**Building a cluster with Apache TomEE**

1. **TomEE Setup**
   1. Download the distribution at <http://TomEE.apache.org/apache-TomEE.html>
      1. The OS used for this article was Mac OS X 10.11.3 (El Captain)
      2. The TomEE version used at this article was 1.7.3 (Web Profile)
      3. The JDK used was 1.8.73
   2. Unpack the zip file where do you prefer
   3. Go to the folder where did you unpacked the file, go to the /bin directory and execute the command:

./startup.sh

* 1. To check if it is working, open a browser and open the URL:

http://localhost:8080

1. **Cluster setup**
   1. At your TomEE home folder, edit the file:

/conf/server.xml

* 1. There are two types of clusters:
     1. Dynamic Discovery: it will deploy to any TomEE node found at your network using BackupManager
     2. Static Discovery: it will deploy only to TomEE nodes added to membership
  2. For this article, we will conver the Dynamic Discovery. So you will add the following lines to your server.xml (at the Engine node in file):

<Cluster className=*"org.apache.catalina.ha.tcp.SimpleTcpCluster"*

channelSendOptions=*"6"*>

<Manager className=*"org.apache.catalina.ha.session.BackupManager"*

expireSessionsOnShutdown=*"false"* notifyListenersOnReplication=*"true"*

mapSendOptions=*"6"* />

<!-- <Manager className="org.apache.catalina.ha.session.DeltaManager" expireSessionsOnShutdown="false"

notifyListenersOnReplication="true"/> -->

<Channel className=*"org.apache.catalina.tribes.group.GroupChannel"*>

<Membership className=*"org.apache.catalina.tribes.membership.McastService"*

address=*"228.0.0.4"* port=*"45564"* frequency=*"500"* dropTime=*"3000"* />

<Receiver className=*"org.apache.catalina.tribes.transport.nio.NioReceiver"*

address=*"auto"* port=*"5000"* selectorTimeout=*"100"* maxThreads=*"6"* />

<Sender className=*"org.apache.catalina.tribes.transport.ReplicationTransmitter"*>

<Transport

className=*"org.apache.catalina.tribes.transport.nio.PooledParallelSender"* />

</Sender>

<Interceptor

className=*"org.apache.catalina.tribes.group.interceptors.TcpFailureDetector"* />

<Interceptor

className=*"org.apache.catalina.tribes.group.interceptors.MessageDispatch15Interceptor"* />

<Interceptor

className=*"org.apache.catalina.tribes.group.interceptors.ThroughputInterceptor"* />

</Channel>

<Valve className=*"org.apache.catalina.ha.tcp.ReplicationValve"*

filter=*".\*\.gif|.\*\.js|.\*\.jpeg|.\*\.jpg|.\*\.png|.\*\.htm|.\*\.html|.\*\.css|.\*\.txt"* />

<Deployer className=*"org.apache.catalina.ha.deploy.FarmWarDeployer"*

tempDir=*"/tmp/war-temp/"* deployDir=*"/tmp/war-deploy/"* watchDir=*"/tmp/war-listen/"*

watchEnabled=*"false"* />

<ClusterListener

className=*"org.apache.catalina.ha.session.ClusterSessionListener"* />

</Cluster>

* 1. Restart your TomEE (./shutdown.sh and ./startup.sh) and that's it! Your first node of your dynamic cluster is up and running
  2. Start up your server. If your configuration is right, you should get a log like this:

mar 06, 2016 7:23:11 PM org.apache.catalina.ha.tcp.SimpleTcpCluster startInternal

INFORMAÇÕES: Cluster is about to start

mar 06, 2016 7:23:11 PM org.apache.catalina.tribes.transport.ReceiverBase bind

INFORMAÇÕES: Receiver Server Socket bound to:/192.168.0.104:5000

mar 06, 2016 7:23:11 PM org.apache.catalina.tribes.membership.McastServiceImpl setupSocket

INFORMAÇÕES: Setting cluster mcast soTimeout to 500

mar 06, 2016 7:23:11 PM org.apache.catalina.tribes.membership.McastServiceImpl waitForMembers

INFORMAÇÕES: Sleeping for 1000 milliseconds to establish cluster membership, start level:4

mar 06, 2016 7:23:12 PM org.apache.catalina.tribes.membership.McastServiceImpl waitForMembers

INFORMAÇÕES: Done sleeping, membership established, start level:4

mar 06, 2016 7:23:12 PM org.apache.catalina.tribes.membership.McastServiceImpl waitForMembers

INFORMAÇÕES: Sleeping for 1000 milliseconds to establish cluster membership, start level:8

mar 06, 2016 7:23:13 PM org.apache.catalina.tribes.membership.McastServiceImpl waitForMembers

INFORMAÇÕES: Done sleeping, membership established, start level:8

* 1. When another node get into your cluster you get something like this at your log:

mar 06, 2016 7:26:00 PM org.apache.catalina.tribes.io.BufferPool getBufferPool

INFORMAÇÕES: Created a buffer pool with max size:104857600 bytes of type:org.apache.catalina.tribes.io.BufferPool15Impl

mar 06, 2016 7:26:01 PM org.apache.catalina.ha.tcp.SimpleTcpCluster memberAdded

INFORMAÇÕES: Replication member added:org.apache.catalina.tribes.membership.MemberImpl[tcp://{192, 168, 0, 107}:5000,{192, 168, 0, 107},5000, alive=1016, securePort=-1, UDP Port=-1, id={111 -38 59 -66 -68 -29 72 -69 -103 12 -121 -120 -13 -25 -90 17 }, payload={}, command={}, domain={}, ]

1. **Deploy an app**
   1. Build a simple web app
   2. Edit its web.xml and add this line to it:

<distributable />

* 1. Deploy your app at your node
  2. Ok, so now you have a TomEE ready to become to a node of a cluster and prepared to make your simple app be high available