milestone 1 - Installing Fedora

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Fedora, along with Drupal, MySQL, Solr and GSearch, is one of the core technologies behind Islandora. This chapter will cover the basic steps for installing Fedora - for more information, please see the FedoraCommons documentation.

Fedora is available under the terms of the Apache License and has a very active open source community producing additional tools, applications and utilities. Islandora currently uses Fedora version 3.8.1

NOTE: The recommendation is that for new installations you use Fedora 3.8.1

Pre-installation Software Checklist

Fedora **must have** the following to be set-up and running prior to beginning your installation:

- Ubuntu 14.04 LTS .
- Oracle Java JDK 8, required by Djatoka (Note: OpenJDK 8 will not satisfy Djatoka requirements)
- You can also see How to Install Oracle Java 8 JDK for a quick installation instruction.
- A database: This is typically some version of MySQL. Consult the Fedora installation and configuration page for notes on running other databases.

MySQL Database

- See Setting up a MySQL Database for Fedora for information on configuring the database for Fedora.

Installation Steps

1. Download the latest release of the Fedora installer from Fedora Commons (as of this writing fcrepo-installer-3.8.1.jar).
2. Read through Fedora's Installation and Configuration page to ensure the pre-installation system pre-requisites are met. Actually running the installer is done later.
3. Prepare your local environment variables by modifying the /etc/profile.d/fedora-profile.sh of the system as the superuser performing the fedora installation ; instead of modifying the /etc/profile.d/fedora-profile.sh, you may create a file with the environment variables, and source it each time you open a new superuser shell to do the installation. Fedora will need to be given variables to find the main fedora directory, the main tomcat directory, and the location of your Java installation (JDK 8). An example set of [Unix/Linux] environment variables are given here.

   The following example assumes Java is installed in /usr/lib/jvm/java-8-oracle and Fedora is installed in /usr/local/fedora.

   Bundled Tomcat

   The above Fedora installer will bundle the Tomcat server in the default location (/usr/local/fedora/tomcat). That should be fine for a production environment. If you wish to install Tomcat on a different location you need to be familiar with that process, since we do not provide specific instructions for that.

   ```
   PATH=/opt/java/bin:$PATH:$HOME/bin
   export FEDORA_HOME=/usr/local/fedora
   export CATALINA_HOME=/usr/local/fedora/tomcat
   LD_LIBRARY_PATH=$LD_LIBRARY_PATH:$CATALINA_HOME/lib
   export LD_LIBRARY_PATH
   export JAVA_OPTS="-Xms1024m -Xmx1024m -Djavax.net.ssl.trustStore=/usr/local/fedora/server/truststore -
   Djavax.net.ssl.trustStorePassword=tomcat"
   export JAVA_HOME=/usr/lib/jvm/java-8-openjdk-amd64
   export JRE_HOME=/usr/lib/jvm/java-8-openjdk-amd64/jre
   export J2SDKDIR=/usr/lib/jvm/java-8-openjdk-amd64
   export J2REDIR=/usr/lib/jvm/java-8-openjdk-amd64/jre
   export KAKADU_LIBRARY_PATH=/usr/local/djatoka/lib/Linux-x86-64
   ```

4. Before beginning your Fedora installation, create a database for Fedora to use. This is **not** the same database that used for your Drupal installation.

5. Start the installer, navigate to the directory where you downloaded the install file (for Fedora 3.8.1 the installer is called fcrepo-installer-3.8.1.jar) and do one of the following methods:

    a. CUSTOM INSTALL - Manually:
        i. Run the following command:

Command Line for "CUSTOM INSTALL - Manually" of Fedora Commons

```
$ java -jar ./fcrepo-installer-3.8.1.jar
```

        ii. Select the CUSTOM INSTALL.

Selecting "CUSTOM INSTALL"

It is important to select the Custom Install as it will enable the resource index by default, which is the backbone of Islandora's collection views and other functionality.

        iii. The Fedora installer will prompt you for responses to a series of questions. Answer these questions according to the following example:

Example of installation properties/answers

```
Installation type - custom
home directory - /usr/local/fedora (default)
Password - [fedora_password]
server host - localhost (default) [could be a domain name etc depending on your environment]
app server context - (default)
API-A - false (default)
ssl avail - true
ssl required for api-a - false (default)
ssl required for api-m - false
servlet included - included (default)
tomcat home -(default)
tomcat http port - 8080 (default)
tomcat shutdown - 8005 (default)
tomcat ssl - 8443 (default)
keystore file - included
databse - mysql
MySQL JDBC driver - (default)
database username - fedoraAdmin
database password - [password]
jdbc url - (default)
JDBC DriverClass - (default)
Use upstream HTTP authentication - false
Enable FESL authz - false
policy enforcement - true
low level storage - akubra-fs (default)
Enable Resource Index - true
Enable Messaging - true
Messaging Provider URI - (default)
deploy local services - true
```

(Source: Installation and Configuration Guide - Fedora 3.8 Documentation)

Servlet Container

The installer will automatically configure and deploy to Tomcat 6.0.x and 7.0.x servlet containers. However, if an existing Tomcat installation (as opposed to the Tomcat bundled with the installer) was selected, the installer will not overwrite your existing `server.xml`, but rather, place a modified copy at `FEDORA_HOME/install` so that you may review it before before installing it yourself.

Other servlet containers will require manual deployment of the *war* files located at `FEDORA_HOME/install`.

Application Server Context

The installer provides the option to enter an application server context name under which Fedora will be deployed. The context name defaults to Fedora (resulting in http[s]://host:port/fedora), however any other valid context name can be supplied. The

installer will name the resulting *war* file according to the supplied context name (defaults to `fedora.war`). Please ensure that the servlet container configuration reflects the name of the Fedora context name in case it needs to be configured explicitly. For further details see Alternative Webapp Context Configuration.

SSL

Configuring SSL support for Fedora's API-M interface is an optional feature. It strongly recommended for production environments if Fedora is exposed to unsecured application and users. However, if your installation is within a managed data center with firewall services, you may choose to provide SSL using a software or hardware front-end instead. For example, a reverse proxy implemented using the Apache HTTP Server and hiding Fedora generally provides better SSL performance.

If the Tomcat servlet container is selected, the installer will configure `server.xml` for you. However, as noted above, if an existing Tomcat installation was selected, the installer will not overwrite your existing `server.xml`.

Please consult your servlet container's documentation for certificate generation and installation. (In particular, the example certificate provided by the installer for Tomcat should not be used in a production environment).

If Fedora is configured to use SSL, the `JAVA_OPTS` environment variable must include the `javax.net.ssl.trustStore` and `javax.net.ssl.trustStorePassword` properties. The value of `javax.net.ssl.trustStore` should be the location of the truststore file and the value of `javax.net.ssl.trustStorePassword` is the password for the keystore. The following values may be used with the sample keystore included with the installer:

```
-Djavax.net.ssl.trustStore=$FEDORA_HOME/server/truststore -Djavax.net.ssl.
trustStorePassword=tomcat
```

FeSL

The Fedora Security Layer is an experimental feature introduced from Fedora 3.3. FeSL consists of two separate components, which can be selected independently during the installation: FeSL Authentication and FeSL Authorisation.

FeSL Authentication is now the default authentication mechanism, however Fesl Authorization is still considered experimental. FeSL Authorization is a replacement for the legacy XACML policy enforcement, so you should not enable XACML policy enforcement if you are going to use FeSL Authorization, as this will provide an alternative XACML policy enforcement engine. See FeSL Installation for more information about FeSL requirements that must be satisfied prior to installation.

Resource Index

If the Resource Index is enabled, Fedora will use Mulgara as its underlying triplestore, with full-text indexing disabled.

Messaging
If Messaging is enabled, Fedora will create and send a message via JMS whenever an API-M method is called.

Once the script has collected your answers and configured Fedora on your system, the values are written to the "install.properties" file and will have a final location in $FEDORA_HOME/install.

b. CUSTOM INSTALL - Automated
   i. Create an "install.properties" file, similar to the example referenced on this github link

To create this file:
1. copy the full contents of the github link above into a text editor
2. where applicable change the database name, database user, database password and database port number, and server host to match your database configuration (these items are noted in square brackets)
3. save the edited file as install.properties to the same directory where the fcrepo ".jar" is stored.

   ii. Install Fedora by entering:

Command Line for "CUSTOM INSTALL - Automated" of Fedora Commons

```
java -jar fcrepo-installer-[version number].jar install.properties
[note: 'version number' will vary depending on the version you've downloaded]
```

Checking Fedora Commons Installation

Once the installation script has completed and Fedora is installed, you need to: start your Fedora instance by running:

Command Line for starting Fedora Commons

```
# $FEDORA_HOME/tomcat/bin/startup.sh

Using CATALINA_BASE:   /usr/local/fedora/tomcat
Using CATALINA_HOME:   /usr/local/fedora/tomcat
Using CATALINA_TMPDIR: /usr/local/fedora/tomcat/temp
Using JRE_HOME:        /usr
Using CLASSPATH:       /usr/local/fedora/tomcat/bin/bootstrap.jar
```

To verify that Fedora has successfully started:

1. $FEDORA_HOME/tomcat/logs/catalina.out should contain no errors.
2. View your Fedora instance through a web browser:

   http://localhost:8080/fedora/

   or

   https://[yourdomain]:8443/fedora

3. You should see something like this:

   Repository Information View

Fedora

Repository Information View

Repository Name: Fedora Repository

Base URL:	http://localhost:8080/fedora
Version:	3.8.1
PID Namespace:	changeme
PID Delimiter:	:
Sample PID:	changeme:100
Retain PID Namespace:	*
OAI Namespace:	example.org
OAI Delimiter:	:
Sample OAI Identifier:	oai:example.org:changeme:100
Sample Search URL:	http://localhost:8080/fedora/objects
Sample Access URL:	http://localhost:8080/fedora/objects/demo:5
Sample OAI URL:	http://localhost:8080/fedora/oai?verb=Identify
Admin Email:	bob@example.org
Admin Email:	sally@example.org

Repository Name:	**Fedora Repository**
Base URL:	http://localhost:8080/fedora
Version:	3.8.1
PID Namespace:	changeme
PID Delimiter:	:
Sample PID:	changeme:100

Retain PID Namespace:	*
OAI Namespace:	example.org
OAI Delimiter:	:
Sample OAI Identifier:	oai:example.org:changeme:100
Sample Search URL:	http://localhost:8080/fedora/objects
Sample Access URL:	http://localhost:8080/fedora/objects/demo:5
Sample OAI URL:	http://localhost:8080/fedora/oai?verb=Identify
Admin Email:	bob@example.org
Admin Email:	sally@example.org

Troubleshooting:

If you have problems accessing http://localhost:8080/fedora you may have to rebuild your database, in particular if you have dropped/recreated the fedora3 database a couple of times:

/usr/local/fedora/server/bin/fedora-rebuild.sh

Setting XACML Policies

Install required polices, remove some restrictive policies.

1. First stop your Fedora instance by running:$FEDORA_HOME/tomcat/bin/shutdown.sh
2. Remove the deny-purge policies:

Command Line to remove "deny-purge" policies

```
$ rm -v /usr/local/fedora/data/fedora-xacml-policies/repository-policies/default/deny-purge-*
```

3. Remove the anonymous-user policies:

Command Line to remove "deny-purge" policies

```
$ rm -v /usr/local/fedora/data/fedora-xacml-policies/repository-policies/islandora/permit-apim-to-anonymous-user.xml
$ rm -v /usr/local/fedora/data/fedora-xacml-policies/repository-policies/islandora/permit-upload-to-anonymous-user.xml
```

4. Navigate to the Fedora "repository-policies" directory:

Command Line to create islandora specific policies

```
$ cd /usr/local/fedora/data/fedora-xacml-policies/repository-policies/
```

5. Download / Clone the Islandora specific XACML policies from the Islandora GitHub XACML Policies repo

```
$ git clone https://github.com/Islandora/islandora-xacml-policies.git islandora
```

The Islandora XACML policies should now be located in "/usr/local/fedora/data/fedora-xacml-policies/repository-policies/islandora". There should be remain only these 4 policies:

- permit-apim-to-authenticated-user.xml
- permit-getDatastream-unrestricted.xml
- permit-getDatastreamHistory-unrestricted.xml
- permit-upload-to-authenticated-user.xml

A standard installation's XACML policy directory structure should look like this:

```
/usr/local/fedora/data/fedora-xacml-policies/repository-policies/
 default
```

```
    deny-apim-if-not-localhost.xml
    deny-inactive-or-deleted-objects-or-datastreams-if-not-administrator.xml
    deny-policy-management-if-not-administrator.xml
    deny-reloadPolicies-if-not-localhost.xml
    deny-unallowed-file-resolution.xml
    permit-anything-to-administrator.xml
    permit-apia-unrestricted.xml
    permit-dsstate-check-unrestricted.xml
    permit-oai-unrestricted.xml
    permit-serverStatus-unrestricted.xml
    readme.txt
 islandora
     permit-apim-to-authenticated-user.xml
     permit-getDatastreamHistory-unrestricted.xml
     permit-getDatastream-unrestricted.xml
     permit-upload-to-authenticated-user.xml
```

Adjusting access for more than "localhost"

Install required polices, remove some restrictive policies.

1. Open the $FEDORA_HOME/data/fedora-xacml-policies/repository-policies/default/deny-apim-if-not-localhost.xml in your favorite editor
2. Locate the text:

```
<AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">127.0.0.1</AttributeValue>
```

3. Duplicate this line for every IP address you wish to access Fedora from (i.e. your Islandora Drupal server, your desktop computer, etc). For example

```
<AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">127.0.0.1</AttributeValue>
<AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">192.168.56.1</AttributeValue>
```

   The Fedora default XACML policies can be restored to their default state at any time by simply removing the 'default' directory, and stopping /starting Fedora. Always backup your polices first before doing this!
4. Start up Fedora by using the startup command from step 8:

```
$FEDORA_HOME/tomcat/bin/startup.sh
```

Test the Fedora Installation

Access the Fedora Web Administrator: http://localhost:8080/fedora/admin and ensure you can ingest and purge objects.

NOTE: If you can not access the above link for ingestion then something went wrong with your installation. Please retrace your steps carefully, and be sure not to miss anything.

Create a milestone 1 snapshot backup:

```
# $FEDORA_HOME/tomcat/bin/shutdown.sh
# /etc/init.d/mysql stop

# /usr/local
# tar -cvzf fedora-milestone1.tar.gz fedora

# cd /var/lib
# tar -cvzf mysql-milestone1.tar.gz mysql

# /etc/init.d/mysql start
# $FEDORA_HOME/tomcat/bin/startup.sh
```

Automatically starting/restating tomcat:

- If you simply want to automatically start on boot you may want to add this lines to the /etc/rc.local:

```
sleep 10
# $FEDORA_HOME/tomcat/bin/startup.sh
```

- To get a more elegant init.d wrapper just follow the hints on this ubuntu post.

For information on using Fedora, make use of the tutorials at the Fedora Commons site.