

# Micro Focus Enterprise Server on the AWS Cloud

## Deployment Guide

*Oct 2022*

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This deployment guide is intended for use with the Quick Start that was created by Micro Focus, Inc. in collaboration with Amazon Web Services (AWS).

[Quick Starts](#) are automated reference deployments that use AWS CloudFormation templates to deploy key technologies on AWS, following AWS best practices.

## Quick Links

The links in this section are for your convenience. Before you launch the Quick Start, please review the architecture, security, and other considerations discussed in this guide.

- If you have an AWS account, and you're already familiar with AWS services and Micro Focus Enterprise Server, you can launch the Quick Start to build the architecture shown in [Figure 1](#) in a new or existing virtual private cloud (VPC). The deployment takes approximately 1 hour and 30 minutes. If you're new to AWS or to Micro Focus Enterprise Server, please review the implementation details and follow the [step-by-step instructions](#) provided later in this guide.

**Launch**  
(for new VPC)

**Launch**  
(for existing VPC)

- If you want to look under the covers, you can view the AWS CloudFormation templates that automate the deployment.

**View template**  
(for new VPC)

**View template**  
(for existing VPC)

## Overview

This Quick Start deployment guide provides step-by-step instructions for deploying Micro Focus Enterprise Server 8.0 to run on Linux or Windows on the AWS Cloud.

This Quick Start is for you if you are:

- An existing Micro Focus customer who has already deployed an IBM mainframe workload to Enterprise Server on premises and want to see how easy it is to migrate these rehosted applications to the AWS Cloud.
- Interested in exploring the feasibility of moving an IBM mainframe workload to the AWS Cloud and want to experience a fully functioning production server for running mainframe applications that can be deployed with a single click.
- A system integrator (SI) who is used to installing and configuring Enterprise Server deployments on premises and wants a template to use as a starting point for installing and configuring Enterprise Server deployments on AWS.

The Quick Start creates the required infrastructure for both AWS Cloud and Enterprise Server. This makes it easy for you to see a fully-functioning demonstration application called BankDemo—using COBOL, CICS, Job Control Language (JCL), Virtual Storage Access Method (VSAM) files, and Performance and Availability Clusters (PACs) — running under Enterprise Server on AWS.

## Micro Focus Enterprise Server on AWS

Micro Focus Enterprise Server is an application deployment environment for IBM mainframe applications that have been running on the IBM z/OS operating system. Enterprise Server enables you to modernize and integrate mainframe applications with technologies such as .NET and Java. It also gives you application flexibility across Linux and Microsoft Windows, containerized or virtual, on AWS.

**Note** For an in-depth discussion of the unique benefits offered by the Micro Focus Enterprise Server solution on AWS, see the AWS blog post [Empowering Enterprise Mainframe Workloads on AWS with Micro Focus](#).

Using Enterprise Server, your organization can:

- Support mainframe application deployment to Linux or Windows on AWS.
- Rapidly replicate business-critical functionality to new platforms to support geographic, regulatory, line-of-business, or other key requirements.
- Reduce your ongoing IT application costs by as much as 90 percent.
- Meet and exceed your application reliability, availability, and serviceability requirements. Enterprise Server 8.0 enables you to deploy your applications into a scale-out architecture, providing even more improvements to your applications' availability, scalability, reliability, and performance.

This scale-out architecture is provided by Performance and Availability Clusters (PACs) and Scale-Out Repositories (SORs) which are currently in Early Adopter Product (EAP) release status in Enterprise Server.

An additional document, [Micro Focus Enterprise Server on the AWS Cloud - Scale-Out Architecture Demonstrations](#) describes how you can take a closer look at the scale-out capabilities offered by Enterprise Server.

- Integrate with your security infrastructure, for appropriate application and system security.

For more information on the architecture employed by Enterprise Server, see [Enterprise Server Architecture Overview](#).

In addition, by using Enterprise Server on AWS you can harness the following benefits of moving any application to the AWS Cloud:

- A high-availability deployment environment that scales as your applications need it to and only charges you for the resources that you use.
- The ability to quickly build new services targeting new channels, such as mobile or voice-based applications.
- Big data services that provide analytics capabilities enabling you to create a data lake that offers a comprehensive view of your mainframe data assets.
- Amazon Machine Learning (Amazon ML) to help you use your historical data to make even better business decisions. Amazon ML can find patterns in your data and then use the patterns to build models to make predictions on future data.

## Costs and Licenses

You are responsible for the cost of the AWS services used while running this Quick Start reference deployment. There is no additional cost for using the Quick Start.

The AWS CloudFormation template for this Quick Start includes configuration parameters that you can customize. Some of these parameters, such as instance type, will affect the cost of deployment. For cost estimates, see the pricing pages for each AWS service you will be using. Prices are subject to change.

**Tip** After you deploy the Quick Start, we recommend that you enable the [AWS Cost and Usage Report](#) to track costs associated with the Quick Start. This report delivers billing metrics to an S3 bucket in your account. It provides cost estimates based on

usage throughout each month and finalizes the data at the end of the month. For more information about the report, see the [AWS documentation](#).

This Quick Start uses a Bring Your Own License (BYOL) model for Enterprise Server. How you license Enterprise Server for use with this Quick Start depends on what sort of license you have:

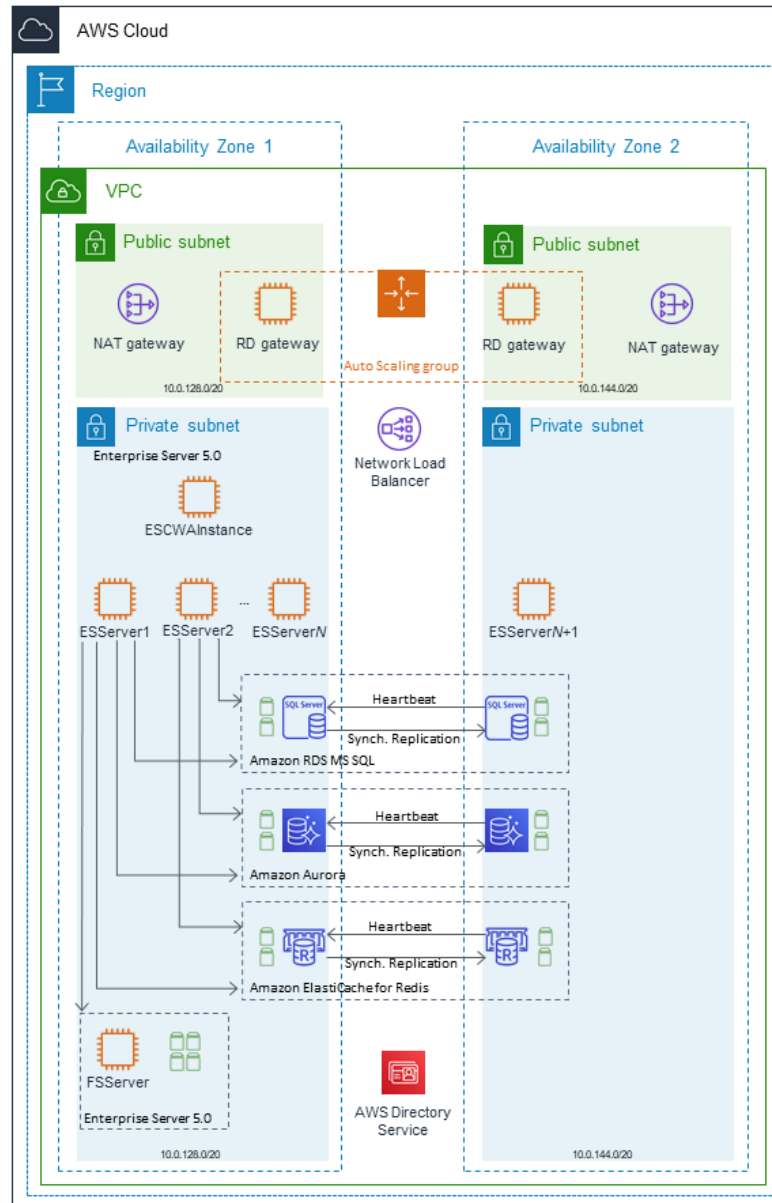
- If you are an existing user of Enterprise Server, you can use one of your existing licenses.
- If you are not an existing user of Enterprise Server, you can [request a trial license from Micro Focus](#).

This trial license for Enterprise Server on AWS is only intended to be used for a maximum of 90 days and is not intended for production use. After the trial period, you are responsible for acquiring the necessary licenses directly from Micro Focus to continue using Enterprise Server on AWS.

## Architecture

### Architecture of Enterprise Server on AWS

Deploying this Quick Start for a new virtual private cloud (VPC)—specifying the inclusion of the [BankDemo demonstration application](#), but otherwise using **default parameters**—builds the following Enterprise Server environment in the AWS Cloud.



**Figure 1: Quick Start architecture for Enterprise Server on AWS**

**Note** If you need to customize the supplied AWS CloudFormation template to deploy your own Enterprise Server applications to the AWS Cloud, the resulting AWS architecture could be very different to the one described in this section.

The Quick Start sets up the following:

- A highly available architecture that spans two Availability Zones.\*
- A VPC configured with public and private subnets according to AWS best practices, to provide you with your own virtual network on AWS.\*

- An internet gateway to allow access to the internet. \*

When deploying the optional BankDemo demonstration applications, TN3270 communications from the internet will also flow through the internet gateway.

- In the public subnets, managed NAT gateways to allow outbound internet access for resources in the private subnets.\*
- Optional Remote Desktop Gateway (RD Gateway) instances in the public subnets for administrative access.
- In the private subnets, a number of Enterprise Server instances that can be accessed via a TN3270 terminal emulator or HTTP.
- A Network Load Balancer to automatically distribute requests for the BankDemo demonstration applications to the deployed Enterprise Server instances.

This is how the Enterprise Server instances are configured for use with the BankDemo demonstration applications. If you modify the AWS CloudFormation template (to tailor it for use for use with other applications), you must allow the required protocols through the load balancer and specify the required number of instances.

**Note** The Quick Start can deploy a maximum of two Enterprise Server instances for demonstration purposes. If you are an SI who wants to launch additional Enterprise Server instances as part of a migration project, you must modify the templates supplied with this Quick Start.

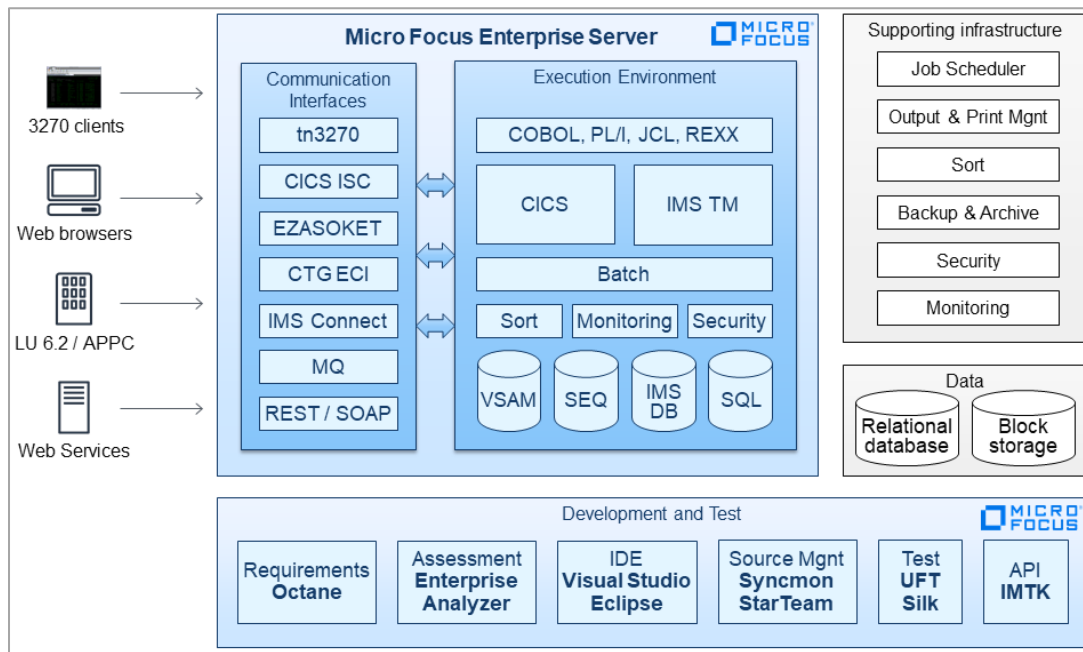
- An optional Fileshare instance that is preconfigured to be accessible from the Enterprise Server instances (via Fileshare) and accessible directly via the Common Internet File System (CIFS) protocol share for batch processing.
- An optional Microsoft SQL Server database connectivity using Amazon Relational Database Service (Amazon RDS) for SQL Server with support for failover and automated backups.
- An optional Amazon ElastiCache for Redis instance that is preconfigured to work as a Scale-Out Repository (SOR) for Enterprise Server.
- AWS Directory Service for Microsoft Active Directory (also known as AWS Managed Microsoft AD).

\* The template that deploys the Quick Start into an existing VPC skips the tasks marked by asterisks and prompts you for your existing VPC configuration and AWS Managed Microsoft AD information.

## Enterprise Server Architecture Overview

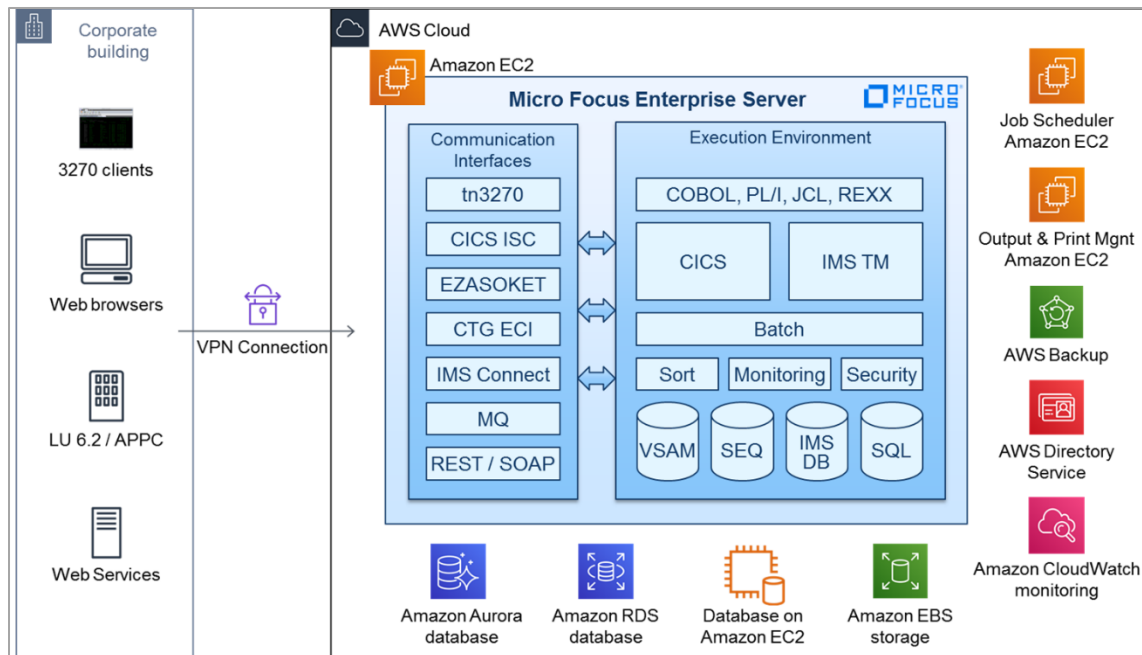
For an overview of Enterprise Server architecture, see [Enterprise Server Architecture](#) and [Enterprise Server Instance Architecture](#) in the Enterprise Server product documentation.

In addition to the standard Enterprise Server installation, other software requirements depend on the user application and third-party components. In an existing rehosted distributed environment, these third-party components will already be in place. They need to be reviewed to ensure they are compatible in the AWS environment.



**Figure 2: Reference architecture for Enterprise Server in a non-cloud environment**





**Figure 3: Reference architecture for Enterprise Server on the AWS Cloud**

## Prerequisites

### Technical Requirements

This Quick Start uses a Bring Your Own License (BYOL) model for Enterprise Server. If you are an existing user of Enterprise Server, you can use one of your existing licenses. If you are not an existing user of Enterprise Server, you need to [request a trial license from Micro Focus](#). For more information, see [Cost and Licenses](#).

The [BankDemo demonstration application](#) that is included as part of this Quick Start requires the use of a TN3270 terminal emulator. You can use any TN3270 terminal emulator, but this guide shows the use of Micro Focus Rumba, which is supplied with Micro Focus Enterprise Developer.

### Specialized Knowledge

Before you deploy this Quick Start, we recommend that you become familiar with the following AWS services. (If you are new to AWS, see [Getting Started with AWS](#).)

- [Amazon Aurora](#)
- [Amazon Elastic Block Store \(Amazon EBS\)](#)
- [Amazon Elastic Compute Cloud \(Amazon EC2\)](#)
- [Amazon ElastiCache for Redis](#)

- [Amazon Relational Database Service \(Amazon RDS\)](#)
- [Amazon Virtual Private Cloud \(Amazon VPC\)](#)
- [AWS CloudFormation](#)
- [AWS Directory Service for Microsoft Active Directory](#) (also known as AWS Managed Microsoft AD)

## Deployment Options

This Quick Start provides two deployment options:

- **Deploy Enterprise Server into a new VPC** (end-to-end deployment). This option builds the required new AWS environment consisting of the VPC, subnets, NAT gateways, security groups, AWS Managed Microsoft AD, bastion hosts, Remote Desktop Gateway (RD Gateway), and other infrastructure components, and then deploys Enterprise Server into this new VPC.
- **Deploy Enterprise Server into an existing VPC**. This option provisions Enterprise Server in your existing AWS infrastructure.

The Quick Start provides separate templates for these options. It also lets you configure CIDR blocks, instance types, and Enterprise Server settings, as discussed later in this guide.

## Deployment Steps

### Step 1. Prepare Your AWS Account

1. If you don't already have an AWS account, create one at <https://aws.amazon.com> by following the on-screen instructions.
2. Use the region selector in the navigation bar to choose the AWS Region where you want to deploy Enterprise Server on AWS.

**Important** This Quick Start includes AWS Directory Service which isn't supported in all AWS Regions. See [AWS Regions and Endpoints](#) for a list of supported regions.

When deploying the RDS Remote Database option, Amazon RDS does not support Windows (domain) Authentication in all AWS Regions. See [Using Windows Authentication with a Microsoft SQL Server DB Instance](#).

3. Amazon EC2 uses public-key cryptography to encrypt and decrypt login information. To be able to log in to your instances, you must create a [key pair](#) in your preferred region. To do this:
  - a. In the navigation pane of the Amazon EC2 console, select **Key Pairs**.
  - b. Choose **Create Key Pair**.
  - c. Specify the name for the key pair.
  - d. Choose **Create**.

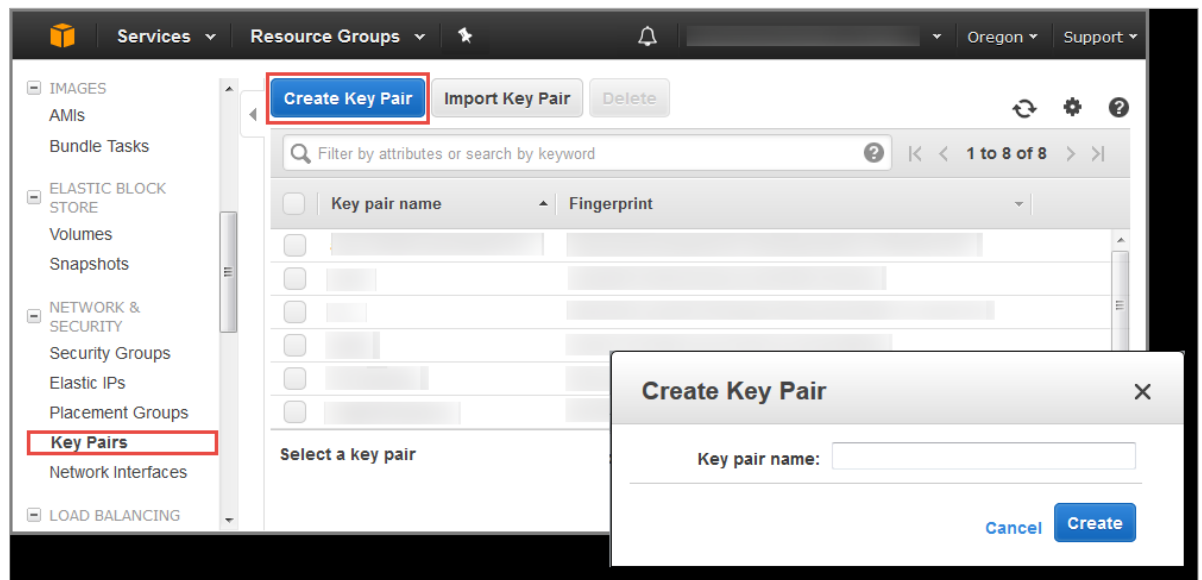


Figure 4: Creating a key pair

4. If necessary, [request a service limit increase](#) for the relevant Amazon EC2 instance types. You might need to do this if you have an existing deployment that uses this instance type, and you think you might exceed the [default limit](#) with this deployment.

## Step 2. Review the Micro Focus End User License Agreement

Before launching this Quick Start for Enterprise Server, you must review the terms of the [Micro Focus End User License Agreement](#). You will be asked to accept the terms of the End User License Agreement during deployment.

## Step 3. Prepare the S3 Bucket

We recommend that you launch the Enterprise Server Quick Start from an S3 bucket; these instructions will guide you through populating this bucket. The commands are using the AWS CLI on Windows, but if you prefer, you can use the user interface options from the

Amazon S3 > Buckets page to complete the tasks. If you are deploying from local files or a non-S3 location, these steps can be skipped.

**Note:** Cloning the GitHub repository requires the use of an SSH key. Generate a new SSH key pair and add the public key to your GitHub account. If you are not familiar with SSH keys in GitHub, see [Adding a new SSH key to your GitHub account - GitHub Docs](#).

1. Create a new folder for the templates and scripts; for example, **C:\quickstart-microfocus-amc-es**.
2. Download the following contents and submodules from our GitHub repository, by entering the following command:

```
git clone --recursive -c core.autocrlf=false git@github.com:aws-quickstart/quickstart-microfocus-amc-es.git c:\quickstart-microfocus-amc-es
```

**Tip:** Check that the script files within the 'scripts' sub-folders of the cloned repository contain the correct line endings for their platform – .ps1 files should have Windows-style line endings (CRLF), and .sh files should have Linux-style line endings (LF).

3. Upload this entire structure, excluding the GitHub metadata files (\*git\*) into an existing, empty S3 bucket, for example:

```
aws s3 cp c:\quickstart-microfocus-amc-es s3://aws-quickstart/quickstart-microfocus-amc-es/ --recursive --exclude *git* --quiet
```

where *aws-quickstart* is the name of the S3 bucket.

4. Add your license file (.mflic) into a folder named **license** in the same S3 bucket; for example:

```
aws s3 cp .\Enterprise-Server.mflic s3://aws-quickstart/license/Enterprise-Server.mflic
```

where *Enterprise-Server.mflic* is the name of the license file.

Using the examples above, these are the parameters that you should specify when deploying the Quick Start:

| Parameter   | Value                         |
|---|-------------------------------|
| <b>Quick Start S3 key prefix (QSS3KeyPrefix)</b>              | quickstart-microfocus-amc-es/ |
| <b>Quick Start S3 bucket name (QSS3BucketName)</b>            | aws-quickstart                |
| <b>Enterprise Server license filename (ESLicenseFilename)</b> | Enterprise-Server.mflic       |
| <b>Quick Start S3 bucket name (ESS3BucketName)</b>            | aws-quickstart                |

This example employs one bucket for both the Quick Start and the Enterprise Server parameters. If required, you can employ separate buckets for each.

#### Step 4. Launch the Quick Start

**Note** You are responsible for the cost of the AWS services used while running this Quick Start reference deployment. There is no additional cost for using this Quick Start. For full details, see the pricing pages for each AWS service you will be using in this Quick Start. Prices are subject to change.

1. Choose one of the following options to launch the AWS CloudFormation template into your AWS account. For help choosing an option, see [Deployment Options](#) earlier in this guide.

|   |   |
|---|---|
| <p><b>Option 1</b></p> <p>Deploy Enterprise Server into a new VPC on AWS</p> <p><b>Launch</b></p> | <p><b>Option 2</b></p> <p>Deploy Enterprise Server into an existing VPC on AWS</p> <p><b>Launch</b></p> |
|---|---|

**Important** If you're deploying Enterprise Server into an existing VPC, make sure that your VPC has two private subnets in different Availability Zones for the database

instances. These subnets require [NAT gateways or NAT instances](#) in their route tables, to allow the instances to download packages and software without exposing them to the internet.

When deploying into an existing VPC, the Quick Start requires [AWS Directory Service for Microsoft Active Directory](#) (also known as AWS Managed Microsoft AD).

You will also need the domain name option and AWS Managed Microsoft AD domain name servers configured in the DHCP options, as explained in the [Amazon VPC documentation](#). You will be prompted for your VPC settings when you launch the Quick Start.

Each deployment takes about 1 hour and 30 minutes to complete.

2. Check the region that's displayed in the upper-right corner of the navigation bar and change it if necessary. This is where the network infrastructure for Enterprise Server will be built. The template is launched in the US East (N. Virginia) Region by default.
3. On the **Create stack** page, amend the Amazon S3 URL accordingly so that it contains the name of your S3 bucket, and then choose **Next**.
4. On the **Specify stack details** page, the stack name field is pre-populated; change it if needed. Review the parameters for the template and provide values for the parameters that require input. For all other parameters, review the default settings and customize them as necessary.

You will need to specify values for at least the following parameters:

- License agreement
- Enterprise Server license filename. The name of a valid license (**.mflic**) file for Enterprise Server.
- Availability Zones
- Allowed CIDR blocks for external access to the Remote Desktop Gateway, bastion hosts, and the demonstration applications.
- Domain admin password (and Re-enter the Domain admin password)
- Key Pair Name. See the AWS documentation on [key pairs](#) for more information.
- Enterprise Server S3 bucket name. The name of the S3 bucket containing the Enterprise Server license file. See the AWS documentation on [Creating a Bucket](#) for more information.
- Database Master User password (and Re-enter the Database Master User password)

- Enterprise Server Demo User password (and Re-enter the Enterprise Server Demo User password)

Specifying values for these parameters and accepting the default values for all other parameters will enable you to launch the Quick Start to run the BankDemo application.

**Note** The Quick Start is configured to enable you to install up to three versions of a BankDemo demonstration application that differ in the types of data that they use. There are versions of BankDemo that use the following:

- VSAM data files that are processed by Fileshare.
- A SQL Server database.
- A Performance and Availability Cluster (PAC) and a Scale-Out Repository (SOR) using ElastiCache for Redis.

If you do not want to run the demonstration application to test the deployment once it has finished, you must select **false** for the **Install Fileshare Demo App**, **Install SQLServer Demo App**, and **Install PAC Demo App** parameters.

For more information on PACs and SORs see [Scale-Out Performance and Availability Clusters](#) in the Enterprise Server product documentation.

In the following tables, parameters are listed by category and described separately for the two deployment options:

- [Parameters for deploying Enterprise Server into a new VPC](#)
- [Parameters for deploying Enterprise Server into an existing VPC](#)

When you have finished reviewing and customizing the parameters, choose **Next**.

- **Option 1: Parameters for deploying Enterprise Server into a new VPC**

[View template](#)

*Software License Agreement:*

| Parameter label (name)                         | Default | Description   |
|--|---------|---|
| <b>License agreement</b><br>(LicenseAgreement) | –       | You must agree to the terms and conditions. I have read and agree to the license terms for Micro Focus Enterprise Server<br><a href="https://www.microfocus.com/documentation/enterprise-developer/ed-latest/ES-WIN/GUID-0562B3C9-2271-4CE8-AF64-93DE4940077F.html">https://www.microfocus.com/documentation/enterprise-developer/ed-latest/ES-WIN/GUID-0562B3C9-2271-4CE8-AF64-93DE4940077F.html</a> . |

| Parameter label (name)   | Default               | Description   |
|--|-----------------------|---|
| <b>Enterprise Server license filename</b><br>(ESLicenseFilename) | <i>Requires input</i> | Place the license file obtained from Micro Focus in the S3 bucket folder:<br>s3://<Enterprise Server S3 bucket name>/license/ |

### Network Configuration:

| Parameter label (name)                                 | Default               | Description   |
|--|-----------------------|---|
| <b>VPC CIDR</b><br>(VPCCIDR)                           | 10.0.0.0/16           | The CIDR block for the VPC. The CIDR block must be in the form x.x.x.x/16-28.   |
| <b>Public Subnet 1 CIDR</b><br>(PublicSubnet1CIDR)     | 10.0.128.0/20         | The CIDR block for the public (DMZ) subnet 1 located in Availability Zone 1. The CIDR block must be in the form x.x.x.x/16-28.  |
| <b>Public Subnet 2 CIDR</b><br>(PublicSubnet2CIDR)     | 10.0.144.0/20         | The CIDR block for the public (DMZ) subnet 2 located in Availability Zone 2. The CIDR block must be in the form x.x.x.x/16-28.  |
| <b>Private Subnet 1A CIDR</b><br>(PrivateSubnet1ACIDR) | 10.0.0.0/19           | The CIDR block for the private subnet 1 located in Availability Zone 1. The CIDR block must be in the form x.x.x.x/16-28.   |
| <b>Private Subnet 2A CIDR</b><br>(PrivateSubnet2ACIDR) | 10.0.32.0/19          | The CIDR block for the private subnet 2 located in Availability Zone 2. The CIDR block must be in the form x.x.x.x/16-28.   |
| <b>Availability Zones</b><br>(AvailabilityZones)       | <i>Requires input</i> | The list of Availability Zones to use for the subnets in the VPC. The Quick Start uses two Availability Zones from your list and preserves the logical order you specify. |

### Microsoft Active Directory Configuration:

| Parameter label (name)  | Default     | Description   |
|---|-------------|---|
| <b>AWS Managed Microsoft AD Edition</b><br>(DSMicrosoftADEdition) | Standard    | Standard Edition includes 1 GB of storage for objects. Enterprise Edition includes 17 GB. The total number of objects supported depends on the types of objects, size of data stored in attributes, and your transaction rates. Scale-out as needed by adding domain controllers. |
| <b>Domain DNS name</b><br>(DomainDNSName)                         | example.com | The fully qualified domain name (FQDN), e.g., example.com. Must be 2-255 characters.  |
| <b>Domain NetBIOS name</b><br>(DomainNetBIOSName)                 | example     | The NetBIOS name of the domain (up to 15 characters) for users of earlier versions of Microsoft Windows, e.g., example.   |



| Parameter label (name)   | Default               | Description  |
|--|-----------------------|--|
| <b>Domain Admin account password</b><br>(DomainAdminPassword)                      | <i>Requires input</i> | The password for the domain Admin account. Must be at least 8 characters containing letters, numbers, and symbols.         |
| <b>Re-enter the domain Admin account password</b><br>(DomainAdminPassword Confirm) | <i>Requires input</i> | Confirm the password for the domain Admin account. Must be at least 8 characters containing letters, numbers, and symbols. |

### Linux Bastion Configuration

| Parameter label (name)                                       | Default               | Description   |
|--|-----------------------|---|
| <b>Number of Bastion hosts</b><br>(NumberOfBastionHosts)     | 1                     | If you choose 'None', the remaining Bastion configuration parameters are ignored.                             |
| <b>Bastion instance type</b><br>(BastionInstanceType)        | T3.micro              | The Amazon EC2 instance type for the Bastion instances.   |
| <b>Allowed Bastion external access CIDR</b><br>(BastionCIDR) | <i>Requires input</i> | The allowed CIDR block for external access to the Bastion host. The CIDR block must be in the form x.x.x.x/x. |

### Remote Desktop Gateway Configuration:

| Parameter label (name)                                       | Default               | Description   |
|--|-----------------------|---|
| <b>Number of RD Gateway hosts</b><br>(NumberOfRDGWHosts)     | 1                     | If you choose 'None', the remaining Remote Desktop Gateway configuration parameters are ignored.                        |
| <b>RD Gateway instance type</b><br>(RDGWInstanceType)        | t2.large              | The Amazon EC2 instance type for the Remote Desktop Gateway instances.  |
| <b>Allowed RD Gateway external access CIDR</b><br>(RDGWCIDR) | <i>Requires input</i> | The allowed CIDR block for external access to the Remote Desktop Gateway. The CIDR block must be in the form x.x.x.x/x. |

*Enterprise Server Configuration:*

| Parameter label (name)  | Default               | Description  |
|---|-----------------------|--|
| <b>Enterprise Server Instance(s) OS type (OS)</b>   | Windows               | The operating system type for the Enterprise Server instance(s).   |
| <b>Enterprise Server instance type (ESInstanceType)</b>                                   | c5.large              | The type of Enterprise Server instance.  |
| <b>Number of Enterprise Server instances (NumberOfESInstance)</b>                         | 1                     | The number of Enterprise Server instances to start.  |
| <b>Key pair name (KeyPairName)</b>  | <i>Requires input</i> | The name of an existing EC2 key pair. All instances will launch with this key pair.  |
| <b>Number of Enterprise Server regions per instance (RegionsPerInstance)</b>              | 1                     | The number of regions per Enterprise Server instance. Must be between 1 and 10 regions per instance.   |
| <b>Additional Enterprise Server instance storage (AdditionalESStorageinGiB)</b>           | 100                   | Additional EBS storage capacity in gibibytes (GiBs) added to each Enterprise Server instance. Enter 0-16384 GiB.   |
| <b>Amazon CloudWatch log retention (ESCWLogGroupRetentionInDays)</b>                      | 7                     | The number of days that log events are kept in Amazon CloudWatch Logs.   |
| <b>Micro Focus Directory Server service domain account name (MFDSServiceAccountName)</b>  | MFDSServiceAccount    | The existing domain account name under which the service will run. If left as default, a domain account 'MFDSServiceAccount' is created. The name must be 5-25 characters. |
| <b>Micro Focus Directory Server service account password (MFDSServiceAccountPassword)</b> | <i>Requires input</i> | Enter a password for MFDSServiceAccount. Must be at least 8 characters containing letters, numbers, and symbols.   |
| <b>Re-enter the Micro Focus Directory Server service account password</b>                 | <i>Requires input</i> | Confirm the password for MFDSServiceAccount. Must be at least 8 characters containing letters, numbers, and symbols.   |

| Parameter label (name)  | Default               | Description  |
|---|-----------------------|--|
| (MFDSServiceAccountPasswordConfirm)                             |                       |  |
| <b>Operator email address</b><br>(OperatorEmail)                | None                  | (optional) The email address that notifications are sent to (e.g., database, VM failures, etc.).   |
| <b>Enterprise Server S3 bucket name</b><br>(ESS3BucketName)     | <i>Requires input</i> | The name of the existing S3 bucket used to store/retrieve objects specific to this stack. A system integrator extending this Quick Start should use this bucket to store or retrieve items needed. This string can include numbers, lowercase letters, uppercase letters, and hyphens (-). It cannot start or end with a hyphen (-). |
| <b>Enterprise Server S3 bucket region</b><br>(ESS3BucketRegion) | <i>Requires input</i> | The AWS Region where the Enterprise Server S3 bucket (ESS3BucketName) is hosted. When using your own bucket, you must specify this value.  |
| <b>Resource 'Name' prefix</b><br>(ESResourceNamePrefix)         | AWS::StackName        | Used to prefix resource 'Name' tags. Leave empty for no prefix. Otherwise, use 'AWS::StackName' or a value such as the parent stack's name.  |

### PAC Configuration:

| Parameter label (name)   | Default               | Description   |
|--|-----------------------|---|
| <b>Install PAC Demo App</b><br>(InstallPACDemoApp)             | True                  | Choose 'False' if you don't want to install the Enterprise Server PAC demo app.   |
| <b>Database instance class</b><br>(PACDBInstanceClass)         | db.r4.large           | The type of Amazon RDS DB instance.   |
| <b>PAC database Master username</b><br>(PACMasterUsername)     | DBAdmin               | Specify an alphanumeric string that defines the login ID for the master user in the PAC database. Master username must start with a letter. Must contain 1 to 64 alphanumeric characters  |
| <b>PAC database Master password</b><br>(PACMasterUserPassword) | <i>Requires input</i> | The password for the DB master user in the PAC database. Must be at least eight characters long, as in "mypassword". Can be any printable ASCII character except "/", "", or "@".         |
| <b>Re-enter the PAC database Master password</b>               | <i>Requires input</i> | Confirm the password for the DB master user in the PAC database. Must be at least eight characters long, as in "mypassword". Can be any printable ASCII character except "/", "", or "@". |

| Parameter label (name)             | Default | Description |
|------------------------------------|---------|-------------|
| (PACMasterUserPass<br>wordConfirm) |         |             |

### Enterprise Server Fileshare Configuration:

| Parameter label (name)  | Default               | Description  |
|---|-----------------------|--|
| <b>Fileshare type</b><br>(FileshareType)  | None                  | If you choose 'None', the remaining Fileshare Configuration parameters are ignored.  |
| <b>Install Fileshare Demo App</b><br>(InstallFSDemoApp)                           | False                 | Choose 'false' if you don't want to install the Enterprise Server Fileshare demo app. Requires selection of the 'Create-Remote-Fileshare-Server' Fileshare type. |
| <b>Enterprise Server Fileshare instance type</b><br>(FSInstanceType)              | c5.large              | The type of Enterprise Server Fileshare instance.  |
| <b>Fileshare allocated storage size</b><br>(FSStorageInGiB)                       | 250                   | Enter 1-16384 GiB.   |
| <b>Enterprise Server Fileshare CCITCP listener port</b><br>(FSCCITCPListenerPort) | 3000                  | The TCP port in the range 1-65535.   |
| <b>FSVIEW user password</b><br>(FSVIEWUserPassword)                               | <i>Requires input</i> | The password for the FSVIEW user. Must be at least 8 characters containing letters, numbers, and symbols.  |
| <b>Re-enter the FSVIEW user password</b><br>(FSVIEWUserPasswordConfirm)           | <i>Requires input</i> | Confirm the password for the FSVIEW user. Must be at least 8 characters containing letters, numbers, and symbols.  |

### Database Configuration:

| Parameter label (name)                 | Default | Description  |
|--|---------|--|
| <b>Database type</b><br>(DatabaseType) | None    | If you choose 'None', the remaining Database Configuration parameters are ignored. |

| Parameter label (name)   | Default                          | Description   |
|--|----------------------------------|---|
| <b>Install SQLServer Demo App</b><br>(InstallSQLDemoApp)                           | False                            | Choose 'true' if you want to install the Enterprise Server SQL Server demo app. Requires selection of the 'Create-RDS-Remote-Database' Database type.                             |
| <b>Database instance class</b><br>(DBInstanceClass)                                | db.r4.large                      | The type of Amazon RDS DB instance.   |
| <b>Database allocated storage size</b><br>(DBStorageInGiB)                         | 100                              | Enter 20-16384 GiB.   |
| <b>Database Master username</b><br>(DBMasterUsername)                              | DBAdmin                          | Specify an alphanumeric string that defines the login ID for the master user. Master user name must start with a letter. Must contain 1 to 64 alphanumeric characters.            |
| <b>Database Master password</b><br>(DBMasterUserPassword)                          | <i>Requires input</i>            | The password for the DB master user. Must be at least eight characters long, as in "mypassword". Can be any printable ASCII character except "/", "", or "@".                     |
| <b>Re-enter the database Master User password</b><br>(DBMasterUserPasswordConfirm) | <i>Requires input</i>            | Confirm the password for the DB master user. Must be at least eight characters long, as in "mypassword". Can be any printable ASCII character except "/", "", or "@".             |
| <b>Deploy in multiple Availability Zones</b><br>(DeployMultiAZ)                    | False                            | Choose 'true' to deploy the database across multiple Availability Zones.  |
| <b>Database backup retention period</b><br>(DBBackupRetentionPeriod)               | 30                               | The number of days that Amazon RDS should retain automatic backups of the DB instance. A backup retention period of zero days will disable automated backups for the DB Instance. |
| <b>Database preferred backup window</b><br>(DBPreferredBackupWindow)               | <i>Requires input (optional)</i> | Must be in the format hh24:mi-hh24:mi, in UTC. Must be at least 30 minutes and must not conflict with the preferred maintenance window.   |
| <b>Database preferred maintenance window</b><br>(DBPreferredMaintenanceWindow)     | <i>Requires input (optional)</i> | Must be in the format ddd:hh24:mi-ddd:hh24:mi, in UTC. Must be at least 30 minutes.   |

*Enterprise Server Demo Apps Configuration:*

| Parameter label (name)   | Default               | Description  |
|--|-----------------------|--|
| <b>Enterprise Server Demo User password</b><br>(ESDemoUserPassword)                      | <i>Requires input</i> | The password for the ESDemoUser. Must contain 8 to 32 characters, at least one uppercase letter, one lowercase letter, one number and one special character.     |
| <b>Re-enter the Enterprise Server Demo User password</b><br>(ESDemoUserPassword Confirm) | <i>Requires input</i> | Confirm password for the ESDemoUser. Must contain 8 to 32 characters, at least one uppercase letter, one lowercase letter, one number and one special character. |
| <b>Allowed Demo Apps external access CIDR</b><br>(DemoAppsIngressCIDR)                   | <i>Requires input</i> | The allowed CIDR block for external access to the demo apps. The CIDR block parameter must be in the form x.x.x.x/x.   |
| <b>Fileshare Bank Demo TN3270 Port</b><br>(FSDemoApp3270Port)                            | 5555                  | The TN3270 port must be a number (1-65535).  |
| <b>SQLServer Bank Demo TN3270 Port</b><br>(SQLDemoApp3270Port)                           | 5349                  | The TN3270 port must be a number (1-65535).  |

*AWS Quick Start Configuration:*

| Parameter label (name)                                | Default               | Description   |
|---|-----------------------|---|
| <b>Quick Start S3 bucket name</b><br>(QSS3BucketName) | <i>Requires input</i> | The S3 bucket you have created for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. The bucket name can include numbers, lowercase letters, uppercase letters, and hyphens (-), but should not start or end with a hyphen. |
| <b>Quick Start S3 key prefix</b><br>(QSS3KeyPrefix)   | <i>Requires input</i> | The S3 key name prefix used to simulate a folder for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. This prefix can include numbers, lowercase letters, uppercase letters, hyphens (-), and forward slashes (/).         |

- **Option 2: Parameters for deploying Enterprise Server into an existing VPC**

[View template](#)

*Software License Agreement:*

| Parameter label (name)   | Default               | Description   |
|--|-----------------------|---|
| <b>License agreement</b><br>(LicenseAgreement)                   | –                     | You must agree to the terms and conditions. I have read and agree to the license terms for Micro Focus Enterprise Server ( <a href="https://www.microfocus.com/documentation/enterprise-developer/ed-latest/ES-WIN/GUID-0562B3C9-2271-4CE8-AF64-93DE4940077F.html">https://www.microfocus.com/documentation/enterprise-developer/ed-latest/ES-WIN/GUID-0562B3C9-2271-4CE8-AF64-93DE4940077F.html</a> ). |
| <b>Enterprise Server license filename</b><br>(ESLicenseFilename) | <i>Requires input</i> | Place the license file obtained from Micro Focus in the S3 bucket folder:<br>s3://<Enterprise Server S3 bucket name>/license/   |

*Network Configuration:*

| Parameter label (name)                             | Default               | Description   |
|--|-----------------------|---|
| <b>VPC ID</b><br>(VPCID)                           | <i>Requires input</i> | The ID of your existing VPC for deployment.   |
| <b>Public Subnet 1 ID</b><br>(PublicSubnet1ID)     | <i>Requires input</i> | The ID of public subnet 1 in Availability Zone 1 for the Elastic Load Balancing (ELB) load balancer (e.g., subnet-9bc642ac).  |
| <b>Public Subnet 2 ID</b><br>(PublicSubnet2ID)     | <i>Requires input</i> | The ID of public subnet 2 in Availability Zone 2 for the Elastic Load Balancing (ELB) load balancer (e.g., subnet-e3246d8e).  |
| <b>Private Subnet 1A ID</b><br>(PrivateSubnet1AID) | <i>Requires input</i> | The ID of private subnet 1A in Availability Zone 1 (e.g., subnet-a0246dcd).   |
| <b>Private Subnet 2A ID</b><br>(PrivateSubnet2AID) | <i>Requires input</i> | The ID of private subnet 2A in Availability Zone 2 (e.g., subnet-01a43dc1ca1fa7f9b).  |
| <b>Availability Zones</b><br>(AvailabilityZones)   | <i>Requires input</i> | The list of Availability Zones to use for the subnets in the VPC. The Quick Start uses two Availability Zones from your list and preserves the logical order you specify. |

*Microsoft Active Directory Configuration:*

| Parameter label (name)                              | Default               | Description   |
|---|-----------------------|---|
| <b>Directory Service ID</b><br>(DirectoryServiceID) | <i>Requires input</i> | The ID of the AWS Managed Microsoft AD directory in which you want to deploy. |

| Parameter label (name)   | Default               | Description  |
|--|-----------------------|--|
| <b>Domain DNS name</b><br>(DomainDNSName)  | example.com           | The fully qualified domain name (FQDN), e.g., example.com. Must be 2-255 characters.                                       |
| <b>Domain NetBIOS name</b><br>(DomainNetBIOSName)                                  | example               | The NetBIOS name of the domain (up to 15 characters) for users of earlier versions of Microsoft Windows, e.g., example.    |
| <b>Domain member Security Group ID</b><br>(DomainMemberSGID)                       | <i>Requires input</i> | The ID of the Domain Member Security Group (e.g., sg-7f16e910).  |
| <b>Domain Admin account password</b><br>(DomainAdminPassword)                      | <i>Requires input</i> | The password for the domain Admin account. Must be at least 8 characters containing letters, numbers, and symbols.         |
| <b>Re-enter the domain Admin account password</b><br>(DomainAdminPassword Confirm) | <i>Requires input</i> | Confirm the password for the domain Admin account. Must be at least 8 characters containing letters, numbers, and symbols. |

#### Remote Desktop Gateway Configuration:

| Parameter label (name)                                  | Default               | Description   |
|---|-----------------------|---|
| <b>RD Gateway Security Group ID</b><br>(RDGWAccessSGID) | <i>Requires input</i> | The security group ID for access from the Remote Desktop Gateway. |

#### Enterprise Server Configuration:

| Parameter label (name)  | Default               | Description  |
|---|-----------------------|--|
| <b>Enterprise Server instance type</b><br>(ESInstanceType)                      | c5.large              | The type of Enterprise Server instance.  |
| <b>Number of Enterprise Server instances</b><br>(NumberOfESInstance)            | 1                     | The number of Enterprise Server instances to start.  |
| <b>Key pair name</b><br>(KeyPairName)   | <i>Requires input</i> | The name of an existing EC2 key pair. All instances will launch with this key pair.                  |
| <b>Number of Enterprise Server regions per instance</b><br>(RegionsPerInstance) | 1                     | The number of regions per Enterprise Server instance. Must be between 1 and 10 regions per instance. |



| Parameter label (name)  | Default               | Description  |
|---|-----------------------|--|
| <b>Additional Enterprise Server instance storage</b><br>(AdditionalESStorageinGiB)                                | 100                   | Additional EBS storage capacity in gibibytes (GiBs) added to each Enterprise Server instance. Enter 0-16384 GiB.   |
| <b>Enterprise Server CCITCP listener port</b><br>(ESCCITCPListenerPort)   | 86                    | The TCP port in the range 1-65535.   |
| <b>Amazon CloudWatch log retention</b><br>(ESCWLogGroupRetentionInDays)   | 7                     | The number of days that log events are kept in Amazon CloudWatch Logs.   |
| <b>Micro Focus Directory Server service domain account name</b><br>(MFDDServiceAccountName)                       | MFDDServiceAccount    | The existing domain account name under which the service will run. If left as default, a domain account 'MFDDServiceAccount' is created. The name must be 5-25 characters.   |
| <b>Micro Focus Directory Server service account password</b><br>(MFDDServiceAccountPassword)                      | <i>Requires input</i> | Enter a password for MFDDServiceAccount. Must be at least 8 characters containing letters, numbers, and symbols.   |
| <b>Re-enter the Micro Focus Directory Server, Service Account Password</b><br>(MFDDServiceAccountPasswordConfirm) | <i>Requires input</i> | Confirm the password for MFDDServiceAccount. Must be at least 8 characters containing letters, numbers, and symbols.   |
| <b>Operator email address</b><br>(OperatorEmail)  | None                  | (optional) The email address that notifications are sent to (e.g., database, VM failures, etc.).   |
| <b>Enterprise Server S3 bucket name</b><br>(ESS3BucketName)   | <i>Requires input</i> | The name of the existing S3 bucket used to store/retrieve objects specific to this stack. A system integrator extending this Quick Start should use this bucket to store or retrieve items needed. This string can include numbers, lowercase letters, uppercase letters, and hyphens (-). It cannot start or end with a hyphen (-). |
| <b>Resource 'Name' prefix</b><br>(ESResourceNamePrefix)   | AWS::StackName        | Used to prefix resource 'Name' tags. Leave empty for no prefix. Otherwise, use 'AWS::StackName' or a value such as the parent stack's name.  |

*Enterprise Server Fileshare Configuration:*

| Parameter label (name)  | Default               | Description  |
|---|-----------------------|--|
| <b>Fileshare type</b><br>(FileshareType)  | None                  | If you choose 'None', the remaining Fileshare Configuration parameters are ignored.  |
| <b>Install Fileshare Demo App</b><br>(InstallFSDemoApp)                           | False                 | Choose 'false' if you don't want to install the Enterprise Server Fileshare demo app. Requires selection of the 'Create-Remote-Fileshare-Server' Fileshare type. |
| <b>Enterprise Server Fileshare instance type</b><br>(FSInstanceType)              | c5.large              | The type of Enterprise Server Fileshare instance.  |
| <b>Fileshare allocated storage size</b><br>(FSStorageInGiB)                       | 250                   | Enter 1-16384 GiB  |
| <b>Enterprise Server Fileshare CCITCP listener port</b><br>(FSCCITCPListenerPort) | 3000                  | The TCP port in the range 1-65535.   |
| <b>FSVIEW user password</b><br>(FSVIEWUserPassword)                               | <i>Requires input</i> | The password for the FSVIEW user. Must be at least 8 characters containing letters, numbers, and symbols.  |
| <b>Re-enter the FSVIEW user password</b><br>(FSVIEWUserPassword Confirm)          | <i>Requires input</i> | Confirm password for the FSVIEW user. Must be at least 8 characters containing letters, numbers, and symbols.  |

*Database Configuration:*

| Parameter label (name)                                     | Default     | Description  |
|--|-------------|--|
| <b>Database type</b><br>(DatabaseType)                     | None        | If you choose 'None', the remaining Database Configuration parameters are ignored.   |
| <b>Install SQLServer Demo App</b><br>(InstallSQLDemoApp)   | False       | Choose 'true' if you want to install the Enterprise Server SQLServer demo app. Requires selection of the 'Create-RDS-Remote-Database' Database type. |
| <b>Database instance class</b><br>(DBInstanceClass)        | db.r4.large | The type of Amazon RDS DB instance.  |
| <b>Database allocated storage size</b><br>(DBStorageInGiB) | 100         | Enter 20-16384 GiB   |

| Parameter label (name)  | Default                          | Description  |
|---|----------------------------------|--|
| <b>Database Master username</b><br>(DBMasterUsername)                               | DBAdmin                          | Specify an alphanumeric string that defines the login ID for the master user. Master user name must start with a letter. Must contain 1 to 64 alphanumeric characters.                   |
| <b>Database Master password</b><br>(DBMasterUserPassword)                           | <i>Requires input</i>            | The password for the DB master user. Must be at least eight characters long, as in "mypassword". Can be any printable ASCII character except "/", "", or "@".                            |
| <b>Re-enter the database Master User password</b><br>(DBMasterUserPassword Confirm) | <i>Requires input</i>            | Confirm the password for the DB master user. Must be at least eight characters long, as in "mypassword". Can be any printable ASCII character except "/", "", or "@".                    |
| <b>Deploy in multiple Availability Zones</b><br>(DeployMultiAZ)                     | False                            | Choose 'true' to deploy the database across multiple Availability Zones.   |
| <b>Database backup retention period</b><br>(DBBackupRetention Period)               | 30                               | Select the number of days that Amazon RDS should retain automatic backups of the DB instance. A backup retention period of zero days will disable automated backups for the DB Instance. |
| <b>Database preferred backup window</b><br>(DBPreferredBackup Window)               | <i>Requires input (optional)</i> | Must be in the format hh24:mi-hh24:mi, in UTC. Must be at least 30 minutes and must not conflict with the preferred maintenance window.  |
| <b>Database preferred maintenance window</b><br>(DBPreferredMaintenance Window)     | <i>Requires input (optional)</i> | Must be in the format ddd:hh24:mi-ddd:hh24:mi, in UTC. Must be at least 30 minutes.  |

### Enterprise Server Demo Apps Configuration:

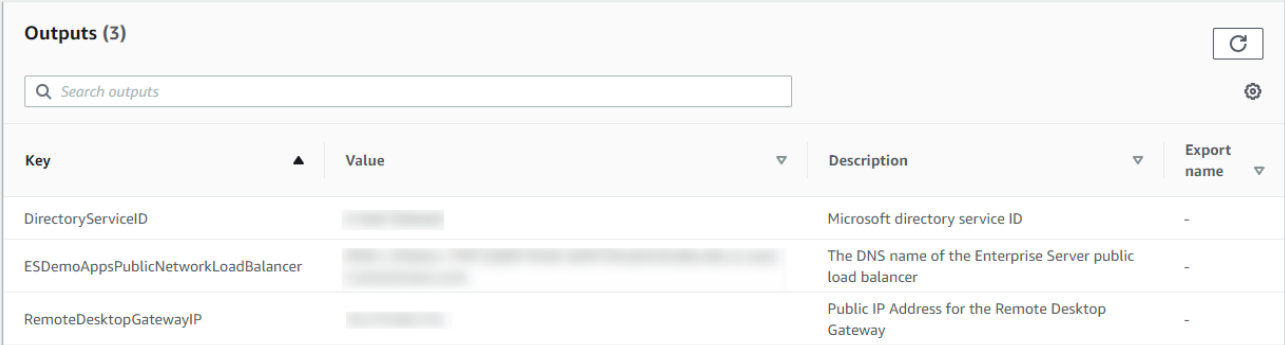
| Parameter label (name)  | Default               | Description  |
|---|-----------------------|--|
| <b>Enterprise Server Demo User password</b><br>(ESDemoUserPassword)                     | <i>Requires input</i> | The password for the ESDemoUser. Must contain 8 to 32 characters, at least one uppercase letter, one lowercase letter, one number and one special character. |
| <b>Re-enter the Enterprise Server Demo User password</b><br>(ESDemoUserPasswordConfirm) | <i>Requires input</i> | Confirm password for the ESDemoUser. Must be at least 8 characters containing letters, numbers, and symbols.   |
| <b>Allowed Demo Apps external access CIDR</b><br>(DemoAppsIngressCIDR)                  | <i>Requires input</i> | The allowed CIDR block for external access to the demo apps. The CIDR block parameter must be in the form x.x.x.x/x.   |

| Parameter label (name)   | Default | Description                                 |
|--|---------|---|
| <b>Fileshare Bank Demo TN3270 Port</b><br>(FSDemoApp3270Port)  | 5555    | The TN3270 port must be a number (1-65535). |
| <b>SQLServer Bank Demo TN3270 Port</b><br>(SQLDemoApp3270Port) | 5349    | The TN3270 port must be a number (1-65535). |

### AWS Quick Start Configuration:

| Parameter label (name)                                    | Default               | Description   |
|---|-----------------------|---|
| <b>Quick Start S3 bucket name</b><br>(QSS3BucketName)     | <i>Requires input</i> | The S3 bucket you have created for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. The bucket name can include numbers, lowercase letters, uppercase letters, and hyphens (-), but should not start or end with a hyphen. |
| <b>Quick Start S3 bucket region</b><br>(QSS3BucketRegion) | <i>Requires input</i> | The AWS Region where the Quick Start S3 bucket (QSS3BucketName) is hosted. When using your own bucket, you must specify this value.   |
| <b>Quick Start S3 key prefix</b><br>(QSS3KeyPrefix)       | <i>Requires input</i> | The S3 key name prefix used to simulate a folder for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. This prefix can include numbers, lowercase letters, uppercase letters, hyphens (-), and forward slashes (/).         |

- On the **Configure stack options** page, you can [specify tags](#) (key-value pairs) for resources in your stack and [set advanced options](#). When you're done, choose **Next**.
- On the **Review** page, review and confirm the template settings. Under **Capabilities**, select the check box to acknowledge that the template will create IAM resources.
- Choose **Submit** to deploy the stack.
- Monitor the status of the stack. When the status is **CREATE\_COMPLETE**, the Enterprise Server cluster is ready.
- Use the URLs displayed in the **Outputs** tab for the stack to view the resources that were created. Some of the values listed in the **Key** column of the **Outputs** tab depend on the settings of some of the stack's parameters, so you might not see all the options shown in the following figure.



| Key                                 | Value      | Description  | Export name |
|-------------------------------------|------------|--|-------------|
| DirectoryServiceID                  | [REDACTED] | Microsoft directory service ID                             | -           |
| ESDemoAppsPublicNetworkLoadBalancer | [REDACTED] | The DNS name of the Enterprise Server public load balancer | -           |
| RemoteDesktopGatewayIP              | [REDACTED] | Public IP Address for the Remote Desktop Gateway           | -           |

**Figure 5: CloudFormation Outputs tab after stack creation**

## Step 5. Test the Deployment

To test the deployment, you run a demonstration application called BankDemo.

BankDemo is a demonstration application for an imaginary banking company and provides simple banking functionality such as displaying accounts and transactions, transferring funds between accounts, and changing users' contact details. The source code for BankDemo is supplied with Enterprise Developer, which is a Micro Focus product that enables you to develop and maintain mainframe COBOL and PL/I applications.

This Quick Start for Enterprise Server includes deployable files that have been built using Enterprise Developer. Running BankDemo after you have launched this Quick Start enables you to verify that the Quick Start has deployed as expected and that Enterprise Server is running successfully on AWS.

This Quick Start includes three versions of BankDemo that differ in the types of data that they use (and therefore the types of AWS instances that they require). The three versions of BankDemo use the following types of data:

- VSAM data files that are processed by Fileshare. This version requires a Fileshare instance.
- A SQL Server database. This version requires an Amazon RDS instance.
- A Performance and Availability Cluster (PAC) using ElastiCache for Redis as a Scale-Out Repository (SOR). The VSAM data files are hosted in Amazon Aurora.

The information in the rest of this section describes how to test the general functionality of the BankDemo demonstration. If you will be using the PAC version of BankDemo, an additional document, [Micro Focus Enterprise Server on the AWS Cloud - Scale-Out Architecture Demonstrations](#) describes how you can use the BankDemo demonstration to investigate the scale-out features provided by Enterprise Server.

Most of the information in the rest of this section applies equally to all versions of BankDemo. Information that does not apply to all versions is marked accordingly.

**Note** The files for the BankDemo demonstration applications are only installed if you set the **Install Fileshare Demo App**, **Install SQLServer Demo App**, or **Install PAC Demo App** parameters to **true** when launching this Quick Start. To run the BankDemo demonstration application you must have a TN3270 terminal emulator. The following instructions use Micro Focus Rumba, which is supplied with Micro Focus Enterprise Developer.

All versions of the BankDemo application can run in online mode. The Fileshare and PAC versions can additionally run in batch mode.

The instructions in the remainder of this section walk you step-by-step through the process of performing the following operations:

- [Connecting to the BankDemo enterprise server](#)
- [Running BankDemo in online mode](#)
- [Running BankDemo in batch mode](#) (Fileshare and PAC versions only)
- [Housekeeping after running BankDemo](#)

### *Connecting to the BankDemo Enterprise Server*

The BankDemo application runs in an enterprise server that's started automatically when you launch this Quick Start. This section describes how to connect to this enterprise server. Use your TN3270 terminal emulator to connect to the load balancer using the following details:

```
Load-balancer-DNS-name:port
```

where:

- `Load-balancer-DNS-name` is the DNS name of the load balancer. This is the value specified for the **ESDemoAppsPublicNetworkLoadBalancer** key on the Enterprise Server stack's **Outputs** tab (as shown in [Figure 5](#)).
- `port` is the port number to use and varies depending on which version of BankDemo you are running. The possible values for `port` are as follows:
  - 5555 - Fileshare version

- 5556 - SQL version
- 5557 - PAC version

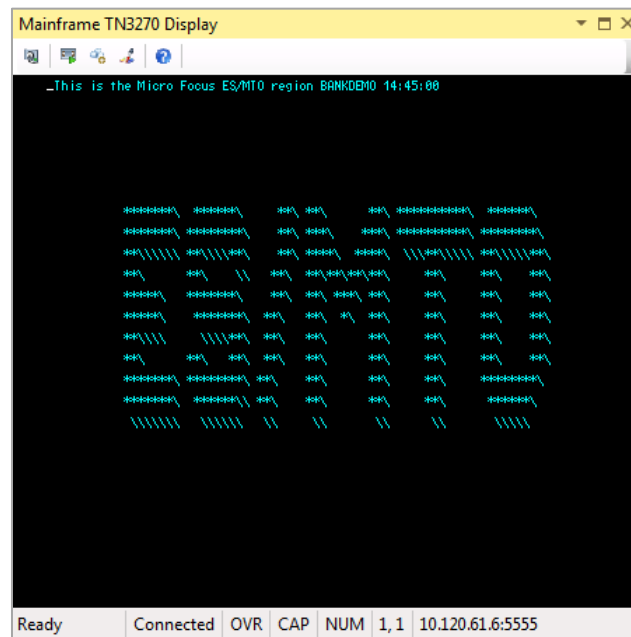
**Note** Some TN3270 terminal emulators place a limit on the length of the name to connect to. If that limit is less than the length of *Load-balancer-DNS-name* you can find the load balancer's IP address by using the following command:

```
ping Load-balancer-DNS-name
```

The request will time out, but the load balancer's IP address will be included in the message returned.

Once you have this information, you can connect your TN3270 terminal emulator to *Load-balancer-IP-address:port* instead of *Load-balancer-DNS-name:port*.

Once connected to the Fileshare or PAC version of the BankDemo application you will see a screen similar to the one in Figure 6. When you connect to the SQL version of BankDemo, you will see a blank screen instead.



**Figure 6: The Enterprise Server region for the Fileshare or PAC version of BankDemo**

Now that you're connected, you're ready to run the BankDemo application in online mode.

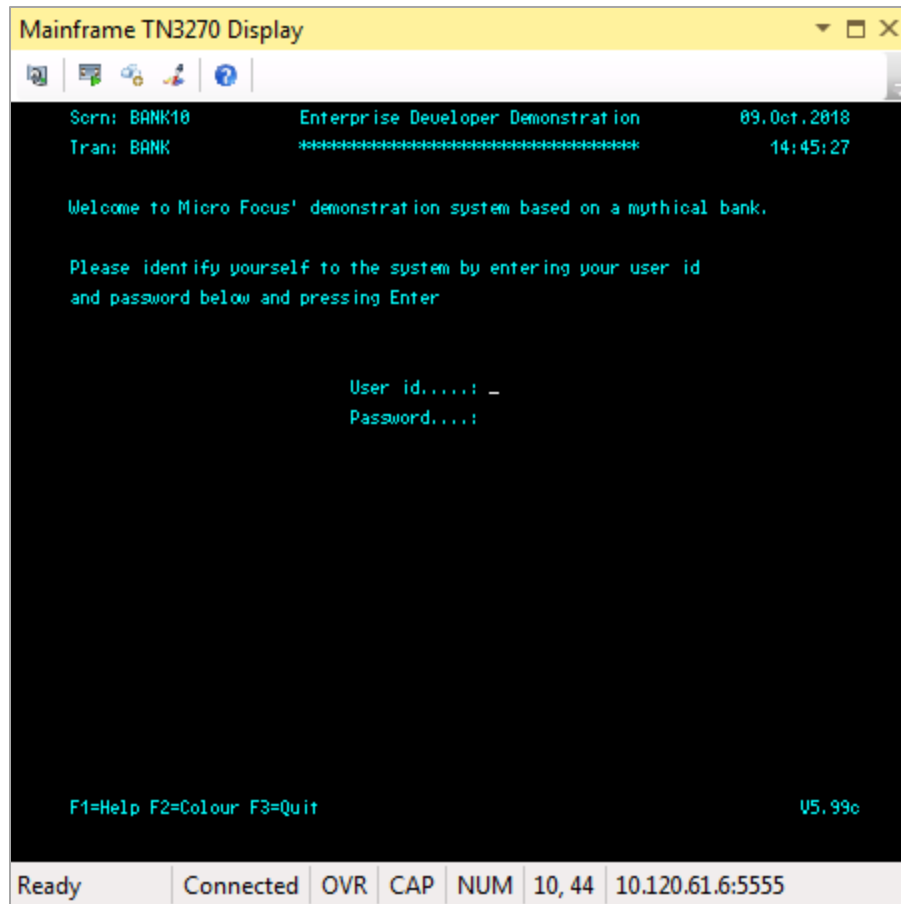
### *Running BankDemo in Online Mode*

You can now perform the following steps to run the BankDemo application in online mode:

1. Press **Ctrl+Shift+Z** to clear the screen.
2. Enter the name of the transaction to run:

**BANK**

The BankDemo sign-on screen is displayed, as shown in Figure 7.



**Figure 7: The BankDemo sign-on screen**

This screen being displayed is confirmation that the BankDemo application is running under Enterprise Server on AWS.

The rest of this section describes how you can try out some of BankDemo's features in online mode, to verify that it is able to read and write data as expected.

If you don't want to try out these BankDemo features in online mode, your next step depends on which version of BankDemo you're running:



- If you are running the Fileshare or PAC version of BankDemo, you can jump to the section [Running BankDemo in Batch Mode](#).
- If you are running the SQL version of BankDemo, you can jump to the section [Housekeeping after Running BankDemo](#).

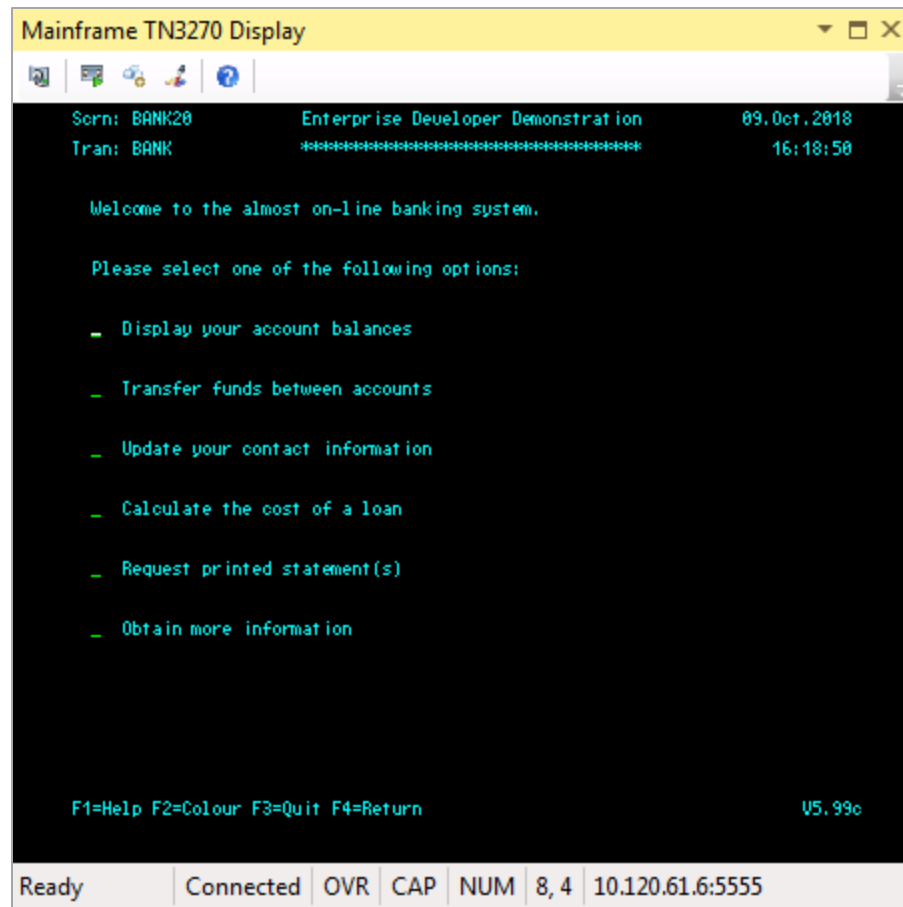
The remaining steps in this section enable you to verify that BankDemo can read and write data by logging in as a user, viewing the user's balance, transferring an amount between two of the user's accounts, and viewing the user's balance again to confirm that the transfer has happened.

**Tip** Each screen of the BankDemo application has its own help page, which you can access by pressing **F1**.

3. From the BankDemo sign-on screen, specify a valid user ID, press **Tab**, and then enter a password. Valid user IDs are B0001 - B0036. This demonstration uses B0004.

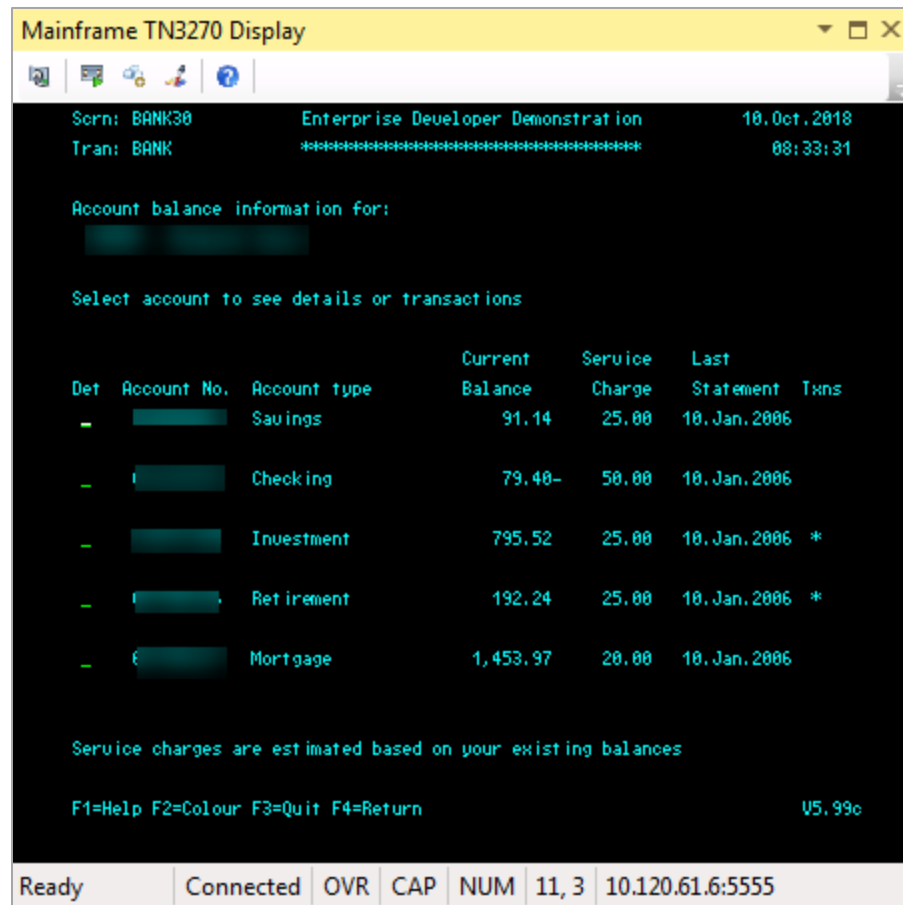
You can use any valid user ID, but if you choose a user other than B0004, the data presented on the screens that you see will be different from the data shown in the figures from this point on.

The password can be any non-blank character string. Once successfully logged on, you see the BankDemo main options screen:



**Figure 8: The BankDemo main options screen**

4. The cursor is positioned on the first option, **Display your account balances**. Press **X**, and then press **Enter**. The BankDemo account balances screen is displayed, showing the balances of the different accounts held by this user:

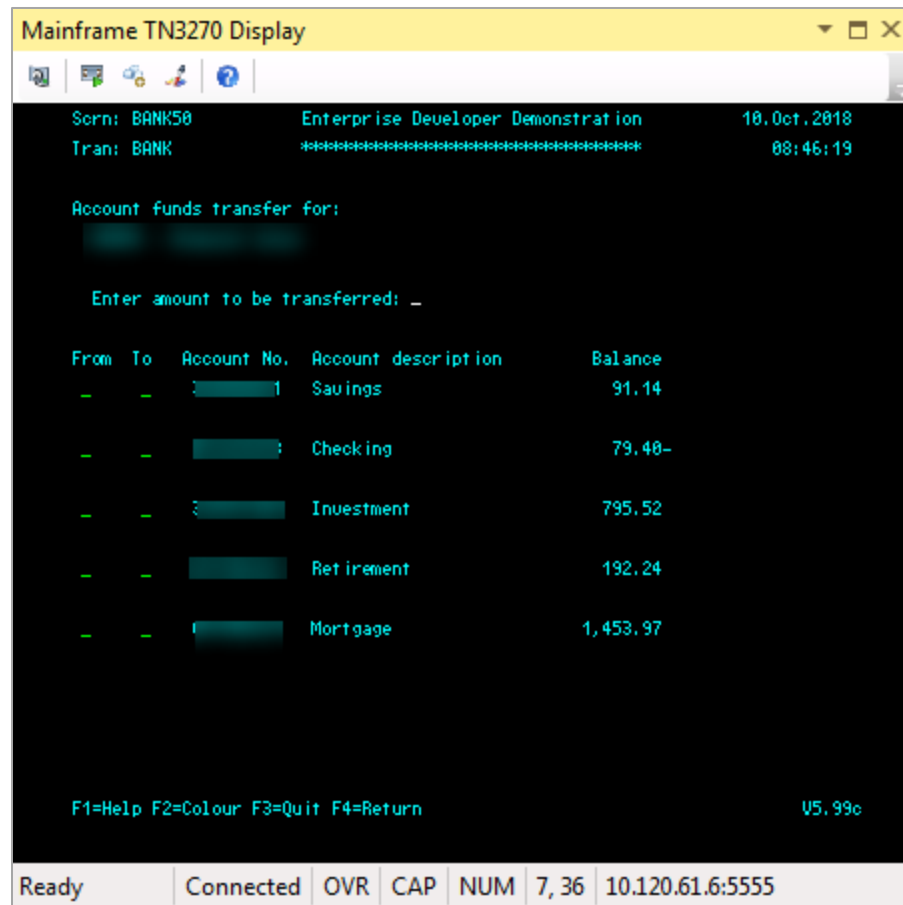


**Figure 9: The BankDemo account balances screen**

5. Press **F4** to return to the BankDemo main options screen.
6. Now we want to transfer some funds from one account to another. You can see from Figure 9 that this user's checking account is overdrawn, so we will transfer \$80 from the savings account to the checking account.

Press **Tab** so that the cursor is positioned next to the **Transfer funds between accounts** option, press **X**, and then press **Enter**.

The BankDemo balance transfer screen is displayed, showing the user's accounts, their balances, and options to move an amount from one account to another.



**Figure 10: The BankDemo balance transfer screen**

7. The cursor is positioned next to the **Enter amount to be transferred** prompt. Specify `80.00` and then press **Tab**.
  8. The cursor is now positioned in the **From** column of the savings account. This is the account that we want to transfer money from. Press **X**, and then press **Tab** twice.
  9. The cursor is now positioned in the **To** column of the checking account. This is the account that we want to transfer money into. Press **X**, and then press **Enter**.
- The account balances are updated, and a message appears toward the bottom of the screen summarizing the transfer.
10. Press **F4** to return to the BankDemo main options screen.
  11. Although the balance transfer screen showed us the changed account balances after we had carried out the transfer, we will now display the account balances screen again. This is to confirm that the data has been updated and that we can read it.

The cursor is positioned on the first option, **Display your account balances**. Press **X**, and then press **Enter**.

The account balances screen is displayed, showing the balances that reflect the changes that were made.

12. Press **F3** to exit BankDemo.

### *Running BankDemo in Batch Mode*

If you're running the Fileshare or PAC version of BankDemo, you can now run it in batch mode. The steps required to do this can be summarized as follows:

1. [Close the BankDemo data files.](#)
2. [Submit the BankDemo JCL job.](#)
3. [View the output.](#)
4. [Reopen the BankDemo data files.](#)

### *Closing the BankDemo Data Files*

1. Still in your TN3270 terminal emulator, press **Ctrl+Shift+Z** to clear the screen.
2. Enter the following, which is the name of a supplied transaction to close BankDemo's data files:

```
CFIL
```

A message is displayed confirming that the data files have been closed.

### *Submitting the BankDemo JCL Job*

To submit the JCL job, you must first connect to the Remote Desktop Gateway instance. After connecting to the Remote Desktop Gateway instance, you connect to another instance, ESCWAInstance, from where you can use Enterprise Server Common Web Administration (ESCWA) to submit the JCL job.

1. From the Enterprise Server stack's **Outputs** tab (see [Figure 5](#)), select the value specified for the **RemoteDesktopGatewayIP** key, and copy it to the clipboard.

**Note** If you launched the Quick Start into an existing VPC, you need to use the appropriate access mechanism in place for your VPC to establish a remote desktop session to the Enterprise Server instance. This could be your own deployed Remote

Desktop Gateway, for instance, or you could directly access the instance from your on-premises network, if you have a hybrid environment.

2. Use Remote Desktop Connection to connect to the Remote Desktop Gateway instance specifying the following credentials:
  - a. Computer: The IP address you copied to the clipboard at step 1.
  - b. User name: **domain\ESDemoUser**, where **domain** is the value specified for the **Domain NetBIOS name** parameter when you launched the Quick Start. The default value for this parameter is "example".
  - c. Password: The value specified for the **Enterprise Server Demo User password** parameter when you launched the Quick Start.
3. Now that you are connected to the Remote Desktop Gateway instance you can connect to ESCWAInstance to perform some additional tasks.

From the Remote Desktop Gateway instance, use Remote Desktop Connection to connect to ESCWAInstance specifying the following credentials:

- a. Computer: ESCWAInstance
  - b. User name: **domain\ESDemoUser**, where **domain** is the value specified for the **Domain NetBIOS name** parameter when you launched the Quick Start. The default value for this parameter is "example".
  - c. Password: The value specified for the **Enterprise Server Demo User password** parameter when you launched the Quick Start.
4. On ESCWAInstance, start Google Chrome, and enter the following text into the address bar:

```
http://localhost:10004
```

Google Chrome opens showing the dashboard for Enterprise Server Common Web Administration (ESCWA).

The dashboard shows two warning messages (which are expected) and a Welcome message.

5. Choose **NATIVE**.

The navigation pane on the left shows the directory servers that are running, which vary depending on whether you are running the Fileshare version of BankDemo or the PAC version:

- For the Fileshare version you will see two directory servers listed: ESSERVER1 and ESSERVER2. ESSERVER1 is started and is where BankDemo is running. ESSERVER2 is stopped and is not used by BankDemo so can be ignored.

Choose **ESSERVER1** and you can see that it includes the BNKDMFS region which is running the BankDemo application.

- For the PAC version you will see two directory servers, ESSERVER1 and ESSERVER2.

Choose ESSERVER1 and ESSERVER2 in turn and you can see that they contain regions BNKDM and BNKDM2 respectively, both of which are running the BankDemo application.

The BNKDM and BNKDM2 regions have been configured to be part of the same Performance and Availability Cluster (PAC) and use a ElastiCache for Redis-based Scale-Out Repository (SOR). BankDemo's VSAM data files are hosted in Amazon Aurora.

Both ESSERVER1 and ESSERVER2 also contain a region called ESDEMO. The ESDEMO region is a demonstration region installed by default by Enterprise Server. It is not used by BankDemo so can be ignored.

The rest of the instructions for working with the PAC version of BankDemo show different operations being carried out on the BNKDM region running on the ESSERVER1 directory server. However, because ESSERVER1 and ESSERVER2 are configured as part of the same PAC, you could substitute ESSERVER2 and BNKDM2 for ESSERVER1 and BNKDM if you so choose.

6. In the navigation pane, expand **Directory Servers > ESSERVER1** and choose **BNKDMFS** if you are running the Fileshare version of BankDemo. If you are running the PAC version of BankDemo the region name is **BNKDM** rather than **BNKDMFS**.

The GENERAL PROPERTIES page shows the basic attributes of the region.

7. Choose **JES > Control**.

The JCL CONTROL page is displayed.

8. Using Windows Explorer on ESCWAInstance, navigate to the folder **c:\BankDemo\_FS\jcl** or **c:\BankDemo\_PAC\jcl** depending on which version of the demonstration application you are using.
9. Drag the file **ZBNKSTMT.jcl** into the dotted area of the JCL CONTROL page, and then choose **SUBMIT**.

A popup window and messages above the **VIEW JOB** button confirm that the JCL job has been submitted. The JCL job that you submitted reads one of the BankDemo data files, sorts the data in it, and then prints the results.

### Viewing the Output

1. Choose **VIEW JOB**.

The JOB page displays informational messages that were generated while the job was running.

2. Scroll to the bottom of the screen where you can see several entries in the DD ENTRIES group, hover over the row that contains **PRINTOUT** in the **DD NAME** column, and choose **View** () to the right of the **RECORDS** column.

The output from the JCL job is displayed, showing that you have successfully run BankDemo in batch mode.

### Reopening the BankDemo Data Files

After you have run BankDemo in batch mode, if you want to run it again in online mode, you must first reopen the data files.

1. Switch back to your TN3270 terminal emulator, and then press **Ctrl+Shift+Z** to clear the screen.
2. Enter the following, which is the name of a supplied transaction to open BankDemo's data files:

```
OFIL
```

A message is displayed confirming that the data files have been opened. You are now free to run BankDemo in online mode again.

### Housekeeping after Running BankDemo

After you have finished with BankDemo, disconnect from the running enterprise server, and then stop the enterprise server:

1. Choose the **Disconnect** button on the Rumba toolbar to disconnect from the running enterprise server.
2. Stop whichever enterprise servers are running the BankDemo application:
  - a. Connect to ESCWAInstance as ESDemoUser if you are not already connected to it. See [Submitting the BankDemo JCL Job](#) for information on how to do this.



- b. Start Google Chrome and enter the following text into the address bar:

```
http://localhost:10004
```

Google Chrome opens showing the dashboard for Enterprise Server Common Web Administration (ESCWA).

- c. In the left-hand pane, expand **Directory Servers > ESSERVER1** and choose the region specified beneath it. This will be one of **BNKDMFS**, **BNKDMSQL**, or **BNKDM** depending on the version of BankDemo that is running.
- d. Choose **GENERAL > Control**.

The CONTROL page is displayed for the region that you selected.

- e. Choose **STOP**.

The Region Stop Options dialog box is displayed showing the region details and security configuration information. This dialog box also gives you the option of specifying operating system and security credentials to be used.

- f. Choose **STOP**.

After a few seconds the status of the region is shown as **Stopped**.

**Note** The preceding instructions show how to stop an enterprise server using ESCWA.

If you have started an enterprise server from an Enterprise Server command prompt, however, you must also stop it from an Enterprise Server command prompt. Similarly, if you started an enterprise server from ESCWA, you must stop it ESCWA.

To stop an enterprise server from an Enterprise Server command prompt, connect to ESCWAInstance, open an Enterprise Server command prompt, and enter the relevant command.

The commands to stop an enterprise server for the different versions of BankDemo are below.

For the Fileshare version:

```
casstop -rBNKDMFS
```

For the SQL version:

```
casstop -rBNKDMSQL
```

For the PAC version:

```
casstop -rBNKDM
```

### Starting the BankDemo Enterprise Server Manually

The enterprise servers used by BankDemo are started automatically when you launch this Quick Start. As a result, if you stop these enterprise servers and then want to re-run the BankDemo application, you must manually start the enterprise server that is appropriate for the version of BankDemo that you want to run.

1. Connect to ESCWAInstance as ESDemoUser, if you aren't already connected to it. See [Submitting the BankDemo JCL Job](#) for information on how to do this.
2. If ESCWA is not already displayed, start Google Chrome and enter the following text into the address bar:

```
http://localhost:10004
```

Google Chrome opens showing the dashboard for Enterprise Server Common Web Administration (ESCWA).

3. In the left-hand pane, expand **Directory Servers** > **ESSERVER1** and choose the region specified beneath it. This will be one of **BNKDMFS**, **BNKDMSQL**, **BNKDM** depending on the version of BankDemo that is running.
4. Choose **GENERAL** > **Control**.

The CONTROL page is displayed for the region that you selected.

5. Choose **START**.

The Region Start Options dialog box is displayed showing the region details and security configuration information. This dialog box also gives you the option of specifying operating system and security credentials to be used.

If you are using the PAC version of BankDemo you can check **Cold Start** to specify that a cold start will be performed. For more information on cold starts see the **Cold Start** option's popup help or the description of the **casstart** command in your Enterprise Server documentation.

6. Choose **START**.

After a few seconds the status of the region is shown as **Started**.

**Note** The preceding instructions show how to start enterprise servers using ESCWA. If you would rather use the command line to start your enterprise server, connect to ESCWAInstance, open an Enterprise Server command prompt, and enter the relevant command.

The commands to start an enterprise server for the different versions of BankDemo are below.

For the Fileshare version:

```
casstart -rBNKDMFS
```

For the SQL version:

```
casstart -rBNKDMSQL
```

For the PAC version:

```
casstart -rBNKDM
```

When starting the enterprise server for the PAC version of BankDemo you might want to use the /s:c option to specify that the enterprise server is to be cold started. For more information see the description of the **casstart** command in your Enterprise Server documentation.

Whichever method you use to start an enterprise server (command line or ESCWA), you must use the same method to stop it.

## Best Practices Using Enterprise Server on AWS

The best practices that apply to using Enterprise Sever in a non-AWS environment also apply to using Enterprise Sever on AWS. See [Diagnostic Best Practice in Micro Focus Enterprise Server](#) for more information.

## Security

Information on security-related aspects of using Enterprise Server is available in the [Enterprise Server Support Pack](#).

## Troubleshooting

**Q.** My application encountered an error when running under Enterprise Server. What information do I need to include when informing Micro Focus of the issue, and what is the best way of obtaining that information?

**A.** For all troubleshooting exercises, gather as much information as possible about the state of the enterprise server region when the problem occurred and about the events leading up

to the problem. This should include the date/time that the problem occurred, observations on what was happening in the system, how long it had been running, what the symptoms were, and how/where these were observed.

When a problem occurs, capture and provide specific logs, traces and dumps, and ideally the contents of various configuration files, directories, and the output from several operating system tools. Do this as soon as possible after the failure occurs.

You can use the MFESdiags diagnostic collection script—**MFESdiags.cmd**—to collect the required Enterprise Server diagnostic information automatically.

This script is included in **C:\MFESDIAGS** in each Enterprise Server instance. It can be run from any command prompt or from Windows Explorer. You will be prompted for the region name. You should create a .zip file of the resultant data collection directory and attach it to the Support Incident (SI) that you submit.

The script invokes the relevant "mfsupport" utility, which collects information about the operating system and machine hardware along with details about Micro Focus products installed.

As a minimum, if MFESdiags isn't used to collect the data, you should collect and provide the following items as soon as possible after a failure (by zipping or 'tar'ing the contents of the system/region directory):

- console.log
- log.html or log-\*.html (for communications problems)
- Journal log (for MFDS/security problems)
- Any casdump or aux traces
- mfSupportInfo

However, the MFESdiags data collection script collects the preceding items, and other useful information details, as follows:

- All files from the Enterprise Server's System/Region Directory, including:
  - **console.log** and **console.bak**. The communications process log **log.html** or **log-\*.html**.
  - Any trace diagnostic datasets, **casauxta.rec** and **casauxtb.rec**.

- Any system abend dumps (**casdumpa.rec**, **casdumpb.rec** or **casdumpx.rec**).
- Any HSF output files (\*.csv).
- The output from mfSupportInfo – contains product and system info.
- The Resource Definition File (RDO/RDT), **dfhdrdat**.
- The Directory Server (MFDS) log file
- The Directory Server configuration directory.

**Q.** I encountered a CREATE\_FAILED error when I launched the Quick Start.

**A.** If AWS CloudFormation fails to create the stack, we recommend that you relaunch the template with **Rollback on failure** set to **No**. (This setting is under **Advanced** in the AWS CloudFormation console, **Options** page.) With this setting, the stack's state will be retained, and the instance will be left running, so you can troubleshoot the issue. (Look at the log files in %ProgramFiles%\Amazon\EC2ConfigService and C:\cfn\log.)

**Important** When you set **Rollback on failure** to **No**, you will continue to incur AWS charges for this stack. Please make sure to delete the stack when you finish troubleshooting.

For additional information, see [Troubleshooting AWS CloudFormation](#) on the AWS website.

**Q.** I encountered a size limitation error when I deployed the AWS CloudFormation templates.

**A.** We recommend that you launch the Quick Start templates from the links in this guide or from another S3 bucket. If you deploy the templates from a local copy on your computer or from a non-S3 location, you might encounter template size limitations when you create the stack. For more information about AWS CloudFormation limits, see the [AWS documentation](#).

## GitHub Repository

You can visit our [GitHub repository](#) to download the templates and scripts for this Quick Start, to post your comments, and to share your customizations with others.

## Additional Resources

### AWS services

- AWS Directory Service for Microsoft Active Directory (also known as AWS Managed Microsoft AD)  
[https://docs.aws.amazon.com/directoryservice/latest/admin-guide/directory\\_microsoft\\_ad.html](https://docs.aws.amazon.com/directoryservice/latest/admin-guide/directory_microsoft_ad.html)
- Amazon Aurora  
[https://docs.aws.amazon.com/AmazonRDS/latest/AuroraUserGuide/CHAP\\_AuroraOverview.html](https://docs.aws.amazon.com/AmazonRDS/latest/AuroraUserGuide/CHAP_AuroraOverview.html)
- Amazon EBS  
<https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/AmazonEBS.html>
- Amazon EC2  
<https://aws.amazon.com/documentation/ec2/>
- Amazon ElastiCache for Redis  
<https://docs.aws.amazon.com/AmazonElastiCache/latest/red-ug/WhatIs.html>
- Amazon S3 - Creating a Bucket  
<https://docs.aws.amazon.com/AmazonS3/latest/dev/UsingBucket.html#create-bucket-intro>
- Amazon VPC  
<https://aws.amazon.com/documentation/vpc/>
- AWS CloudFormation  
<https://aws.amazon.com/documentation/cloudformation/>
- AWS Solution Calculator  
<http://calculator.s3.amazonaws.com/index.html#r=IAD&key=calc-F065BC8B-D620-415F-B03B-097400FC1C7A>

### Enterprise Server on the AWS Cloud

- Empowering Enterprise Mainframe Workloads on AWS with Micro Focus  
<https://aws.amazon.com/blogs/apn/empowering-enterprise-grade-mainframe-workloads-on-aws-with-micro-focus/>

### Enterprise Server resources

The Micro Focus website includes a wide variety of resources related to Enterprise Server. Many of these resources are freely available, while other resources require you to have a

SupportLine login. To obtain a login, you need a valid license for Enterprise Server (or other relevant Micro Focus product). For licensing information, see [Costs and Licenses](#), earlier in this guide.

The following resources are freely available:

- Configuring the Fileshare Server  
<https://www.microfocus.com/documentation/enterprise-developer/ed80/ES-WIN/BKFSFSSTDOS011.html>
- Diagnostic Best Practice in Micro Focus Enterprise Server  
<https://supportline.microfocus.com/examplesandutilities/TroubleShootingpack/Best%20Practice%20implementation%20of%20MF%20Enterprise%20Server.pdf>
- Enterprise Server for UNIX product documentation:
  - Enterprise Server product documentation home page  
<https://www.microfocus.com/documentation/enterprise-developer/ed80/ES-UNIX/index.html>
  - Enterprise Server architecture  
<https://www.microfocus.com/documentation/enterprise-developer/ed80/ES-UNIX/GUID-B2ED168C-812D-4660-9A2C-F5A106E90FDD.html>
  - Enterprise Server instance architecture  
<https://www.microfocus.com/documentation/enterprise-developer/ed80/ES-UNIX/BKCACAINTRU005.html>
  - Scale-Out Performance and Availability Clusters  
<https://www.microfocus.com/documentation/enterprise-developer/ed80/ES-UNIX/GUID-F6E1BBB7-AEC2-45B1-9E36-1D86B84D2B85.html>
  - Micro Focus Enterprise Server on the AWS Cloud - Scale-Out Architecture Demonstrations  
[https://www.microfocus.com/documentation/enterprise-developer/ed50/Scale-Out Demonstration for Enterprise Server on AWS.pdf](https://www.microfocus.com/documentation/enterprise-developer/ed50/Scale-Out%20Demonstration%20for%20Enterprise%20Server%20on%20AWS.pdf)
- Enterprise Server for Windows product documentation:
  - Enterprise Server product documentation home page  
<https://www.microfocus.com/documentation/enterprise-developer/ed80/ES-WIN/index.html>
  - Enterprise Server architecture  
<https://www.microfocus.com/documentation/enterprise-developer/ed80/ES-WIN/GUID-B2ED168C-812D-4660-9A2C-F5A106E90FDD.html>

- Enterprise Server instance architecture  
<https://www.microfocus.com/documentation/enterprise-developer/ed80/ES-WIN/BKCACAINTRU005.html>
- Scale-Out Performance and Availability Clusters  
<https://www.microfocus.com/documentation/enterprise-developer/ed80/ES-WIN/GUID-F6E1BBB7-AEC2-45B1-9E36-1D86B84D2B85.html>
- Micro Focus End User License Agreement  
<https://www.microfocus.com/documentation/enterprise-developer/ed80/ES-WIN/GUID-0562B3C9-2271-4CE8-AF64-93DE4940077F.html>
- Requesting a Trial License for Enterprise Server  
<https://www.microfocus.com/products/enterprise-suite/enterprise-server/trial/>
- To Set Environment Variables from the User Interface  
<https://www.microfocus.com/documentation/enterprise-developer/ed80/ES-WIN/GUID-B31297A6-577B-4118-961B-FBD8DB4C2892.html>

The following resource requires you to have a SupportLine login:

Enterprise Server Troubleshooting Enablement Pack and Support Videos

<https://supportline.microfocus.com/examplesandutilities/TroubleShootingpack/index.aspx>

### Quick Start reference deployments

- AWS Quick Start home page  
<https://aws.amazon.com/quickstart/>



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