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jBPM Clustered deployment

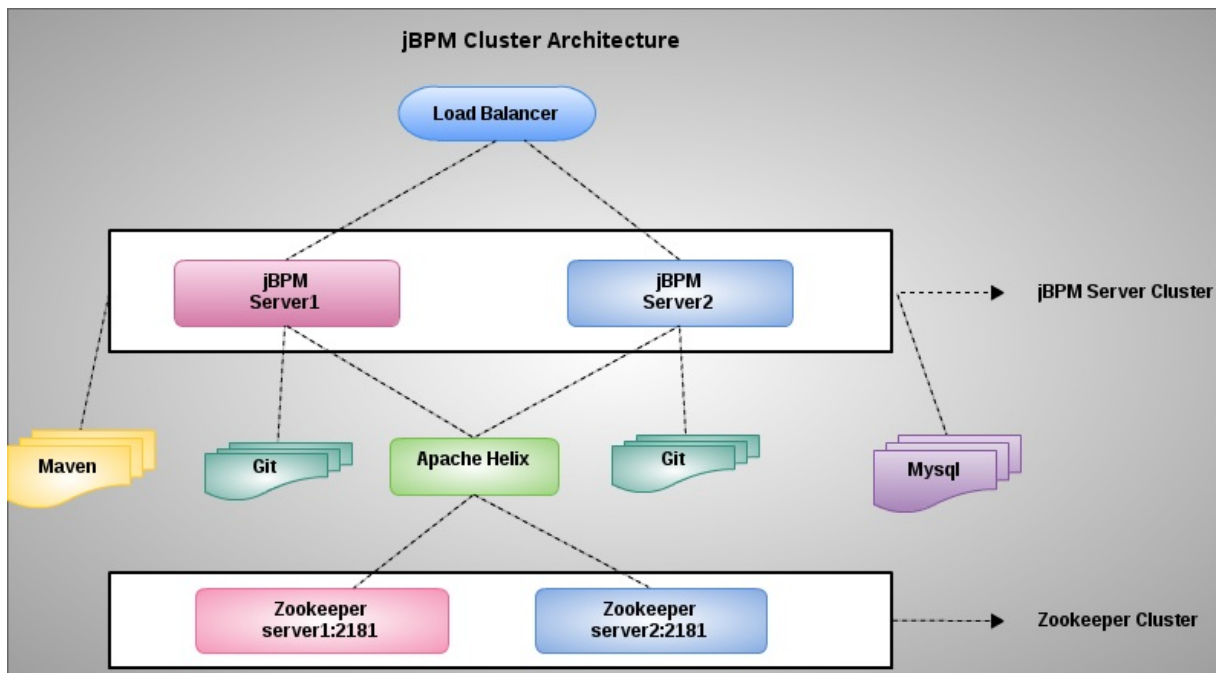
Primary purpose of this document is to set up a clustered jBPM environment.

Cluster Architecture

Usually, a BPM system mainly contain 3 components:

1. Design Time Tools - Used to design process, a version control and a process persist tool are necessary, some BPM system use RDBMS to do this, but jBPM use git for version control, maven for persist final process, this also for compatible with recent DevOps, Cloud Solution, git is well demonstrate by Github for version control, maven are great for distributing archive across servers/machines.
2. Runtime Engine - A business process is a abstraction of business logic and involve business people via Human based Task, some time the business logic need roll back or re-orchestrate, that means great number of database interations are necessary.
3. RDBMS - Some BPM system use store procedure to operated Database, but jBPM use Hibernate with native sql

After the overview of the basic architecture of jBPM , below figure is for how to cluster jBPM.



- Server1 and Server2 are two physical linux server
- Both servers point to a shred Mysql database
- Both servers point to a shred Maven repository
- Apache Zookeeper and Helix used to replicate assets(process, data modules) between 2 git repositories
- Quartz Job Scheduler used to run complexed timer related process

jBPM Cluster Deployment

Overview

This section contain how to download and install jBPM 6.5 version.

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Download

Download jBPM 6.5(jbpm-6.5.0.Final-installer-full.zip) from <http://jbpm.org/download/download.html>

Installaton

Note	This section depend on above Download section.
------	--

0 - Unzip jBPM full zip

```
unzip jbpm-6.5.0.Final-installer-full.zip
```

Note	A <code>jbpm-installer</code> folder will be generated, the following installation steps depend on this folder.
------	---

1 - Install WildFly

- Extract the zip file to install WildFly

```
unzip jbpm-installer/lib/jboss-wildfly-10.0.0.Final.zip
```

- Create placeholder directories

Change into WildFly Home, create 2 directories: `clustering` and `installation` :

```
cd wildfly-10.0.0.Final/
mkdir clustering
mkdir installation
```

Note	the <code>clustering</code> and <code>installation</code> directory are used across the whole installation, including <code>clustering test</code> , etc. clustering used to keep cluster related software, scripts. installation used to keep other cli/shell scripts, 3rd party libraries, etc.
------	---

- Copy all cli/shell scripts to `WFY_HOME/installation`

```
cp *.cli ~/wildfly-10.0.0.Final/installation
cp *.sh ~/wildfly-10.0.0.Final/installation
```

2 - Install jBPM console

Unzip jbp console war to WildFly deployment folder and add a dodeploy file:

```
unzip jbp-console/lib/jbp-console-6.5.0.Final-wildfly-10.0.0.Final.war -d ~/wildfly-10.0.0.Final/standalone/deployments/jbp-console
touch ~/wildfly-10.0.0.Final/standalone/deployments/jbp-console.war.dodeploy
```

3 - Install kie Server

Unzip kie server war to WildFly deployment folder and add a dodeploy file:

```
unzip jbp-console/lib/kie-server-6.5.0.Final-wildfly-10.0.0.Final.war -d ~/wildfly-10.0.0.Final/standalone/deployments/kie-server
touch ~/wildfly-10.0.0.Final/standalone/deployments/kie-server.war.dodeploy
```

4. Set up user group

Change into WildFly Home, execute add users shell script [add-users.sh](#):

```
./installation/add-users.sh
```

Alternatively, execute below commands under WildFly Home

```
./bin/add-user.sh -a -u admin -p password1! -g admin,analyst,kiemgmt,rest-all,kie-server
./bin/add-user.sh -a -u krisv -p password1! -g admin,analyst,rest-all,kie-server
./bin/add-user.sh -a -u john -p password1! -g analyst,Accounting,PM
./bin/add-user.sh -a -u mary -p password1! -g analyst,HR
./bin/add-user.sh -a -u sales-rep -p password1! -g analyst,sales
./bin/add-user.sh -a -u jack -p password1! -g analyst,IT
./bin/add-user.sh -a -u katy -p password1! -g analyst,HR
./bin/add-user.sh -a -u salaboy -p password1! -g admin,analyst,IT,HR,Accounting,rest-all
./bin/add-user.sh -a -u kieserver -p password1! -g kie-server
```

Note

These users are used for test and use simple plain txt based jaas login module, if use OpenLDAP server, this step is redundant

5. Installation Validation

Change into Wildfly Home, edit `bin/standalone.conf`, make sure WildFly/jBPM server has enough memory

```
-Xms2048m -Xmx2048m -XX:MetaspaceSize=256M -XX:MaxMetaspaceSize=512m
```

add system properties to disable import example data

```
-Dorg.kie.demo=false -Dorg.kie.example=false
```

start WildFly/jBPM via

```
./bin/standalone.sh -b 0.0.0.0 -bmanagement=0.0.0.0 -c standalone-full.xml
```

Once start finished, access <http://localhost:8080/jbp-console> will log into jBPM console with `admin / admin`.

Alternative Options

Download/Install Production BPM Suite is a alternative. Refer to [Download and Installation BPM S 6](#) for details.

What's it

jBPM default configured to use an example h2 data source, this not suitable for production. This section including setps of switch to mysql from default h2.

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- [Install Mysql on Linux and create jbpm database](#)
- [Set up Mysql Data Source](#)
 - [Amend Data Source](#)
- [Switch from h2 to mysql](#)

Install Mysql on Linux and create jbpm database

- Install Mysql on Linux via:

```
yum install mysql
```

- Start Mysql in Linux via:

```
service mysqld start
```

- Log into mysql with root user, create database, user and grant privileges

```
CREATE DATABASE jbpm;  
CREATE USER 'jbpm_user'@'%' IDENTIFIED BY 'jbpm_pass';  
GRANT ALL PRIVILEGES ON jbpm.* TO 'jbpm_user'@'%';
```

- Log into mysql with jbpm_user import the DDL script to jbpm database

```
mysql -u jbpm_user -p jbpm < ~/work/jbpm/jbpm-installer/db/ddl-scripts/mysql5/mysql5-jbpm-schema.sql  
mysql -u jbpm_user -p jbpm < ~/work/jbpm/jbpm-installer/db/ddl-scripts/mysql5/quartz_tables_mysql.sql
```

Set up Mysql Data Source

- Download mysql driver (<http://dev.mysql.com/downloads/connector/>) to WFY_HOME/installation, assume `mysql-connector-java-5.1.38.jar` be downloaded.
- Add Mysql Driver as a Module

Assume `module-add-mysql.cli` already be copy to WFY_HOME/installation, make sure WildFly Server is running and execute:

```
./bin/jboss-cli.sh --connect --file=installation/module-add-mysql.cli
```

- Create Mysql Data Source

Assume `create-mysql-ds.cli` already be copy to WFY_HOME/installation, make sure WildFly Server is running and execute:

```
./bin/jboss-cli.sh --connect --file=installation/create-mysql-ds.cli
```

Note

If above cli execute success, you will find the output like `"result" => [true]`, if failed, please check the database name, user, password, etc.

Amend Data Source

If want to change datasource url, log into CLI console, execute

```
./bin/jboss-cli.sh --connect
/subsystem=datasources/data-source=MysqlDS:write-attribute(name=connection-url,value="jdbc:mysql://191.168.1.101:3306/jbpm")
/subsystem=datasources/data-source=quartzNotManagedDS:write-attribute(name=connection-url,value="jdbc:mysql://191.168.1.101:3306/
```

Switch from h2 to mysql

Make sure WildFly Server is shut down, navigate to WildFly Home, Edit `standalone/deployments/jbpm-console.war/WEB-INF/classes/META-INF/persistence.xml`,

- Locate the `<jta-data-source>` tag and change it to the JNDI name of your data source, for example:

```
<jta-data-source>java:jboss/datasources/MysqlDS</jta-data-source>
```

- Locate the `<properties>` tag and change the `hibernate.dialect` property, for example:

```
<property name="hibernate.dialect" value="org.hibernate.dialect.MySQL5Dialect" />
```

- Locate the `hibernate.hbm2ddl.auto`, change the update to none:

```
<property name="hibernate.hbm2ddl.auto" value="none" />
```

- Assume [switch-kie-server.cli](#) already be copy to `WFY_HOME/installation`, make sure WildFly Server is running and execute:

```
./bin/jboss-cli.sh --connect --file=installation/switch-kie-server.cli
```

- Restart WildFly Server, to make sure the switch work fine.

Disable Server Sent Event

There have been reports that Firewalls in between the server and the browser can interfere with Server Sent Events (SSE) used by the Workbench. This will result in the "Loading..." spinner remaining visible and the Workbench failing to materialize.

To disable Server Sent Event, change into jBPM/WildFly home, create a file `ErraiService.properties` under `standalone/deployments/jbpm-console.war/WEB-INF/classes/`, add the following line content

```
errai.bus.enable_sse_support=false
```

Switch to LDAP

This section including how to configure jbp-m-console to use LDAP for authentication and authorization of users.

- Change into WildFly Home, execute `create-security-domain-ldap.cli` cli:

```
./bin/jboss-cli.sh --connect --file=installation/create-security-domain-ldap.cli
```

- Edit `jbp-m-console.war/WEB-INF/jboss-web.xml`, change security domain to `jbp-m-cluster`

```
<jboss-web>  
  <security-domain>jbp-m-cluster</security-domain>  
</jboss-web>
```

Note	<code>admin, analyst, reviewer</code> are necessary in LDAP.
------	--

Design-Time Clustering

Design-time clustering makes use of Apache Helix and Apache ZooKeeper, to share assets(processes, rules, data model objects) in the Git repository between all cluster nodes. This section including contents of how to set up Design-Time Clustering

What's this?

This section including steps to download and setting a clustering.

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- [Download](#)
- [Installation](#)

Download

Change into WFY_HOME/clustering directory

- Download `zookeeper-3.3.6.tar.gz` from <http://apache.fayea.com/zookeeper/zookeeper-3.3.6/>

```
wget http://apache.fayea.com/zookeeper/zookeeper-3.3.6/zookeeper-3.3.6.tar.gz
```

- Download `helix-core-0.6.6-pkg.tar` from <http://helix.apache.org/0.6.6-docs/download.cgi>

Installation

- Change into WFY_HOME/clustering directory.

Note the `WFY_HOME/clustering` used to keep zookeeper/helix for each servers.

- Extract `zookeeper-3.3.6.tar.gz` to WFY_HOME/clustering

```
tar -xvf zookeeper-3.3.6.tar.gz
```

- Extract `helix-core-0.6.6-pkg.tar` to WFY_HOME/clustering

```
tar -xvf helix-core-0.6.6-pkg.tar -C ~/wildfly-10.0.0.Final/clustering/
```

Configure Apache ZooKeeper

- Change into `WFY_HOME/clustering/zookeeper/conf`, create a `zoo.cfg` from sample

```
cp zoo_sample.cfg zoo.cfg
```

- Edit `zoo.cfg`, add the following content

```
# Defining ZooKeeper ensemble.  
server.1=localhost:2888:3888  
server.2=localhost:2889:3889
```

- Assign a node ID to each member that will run ZooKeeper. For example, use 1, 2 for node 1, node 2 respectively. The ZooKeeper node ID is specified in a field called `myid` under the data directory of ZooKeeper on each node. For example, on node 1, execute:

```
mkdir /tmp/zookeeper  
echo "1" > /tmp/zookeeper/myid
```

- Start Zookeeper

Change into zookeeper home execute

```
./bin/zkServer.sh start
```

Configure Apache Helix

- Change into `WFY_HOME/clustering/helix-core`, create the cluster

```
./bin/helix-admin.sh --zkSvr server.1:2181,server.2:2181 --addCluster jbpm-cluster
```

- Add nodes to the cluster

```
./bin/helix-admin.sh --zkSvr server.1:2181,server.2:2181 --addNode jbpm-cluster node1:12345  
./bin/helix-admin.sh --zkSvr server.1:2181,server.2:2181 --addNode jbpm-cluster node2:12346
```

- Add resources to the cluster.

```
./bin/helix-admin.sh --zkSvr server.1:2181,server.2:2181 --addResource jbpm-cluster vfs-repo 1 LeaderStandby AUTO_REBALANCE
```

- Rebalance the cluster with the three nodes.

```
./bin/helix-admin.sh --zkSvr server.1:2181,server.2:2181 --rebalance jbpm-cluster vfs-repo 1  
./bin/helix-admin.sh --zkSvr server.1:2181,server.2:2181 --rebalance jbpm-cluster vfs-repo 2
```

- Start the Helix controller in all the nodes in the cluster.

```
./bin/run-helix-controller.sh --zkSvr server.1:2181,server.2:2181 --cluster jbpm-cluster 2>&1 > ./controller.log &
```

Configure WildFly/jBPM Server

Configure individual server nodes with a series of System properties to point to Apache Helix controller.

Configure Server 1

- Create the following directories on Server 1

```
mkdir -p /tmp/jbpm/node1
mkdir -p /tmp/jbpm/quartz
```

- Copy [design-time-cluster-server-1.cli](#) to WFY_HOME/installation, make sure WildFly Server is running and execute:

```
./bin/jboss-cli.sh --connect --file=installation/design-time-cluster-server-1.cli
```

- If want to amend a specific property, log into CLI console, execute

```
./bin/jboss-cli.sh --connect
/system-property=org.uberfire.cluster.zk:write-attribute(name=value,value="10.66.192.120:2181,10.66.192.121:2181")
```

Configure Server 2

- Create the following directories on Server 2

```
mkdir -p /tmp/jbpm/node2
mkdir -p /tmp/jbpm/quartz
```

- Copy [design-time-cluster-server-2.cli](#) to WFY_HOME/installation, make sure WildFly Server is running and execute:

```
./bin/jboss-cli.sh --connect --file=installation/design-time-cluster-server-2.cli
```

- If want to amend a specific property, log into CLI console, execute

```
./bin/jboss-cli.sh --connect
/system-property=org.uberfire.cluster.zk:write-attribute(name=value,value="10.66.192.120:2181,10.66.192.121:2181")
```

Run-Time Clustering

The runtime clustering including setup Quartz Enterprise Job Scheduler, kie-server cluster, dashbuilder cluser, etc.

Configure Quartz

Configure Quartz is necessary to make sure jBPM cluster works fine.

- Prepare data source

This step are finished in [Set up data sources](#) section, `quartzNotManagedD` should be used in the following configuration.

- Create Quartz tables on `quartzNotManagedD` referred database.

```
cp jbpm-installer/db/ddl-scripts/mysql5/quartz_tables_mysql.sql wildfly-10.0.0.Final/installation/  
mysql -u jbpm_user -p jbpm < wildfly-10.0.0.Final/installation/quartz_tables_mysql.sql
```

- Create the Quartz configuration file [quartz-definition-mysql.properties](#)

Copy it to `/tmp/jbpm/quartz` which compatible with `org.quartz.properties` property definition in [Configure WildFly/jBPM](#).

Configuring Load Balancer

Setup apache 2 in ubuntu 14.04

- apache 2 install

```
sudo apt-get install apache2
```

- Edit `/etc/apache2/apache2.conf` add `ServerName`

```
ServerName 192.168.31.103
```

- apache restart

```
/etc/init.d/apache2 restart
```

Setup httpd on RHEL 7

This section use Apache `httpd` with `mod_proxy_balancer` as a Load Balancer, stick session are enabled.

- httpd install

```
yum -y install httpd
```

- httpd configuration

Copy [jbp-cluster.conf](#) to `/etc/httpd/conf.d`

- httpd start

```
systemctl start httpd.service
```

Once httpd started, <http://localhost:8080/jbp-console/> can use to log into jbp console.

Start and Stop Cluster

Starting a Cluster

Start cluster with the following order:

- Start ZooKeeper servers

```
./bin/zkServer.sh start
```

Note	Two nodes need to start accordingly.
------	--------------------------------------

- Start Helix Controller

```
./bin/run-helix-controller.sh --zkSvr 192.168.31.103:2181,192.168.31.102:2181 --cluster jbpm-cluster 2>&1 > ./controller.log &
```

- Start WilFly/jBPM Server

```
./bin/standalone.sh -b 0.0.0.0 -bmanagement=0.0.0.0 -c standalone-full.xml 2>&1 > ./console.log &
```

Note	Two servers need to start accordingly.
------	--

Stopping a Cluster

To stop your cluster, stop the components in the reversed order from starting it:

- Stop WilFly/jBPM Server

Either use the stop shell scripts, or Ctrl + c.

Note	Two servers need to stop accordingly.
------	---------------------------------------

Alternatively, use `jps -l` find the jBPM server process, kill the process

```
$ /usr/lib/jvm/jdk1.8.0_111/bin/jps -l
18822 /home/ubuntu/wildfly-10.0.0.Final/jboss-modules.jar
$ kill -9 18822
```

- Stop Helix Controller

```
ps aux|grep HelixControllerMain
kill -15
```

- Stop ZooKeeper server(s).

```
./bin/zkServer.sh stop
```

Note	Two nodes need to stop accordingly.
------	-------------------------------------

What's it

This section contain commands & scripts which used in whole document.

How to run default jBPM Sample

- Install Demo

```
ant install.demo.noecclipse
```

- Start H2

```
ant start.h2
```

- Start Demo

```
./bin/standalone.sh --server-config=standalone-full.xml -Dorg.kie.demo=true -Dorg.kie.example=false -Dorg.kie.server.id=default-k
```

Zookeeper configure

```
/home/ubuntu/wildfly-10.0.0.Final/clustering/zookeeper-3.3.6/zookeeper
```

```
server.1=192.168.31.103:2888:3888  
server.2=192.168.31.102:2889:3889
```

Helix configure

```
./bin/helix-admin.sh --zkSvr 192.168.31.103:2181,192.168.31.102:2181 --addCluster jbpm-cluster
```

```
./bin/helix-admin.sh --zkSvr 192.168.31.103:2181,192.168.31.102:2181 --addNode jbpm-cluster jbpm-server-1:12345
```

```
./bin/helix-admin.sh --zkSvr 192.168.31.103:2181,192.168.31.102:2181 --addNode jbpm-cluster jbpm-server-2:12346
```

```
./bin/helix-admin.sh --zkSvr 192.168.31.103:2181,192.168.31.102:2181 --addResource jbpm-cluster vfs-repo 1 LeaderStandby AUTO_REE
```

```
./bin/helix-admin.sh --zkSvr 192.168.31.103:2181,192.168.31.102:2181 --rebalance jbpm-cluster vfs-repo 1
```

```
./bin/helix-admin.sh --zkSvr 192.168.31.103:2181,192.168.31.102:2181 --rebalance jbpm-cluster vfs-repo 2
```

```
./bin/run-helix-controller.sh --zkSvr 192.168.31.103:2181,192.168.31.102:2181 --cluster jbpm-cluster 2>&1 > ./controller.log &
```

jBPM Cluster Administration

Server	Home Directory
jBPM	/home/ubuntu/wildfly-10.0.0.Final/
Zookeeper	/home/ubuntu/wildfly-10.0.0.Final/clustering/zookeeper-3.3.6/
Helix	/home/ubuntu/wildfly-10.0.0.Final/clustering/helix-core

jBPM console

- <http://10.10.103.226:8080/jbpm-console>
- <http://10.10.103.227:8080/jbpm-console>

Users/Roles

User	Password	Role
admin	password1!	admin,analyst,kiemgmt,rest-all,kie-server
krisv	password1!	admin,analyst,rest-all,kie-server
john	password1!	analyst,Accounting,PM
mary	password1!	analyst,HR
sales-rep	password1!	analyst,sales
jack	password1!	analyst,IT
katy	password1!	analyst,HR
salaboy	password1!	admin,analyst,IT,HR,Accounting,rest-all
kieserver	password1!	kie-server

Start

Refer to [Start Cluster](#) Start WilFly/jBPM Server section.

Adminisration From CLI

Change into Zookeeper home, connect to CLI

```
./bin/zkCli.sh
```

Refer to <https://zookeeper.apache.org/doc/trunk/zookeeperAdmin.html#The+Four+Letter+Words> for completed Adminisration Commands.

Adminisration From jconsole

```
$ /usr/lib/jvm/jdk1.8.0_111/bin/jconsole
```

Once start, select `org.apache.zookeeper.server.quorum.QuorumPeerMain` .

Administration From CLI

Change into Helix home, execute CLI via

```
./bin/helix-admin.sh --zkSvr <ZookeeperServerAddress> <command> <parameters>
```

Refer to http://helix.apache.org/0.6.6-docs/tutorial_admin.html for completed commands list.