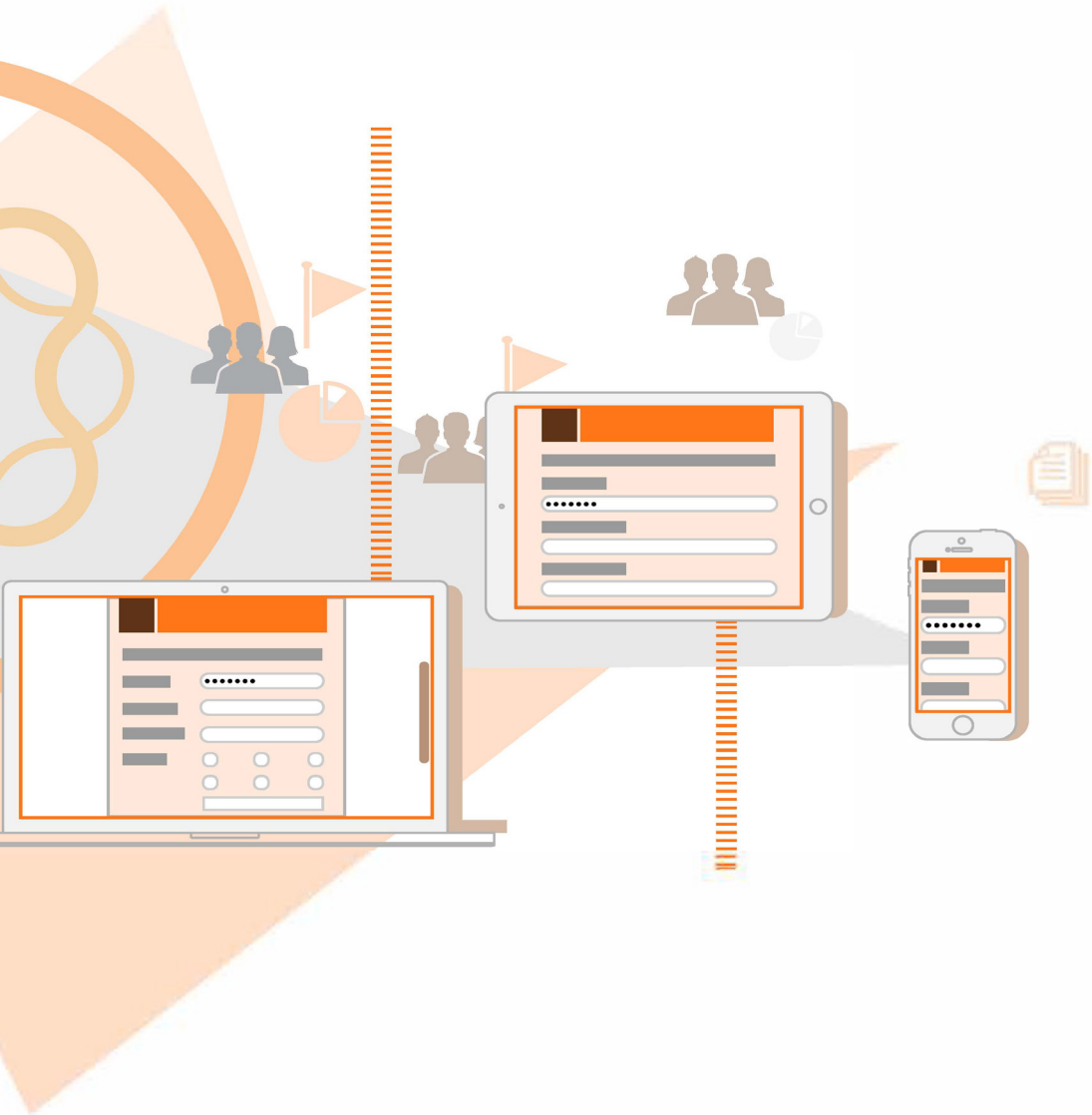
Preparing to Install AEM Forms (Server Cluster)



AEM 6.5 Forms

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1. About This Document

AEM Forms on JEE is an enterprise server platform that helps you automate and streamline business processes. AEM Forms comprises the following components:

- J2EE-based Adobe Experience Manager Forms provides server capabilities and runtime environment
- Tools to design, develop, and test AEM Forms on JEE applications
- Modules and Services are deployed on AEM Forms on JEE server and provide functional services

This document is part of a larger documentation set available at AEM Forms on JEE Documentation page. It is advised that you start with the preparing guide and then move on to installation and configuration guide. For Turnkey deployment, which is only for evaluation purposes, see Installing and Deploying AEM forms on JEEusingJBossTurnkey.

1.1. Conventions used in this document

The following naming conventions are used for common file paths.

Name	Description	Default value
[aem-forms root]	The installation directory that is used for all AEM Forms on JEE modules. The installation directory contains subdirectories for Configuration Manager, the SDK, and each AEM Forms on JEE module installed (along with the product documentation). This directory also includes directories relating to third-party technologies.	Windows: C:\Adobe\Adobe_Experience_Manager_Forms
[appserver root]	The home directory of the application server that runs the services that are part of AEM Forms.	JBoss on Windows: C:\jboss JBoss on Linux: /opt/jboss JBoss Enterprise Application Platform on Windows: C:\jboss-eap-<*version*>\jboss-as JBoss Enterprise Application Platform on Linux: /opt/jboss-eap-<*version*>/jboss-as WebSphere on Windows: C:\Program Files\IBM\WebSphere\AppServer WebSphere on Linux: /opt/IBM/WebSphere/AppServer

Name	Description	Default value
[WebSphere ND root]	The install directory for WebSphere Application Server, Network Deployment	WebSphere on Windows: C:\Program Files\IBM\WebSphere\AppServer WebSphere on Linux: /opt/IBM/WebSphere/AppServer
[server name]	The name of the server configured on your WebSphere server	WebSphere: server1
[profile_name]	The profile name for the JBoss application server.	Adobe pre-configured JBoss: domain_<*db-name*> Manual or Downloaded Jboss: all
[dbserver root]	The location where the database server is installed	Depends on the database type and your specification during installation

Most of the information about directory locations in this document is cross-platform (all filenames and paths are case-sensitive on Linux). Any platform-specific information is indicated as required.

1.2. Additional information

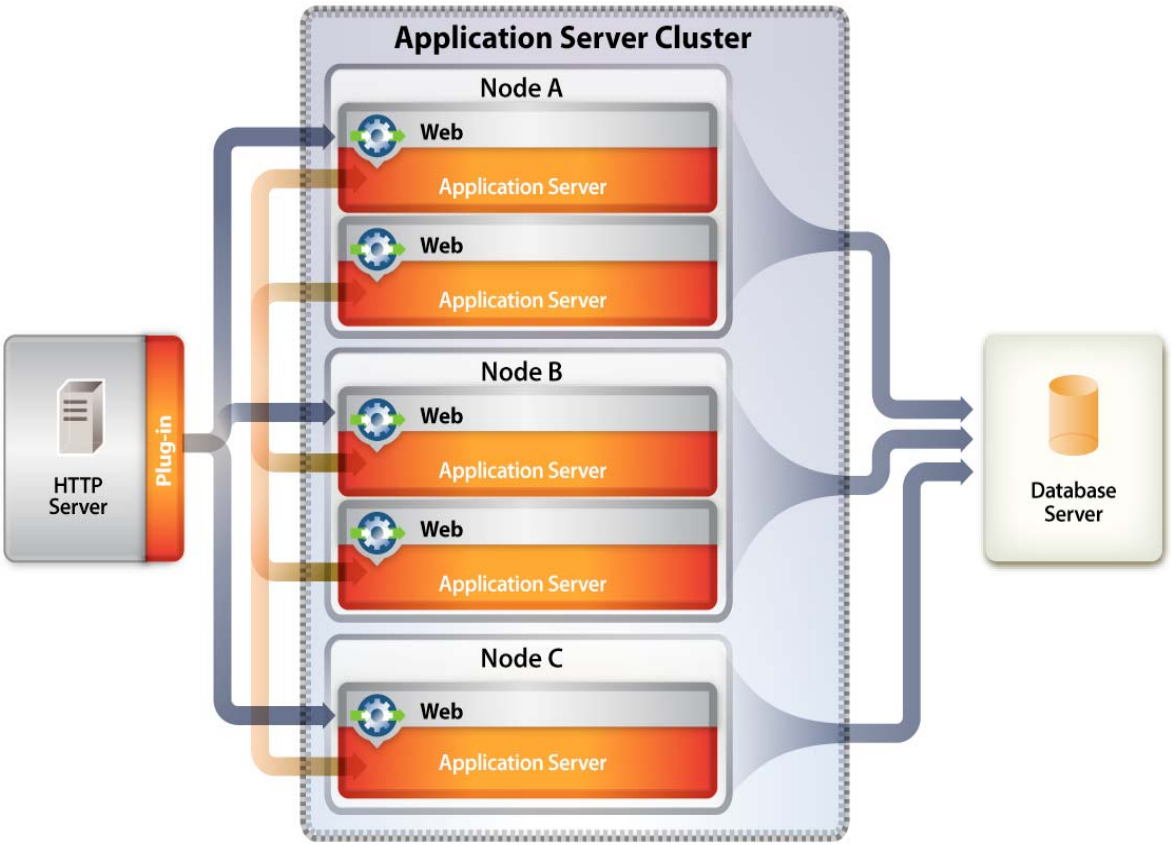
The resources in this table can help you learn about AEM Forms on JEE.

For information about	See
Introduction to AEM Forms	Overview
All documentation that is available for AEM Forms on JEE	Documentation

2. Introduction to Application Server Clusters

2.1. About clustering application servers

A *cluster* is a group of application server instances that run simultaneously, which act like a single system, enabling high availability and load balancing. Within an AEM Forms cluster, multiple server instances can be located on different computers (known as a *horizontal cluster*). With clustering, client work can be distributed across several nodes instead of handled by a single application server.



In a clustered configuration, application server instances are server members of the cluster, all of which must have identical application components deployed on them. However, other than the configured applications, cluster members do not have to share any other configuration parameters.

By clustering, you can achieve one or more of the following benefits. How you implement clustering determines which benefits are achieved:

- Failover
- Load balancing
- Scalability

Failover

Failover allows one or more application server instances to act as backup to a failed application server instance and resume processing the task, therefore enabling another application server to carry on processing. However, if an application server fails during a transaction, the backup application server does not recover the state of the failed instance. If a server fails when a user enters data into a form, for example, the data may have to be reentered.

Load balancing

Load balancing is a technique used to distribute work across a number of systems so that no single device is overwhelmed. If one server starts to get congested or overloaded, requests are forwarded to another server that has more capacity.

Application server load balancing

Application server load balancing is useful for managing the load between application servers. Application servers can be configured to use a weighted round-robin routing policy that ensures a balanced routing distribution based on the set of server weights that are assigned to the members of a cluster. Configuring all servers in the cluster to have the same weight produces a load distribution in which all servers receive approximately the same number of requests. Weighting some servers more heavily sends more requests to these servers than to those that are weighted less heavily.

Preferred routing configurations can also be configured to ensure, for example, that only cluster members on that node are selected (using the round-robin weight method) and cluster members on remote nodes are selected only if a local server is not available. Application server load balancing is best used when balancing is needed between tiers.

Web server load balancing

*Web server load balancing*is useful for queuing and throttling requests. For the Apache HTTP Server, the most commonly used method for load balancing is Round-Robin DNS.

Round-Robin DNS is a relatively simple method of load balancing, where a domain name system (DNS) server provides a name to address resolution and is always involved when a host name is included in a URL. A Round-Robin DNS server can resolve one single host name into multiple IP addresses such that requests for a single URL (containing a host name) actually reference different web servers. The client requests a name resolution for the host name but, in fact, receives different IP addresses, therefore spreading the load among the web servers. In a simple configuration, the Round-Robin DNS server cycles through the list of available servers.

Scalability and availability

Scalability in a cluster means that an administrator can increase the capacity of the application dynamically to meet the demand without interrupting or negatively impacting service. Clusters allow administrators to remove nodes from a cluster in order to upgrade components, such as memory, or to add nodes to the cluster without bringing down the cluster itself.

2.2. Terminology

Each application server vendor uses specific terminology, which is defined here to avoid confusion.

JBoss

server: Represents an instance of a Java™ virtual machine (JVM™).

cluster: Represents a logical grouping of multiple application servers for administration, application deployment, load balancing, and failover purposes.

WebSphere

server: Represents an instance of a Java™ virtual machine (JVM™).

node: Represents a physical system running one or more instances of WebSphere Application Server.

cell: Represents a logical grouping of multiple nodes for administrative purposes.

federation: The process of joining a stand-alone WebSphere node to a WebSphere cell.

cluster: Represents a logical grouping of multiple application servers within a cell for administration, application deployment, load balancing, and failover purposes.

2.3. Clustering AEM Forms

If you install a AEM Forms component on an application server cluster, here are some things you must know:

- Each application server in the cluster on which you deploy AEM Forms must have a homogeneous topology (that is, all nodes in the cluster must be configured identically). You can ensure that all modules are configured identically by configuring run-time properties in the single-installation staging area.
- The configuration is deployed by using the single entity approach; all nodes in a cluster are deployed as if deploying to a single node.

Setting up a clustered environment for AEM forms involves the tasks that follow.

Clustering AEM Forms on JBoss

You must perform the following tasks to deploy AEM Forms on a JBoss Application Server cluster:

1) Prepare the hardware as per your requirements.
2) Install the operating system and update it with all necessary patches and service packs.
3) Install and configure the database server.
4) Install and configure the application server cluster.
5) Install AEM Forms modules and configure AEM Forms for deployment.

6) Deploy AEM Forms to JBoss Application Server.

Clustering AEM Forms on WebSphere

You must perform the following tasks to deploy AEM Forms on a WebSphere Application Server cluster:

1) Prepare the hardware as per your requirement.
2) Install WebSphere Application Server Network Deployment software on the server that will manage the cluster ***NOTE:*** *Select default environment(Cell), if you want to install deployment manager and an application server profile on the same machine.*
3) Install WebSphere Application Server Network Deployment software on any other server that will be used as a cluster node. ***NOTE:*** *In steps 2 and 3, you can also select None and create Deployment Manager or Application Server profiles later using command line utility.* ***NOTE:*** *For cluster, use Network Deployment software only. Base software version is only for standalone application server. As per IBM EULA, user are not allowed to use Base software with Network Deployment software.*
4) Install the HTTP Server (IBM HTTP Server) and start Webserver.
5) Install WebSphere Update Installer on each server/node and deploy the required Fixpack.

   Before you deploy AEM Forms, you must update to the supported version of WebSphere as specified in AEM Forms SupportedPlatforms. See the WebSphere SupportWebsite for Fix Pack installation instructions and to access the WebSphere updates.
6) Install Websphere Installation Manager on each server/node.
7) Set up the cluster:
   - Start the Deployment Manager.
   - Start all servers on all nodes.
   - Federate nodes to the Deployment Manager.
   - Create the cluster using existing application server profiles or create member using application server template.
   - Start the cluster.
8) Configure cluster resources.
9) (For manual deployment) Deploy applications to both the cluster and HTTP Server.
10) Generate the WebSphere HTTP plug-in and propagate it.

2.4. Supported topologies

The following sections discuss various topologies, both clustered and non-clustered, that you can employ. For additional information about configuring your application server in a cluster, go to one of the following websites, as applicable to your application server:

- (WebSphere Application Server) WebSphere Application Server (DistributedplatformsandWindows)
- (JBoss Application Server) High Availability Enterprise Services viaJBossClusters

Combined web, application, and database servers

This topology consists of a web server, an application server, and a database server on the same node. This topology is the simplest one and must be used for development only.

Combined web and application servers with separate database server

This topology can be considered for production in case the load on the user interface (including the web tier) is minimal, with a small number of users.

Combining the web and application servers means that all Enterprise JavaBeans™ (EJB) look-ups are local, and therefore reduces the overhead of doing a remote look-up. Also, this topology reduces the network overhead of a round trip between the web tier and the application tier.

However, with both servers on the same node, if the web tier is compromised, both tiers are compromised. If the web tier experiences a heavy load, the application server processing is affected and vice versa. User response time is usually affected in situations when users need to wait a significant amount of time to get a page back due to all server resources (that is, CPU and/or memory) being consumed by the application server.

Single web server with combined application and database server

The simplest topology that should be considered for a production environment is a web server and combined application server with a database server. Use this topology only if you are sure that your database load will be minimal. In this scenario, the web server is providing a redirection to the application server. The advantages of this topology are low cost, low complexity, and no need for load balancing. The disadvantages of this topology are little redundancy, low scalability, inability to perform updates and upgrades, and possible low performance due to too many CPU processes.

Separate web, application, and database servers

This topology is the most common in production systems because it allows allocation of separate resources to each of the tiers. In this case, the web server acts as a proxy to the web tier on the application server that hosts the web components. This level of indirection provides additional security by securing the application server even if the web server is compromised.

Adding additional web servers

You can add additional web servers for scalability and failover. When using multiple web servers, the WebSphere HTTP plug-in configuration file must be applied to each web server. Failure to do so after introducing a new application will likely cause a “404 File Not Found” error to occur when a user tries to access the web application.

Adding additional application servers

This topology is used in most large-scale production systems where the application servers are clustered to provide high availability and, based on the topology, failover and load balancing.

Clustering application servers has these benefits:

- You can use cheaper hardware configurations and still achieve higher performance
- You can upgrade software on servers without down time
- Provides higher availability (that is, if one server fails, the other nodes in the cluster pick up the processing)
- Provides the ability to leverage load-balancing algorithms on the web server (by using load balancers) as well as on the EJB tier for processing requests

AEM Forms components are typically CPU-bound. As a result, performance gains are better achieved by adding more application servers than by adding more memory or disk space to an existing server.

2.5. Unsupported topologies

The following topologies are not supported for AEM Forms.

Splitting the web container from the EJB container

Splitting AEM Forms Server into presentation/business logic tiers and running them on distributed computers is not supported.

Geographically distributed configuration

Many applications locate their systems geographically to help distribute the load and provide an added level of redundancy. AEM Forms does not support this configuration because AEM Forms components cannot be pulled apart to run on different hosts; AEM Forms is deployed as a monolithic application.

Most of the information about directory locations in this document is cross-platform (all file names and paths are case-sensitive on Linux and UNIX). Platform-specific information is indicated as required.

TarMK for clustered environments

Many organizations configure their systems in a clustered environments to help distribute the load and provide an added level of redundancy. AEM Forms does not support TarMK in cluserted environments.

TarMK Cold Standby

AEM Forms does not support TarMK Cold Standby.

3. System requirements

3.1. Prepare your server environment

Do the following tasks to prepare your server environment:

1) Read the AEM Forms on JEE Supported Platforms document and ensure that your software, hardware, operating systems, application server, databases, JDKs, and other infrastructure are compliant.
2) Install and configure the operating system, and update with the necessary patches and service packs.
3) Install and configure database server.
4) Install and configure the application server.

3.2. Privileges required to install on Windows

When installing on Windows, you must use an account that has administrator privileges. If you run the installer using a non-administrator account, provide the credentials of an account that has administrator privileges, when asked. Also, turn off the Windows UAC. AEM Forms installation and configuration processes require the UAC to be disabled.

3.3. Synchronizing clock times

You must ensure that all computers in a horizontal cluster synchronize their clock times regularly. Your AEM Forms on JEE installation may encounter problems if the node times differ by more than a few seconds.

Apply the standard time synchronization practices employed by your network to all computers of the AEM Forms on JEE cluster.

3.4. (Optional) Additional system requirements

Certain capabilities/platforms have a few additional requirements for:

- Linux
- PDF Generator
- AEM Forms IPv6 support
- Connectors for IBM File Net, Documentum, and IBM Content Manager
- Forms, Output, and ConvertPDF services
- AEM Forms on JEE with a Luna HSM cluster
- LDAP Configuration

- Processes with document form variables and digital signatures
- *AEMFormsCredentialsandCertificates*

4. AEM Forms Credentials and Certificates

This section describes how to do the following tasks:

- Obtain the Document Security Rights credential.
- Obtain digital certificates for use with Digital Signatures.

4.1. Obtaining the Acrobat Reader DC extensions Rights credential

The Acrobat Reader DC extensions Rights credential is a digital certificate that is specific to Acrobat Reader DC extensions that enables Adobe Reader usage rights to be activated in PDF documents. If the credential is not installed, Acrobat Reader DC extensions users cannot apply usage rights to documents. You cannot use a standard digital certificate for this function; you must use the dedicated Rights credential.

The Rights credential extends the usage rights of each PDF file that Acrobat Reader DC extensions processes. It is a critical part of the software licensing and should be stored carefully in a secure environment.

The following types of Rights credentials are available:

Customer Evaluation: A credential with a short validity period that is provided to customers who want to evaluate Reader Extensions. Usage rights applied to documents using this credential expire when the credential expires. This type of credential is valid only for two to three months.

Production: A credential with a long validity period that is provided to customers who purchased the full product. Production credentials are unique to each customer but can be installed on multiple systems.

The Rights credential is delivered as a digital certificate that contains the public key, the private key, and the password used to access the credential.

If your organization orders an evaluation version of Acrobat Reader DC extensions, you receive an evaluation Rights credential from the sales representative you ordered the product from or from the website where you downloaded the evaluation product.

If your organization purchases a production version of Reader Extensions, the production Rights credential is delivered by Electronic Software Download (ESD). A production Rights credential is unique to your organization and can enable the specific usage rights that you require.

If you obtained Acrobat Reader DC extensions through a partner or software provider who integrated Acrobat Reader DC extensions into their software, the Rights credential is provided to you by that partner who, in turn, receives this credential from Adobe.

NOTE: The Rights credential cannot be used for typical document signing or assertion of identity. For these applications, you can use a self-sign certificate or acquire an identity certificate from a Certificate Authority (CA).

4.2. Obtaining digital certificates for use with Digital Signatures

Digital certificates are required for use with Digital Signatures. Although, you can configure and manage digital certificates after you install and configure AEM Forms, obtaining them before you install ensures that you are ready to use AEM Forms when it is deployed.

Digital certificates are obtained from a Certificate Authority (CA) and sent to you by email or over the web as a certificate file. This certificate file contains the public keys (also called *certificates*) and references to private keys (also called *credentials*) that are used for encrypting and signing documents. Certificates do not contain actual private keys; instead, they contain a reference to the identity of the user who keeps the private keys securely stored in an encrypted file or HSM.

You can use Internet Explorer (Windows) or OpenSSL (non-Windows operating system) to export PFX, P12, and CER files for certificates that are stored in any compatible certificate store that is available on your computer. PFX files can be exported only as the certificate store or the credential itself permits. CER files that hold the public key that corresponds to a credential can also be exported from PFX files by using either Internet Explorer or OpenSSL.

NOTE: You can configure and manage certificates, credentials, and Certification Revocation Lists (CRLs) for use with AEM Forms by using Trust Store Management, which is accessible through the web-based administration console. (See administration help.)

The CRL distribution point describes where you can download the CRL that corresponds to a particular CER or PFX file.

The following file types are supported:

Certificates: DER-encoded X509v3 and base64-encoded certificate (.cer) files. Certificates that verify the trust.xml file can be either DER-encoded or base64-encoded.

Credentials: RSA and DSA credentials up to 4096 bits in standard PKCS12 format (.pfx and .p12 files).

CRLs: Base64-encoded and DER-encoded CRLfiles.

Maintaining the security of private keys (credentials) is critical to ensuring the stability of sensitive information. A physical storage device, often called a *Hardware Security Module* (HSM), typically provides the maximum level of security for private keys. If you do not use a physical device, it is important to store highly sensitive private keys and certificates in encrypted files in a safe place.

Digital Signatures supports the industry-standard PKCS #11 interface to communicate with HSMs. An HSM vendor can provide the resources and tools that you need to install and configure an HSM storage system.

5. Create the AEM Forms Database

5.1. Database configuration requirements

This section describes how to set up the database for use with AEM Forms. This section describes special tables, indexes, and other properties that are required in the AEM Forms database that are not configured by Configuration Manager. The section has instructions for all the supported database; perform the instructions only for your database:

The database will contain these elements:

- AEM Forms services
- AEM Forms run-time configurations
- AEM Forms process data
- Customer process definitions and templates
- Application server managed data

Before you create the database, ensure that you read the pre-installation requirements and have the required software installed.

5.2. Minimum database user permissions

Database	Initialization permissions	Runtime permissions
Oracle	CREATE SESSION CREATE CLUSTER CREATE TABLE CREATE VIEW CREATE SEQUENCE UNLIMITED TABLE SPACE	CREATE SESSION UNLIMITED TABLE SPACE (only needed if you do not configure user quotas) CREATE TABLE

Database	Initialization permissions	Runtime permissions
MySQL	SELECT INSERT UPDATE DELETE CREATE DROP REFERENCES INDEX ALTER CREATE_TEMP_TABLE LOCK_TABLES	SELECT INSERT UPDATE DELETE
SQL Server - DB level	Create Table Create View Connect	Connect
SQL Server - Schema level	Alter Insert References Select Update Delete	Insert Select Update Delete

5.3. Creating an Oracle database

If you prefer not to use the default database that was created when you installed Oracle, create a new database by using the Database Configuration Assistant tool.

NOTE: You can use the Transaction Processing or General Purpose templates while configuring an Oracle database instance for AEM Forms. If you wish to use the Custom Database template for configuring a database instance, the minimum set of database components you must include are **Oracle JVM** and **Enterprise Manager Repository**.

Do the following when you create your Oracle database:

- Create user quotas to allow the database to grow to accommodate persistent data from applications.
- Enable support for UTF-8 encoding.
- Set the Database Character Set to Unicode (AL32UTF8), and the National Character Set to AL16UTF16 (Unicode UTF-16 universal character set).
- Set NLS_LENGTH_SEMANTICS to BYTE (if required). The database initialization fails if you set any other value.
- You must install Oracle using Transaction Processing and set the connection mode for the server to Dedicated Processing.

User account and rights

Create a new user account on the database and assign it the following system privileges:

- CREATE SEQUENCE
- CREATE VIEW
- UNLIMITED TABLESPACE
- CREATE TABLE
- CREATE CLUSTER
- CREATE SESSION

NOTE: For deployments on non-Windows operating systems, the username must not exceed eight characters; on Windows, it must not exceed 12 characters.

You need the following information when you configure the data source on the application server:

- SID (Service ID)
- Username and password of the Oracle user account
- Host name or IP address of the database server
- Oracle LISTENER port number (default is **1521**)

For information about using Oracle, see the appropriate Oracle's user documentation.

5.4. Creating an SQL Server database

You can create an SQL Server database that AEM Forms will use to store run-time and configuration data. For information about creating an SQL Server database, refer to the SQL Server documentation.

Create an SQL Server database, and create a user account and assign it DB_OWNER privileges for use when configuring the data source on the application server. For information about creating the database and user, see the SQL Server documentation.

You need the following information when you configure the data source on the application server:

- Database name
- Username and password of the SQL Server user account
- Host name or IP address of the database server
- SQL Server port number

Set up the SQL Server for AEM Forms

Before you create the AEM Forms database, optimize the SQL Server by changing these settings.

Increase memory

The default SQL Server settings do not aggressively allocate memory. This situation significantly affects performance on most deployments of an SQL Server database.

NOTE: This section is recommended but optional.

1) Using Microsoft SQL Server Management Studio, connect to the database server where you will host the AEM Forms database.
2) Right-click the database server connection and select **Properties**.
3) Select the **Memory** page and enter a size in the **Minimum Server Memory (in MB)** box that is equal to the size of the free memory on the server.
4) Restart the SQL Server database.

Set the processor priority

On dedicated database servers, which are recommended for production installations of AEM Forms, the SQL Server process is configured so that it does not consume too much of the system CPU resources.

NOTE: This section is recommended but optional.

1) Using Microsoft SQL Server Management Studio, connect to the database server where you will host the AEM Forms database.
2) Right-click the database server connection and select **Properties**.
3) Select the **Processors** page and select **Boost SQL Server Priority**.
4) Restart the SQL Server database.

Increase the recovery interval

This setting specifies the amount of time the deployment waits for recovery after a crash. The SQL Server default setting is one minute. Increasing this setting to a larger value improves performance because it causes the server to write changes from the database log to the database files less frequently. This setting does not compromise the transactional behavior; however, it affects the size of the log file that is replayed on startup.

NOTE: This section is recommended but optional.

1) Using Microsoft SQL Server Management Studio, connect to the database server where you will host the AEM Forms database.
2) Right-click the database connection and select**Properties**.
3) Select the **Database Settings** page and type 5 in the **Recovery Interval (Minutes)** box.
4) Restart the SQL Server database.

Integrated security

NOTE: This is an optional configuration.

If you are using SQL Server integrated security, you can set your SQL Server database to Mixed Mode or Windows Authentication Mode. However, if you are using Windows Authentication Mode, you must configure integrated security on Windows to establish a trusted connection with the SQL Server.

- For JBoss, see *ConfigureIntegratedSecurityonWindows* in Preparing to Install AEM forms on Single-Server.

NOTE: When you run the Configuration Manager after configuring Microsoft SQL Server integrated security, the below error message appears on the DataSource Configuration screen:

`Database settings failed validation.Note: Windows Authentication on SQL Server will fail the connection test. See documentation for more details.`

You can ignore the error message and continue configuring AEM Forms server.

Sizing your SQL Server database

The default database sizes that SQL Server provides are too small for AEM Forms. Even if the database is set to auto-grow, unintended effects can occur, such as reduced performance when the database grows or the growth begins to fragment the disk. It is best to preallocate the database size at creation to reflect your deployment requirements:

Medium-size deployments: Environments where the LDAP directory has approximately 100,000 users and 10,000 groups. Set Database Data Initial Size to 1GB, and set autogrowth to 250MB.

Large-size deployments: Environments where the LDAP directory has approximately 350,000 users and more than 10,000 groups. Set Database Data Initial Size to 2GB, and set autogrowth to 1GB.

NOTE: Database growth is always restricted to a certain size. Administrators should monitor the resource usage of the AEM Forms database to ensure that it does not lose its restricted space or the space available on the disks where the database resides.

Creating the AEM Forms database user, schema, and login

You are now ready to create the AEM Forms database user, schema, and login.

IMPORTANT: Ensure that you use the SQL_Latin1_General_CP1_CI_AS collation (or the Japanese_CI_AS collation if your database will run in a Japanese environment) when you create the database instance for AEM Forms. Any other collation may cause your database initialization to fail. The collation for your AEM Forms database instance can be different from the collation used when creating the SQL Server database.

1) Using Microsoft SQL Server Management Studio, click **Server**, and then right-click **Database** and select **New Database**.
2) Enter the database name of your choice.

   NOTE: The database name is very important, and the name chosen must be consistently used in the following procedures where a reference to `database_name` *exists.*
3) In the **Database Data Initial Size MB** box, enter the appropriate value:
   - For small development or small production systems, specify 200MB.
   - For larger systems, see *SizingyourSQLServerdatabase*.
4) In the **Database Data Autogrowth** box, enter 50%.
5) In the **Database Log Initial Size** box, enter the appropriate value:
   - For small development or small production systems, specify 20MB.
   - For larger systems, see *SizingyourSQLServerdatabase*.
6) In the **Database Log Autogrowth** box, enter 50%.
7) Click **OK** to create the database.

Create the AEM Forms user in SQL Server

In the following procedure, *[database_name]* represents the name you specified when you created your database, and *[database_username]* represents the name you must specify for the new user.

1) Using Microsoft SQL Server Management Studio, connect to the database server where you created the AEM Forms database.
2) Click **Server** > **Security**, and then right-click **Logins** and select **New Login**.
3) Enter the login name*[database_username]*, and then select **SQL Server Authentication**and type a new password.
4) Ensure that **Enforce Password Expiration, User must change password on next login** is also deselected.
5) Leave the default database as **Master**, and click **OK**.
6) Click **Server** > **Databases** > *[database_name]* > **Security**, and then right-click **Schemas** and select **New Schema**.
7) In the **Schema Name** box, type *[database_username]*, and click **OK**.
8) Click **Server** > **Databases** >*[database_name]* > **Security**, and then right-click **Users** and select **New User**.
9) In the New User dialog box, type the login name and username *[database_username]*.
10) Set the default schema to *[database_username]* and click **OK**.

    NOTE: The schema name should be the same as the *[database_username].*
11) Click **Server** > **Databases** > [*database_name*] > **Security**, right-click the *[database_username]* schema, and select **Properties** > **Permissions**.
    a) Click **Search** in Users or Roles and type [*database_username*] and click **OK**.
    b) In the **Explicit** tab, grant the following permissions:
        - Alter
        - Insert
        - Reference
        - Select
        - Update
        - Delete
    c) Click **OK**.
12) Right-click **Server** > **Databases** > [*database_name*], right-click the [*database_username*] schema, and select **Properties > Permissions**.
    a) In the **Explicit** tab, grant Create Table, Create View, and Connect permissions.
    b) Click **OK**.

Associate the AEM Forms user with the database

After you create the AEM Forms user, associate it with the AEM Forms database.

1) Click **Security** > **Logins**, and then right-click *[database_username]* and select **Properties**.
2) In Login Properties, on the General page, set the user's default database to *[database_name]*.

3) Select the **User Mapping** page and, in the Users Mapped To This Login section, verify that *[database_name]* is selected, **User** is set to *[database_username]*, and **Default Schema** is set to *[database_username]*.
4) Ensure that *[database_name]* is selected in the Users Mapped To This Login table, and ensure that **public**is selected in the **Database Role Membership For** *[database_name]* table and then click **OK**.

Set the isolation level for the AEM Forms database

AEM Forms requires a specific isolation level to manage deadlocking. The deadlocking occurs when long-running transactions and numerous shorter reads occur at the same time.

IMPORTANT: You must set the isolation level for MS SQL Server to avoid deadlocking issues.

1) Click **Databases**, and then right-click *[database_name]* and select **New Query**.

   NOTE: *[database_name] represents the name you specified when you created your database.*
2) In the Query panel, type the following text:

```
ALTER DATABASE [database_name]
SET READ_COMMITTED_SNAPSHOT ON
GO
```

3) Click **Execute**. A response is displayed in the messages panel.

6. Appendix - Additional system requirements

PDF Generator, AEM Forms IPv6 support, Connectors for IBM File Net, Documentum, IBM Content Manager, and Forms, Output and ConvertPDF services, and some other components require a few additional settings. Perform these settings only if you are configuring these capabilities.

6.1. Additional requirements for Linux and UNIX based platforms

NOTE: On Linux and UNIX platforms, AEM Forms on JEE installer uses the JDK installed on the machine. Therefore, you must ensure to install the supported JDK version. On other operating systems, the installer uses the JVM bundled with the installer.

Installing and configuring UTF-8

When installing AEM Forms on JEE on Linux and UNIX based operating systems, you must install and configure the US English version of UTF-8 locale if it is not already installed. You will need the install media (CDs or DVDs) for the operating system to perform this task.

NOTE: On Linux platforms, this locale is installed by default and is called en_US.utf8. It can be verified by using the `locale -a` command.

Linux

On Linux operating systems, ensure the following:

- **All Linux distributions:**
  - Ensure that X Window libraries are installed on your operating system. This is required for PDF Generator and Forms. See documentation for your operating system for more information.
  - Install the latest version of 32-bit libcurl, libcrypto, and libssl libraries.
  - Ensure that the directories /usr/lib/X11/fonts and /usr/share/fonts exists. If the directories do not exist, then use the ln command to create a symbolic link from /usr/share/X11/fonts to /usr/lib/X11/fonts and another symbolic link from /usr/share/fonts to /usr/share/X11/fonts. Also ensure that the courier fonts are available at /usr/lib/X11/fonts
  - Ensure that all the fonts (Unicode and non-unicode) are available in the /usr/share/fonts or /usr/share/X11/fonts directory.
  - On RedHat Enterprise Linux 7.x, the courier fonts are not available, download the font-ibm type1-1.0.3.zip archive. Extract the archive at /usr/share/fonts. Create a symbolic link from /usr/share/X11/fonts to /usr/share/fonts. Delete all the .lst font cache files from the Html2PdfSvc/bin and /usr/share/fonts directories.
- **SUSE Linux:** You must install the glibc-locale-32bit library that ships with SUSE Linux Enterprise Server; otherwise, AEM Forms on JEE will not generate PDF files. This library file is not installed by

default, you must use YaST to install it. (See the SUSE Linux Enterprise Server documentation for details.)

Configuring the file limit values on non-Windows operating systems

To avoid StuckThread issues on a non-Windows operating systems environment, add or increase the rlim values in the /etc/system file.

1) (**Linux**) Locate and open the /etc/security/limits.conf file.
2) (**Linux**) Add the following lines to the /etc/security/limits.conf file:

```
<app_group> soft nofile 65553
<app_group> hard nofile 65553
```

Replace <app_group> with the user group who will run the application server. You may also replace < app_group > with an asterisk (*) to match all users and user groups.

3) Save and close the file.
4) Restart your computer.

Verify the updated settings

1) Launch a new shell.
2) Type `ulimit -n` and press **Enter**.
3) Verify the value returned matches the `rlim` values you have set.

6.2. LDAP configuration

This configuration is optional and required only if you are using an LDAP directory to authenticate users.

If you do not have an existing LDAP server and database, install and configure your LDAP server and database according to the vendor's documentation. Make note of the LDAP administrator name and password to use during the AEM Forms on JEE configuration process. Configure AEM Forms on JEE to connect with the LDAP database after you install and deploy your services that are part of AEM Forms on JEE. This configuration is done by using the User Manager service.

6.3. Additional requirements for PDF Generator

NOTE: You cannot use the Shared Printer Protocol for the `SendToPrinter` API on Windows 2016 machines that have PDF Generator deployed on them. Use alternate protocols like CIFS or Direct IP.

User account for Windows

You must use a user account with administrator privileges for the following tasks:

- Installing Microsoft Office
- Installing PDF Generator

- Installing Acrobat for PDF Generator (Windows only)
- Running the application server process

NOTE: When you add users for PDF Generator, grant the user running the application server with the Replace a process level token privilege.

User account for non-Windows operating systems

You must use a user account with administrator privileges for the following tasks:

- Installing PDF Generator
- Running the application server process
- Running the `sudo` command

NOTE: When you add users for PDF Generator, grant the user running the application server with the Replace a process level token privilege.

Native file conversion software installation

Before you install PDF Generator, install the software that supports the file formats for which PDF conversion support is required and manually activate the licenses for the software using the user account that is used for running the application server process.

NOTE: *On cluster configurations, you must activate one license on each AEM Forms on JEE Server of your cluster for each native application that PDF Generator supports.*

Refer to the individual licensing agreement for each native application that your AEM Forms on JEE deployment will support, and ensure that your AEM Forms on JEE deployment meets the licensing requirements specified. Typically, each AEM Forms on JEE user who will use native application support must also have an activated license on their own computer for the native application.

PDF Generator can be extended to convert additional file types to PDF files by using third party native file conversion applications. For the complete list of supported application and file formats, see Supported Platform Combinations document.

NOTE: PDF Generator uses native applications to convert the supported file formats to PDF. Unless otherwise indicated, only the German, French, English, and Japanese versions of these applications and platforms (operating systems) are supported. Also, ensure that the supported languages are installed on underlying platform (operating system).

NOTE: AEM Forms on JEE supports only 32-bit editions of all the above mentioned software.

NOTE: OpenOffice 3.4 or later must be installed on the server to convert the documents created in version 3.4.

NOTE: Native file conversion software might have initial registration/activation dialogs. Dismiss all the initial registration/activation dialogs for all the PDFG user accounts configured on the server.

NOTE: On Linux platform, OpenOffice must be installed under `/root` user. If OpenOffice is installed for specific users, PDFG might not be able to convert OpenOffice documents.

NOTE: End users should not use software applications used by PDF Generator on the server. This can lead to interference with PDF Generator conversions.

You do not need to install a native software application to convert the following native file formats:

- Print files (PS, PRN, EPS)
- Web files (HTML)
- Image files (JPEG, GIF, BMP, TIFF, PNG)

Installing Acrobat for PDF Generator (Windows only)

Install Acrobat DC Pro before running the AEM Forms on JEE installer. Ensure that you launch Acrobat at least once after installing it to avoid PDF Generator configuration issues. Dismiss all modal dialog boxes that appear on launching Acrobat. ***NOTE:*** *Ensure that Acrobat is installed using the same user account that you will use to install AEM Forms on JEE.*

However, if AEM Forms on JEE is installed and Acrobat DC Pro is not installed, install Acrobat DC Pro and then run the Acrobat_for_PDFG_Configuration.bat script, located in the folder *[aem-forms root]*\pdfg_-config. Otherwise, PDF conversions will fail.

The Configuration Manager sets the Acrobat_PATH (case-sensitive) environment variable automatically. You can also choose to set it manually, see *Settingenvironmentvariables*. Restart your application server after setting the environment variable.

Configure Acrobat to use SHX fonts (Windows only)

NOTE: Perform these steps to configure Acrobat if you want PDF Generator to use SHX fonts to convert AutoCAD DWG files without installing AutoCAD. Also, these steps need to be performed for all user accounts configured in administration console.

1) Open Acrobat.
2) Select **Edit > Configurations**.
3) Select **Convert to PDF > Autodesk AutoCAD**.
4) Click **Edit Settings**.
5) Click **Configuration Preferences**.
6) Click **Browse** next to the SHX Font File Search Path and specify the path to the SHX font file.
7) Click **OK** on each opened dialog.

QuickTime 7

PDF Generator requires that QuickTime 7.7.9 or later (Player or Pro) be installed if you want to convert video embedded in files, such as PowerPoint presentations to PDF multimedia files. This application is available from the Apple Downloads site.

Setting environment variables (Windows only)

You must set the environment variables in Windows if you plan to create PDF documents from applications such as Photoshop and WordPerfect.

The names of these environment variables are listed here:

- `Notepad_PATH`
- `OpenOffice_PATH` (This variable is applicable for both, Windows and Linux.)
- `WordPerfect_PATH`
- `Acrobat_PATH`

These environment variables are optional and need to be set only if you plan to use the corresponding application to convert PDF files through PDF Generator. The value of the environment variable should contain the absolute path of the executable that is used to start the corresponding application.

Configuring PDF Generator on a Remote Machine

In case of a cluster, AEM Forms on JEE is installed only on one machine. Perform the following steps to configure PDF Generator on other machines in the cluster:

1) On the remote machine, if an earlier version of Acrobat is installed, uninstall it by using Add or Remove Programs in the Windows Control Panel.
2) Install Acrobat DC Pro by running the installer.
3) From the machine where AEM Forms on JEE is installed, copy `pdfg_config` and `plugins` folders to the remote machine under any directory.
4) On the remote machine, open /pdfg_config/ Acrobat_for_PDFG_Configuration.bat file for editing.
5) Locate and comment the `goto locationerror` line.

   Before

   ```
   goto locationerror
   ```

   After

   ```
   rem goto locationerror
   ```
6) Save and close the Acrobat_for_PDFG_Configuration.bat file.
7) Open the command prompt and run the following command:

   ```
   Acrobat_for_PDFG_Configuration.bat <Path of the pdfg_Configuration folder>
   ```

Service Control Manager command line tool

Before you complete an automatic installation of PDF Generator on Windows, ensure that the Service Control Manager command line tool, sc.exe, is installed in the Windows environment. Some Windows servers do not have this software preinstalled. By default, the sc.exe file is installed in the C:\Windows\system32 directory. Most OS installations have this tool installed. If you do not have the tool installed, it is available in the Windows Resource Kit for your specific version of Windows. To confirm that the tool is installed on your server, type `sc.exe` from a command prompt. The tools usage is returned.

NOTE: For PDF Generator to work properly, ensure that AEM Forms on JEE is running as a Windows service and the service must run under the Local System account.

Headless mode configuration

If you are running PDF Generator in a headless mode environment (that is, on a server without a monitor, keyboard, or mouse), the x11 libraries must be installed. Some flavors of Linux do not install these libraries by default; therefore, you must obtain the libraries and install them manually.

NOTE: *Activating x11 forwarding on a shell session causes the SOAP UI to create UI elements during SOAP requests, leading to request failures. To avoid request failures, you must add the* `-Djava.awt.headless=true` *JVM argument to application server startup parameters. For specific steps, see application server documentation.*

Enabling multi-threaded file conversions and multi-user support for PDF Generator

By default, PDF Generator can convert only one OpenOffice, Microsoft Word, or PowerPoint document at a time. If you enable multi-threaded conversions, PDF Generator can convert more than one of the documents concurrently by launching multiple instances of OpenOffice or PDFMaker (which is used to perform the Word and PowerPoint conversions).

NOTE: Multi-threaded file conversions (through Microsoft Office) are only supported for Microsoft Word and Microsoft PowerPoint.

NOTE: Microsoft Excel, Publisher, and Project files are not converted simultaneously. During conversion, EXCEL.exe, PUBLISHER.exe, and PROJECT.exe are watched in the task manager.

Each instance of OpenOffice or PDFMaker is launched using a separate user account. Each user account that you add must be a valid user with administrative privileges on the AEM Forms on JEE Server computer. For more information, see ConfiguringWindowsinstallation

In a clustered environment, the same set of users must be valid for all nodes of the cluster.

After your AEM Forms on JEE Server is configured, add AEM Forms on JEE user accounts in administration console. See the User accounts for multi-threaded file conversions section in the AEM Forms on JEE installation guide for your application server. To enable multiuser support for native files and OpenOffice files on a Windows environment, add a minimum of three users with the following permissions.

When you add users for PDF Generator native conversions, grant the user running the application server with the Replace a process level token privilege.For more information, see *Granting the Replace a process level token privilege (Windows only)*

Dismiss initial dialogs and disable automatic updates for native applications

Converting native files from PDF Generator requires dismissing any initial registration, activation, and Improvement program dialogs with the option to not show them again. Automatic updates for these applications also needs to be disabled as these update dialogs can cause failures on a running server.

The dialogs and automatic update need to be disabled for the user running the server and all user accounts configured under PDFG Accounts for multi-user support. The dialogs need to be dismissed for all third-party applications if installed on the server:

NOTE: Ensure that you launch Adobe Acrobat Distiller at least once for all the PDFG user accounts configured on the server.

Disable error reporting on Windows Server 2016 (Optional but recommended)

While converting a document to PDF using PDF Generator on Windows Server 2016 Windows may report that the executable has encoutered a problem and needs to close. However, it does not impact the PDF conversion as it continues in the background.

To avoid receiving the error, you can disable the Windows error reporting. For more information on disabling error reporting, see https://technet.microsoft.com/en-us/library/gg232692%28v=ws.10%29.aspx.

Additional configuration required for OpenOffice on non-Windows operating systems

1) Add entries for additional users (other than the administrator who runs the AEM Forms on JEE Server) in the /etc/sudoers file. For example, if you are running AEM Forms on JEE as a user named lcadm and a server named myhost, and you want to impersonate user1 and user2, add the following entries to /etc/sudoers:

   ```
   lcadm myhost=(user1) NOPASSWD: ALL
   lcadm myhost=(user2) NOPASSWD: ALL
   ```

   This configuration enables lcadm to run any command on host 'myhost' as 'user1' or 'user2' without prompting for password.

2) Allow all the AEM Forms on JEE users to make connections to the AEM Forms on JEE Server. For example, to allow a local user named user1 the permission of making the connection to the AEM Forms on JEE Server, use the following command:

   ```
   xhost +local:user1@
   ```

   Ensure that the session with which the application server started should not get closed.

   For more details, refer to xhost command documentation.

3) Restart the server.

Multi-user support for PDF Generator

To enable multi-user support for native files and OpenOffice files on a Windows environment, a minimum of three users with the following permissions must be added. On a non-Windows operating systems platform, create at least one user.

Platform	User permissions
Windows Server	Users with administrative privileges, Read/write permission on AEM Forms on JEE temporary directory, PDF Generator temporary directory and application server installation directory.

non-Windows operating systems	Users with `sudo` privileges Read/write permission on AEM Forms on JEE temporary directory, PDF Generator temporary directory, and application server installation directory.

NOTE: For clusters, the users you create must have the above permissions on all nodes.

When you add users for PDF Generator native conversions, you must grant the user running the application server with the *Replace a process level token* privilege. See *Granting the Replace a process level token privilege (Windows only)*.

Granting the Replace a process level token privilege (Windows only)

User account that are used to start the application server should be part of the local administrators group and requires the *Replace a process level token* privilege. To provide *Replace a process level token*privilege:

1) Click Start > Run, and then type `gpedit.msc`.
2) On the Group Policy dialog box, select **Computer Configuration** > **Windows Settings** > **Security Settings** > **Local Policies** > **User Rights Assignment**, and double click **Replace a process level token**.
3) Click **Add User or Group**, add the Windows user account that is used to open the command prompt from which the application server is started.
4) Restart Windows, and then start the application server.

Symbolic link on Linux platform

To substitute required fonts in a HTML-to-PDF conversion on the Linux platform, PDF Generator creates a symbolic link that point to the /usr/share/X11/fonts directory.

Sometimes the user running the application server might not possess permissions that are necessary to create a symbolic link. On such systems; create a symbolic link `/usr/lib/X11/fonts` that point to the `/usr/share/X11/fonts` directory.

Additional requirements for Red Hat Enterprise Linux

PDF Generator requires additional RPM packages and fonts to perform conversions on RHEL. Perform the following steps to configure the PDF Generator on RHEL:

1) Install the RPM packages for your RHEL version. The following versions are for RHEL7:
   - glibc-2.12-1.25.el6.i686.rpm
   - nss-softokn-freebl-3.12.9-3.el6.i686.rpm
   - libX11-1.3-2.el6.i686.rpm
   - libxcb-1.5-1.el6.i686.rpm
   - libXau-1.0.5-1.el6.i686.rpm

- zlib-1.2.3-25.el6.i686.rpm
- libXext-1.1-3.el6.i686.rpm
- fontconfig-2.8.0-3.el6.i686.rpm
- expat-2.0.1-9.1.el6.i686.rpm
- freetype-2.3.11-6.el6_0.2.i686.rpm
- libSM-1.1.0-7.1.el6.i686.rpm
- libICE-1.0.6-1.el6.i686.rpm
- libuuid-2.17.2-12.el6.i686.rpm
- libXrandr-1.3.0-4.el6.i686.rpm
- libXrender-0.9.5-1.el6.i686.rpm
- libXinerama-1.1-1.el6.i686.rpm

2) In your browser, open website `http://cgit.freedesktop.org/xorg/font/ibm-type1/`
3) Download the compressed file `font-ibm-type1-1.0.3.tar.gz`or `font-ibm-type1-1.0.3.zip`.The compressed file contains required fonts.
4) Extract the downloaded zip file to the `/usr/share/fonts` directory.

Configuring user accounts for multi-threaded file conversions

By default, PDF Generator can convert only one OpenOffice, Microsoft Word, or PowerPoint document at a time. If you enable multi-threaded conversions, PDF Generator can convert more than one of the documents concurrently by launching multiple instances of OpenOffice or PDFMaker (which is used to perform the Word and PowerPoint conversions).

If you need to enable multi-threaded file conversion, you must first perform the tasks outlined in the "Enabling multi-threaded file conversions" section of the Preparing to Install or Upgrade guide available on the AEM Forms on JEE documentation.

For non-Windows operating systems users, you must create users and configure the system to remove the password prompts. The following section outlines the method to create a user and perform additional configurations.

Add user account

1) In administration console, click **Services** > **PDF Generator**> **User Accounts.**
2) Click **Add** and enter the user name and password of a user who has administrative privileges on the AEM Forms on JEE Server. If you are configuring users for OpenOffice, dismiss the initial OpenOffice activation dialogs.

   NOTE: If you are configuring users for OpenOffice, the number of instances of OpenOffice cannot be greater than number of user accounts specified in this step.
3) Restart the AEM Forms on JEE Server.

NOTE: Ensure that the added user account is defined for all the nodes of the cluster.

Manual use of Acrobat restricted

If you installed the PDF Generator for native document conversion, use of the bundled Acrobat installation is restricted to the Generate PDF service and is not licensed for any other use.

6.4. Additional requirements for Connector for Documentum

If AEM Forms on JEE is connecting to Documentum, you must install Document Foundation Classes on machine hosting AEM Forms on JEE.

6.5. Additional requirements for Connector for IBM Content Manager

- DB2 Universal Database Client
- IBM Information Integrator for Content (II4C)

See “Post-Deployment Activities” chapter in the Installing and Deploying AEM Forms on JEE document for your application server.

Configure the connection for a single IBM Content Manager datastore

1) Start the DB2 Configuration Assistant.
2) Click **Selected**>**Add Database Using Wizard**.
3) Select **Manually Configure a Connection to a Database** and click **Next**.
4) Select **TCP/IP** and click **Next**.
5) Specify the following TCP/IP communication options and then click **Next**:
   – In the **Host Name** box, type the host name of the server hosting DB2 Content Manager.
   – Leave the Service Name box empty.
   – In the **Port Number** box, type the port number. The default DB2 Content Manager port number is 50000.
6) In the **Database Name** box, type the IBM Content Manager datastore name and, in the **Database Alias** box, type the alias name for the datastore and then click **Next**.
7) Click **Next** to accept the default data source settings.
8) In the **Operating System** list, select the operating system you are using and then click **Next**.
9) Specify the following system options and then click **Next**:
   – In the **System Name** box, type the server name hosting DB2. If you click Discover, DB2 Content Manager searches for the system name you specified and, if the system is not found, all of the DB2 instances are listed.
   – In the **Host Name** box, type the name of the host, or click View Details to show the domain and IP address of the system you named in the previous step.

– In the **Operating System** list, select the operating system on which you deployed DB2 Content Manager.

10) (Optional) To specify Security options, select **Use Authentication Value in Server's DBM Configuration** and click **Finish**.

11) In the Test Connection dialog box, test the connection as required.

Configure connections for multiple IBM Content Manager datastores

1) Configure the initial connection by following the steps in *ToconfiguretheconnectionforasingleIBM-ContentManagerdatastore:*.

2) Add additional database connections by modifying the cmbicmsrvs.ini file (the file that stores the datastore information) as follows:
   – From a command prompt window, change the directory to *[II4C home]*/bin (for example, C:\Program Files\db2cmv8\ on Windows **or** /opt/IBM/db2cmv8 on non-Windows operating systems).
   – Run the cmbenv81.bat (Windows) or cmbenv81.sh (non-Windows operating systems) file to set the environment and the classpath for the Java Utilities of II4C.
   – Change the directory to *[II4C working directory]*/cmgmt/connectors where *[II4C working directory]* is one of the following paths:

     (Windows) C:/Program Files/db2cmv8

     (Linux) /home/ibmcmadm
   – Run the command

     `java com.ibm.mm.sdk.util.cmbsrvsicm -a add -s <library server database name> -sm <database schema name>`

     where `<library server database name>` is the same as `Database Alias` configured in step 6 above.

   NOTE: The following procedure allows users without DB2 rights to share the connection credentials through the cmbicmenv.ini file.

Configure a multiuser connection to the IBM Content Manager datastore

1) From a command prompt window, change the directory to *[II4C home]*/bin (for example, C:\Program Files\db2cmv8\ on Windows **or** /opt/IBM/db2cmv8 on non-Windows operating systems).

2) Run the cmbenv81.bat (Windows) or cmbenv81.sh (non-Windows operating systems) file to set the environment and the classpath for the Java Utilities of II4C.

3) Change the directory to *[II4C working directory]*/cmgmt/connectors, where *[II4C working directory]* is one of the following paths:

   (Windows) C:/Program Files/db2cmv8

   (Linux) /home/ibmcmadm

4) Run the command

```
java com.ibm.mm.sdk.util.cmbenvicm -a add -s <library server database
name> -u <database user ID> -p <database password>
```

where <library server database name> is the same as Database alias configured in step 6 above.

6.6. Additional requirements for Connector for IBM FileNet

These requirements are optional and required only if you are installing Connector for IBM® FileNet.

IBM FileNet 5.x

If AEM Forms on JEE is connecting to IBM FileNet Content Engine, you must install the Content Engine Java Client. Use the IBM FileNet content engine client installer located by default in C:\Program Files\FileNet\CEClient. During installation, select at least one of the components from Application Engine or Process Engine on the component selection screen.

For IBM FileNet Process Engine, you must install the IBM FileNet Process Engine Client located by default in C:\Program Files\FileNet\BPMClient. During installation, select the Other option on the component selection screen.

NOTE: IBM FileNet 5.2 and IBM FileNet 5.5.2 are supported.

6.7. Additional requirement for Forms, Output and ConvertPDF on Windows based cluster

Microsoft Visual C++ 2008 SP1 or 2010 SP1 Redistributable Package (x86) is installed along with the AEM Forms on JEE installation. For Cluster, AEM Forms on JEE installation is not performed on all the nodes so the redistributable package is not installed all the nodes.

On Windows based clusters, install Microsoft Visual C++ 2008 SP1 or 2010 SP1 Redistributable Package (x86) on all the nodes of cluster.

6.8. AEM Forms on JEE IPv6 support

AEM Forms on JEE includes IPv6 support. The default configurations defined in the installation documentation for AEM Forms on JEE set IPv4 as the default IP protocol because this protocol has the most compatibility with third-party infrastructure.

Do not enable IPv6 unless your deployment must use it. The number of supported platform configurations is reduced when enabling IPv6 support with AEM Forms on JEE. You should verify that all third-party software, hardware, and networks that you plan to use have IPv6 support before you attempt to enable IPv6.

NOTE: If you are enabling CIFS in an IPv6 environment, you must explicitly enable IPv6 configuration after you configure your AEM Forms on JEE installation using Configuration Manager. See “Enabling CIFS in IPv6 mode” in the guide for your application server.

Supported IPv6 configurations

Not all infrastructure components support IPv6. For example, Oracle database does not support IPv6. You can use these databases by configuring the connection between the application server and the databases with IPv4, and the remaining communications over IPv6.

Check with your component vendor if IPv6 is supported.

IPv6 implementation guidelines

When you use IPv6 implementation either partially or fully, keep the following points in mind:

- After installing AEM Forms on JEE, do not use the option to start the Configuration Manager directly from the AEM Forms on JEE installer. Instead, navigate to the *[aem-forms root]*\configurationManager\bin\IPv6 directory, and run the IPv6-specific script (`ConfigurationManager_IPv6.bat` or `ConfigurationManager_IPv6.sh`) to launch the Configuration Manager.
- If you have chosen to validate the application server configuration using the Configuration Manager, the validation will fail after you enable IPv6 for the application server. You can ignore this error message during the process. After you restart the application server in the IPv6 mode, the application server can connect to the database.
- To have a pure IPv6 communication with the database server, modify EDC_DS, AEM_DS, and IDP_DS connection settings to use the hostname of the database which resolves to a numeric IPv6 address.
- If you are installing AEM Forms on JEE on to a server cluster, you must map the numeric IPv6 addresses of each cluster node to the computer's host name in DNS or in the `hosts` file on each cluster node.The `hosts` file is located at:
  - Windows: C:\Windows\system32\drivers\etc\hosts
  - Linux:/etc/hosts
- Many software components such as database drivers do not completely support numeric IPv6 addresses. So, it is recommended that you use a DNS-resolved hostname instead of numeric IPv6 addresses.
- Ensure that name used for mapping IPv6 is added to the CSRF filter section. If the name is not added, see Preventing CSRF attacks section in administration help.

  NOTE: *Name used for mapping IPv6 must not contain square brackets ([]).*
- In an IPv6 environment, if you are using Microsoft SQL Server, you should specify the database server IP address in the following format. Note that in this string, *;serverName* is a keyword, and so must not be replaced with the actual server name.

  ```
  jdbc:sqlserver://;serverName=<IPv6 address>;
  portNumber=<port>;databaseName=<db_name>
  ```

  Here, instead of the numeric IPv6 address, you can specify the hostname of the SQL Server database.

Configuring IPv6 for JBoss

1) You can download and install JBoss from http://www.jboss.org/jbossas/downloads/ or obtain the jboss.zip file from the third-party directory on the installation media and extract the bundled JBoss.
2) Modify lc_turnkey.xml and the database-specific data source configuration file to connect to the AEM Forms on JEE database.
3) Modify the lc-turnkey.xml file to connect to the AEM Forms on JEE database.
4) For clusters, modify the `jgroups-channelfactory-stacks.xml` files to enable IPv6. Refer to *Configuring AEM Forms on JEE Application Server Clusters Using JBoss*.
5) Modify the following files to enable IPv6:
   – ***(JBoss on Windows)*** [appserver root]\bin\standalone.conf.bat

     (JBoss on other platforms) *[appserver root]\bin\standalone.conf*
     - Change `-Djava.net.preferIPv4Stack=true` to `-Djava.net.preferIPv6Stack=true`.
     - Add the `-Djava.net.preferIPv6Addresses=true` argument.
6) Launch Configuration Manager by invoking the *[aem-forms root]*\configurationManager\bin\IPv6\ ConfigurationManager_IPv6.bat or ConfigurationManager_IPv6.sh script.
7) In the Configuration Manager, select the steps to configure EAR files, bootstrap and deploy AEM Forms on JEE modules.
8) After the Configuration Manager process is completed, copy these EAR files to the *[appserver root]*\\standalone\deployments directory.
9) Start JBoss from a command line.
10) Provide Configuration Manager hostname of the computer that is mapped to its IPv6 address and then bootstrap the application server to deploy the AEM Forms on JEE modules.

6.9. Using AEM Forms on JEE with a Luna HSM cluster

When using a SafeNet Luna ethernet-attached Hardware Security Module (HSM) cluster, you must ensure HAOnly mode is enabled on the device.

Enable HAOnly mode on the Luna device

1) Use the vtl tool shipped with the Luna client to determine if HAOnly mode is enabled. Type:
   ```
   vtl haAdmin –HAOnly -show
   ```
2) If HAOnly mode is not enabled, type:
   ```
   vtl haAdmin –HAOnly -enable
   ```