the user to examine using the administration console.

To support capacity planning, the console provides real-time monitoring and transaction performance measurements (for example, tasks per minute, average task duration, request latency) to predict required hardware capabilities.

Production recovery aids are also available from the console. Enterprise Server configurations can be saved, restored, imported or deleted. Individual services can be deployed, started, stopped, edited and deleted, providing full user control of service deployment. Journal information and statistics maintained during program execution are also visible via the console to aid with problem determination and diagnosis.

The console provides the ability to interact with a running instance of Enterprise Server in a similar way to a mainframe console. This provides real-time reporting on the current status of the active elements of the system to enable users to manage the performance characteristics of the system and adjust the environment dynamically.

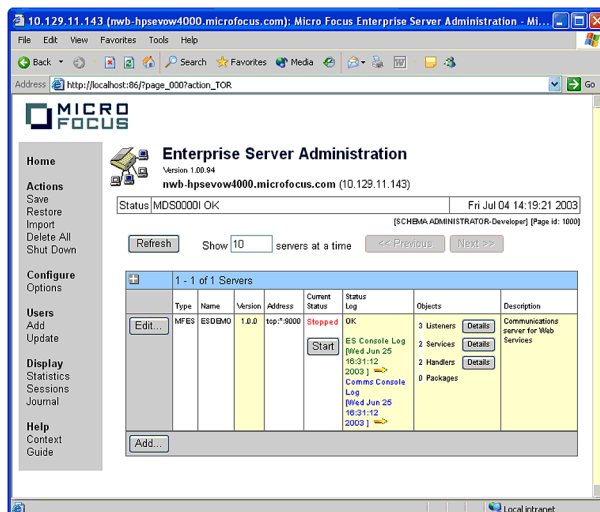


Figure 3: Managing an Enterprise Server (CICS Region) – currently 'stopped'

In addition to the interactive management and monitoring interfaces, Enterprise Server provides system monitoring data that can be accessed via a program to support automated or unattended monitoring. This data, which includes information like console messages, task counts and other system events, can be used by an external third-party management and monitoring product to provide an integrated solution.

On Windows, Microsoft System Center Operations Manager manages Windows Server Systems and enables health and performance monitoring. Management Packs support the automatic discovery of Enterprise Server instances and integrated monitoring of active servers for system health and performance data. Rules built into the Management Packs detect critical system messages and generate alerts for operators that can automatically trigger commands to be executed to resolve problems.

For example

- The Active PCT (transaction) view page can display the number of times each defined transaction has been executed and the average time taken to run
- CICS and IMS transactions can be configured with a time threshold and a message logged to the console whenever a transaction exceeds the threshold
- A monitor is included to detect transactions exceeding their thresholds
- A monitor is included in to detect JES jobs that have been terminated because they have exceeded their TIME parameter

A facility called Historical Statistics Facility (HSF) is available to gather statistical information about transaction execution within the Enterprise Server environment.

Statistics can be written to a .CSV file format and a limited number of records can also be held in memory for viewing through ESMAC.

The Statistics generated include information about

- The type of task (CICS, IMS, JCL, Web Service, CGI)
- Task number and start time
- Transaction ID/Program name and user that initiated
- Latency and response times
- Files accessed duration and number of occurrences
- Time spent in SQL and CICS API

## DATA ACCESS CAPABILITIES AND DATABASE SUPPORT

### Comprehensive data access options

Server Enterprise Edition supports QSAM and the main VSAM file types (KSDS, RRDS and ESDS) as well as Partitioned Datasets (PDSs) and Generation Data Groups (GDGs). This support is vital to enable applications using these mainframe file formats to be migrated without changing the COBOL or PL/I I/O logic.

Server Enterprise Edition also provides comprehensive run time support for the most popular relational databases on Linux, UNIX and Windows, including IBM DB2 LUW, Microsoft SQL Server and Oracle 11g<sup>4</sup>.

It also provides the execution level capabilities behind the Micro Focus OpenESQL technology, a platform and database independent SQL access capability which requires no specific pre-compiler from the database vendors. OpenESQL transparently converts embedded SQL statements into ODBC or ADO.NET API calls, enabling access to different database systems through any appropriate ODBC driver or ADO.NET provider for the database.

### IMS DL/I Compatible production database support

As an optional add-on, Server Enterprise Edition includes a production database which provides a functionally rich IMS DB implementation on Linux, UNIX or Window servers.

The capability allows IMS DB applications to be migrated and deployed without the effort and risk of:

- Changing database model from hierarchical to relational
- Migrating actual data to a new relational model
- Updating the programs to access a new relational database

Using XA-compliant architecture all transaction queue activity, as well as database activity, is logged and the updates synchronized with database commits. Consequently both Rollback (in the event of deadlocks and failed processes), and Roll Forward (in disaster recovery situations) recovery is provided. BMP Checkpoint / Restart are also supported.

Key Features:

- Run time for DLI function and interface support
  - COBOL applications using the CBLTDLI API interface
  - PL/I applications using the PLITDLI API interface
  - COBOL applications using EXEC DLI.
- Implementation of all IMS database access types
- Support for key IMS database segment types
- Extensive Segment Search Argument (SSA) support
- Sparse index and Data Capture exits
- Batch backout support
- Password re-verification

### **Support to simplify the migration of mainframe DB2 to Relational Databases on LUW**

'Data migration' is recognized as one of the more difficult, time consuming and risky elements of any migration. The more changes that have to be made to application code, the higher the risk.

Server Enterprise Edition includes a variety of run time technology to make it as simple as possible to migrate mainframe data to IBM DB2 LUW and Microsoft SQL Server.

#### **DB2 data migration support**

As none of the popular relational databases available on Linux, UNIX or Windows are completely compatible with DB2 on the mainframe, changes are required to the SQL within applications that are to be migrated. These changes are needed to ensure the applications compile correctly and behave the same post migration.

Studio and Server Enterprise Edition provide two options to make it easier to migrate mainframe DB2 data while minimizing the changes required to the application code:

- Host Compatibility Option for IBM DB2 LUW (HCOB2)
- Host Compatibility Option for Microsoft SQL Server (HCOSS)

The HCO options within the Studio Enterprise Edition development environment provide various tools and utilities that supplement the migration capabilities provided by the database vendors. These make it easier to migrate DB2 environment characteristics, schema and data into DB2 LUW or SQL Server.

The HCO options within the Server Enterprise Edition deployment environment provide a run-time capability. This interprets and dynamically modifies common mainframe DB2 SQL syntax, which is not supported within the target database, to deliver the same results against the new database. This enables a simpler, safer migration because changes to the application code are minimized.

Organizations which prefer to have fully native solutions which minimizes the number of technologies involved can do so, as long as enough time is available to ensure the new relational database is configured and loaded correctly and all applications are modified to:

- Replace any proprietary syntax that is not supported within the new database environment
- Update all code containing syntax which is supported but which does not produce the same behavior
- Adjust all application logic that is dependent on mainframe DB2 data characteristics

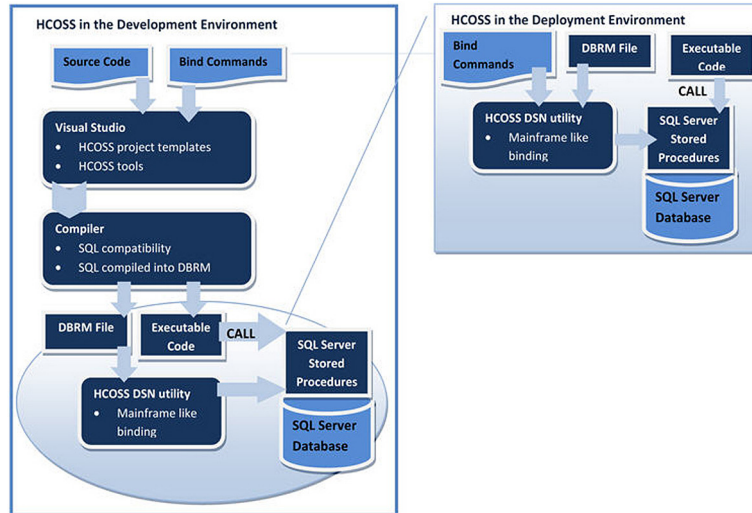


Figure 4: HCOSS Run Time Support Architecture

If time is an issue, the HCO capabilities can be vital to ensure the overall migration can be completed on time with the resources available. This is especially true when the target database is SQL Server as the manual changes required are typically more extensive.

**VSAM Data to SQL Server migration support**

Micro Focus generally recommends keeping VSAM data intact during initial migrations in order to minimize change and mitigate risk. Any VSAM to relational database data transformation would therefore normally be tackled as a second step in the modernization journey. However, if changing data models to relational is part of the initial migration, Micro Focus offers technology to minimize the changes involved and ensure the transition can occur within the target timescale for the overall migration.

**ACCESSING MAINFRAME DATA AND TRANSACTIONS DURING PARTIAL OR GRADUAL MIGRATIONS**

Migrated mainframe applications often need to access data or communicate with other applications that continue to reside on mainframe environments.

**Remote data access support**

For most migrations to Linux, UNIX or Windows servers, the data held in host DB2 databases is typically converted from EBCDIC to ASCII and migrated to a database that’s available on the destination server. However, in certain circumstances this is not possible; for example when a subset of the mainframe applications are being migrated and certain data must still reside on z/OS.

During such partial or gradual migration projects there is therefore often a requirement to access mainframe data directly, rather than migrating the data to files or databases available in the new target environment.

In such circumstances, the data remains in EBCDIC format on the mainframe, and remote access is enabled by utilizing third party middleware in products like Microsoft BizTalk, IBM DB2 Connect and Alebra PDM zOpenGate.

Accessing remote data is therefore very straightforward, but Micro Focus always advises comprehensive testing that simulates production level demands very early. This is advisable because remote data access across a network typically introduces a performance overhead. This overhead, especially for I/O bound applications, can severely impact overall performance compared with accessing the data locally on the mainframe. In addition, the overhead in processing the data remotely can sometimes time drive up the MIPS utilization on the mainframe.

Depending on the business drivers, and how important performance and MIPS utilization are, the overheads may be acceptable but this should be determined early in the project.

If the performance overhead prohibits realizing the business benefits of the migration, redistributing workload to IBM Integrated Facility for Linux (IFL) may be an option.

In this scenario, the COBOL workload is moved to the IFLs on the same System z mainframe, and IBM DB2 Connect is used on the IFLs to access DB2 data on z/OS. On System z, because DB2 Connect utilizes a technology called HyperSockets, much of the communication can be done within memory to increase the speed of the remote DB2 access. This may deliver enough of a performance improvement to help support the business case for the migration.

### **CICS Inter-System Communication (ISC) support**

Sometimes, there is a requirement for migrated CICS application to communicate with other applications that continue to run on mainframe environments, which may in turn access data that resides on the mainframe.

To enable this, Server Enterprise Edition supports CICS Inter-System Communication (ISC) through two different technologies.

First, Server Enterprise Edition includes technology that can be deployed on the mainframe to handle the conversion between TCP/IP protocol stacks on Linux, UNIX or Windows and the SNA/LU6.2 protocol stack on the mainframe. This option is useful when the mainframe CICS applications are running on in-house mainframes.

However, sometimes the migrated application must interface with partners' or even competitors' CICS systems on other mainframes, where installing third party communication technology is simply not an option.

In this situation, Server Enterprise Edition can exploit the Host Integration Server capabilities of Microsoft BizTalk to enable direct 2-Phase Commit communication flows with other mainframe CICS systems through SNA/LU6.2. This requires a Windows Server with Microsoft BizTalk installed to provide a gateway through to the mainframe CICS applications from the migrated CICS applications.

Alternatively, if the Server Enterprise Edition environment is running UNIX or Linux various other third-party UNIX APPC communications products are used to support 2-Phase Commit communication flows. For example, IBM Communications Server on AIX, Red Hat and SuSE SLES, HP SNAPplus2 on HP/UX and Metaswitch SNAP-IX on Solaris are used to enable Enterprise Server to take part as a peer in distributed Sync Level 2 Sync Point processing conversations

### **HIGH PERFORMANCE AND SCALABLE DEPLOYMENT ENGINE**

Enterprise Server is built on architecture designed to provide high performance transactional throughput for COBOL and PL/I programs and CICS/IMS transactions and services. The product is designed to scale-up as more CPUs are added to the chosen server.

This architecture enables multiple concurrent tasks to execute, providing UOW (Unit of Work) integrity, which enables multiple applications to access and update the same resources. These capabilities support user level file locking, lock contention management, deadlock detection and resolution.

A single Enterprise Server image provides support for high numbers of concurrent clients and workload without the need to replicate the environment into separate servers. Dynamic system administration allows the Enterprise Server configuration to be updated 'in flight' to support variations in workload.

### **INFRASTRUCTURE FOR RELIABILITY, AVAILABILITY AND SERVICEABILITY (RAS)**

Enterprise Server has extensive data integrity and recovery features that combine with the high availability features of LUW servers to provide mainframe level RAS capabilities.

Full two-phase Commit/Rollback and database recovery facilities are provided via XA-compliant architecture. This ensures all interactions with relational databases and VSAM files are always controlled and synchronized.

Advanced production recovery capabilities ensure service is restored in the shortest possible time. The transaction support enables the effective recovery of aborted or failed services. It also provides a separate program execution space for each COBOL or PL/I program being executed, to reduce the risk of a program exception affecting the rest of the system.

Enterprise Server also includes automatic self-healing facilities to detect failures, resolve them and restart appropriate sub-systems, if required.

The program isolation model results in a long Mean-Time-To-Failure statistic and this, coupled with a short Mean-Time-To-Recovery period, means Server Enterprise Edition provides a high availability infrastructure for the applications it executes.

Service recovery is further hastened by the provision of journal facilities and options for the backup, restoration and importing of Enterprise Server data.

Deployment scenarios that integrate with storage replication facilities and third-party clustering software provide automatic fail-over capabilities and additional availability characteristics.

### **FLEXIBLE AND COMPREHENSIVE SECURITY OPTIONS**

The product includes a RACF compatible security capability to enable customers to move their existing mainframe security rules for authentication and authorization at the application level to their chosen open systems environment.

An extensible External Security Management (ESM) system provides security support integrated with the operating system and third-party facilities. Features supported include application resource control, user authorization including Lightweight Directory Access Protocol (LDAP) and Security Authentication Facility (SAF), and the auditing of administration functions, including reporting provisions.

The system is both flexible and extensible and can be adapted to meet varying user requirements.

### **ARCHITECTURE TO SUPPORT MODERNIZATION ON 32- AND 64-BIT SERVERS**

Enterprise Server is architected to run in 32-bit or 64-bit operating system environments.

This means mainframe COBOL applications can be migrated to any popular LUW environment and work natively with any 32-bit or 64-bit third-party products. From an application perspective, no specific changes are required. Server Enterprise Edition takes care of any differences and exploits the capabilities of the operating environment under the covers.

The PL/I language environment is only 32-bit at this time. When migrating systems that include PL/I, if the target environment is 64-bit, it must support applications operating in 32-bit mode and all third party technologies used must also be fully supported running in 32-bit mode.

Once an application is rehosted to any of these new environments, a wide range of new technologies can be exploited to accelerate modernization initiatives required to fulfill new business requirements.

Server Enterprise Edition not only supports CICS, IMS and JCL execution, but also J2EE and Web service transactions.

This provides an unprecedented number of choices regarding ways to modernize the migrated COBOL applications and opportunities to reuse and integrate mature existing functionality with the very latest technologies such as .NET, J2EE and SOA.

Traditional clients, like 3270 BMS or MFS screens, are supported to ensure migrated applications can be utilized by existing users, with no additional training. In addition, all of today's popular client technologies can be exploited, to provide additional or improved web or graphical user interfaces for different user communities utilizing graphical workstations, browsers or mobile devices.

By reusing elements of the migrated application, users can deliver more value-add capabilities faster by exploiting proven functionality and making it available to other applications or through new user interfaces and devices.

#### **Web Services**

Today's heterogeneous IT systems mean few business systems operate in isolation, Server Enterprise Edition supports the integration of COBOL services.

By supporting Web services, Server Enterprise Edition provides an open approach to the deployment of COBOL business processes within SOA. Since direct COBOL Web services deployed within Enterprise Server are standards-based, they can be consumed on any platform or device, from any language that acts as a Web service client including Java, Microsoft .NET languages and COBOL.

As no third-party application servers or web servers are required for the deployment of direct COBOL Web services, costs are minimized while the agility of existing COBOL business processes is increased.

## Java and J2EE

Server Enterprise Edition includes support for COBOL/Java interoperability that extends the business rules represented in COBOL assets to Java and J2EE applications. By deploying an Enterprise JavaBean (EJB) and the J2EE Connector, COBOL assets can be accessed in a J2EE-compliant manner from Java application servers such as IBM WebSphere, Oracle Application Server, JBoss and Oracle WebLogic.

## Multi Platform Support

Server Enterprise Edition is available on popular LUW platforms, making it possible to deploy the rehosted application on whatever environment makes sense from a business and technology perspective.

The extension capabilities are all designed in an open platform manner. So, however an organization chooses to modernize an application, it is possible to do it in a way that minimizes the risk of 'lock in' to any particular hardware or operating system platform.

If the server strategy changes in the future, users are assured that the application functionality migrated from the mainframe and subsequently modernized can be redeployed to any alternative platform demanded by IT or business strategy.

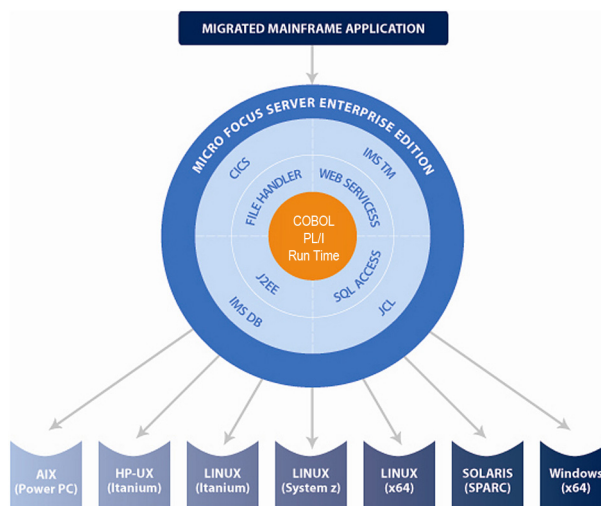


Figure 5: Server Enterprise Edition multi-platform support

## DEPLOY COBOL/CICS APPLICATIONS INTO MICROSOFT’S AZURE CLOUD

For COBOL/CICS applications the multi-platform support provided by Micro Focus extends to the Azure cloud.

Enterprise Server Azure is included as part of Server Enterprise Edition. It provides a different deployment architecture tightly integrated with the Microsoft Windows .NET framework and Azure. Applications run as managed code in a scale-out capable system relying on Internet Information Services (IIS), Windows Communication Foundation (WCF), Windows Process Activation Service (WAS) and Microsoft SQL Server Azure technologies.

With this capability, migrated online CICS/COBOL applications can be deployed within the managed code .NET framework on Windows Servers and applications can exploit all the classes provided within the .NET framework.

For customers whose preferred deployment platform is Windows, applications can be migrated within minimum risk using the standard Server Enterprise Edition for Windows product. Post migration, the Server Enterprise Edition for .NET or Enterprise Server Azure technology can be used to explore the advantages the .NET framework can provide for specific applications and any potential changes that may be required in order to deploy any application to the Microsoft’s Windows Azure cloud computing platform.

For more information on Enterprise Server Azure please refer the specific data sheet at <http://www.microfocus.com/products/enterprise/ServerEnterpriseEdition.aspx>

## INTEGRATION WITH POPULAR THIRD-PARTY PRODUCTS

Server Enterprise Edition has been integrated with many third-party products to provide a complete solution for many customer requirements. Some third-party vendors have even exploited integration points within Server Enterprise Edition to provide out-of-the-box integration or a more complete solution.

For an up to date list please visit <http://www.microfocus.com/>

Latest environments tested against include:

3rd Party	3rd Party Product	Area	Integration Level
BMC Software	BMC Control-M	IT Workload Automation and Job Scheduling	Exit Point Integration
CA	CA Autosys Workload Automation	IT Workload Automation and Job Scheduling	Product Integration
CA	CA ESP Workload Automation	IT Workload Automation and Job Scheduling	Product Integration
Levi, Ray & Shoup	LRS VPSX	Print Management	Product Integration
Microsoft	Microsoft BizTalk	Host Integration	Product Integration
Microsoft	Microsoft Systems Center Operation manager	Monitoring and Management	Exit Point Integration
Syncsort	Syncsort DMExpress	High Speed Sorting	Product Integration
UC4	UC4 Global	Scheduling	Exit Point Integration

**REFERENCE DEPLOYMENT ARCHITECTURE**

Micro Focus has developed a reference architecture for migrated applications that includes Micro Focus software and some of the common third party software utilized by migrated applications when they operate in production on Linux, UNIX or Windows.

The third party software used in production includes databases, job schedulers, high performance sort and output and print management software.

Having a standard target reference environment is invaluable. It does not mean that you cannot deviate from it; it simply provides a reference of what is required, so decisions can be made about the actual technology or product to be used to fulfill the common requirement, if appropriate.

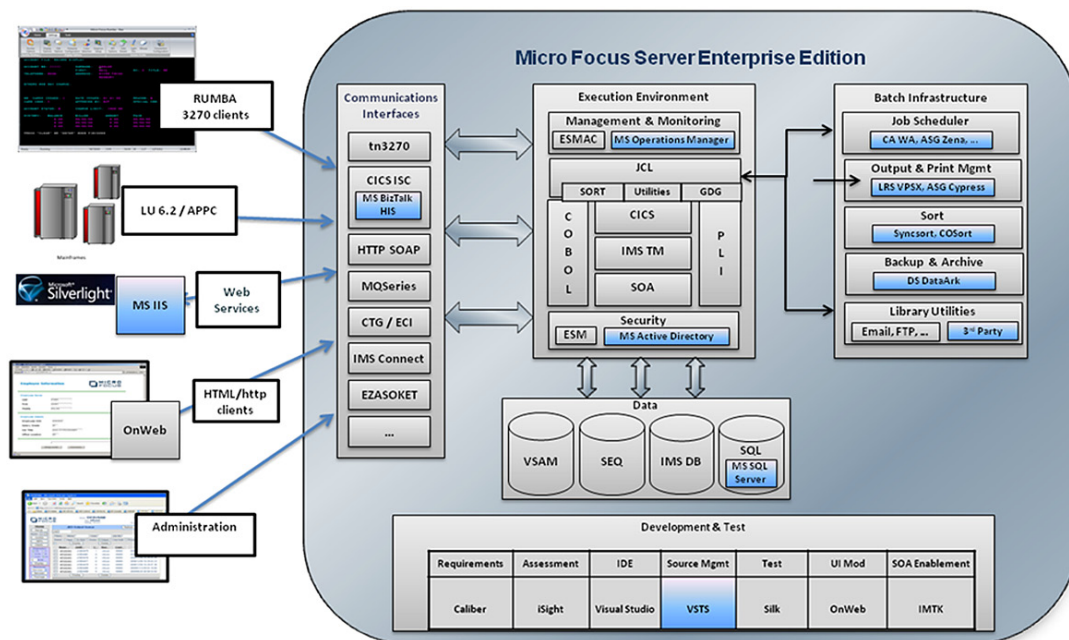


Figure 6: The Micro Focus Reference Architecture for Windows

The Micro Focus Reference Architecture (MFRA), Figure 7, shows the type of tools and technologies involved when a mainframe application is migrated to a Windows server environment. All of these capabilities are typically also required when Linux or UNIX servers are used as the production environment. If a technology depicted in the MFRA for Windows is not available on the target Linux or UNIX environment, a decision must be made to determine what equivalent technology will be used instead to fulfill the requirement. Alternatively, it may well be that for a specific migration or application there is no requirement for any technology to fulfill the requirement

For example,

- If migrating a mainframe application that uses a DB2 to a Linux server environment then a relational database will definitely be required. If the database must be hosted on Linux a decision must be made about whether the target database should be IBM DB2 or Oracle 11g.
- If the target server environment is HP-UX server farm, then a decision needs to be made about which operations management capability will be used instead of Microsoft SCOM, for example HP Operations Manager.
- If migrating to an environment where this is an established central security system that is not based around Active Directory then this would be the natural substitute within the target reference architecture.

The key is to use the MFRA as a guide, adopt as much as possible that makes sense and proactively decide on what alternative to use, or not, as part of the migration project plan.

**MARKET LEADING PRODUCT SUPPORT**

Of primary concern during and after migration is the long-term viability of any vendor who provides production level software and the vendor’s ability to deliver the level of product support required to meet appropriate Service Level Agreements.

SupportLine is Micro Focus’ award winning product support organization operated through in-house SupportLine centers in North America, UK, France, Germany, Japan and Australia.

Skilled engineers provide technical support 24 hours a day, 7 days a week, 365 days a year via telephone, e-mail and the Internet. In addition, the SupportLine website provides on-line incident reporting and tracking, along with the latest product downloads, a Google searchable knowledge base, code samples, and full product documentation.

**TECHNICAL SPECIFICATIONS**

Windows Components - Operating System Requirements

- Windows 7, Windows Server 2008, Windows Vista, or Windows XP

UNIX/Linux Components - Operating System requirements vary depending on the specific platform. Visit <http://supportline.microfocus.com/productreleaselevels/unix.asp> for details.

Latest environments tested against are:

Operating System and Processor	Notes
HP-UX 11i v3 on Integrity servers with Itanium 64-bit processors	<ul style="list-style-type: none"> <li>➤ PL/I is not supported on this platform</li> <li>➤ 64-bit COBOL support requires Server EE 6.0 or above</li> </ul>
IBM AIX 6.1 on System p servers with Power PC 64-bit processors	<ul style="list-style-type: none"> <li>➤ 64-bit COBOL support requires Server EE 6.0 or above</li> </ul>
Red Hat Enterprise Linux 5.3 servers with Itanium 64-bit processors	<ul style="list-style-type: none"> <li>➤ PL/I is not supported on this platform</li> <li>➤ Only supported with Server EE 6.0 or above</li> </ul>
Red Hat Enterprise Linux 5.3 servers with x86-64-bit processors	<ul style="list-style-type: none"> <li>➤ Only supported with Server EE 6.0 or above</li> </ul>

Red Hat Enterprise Linux 5.3 System z servers with z/390 processors	<ul style="list-style-type: none"> <li>➤ PL/I is not supported on this platform</li> <li>➤ COBOL support requires Server EE 6.0 WP1 or above</li> </ul>
Sun Solaris 10 on SUN SPARC Servers with SPARC 64-bit processors	<ul style="list-style-type: none"> <li>➤ COBOL support requires Server EE 6.0 WP1 or above</li> </ul>
SuSE Linux ES 10 SP2 on servers with x86-64-bit processors	<ul style="list-style-type: none"> <li>➤ 64-bit COBOL support requires Server EE 6.0 or above</li> </ul>
SuSE Linux ES 10 SP2 on System z servers with z/390 64-bit processors	<ul style="list-style-type: none"> <li>➤ PL/I is not supported on this platform</li> <li>➤ 64-bit COBOL support requires Server EE 6.0 or above</li> </ul>
Windows Server 2008 SP1 on servers with x86-64-bit processors	<ul style="list-style-type: none"> <li>➤ 64-bit COBOL support requires Server EE 6.0 or above</li> </ul>
Windows Vista SP1 on servers with x86-64-bit processors	<ul style="list-style-type: none"> <li>➤ 64-bit COBOL support requires Server EE 6.0 or above</li> </ul>
Windows XP SP2 on servers with x86-64-bit processors	<ul style="list-style-type: none"> <li>➤ 64-bit COBOL support requires Server EE 6.0 or above</li> </ul>
Windows 7 on servers with x86-64-bit processors	<ul style="list-style-type: none"> <li>➤ COBOL support requires Server EE 6.0 WP2 or above</li> </ul>

**References**

- <sup>i</sup> Unless PL/I portability standards have been adhered to, you should expect that some changes to PL/I code will be required
- <sup>ii</sup> PL/I applications are not currently supported on z/Linux or Itanium-based servers and PL/I application support is 32-bit only at this time. If PL/I application are migrated, a 32-bit or 64-bit environment that supports 32-bit is required.
- <sup>iii</sup> At time of release this support for PL/I applications was “on backlog” status. Contact Micro Focus sales for details
- <sup>iv</sup> At time of release Oracle support for PL/I applications was at “planned” status. Contact Micro Focus sales for details.

**About Micro Focus**

Micro Focus, a member of the FTSE 250, provides innovative software that allows companies to dramatically improve the business value of their enterprise applications. Micro Focus Enterprise Application Modernization, Testing and Management software enables customers’ business applications to respond rapidly to market changes and embrace modern architectures with reduced cost and risk.

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