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PHASE 1:

Deliverables

Proposed Plan

The below activities that were initially planned to be performed as part of Phase-1 delivery.

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-- Perform Standalone Setup	
-- Log Analysis	
-- Record existing traces and issues	
-- Understand Messaging Channels	
-- Understand Socket Channels	
-- Understand & Record Components Involved	
-- Understand & Record Entry Points	
-- Understand Basic Functional Navigation	
-- Record Identified State Information	
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-- Topology Design (3 Tier)	2
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Any Deviations from the Proposed Plan

1. **System Study –** TAFJ-Transact on JBoss EAP 7.2 Standalone Setup from scratch hasn't performed yet as the machines provided were already pre-configured. Hence, we compared and validated the existing Temenos Configurations against R20 Stack Book.

2. **Set Benchmark** – No documents provided for Non-Functional as well as Functional Test Cases. Hence, the activity is still pending.

System Study

Perform Standalone Setup

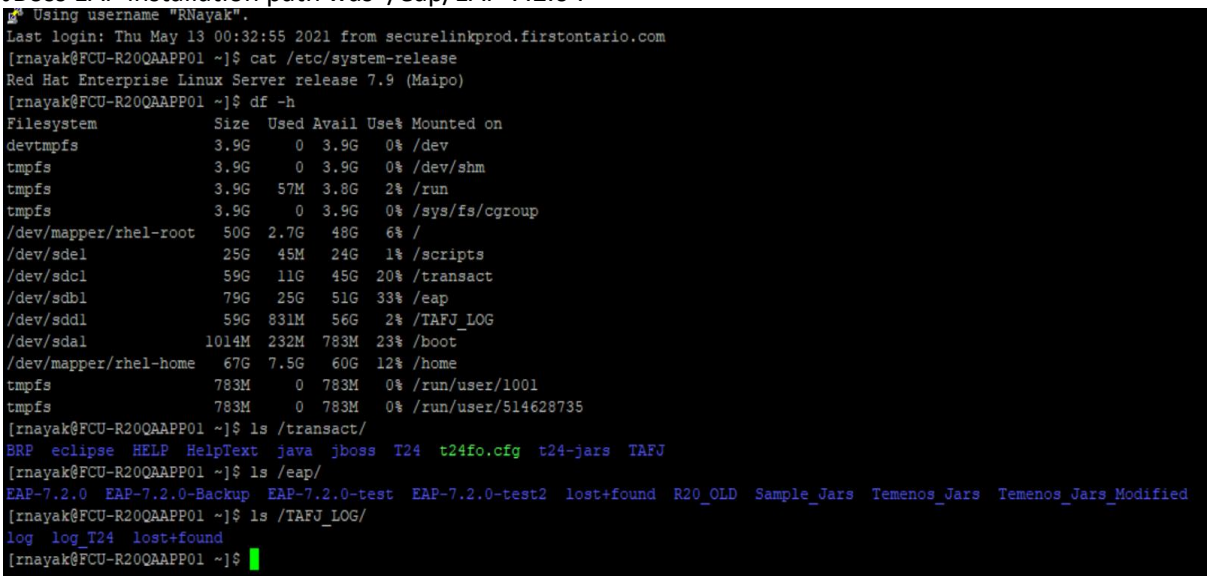
Initially, we were supposed to follow a document "*Customer Runbook 6.0 | February 2021*" from Temenos to perform complete standalone setup of the App from scratch.

By doing that, we would have captured the below information:

- **OS level Info**: installation pre-requisites, hardware requirements, app user setup, network settings, system environment variables, user environment variables, running app as a system service etc.
- **Application-level Info**: installation binaries involved, configuring Transact, TAFZ, JBoss EAP and how to access transact through BrowserWeb, capturing the setup logs, performing sanity checks, capturing business process flows, identifying state persistence in file and DB, recording existing issues by running unit and integration test scripts etc.

As we received a pre-installed OS environment with preconfigured Transact and JBoss EAP standalone setup, it was impossible to capture the above information in real-time. So, we had to reverse engineer the entire installation procedure by validating each configuration done against "*R20 Stack book".*

- All the transact binaries were present inside '/transact' path and its log path '/TAFJ_LOG'. JBoss EAP installation path was '/eap/EAP-7.2.0'.



- All the environment variables were setup in '.bash_profile' under 'jboss-user' user. Java version is '1.8'.

```
[rnayak@FCU-R20QAAPP01 ~]$ sudo su - jboss-user
Last login: Thu May 13 01:12:11 EDT 2021 on pts/3
[jboss-user@FCU-R20QAAPP01 ~]$ more .bash_profile
# .bash_profile

# Get the aliases and functions
if [ -f ~/.bashrc ]; then
        . ~/.bashrc
fi

# User specific environment and startup programs

export JAVA_HOME=/transact/java
export TAFJ_HOME=/transact/TAFJ
export LOG_HOME=/transact/log

export UTP_HOME=/transact/.
export UTP_TOOL_HOME=$UTP_HOME/../tools/utptool
export PATH=$JAVA_HOME/bin:$TAFJ_HOME/bin:$PATH
export TAFJ_LOG_HOME=$TAFJ_HOME/log
export T24_LOG_HOME=$TAFJ_HOME/log_T24
export T24_HOME=/transact/T24/UD
BRP_HOME=$UTP_HOME/BRP; export BRP_HOME

export LOG_DIRECTORY=$T24_LOG_HOME
export LOG_DIRECTORY_T24=$T24_LOG_HOME

export PACKAGE=$T24_HOME/package
export DS_PACKAGE_UPDATES=$T24_HOME/DSPackageUpdates

PATH=$PATH:$HOME/.local/bin:$HOME/bin:$TAFJ_HOME/bin:$JAVA_HOME/bin:$T24_HOME/updater/bin

export PATH
[jboss-user@FCU-R20QAAPP01 ~]$ java -version
java version "1.8.0_202"
Java(TM) SE Runtime Environment (build 1.8.0_202-b08)
Java HotSpot(TM) 64-Bit Server VM (build 25.202-b08, mixed mode)
[jboss-user@FCU-R20QAAPP01 ~]$
```

- JBoss EAP was configured as a rhel service with service configuration file “jboss-eap.conf” present in ‘/etc/default’ path and startup script “jboss-eap-rhel.sh” in ‘/etc/init.d’ path. Both the files were taken and modified from path ‘/eap/EAP-7.2.0/bin/init.d’.

```
[rnayak@FCU-R20QAAPP01 ~]$ ls /etc/default/
grub  jboss-eap.conf  nss  useradd
[rnayak@FCU-R20QAAPP01 ~]$ ls /etc/init.d/
functions  jboss-eap-rhel.sh  netconsole  network  README  rhnsd
[rnayak@FCU-R20QAAPP01 ~]$ chkconfig --list | grep jboss

Note: This output shows SysV services only and does not include native
      systemd services. SysV configuration data might be overridden by native
      systemd configuration.

      If you want to list systemd services use 'systemctl list-unit-files'.
      To see services enabled on particular target use
      'systemctl list-dependencies [target]'.

jboss-eap-rhel.sh       0:off   1:off   2:off   3:off   4:off   5:off   6:off
[rnayak@FCU-R20QAAPP01 ~]$
```

- The server configuration file which was used to start JBoss instance is “standalone.xml” and all the temenos artifacts were deployed in ‘deployment’ directory with all server log files in ‘log’ directory.

```
[rnayak@FCU-R20QAAPP01 /]$ ls /eap/EAP-7.2.0/standalone/configuration/
application.keystore          logging.properties      standalone-full.xml          standalone.xml             T24.xml
application.keystore.backup   mgmt-groups.properties  standalone-ha.xml            standalone.xml.backup
application-roles.properties  mgmt-users.properties   standalone-load-balancer.xml standalone_xml_history
application-users.properties  standalone-full-ha.xml  standalone.orig.xml          standalone.xml_originialhb
[rnayak@FCU-R20QAAPP01 /]$ ls /eap/EAP-7.2.0/standalone/deployments/
Authenticator-20.0.35.war                  IVR.war.deployed                          t24-EB_ResourceProviderService-ejb.jar
Authenticator-20.0.35.war.deployed         PROLENDER.war                             t24-EB_ResourceProviderService-ejb.jar.deployed
axis2.war                                  PROLENDER.war.deployed                    t24-IF_IntegrationFrameworkService-ejb.jar
axis2.war.deployed                         r20qa.war                                 t24-IF_IntegrationFrameworkService-ejb.jar.deployed
BrowserWeb.war                             r20qa.war.deployed                        TAFJJEE_EAR.ear
BrowserWeb.war.deployed                    t24-EB_AuthenticationService-ejb.jar      TAFJJEE_EAR.ear.deployed
EBillMDB.jar                               t24-EB_AuthenticationService-ejb.jar.deployed TAFJSpoolerPlugins.rar
EBillMDB.jar.deployed                      t24-EB_CatalogService-ejb.jar             TAFJSpoolerPlugins.rar.deployed
irf-t24catalog-services-20.0.25.war        t24-EB_CatalogService-ejb.jar.deployed    tocfee.ear
irf-t24catalog-services-20.0.25.war.deployed t24-EB_OFSConnectorService-ejb.jar      tocfee.ear.deployed
IVR.war                                    t24-EB_OFSConnectorService-ejb.jar.deployed
[rnayak@FCU-R20QAAPP01 /]$ ls /eap/EAP-7.2.0/standalone/log/
audit.log            server.log.2019-05-08  server.log.2021-01-30  server.log.2021-02-10  server.log.2021-02-25  server.log.2021-04-12
backupgc.log.current server.log.2019-05-09  server.log.2021-02-02  server.log.2021-02-11  server.log.2021-02-26  server.log.2021-04-13
browser.log          server.log.2021-01-24  server.log.2021-02-03  server.log.2021-02-17  server.log.2021-02-28  server.log.2021-04-14
console.hb.log       server.log.2021-01-25  server.log.2021-02-04  server.log.2021-02-18  server.log.2021-03-01  server.log.2021-04-16
console.log          server.log.2021-01-26  server.log.2021-02-05  server.log.2021-02-19  server.log.2021-03-02  server.log.2021-04-20
gc.log.0.current     server.log.2021-01-27  server.log.2021-02-07  server.log.2021-02-22  server.log.2021-03-03  server.log.2021-04-26
server.hb.log        server.log.2021-01-28  server.log.2021-02-08  server.log.2021-02-23  server.log.2021-03-04  server.log.2021-04-27
server.log           server.log.2021-01-29  server.log.2021-02-09  server.log.2021-02-24  server.log.2021-04-09
[rnayak@FCU-R20QAAPP01 /]$
```

The JBoss standalone instance running process can be found out using 'netstat'.

```
[rnayak@FCU-R20QAAPP01 ~]$ sudo netstat -tlnup | grep java | grep 22903
tcp        0      0 0.0.0.0:8443            0.0.0.0:*               LISTEN      22903/java
tcp        0      0 0.0.0.0:9990            0.0.0.0:*               LISTEN      22903/java
tcp        0      0 127.0.0.1:3528          0.0.0.0:*               LISTEN      22903/java
tcp        0      0 0.0.0.0:8009            0.0.0.0:*               LISTEN      22903/java
tcp        0      0 127.0.0.1:33488         0.0.0.0:*               LISTEN      22903/java
tcp        0      0 0.0.0.0:8080            0.0.0.0:*               LISTEN      22903/java
udp        0      0 230.0.0.4:45688         0.0.0.0:*                           22903/java
udp        0      0 127.0.0.1:55200         0.0.0.0:*                           22903/java
udp        0      0 224.0.1.105:23364       0.0.0.0:*                           22903/java
[rnayak@FCU-R20QAAPP01 ~]$
```

- The JBoss EAP admin console url: http://{host-public-ip}:9990/console
  The JBoss EAP application access url: https://{host-public-ip}:8443/{app-path}
  TAFZ Admin url: https://{host-public-ip}:8443/TAFJEE

Note:

- Basic sanity check has been done for TAFZ components and JBOSS EAP components by the following the steps mentioned in Temenos "R20 Stack book".
- However, due to lack of unit, integration test scripts, a thorough check up of the entire App eco system could not be performed for the standalone setup.

Prepare Cluster specific configurations

After analyzing the messaging channels, socket channels, DB connectivity, business process entry points and basic functional navigations with the help of captured traces and logs by performing many rounds of sanity testing, we prepared and finalized a "standalone-full-ha.xml" server configuration file currently present in '/eap/EAP-7.2.0-test/standalone/configuration' path.

```
[rnayak@FCU-R20QAAPP01 ~]$ cd /eap/EAP-7.2.0-test/standalone/configuration/
[rnayak@FCU-R20QAAPP01 configuration]$ ls
application.keystore          logging.properties      standalone-full.xml          standalone.xml              T24.xml
application.keystore.backup   mgmt-groups.properties  standalone-ha.xml            standalone.xml.backup
application-roles.properties  mgmt-users.properties   standalone-load-balancer.xml standalone_xml_history
application-users.properties  standalone-full-ha.xml  standalone.orig.xml          standalone.xml_originialhb
[rnayak@FCU-R20QAAPP01 configuration]$
```

Note:

- This file will be required in the future for setting up servers which will participate in the cluster.
- The parameters currently present in the file are currently 90-95% stable. Further minor changes might be required in the file as cluster testing intensifies.

Set Benchmark (in collab with FCU)

As part of this planned activity, we were supposed to get and follow Non-functional Test Cases, Functional Test Cases and prepare “Completion Checklist”.

As no such documents were provided to us due to lack of availability on FCU side, hence this activity is marked as ‘*pending*’.

Cluster Planning

As part of this planned activity, we were supposed to find out the clusterability of Temenos artifacts like war, ear etc. currently present in server deployment directory as well as the cluster topology.

App clusterability Check:

- The temenos binaries currently present under ‘/transact’ directory is not part of JBoss EAP deployment.
- Artifacts shown below are part of JBoss EAP deployment.

```
[rnayak@FCU-R20QAAPP01 configuration]$ ls /eap/EAP-7.2.0/standalone/deployments/
Authenticator-20.0.35.war                  IVR.war.deployed                          t24-EB_ResourceProviderService-ejb.jar
Authenticator-20.0.35.war.deployed         PROLENDER.war                             t24-EB_ResourceProviderService-ejb.jar.deployed
axis2.war                                  PROLENDER.war.deployed                    t24-IF_IntegrationFrameworkService-ejb.jar
axis2.war.deployed                         r20qa.war                                 t24-IF_IntegrationFrameworkService-ejb.jar.deployed
BrowserWeb.war                             r20qa.war.deployed                        TAFJJEE_EAR.ear
BrowserWeb.war.deployed                    t24-EB_AuthenticationService-ejb.jar      TAFJJEE_EAR.ear.deployed
EBillMDB.jar                               t24-EB_AuthenticationService-ejb.jar.deployed TAFJSpoolerPlugins.rar
EBillMDB.jar.deployed                      t24-EB_CatalogService-ejb.jar             TAFJSpoolerPlugins.rar.deployed
irf-t24catalog-services-20.0.25.war        t24-EB_CatalogService-ejb.jar.deployed    tocfee.ear
irf-t24catalog-services-20.0.25.war.deployed t24-EB_OFSConnectorService-ejb.jar      tocfee.ear.deployed
IVR.war                                    t24-EB_OFSConnectorService-ejb.jar.deployed
```

However, we found, none of the war files present had <distributable/> tag embedded in their web.xml file. This tag is needed for the component to participate in clustering by enabling features like session replication.

Note:

- **Queries** were raised to find out the list of files that are ready to participate in clustering and also the deployment order of those artifacts. The response we got from **Temenos via email**:

1. ” There is no order for deploying the war files, all files can be deployed and then the Application Ex JBoss or WebSphere can be started.”

On 01-05-2021 01:12, Bake, Henry wrote:

[External Email]
Hi Ram,

Received this updated from Temenos. So I expect you are goo to continue.

”There is no order for deploying the war files, all files can be deployed and then the Application Ex Jboss or Websphere can be started.”

2. ” Except EbillMDB.jar all other CAMB war files/jar files can be deployed in cluster environment. No other dependencies “

On 28-04-2021 21:28, Bake, Henry wrote:

[External Email]
Hi Ram,

Latest confirmation I received from Temenos:

”Except EbillMDB.jar all other CAMB war files/jar files can be deployed in cluster environment. No other dependencies“

The above temenos response conveys that the EbillMDB.jar is not cluster-ready whereas all other files are cluster-ready.

- As of our understanding, the response is inconclusive.
Provided below a resolution from Red hat access portal.
https://access.redhat.com/solutions/2339831

The clustering functionality is configured in the HA-based profiles: `standalone-ha.xml` and `standalone-full-ha.xml`. By default, EAP will use UDP-based clustering (multicast address 230.0.0.4). If desired, one can use TCP-based clustering. To setup a UDP-based cluster consisting of two standalone instances, follow the below steps:

- Assume JBoss EAP is installed on the filesystems of machines `10.10.10.10` and `20.20.20.20`.
- Deploy a clustered application to both instances. Note that a clustered application contains a `<distributable/>` tag within the application's *web.xml* file.
- Start up both machines:

- Below are the deployment dependencies which I found following the R20 Stack book. However, the book doesn’t give a clear deployment order of those files.

```
# Deployment Order:

# 11.1 Deploying TAFJJEE_EAR.ear and TAFJ Spooler plugins:
TAFJSpoolerPlugins.rar
TAFJJEE_EAR.ear

# 11.10 Deploying UXP Browser artefacts in JBoss:
Authenticator-20.0.35.war
BrowserWeb.war
irf-t24catalog-services-20.0.25.war

# 11.11 Deploying the EJB JAR files in JBoss:
t24-EB_AuthenticationService-ejb.jar
t24-EB_CatalogService-ejb.jar
t24-EB_ResourceProviderService-ejb.jar

# 12.2 Deploying Axis2:
axis2.war

# remaining:
EBillMDB.jar
IVR.war
PROLENDER.war
r20qa.war
t24-EB_OFSConnectorService-ejb.jar
t24-IF_IntegrationFrameworkService-ejb.jar
tocfee.ear

# There are few new files which are recently added to the server deployment directory:
ONLINEMEMBER.war
t24-PW_HumanTaskService-ejb.jar
t24-PW_HumanTaskService-ProxyAdaptor.jar
t24-IF_IntegrationFrameworkService-ProxyAdaptor.jar
t24-IF_IntegrationFlowService-ejb.jar
t24-IF_IntegrationFlowService-ProxyAdaptor.jar
t24-IF_InflowService-ejb.jar
t24-IF_InflowService-ProxyAdaptor.jar
t24-EB_ResourceProviderService-ProxyAdaptor.jar
t24-EB_EntitlementService-ejb.jar
t24-EB_EntitlementService-ProxyAdaptor.jar
t24-EB_CatalogService-ProxyAdaptor.jar
t24-DS_DesignStudioInstallerService-ejb.jar
t24-DS_DesignStudioInstallerService-ProxyAdaptor.jar
t24-AC_DDAService-ejb.jar
t24-AC_DDAService-ProxyAdaptor.jar
```

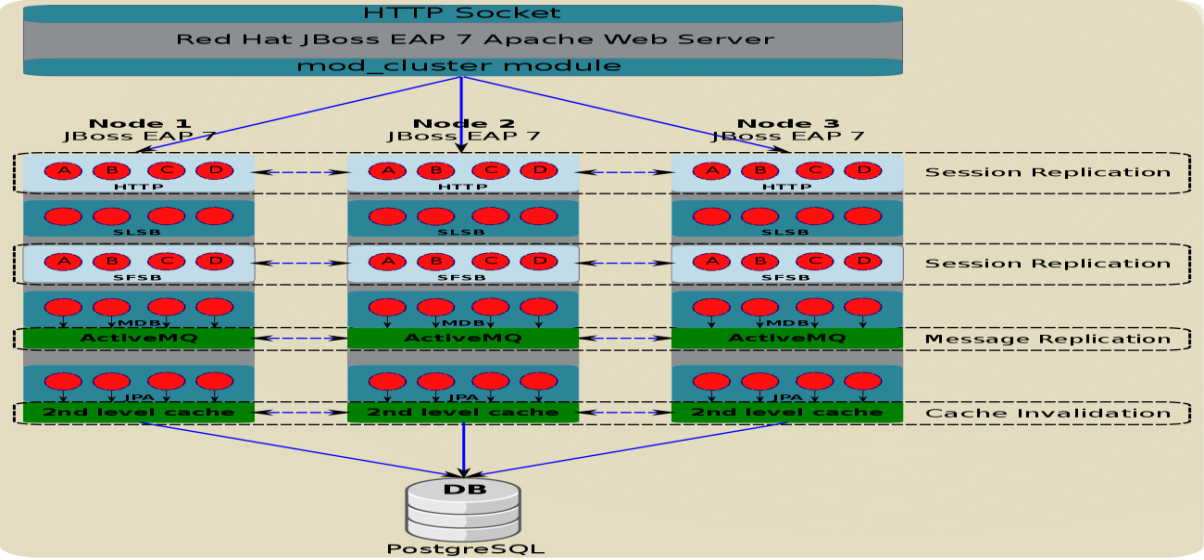
The new files above that were added recently are not tested as of now.
r20qa.war file tested for http session replication was successful.

Perform Vertical Cluster Setup

Before creating a fully functional QA cluster which can take some additional amount of time for setting up load balancer (software | Hardware) etc., we needed to find out whether the existing Temenos artifacts present are cluster ready or not.

So, we prepared a *Two node vertical standalone cluster for reverse engineering* as seen in the diagram below.

Cluster for Reverse Engineering (Apache Web Server not implemented):



The 2 running JBoss instances are shown using 'netstat' command.

```
Using username "RNayak".
Last login: Thu May 13 02:43:48 2021 from securelinkprod.firstontario.com
[rnayak@FCU-R20QAAPP01 ~]$ sudo netstat -tlnup | grep java
tcp        0      0 0.0.0.0:8443            0.0.0.0:*               LISTEN      22903/java
tcp        0      0 0.0.0.0:8543            0.0.0.0:*               LISTEN      29364/java
tcp        0      0 0.0.0.0:9990            0.0.0.0:*               LISTEN      22903/java
tcp        0      0 127.0.0.1:3528          0.0.0.0:*               LISTEN      22903/java
tcp        0      0 0.0.0.0:8009            0.0.0.0:*               LISTEN      22903/java
tcp        0      0 0.0.0.0:10090           0.0.0.0:*               LISTEN      29364/java
tcp        0      0 127.0.0.1:3628          0.0.0.0:*               LISTEN      29364/java
tcp        0      0 0.0.0.0:8109            0.0.0.0:*               LISTEN      29364/java
tcp        0      0 127.0.0.1:39727         0.0.0.0:*               LISTEN      29364/java
tcp        0      0 127.0.0.1:33488         0.0.0.0:*               LISTEN      22903/java
tcp        0      0 0.0.0.0:8080            0.0.0.0:*               LISTEN      22903/java
tcp        0      0 0.0.0.0:8180            0.0.0.0:*               LISTEN      29364/java
udp        0      0 230.0.0.4:45688         0.0.0.0:*                           22903/java
udp        0      0 230.0.0.4:45688         0.0.0.0:*                           29364/java
udp        0      0 127.0.0.1:55200         0.0.0.0:*                           22903/java
udp        0      0 127.0.0.1:55300         0.0.0.0:*                           29364/java
udp        0      0 224.0.1.105:23364       0.0.0.0:*                           22903/java
udp        0      0 224.0.1.105:23364       0.0.0.0:*                           29364/java
[rnayak@FCU-R20QAAPP01 ~]$
```

Q1. How to know the JBoss instances are participating in the cluster?

- Below are the logs generated when a new server instance (node1) joins the cluster.

```
2021-05-13 14:11:33,349 INFO  [org.infinispan.CLUSTER] (MSC service thread 1-6) ISPN000094: Received new cluster view for channel ejb: [node1|0] (1)
[node1]
2021-05-13 14:11:33,349 INFO  [org.infinispan.CLUSTER] (MSC service thread 1-2) ISPN000094: Received new cluster view for channel ejb: [node1|0] (1)
[node1]
2021-05-13 14:11:33,349 INFO  [org.infinispan.CLUSTER] (MSC service thread 1-3) ISPN000094: Received new cluster view for channel ejb: [node1|0] (1)
[node1]
2021-05-13 14:11:33,349 INFO  [org.infinispan.CLUSTER] (MSC service thread 1-4) ISPN000094: Received new cluster view for channel ejb: [node1|0] (1)
[node1]
```

- Below are the logs generated when a 2nd server instance (node2) joins the cluster.

```
2021-05-13 14:11:53,277 INFO  [org.infinispan.CLUSTER] (thread-3,null,null) ISPN000094: Received new cluster view for channel ejb: [node1|1] (2) [
node1, node2]
2021-05-13 14:11:53,285 INFO  [org.infinispan.CLUSTER] (thread-3,null,null) ISPN100000: Node node2 joined the cluster
2021-05-13 14:11:53,288 INFO  [org.infinispan.CLUSTER] (thread-3,null,null) ISPN000094: Received new cluster view for channel ejb: [node1|1] (2) [
node1, node2]
2021-05-13 14:11:53,290 INFO  [org.infinispan.CLUSTER] (thread-3,null,null) ISPN100000: Node node2 joined the cluster
2021-05-13 14:11:53,292 INFO  [org.infinispan.CLUSTER] (thread-3,null,null) ISPN000094: Received new cluster view for channel ejb: [node1|1] (2) [
node1, node2]
2021-05-13 14:11:53,295 INFO  [org.infinispan.CLUSTER] (thread-3,null,null) ISPN100000: Node node2 joined the cluster
2021-05-13 14:11:53,296 INFO  [org.infinispan.CLUSTER] (thread-3,null,null) ISPN000094: Received new cluster view for channel ejb: [node1|1] (2) [
node1, node2]
2021-05-13 14:11:53,299 INFO  [org.infinispan.CLUSTER] (thread-3,null,null) ISPN100000: Node node2 joined the cluster
```

- Below are the logs generated when a 2nd server instance (node2) is down and leaves the cluster.

```
2021-05-13 14:22:50,898 INFO  [org.infinispan.CLUSTER] (thread-13,ejb,node1) ISPN000094: Received new cluster view for channel ejb: [node1|2] (1) [
node1]
2021-05-13 14:22:50,901 INFO  [org.infinispan.CLUSTER] (thread-13,ejb,node1) ISPN100001: Node node2 left the cluster
2021-05-13 14:22:50,903 INFO  [org.infinispan.CLUSTER] (thread-13,ejb,node1) ISPN000094: Received new cluster view for channel ejb: [node1|2] (1) [
node1]
2021-05-13 14:22:50,904 INFO  [org.infinispan.CLUSTER] (thread-13,ejb,node1) ISPN100001: Node node2 left the cluster
2021-05-13 14:22:50,907 INFO  [org.infinispan.CLUSTER] (thread-13,ejb,node1) ISPN000094: Received new cluster view for channel ejb: [node1|2] (1) [
node1]
2021-05-13 14:22:50,909 INFO  [org.infinispan.CLUSTER] (thread-13,ejb,node1) ISPN100001: Node node2 left the cluster
2021-05-13 14:22:50,911 INFO  [org.infinispan.CLUSTER] (thread-13,ejb,node1) ISPN000094: Received new cluster view for channel ejb: [node1|2] (1) [
node1]
2021-05-13 14:22:50,912 INFO  [org.infinispan.CLUSTER] (thread-13,ejb,node1) ISPN100001: Node node2 left the cluster
```

- Below are the logs generated when a Message Broker(activemq) is clustered.

```
2021-05-12 08:11:18,336 INFO  [org.apache.activemq.artemis.core.server] (ServerService Thread Pool -- 84) AMQ221000: live Message Broker is starting
with configuration Broker Configuration (clustered=true,journalDirectory=/eap/EAP-7.2.0-test/standalone/data/activemq/journal,bindingsDirectory=/eap/
EAP-7.2.0-test/standalone/data/activemq/bindings,largeMessagesDirectory=/eap/EAP-7.2.0-test/standalone/data/activemq/largemessages,pagingDirectory=
/eap/EAP-7.2.0-test/standalone/data/activemq/paging)
```

- Below are the logs generated when the Message Broker Cluster Connection Bridge is connected.

```
2021-05-12 08:11:21,740 INFO  [org.apache.activemq.artemis.core.server] (Thread-27 (ActiveMQ-server-org.apache.activemq.artemis.core.server.impl.
ActiveMQServerImpl$5@2ab99698)) AMQ221027: Bridge ClusterConnectionBridge@38d3d07c [name=$.artemis.internal.sf.my-cluster.40fd7637-af27-11eb-9eed-
005056afaadc, queue=QueueImpl[name=$.artemis.internal.sf.my-cluster.40fd7637-af27-11eb-9eed-005056afaadc, postOffice=PostOfficeImpl [server=
ActiveMQServerImpl::serverUUID=d7528788-af26-11eb-ad24-005056afaadc], temp=false]@325b407d targetConnector=ServerLocatorImpl (identity=(Cluster-
connection-bridge::ClusterConnectionBridge@38d3d07c [name=$.artemis.internal.sf.my-cluster.40fd7637-af27-11eb-9eed-005056afaadc, queue=QueueImpl[name
=$.artemis.internal.sf.my-cluster.40fd7637-af27-11eb-9eed-005056afaadc, postOffice=PostOfficeImpl [server=ActiveMQServerImpl::serverUUID=d7528788-
af26-11eb-ad24-005056afaadc], temp=false]@325b407d targetConnector=ServerLocatorImpl [initialConnectors=[TransportConfiguration(name=http-connector,
factory=org-apache-activemq-artemis-core-remoting-impl-netty-NettyConnectorFactory) ?httpUpgradeEndpoint=http-acceptor&activemqServerName=default&
httpUpgradeEnabled=true&port=8180&host=FCU-R20QAAPP01], discoveryGroupConfiguration=null]]::ClusterConnectionImpl@2023059380[nodeUUID=d7528788-af26-
11eb-ad24-005056afaadc, connector=TransportConfiguration(name=http-connector, factory=org-apache-activemq-artemis-core-remoting-impl-netty-
NettyConnectorFactory) ?httpUpgradeEndpoint=http-acceptor&activemqServerName=default&httpUpgradeEnabled=true&port=8080&host=0-0-0-0, address=jms,
server=ActiveMQServerImpl::serverUUID=d7528788-af26-11eb-ad24-005056afaadc])) [initialConnectors=[TransportConfiguration(name=http-connector, factory
=org-apache-activemq-artemis-core-remoting-impl-netty-NettyConnectorFactory) ?httpUpgradeEndpoint=http-acceptor&activemqServerName=default&
httpUpgradeEnabled=true&port=8180&host=FCU-R20QAAPP01], discoveryGroupConfiguration=null]] is connected
```

- Clustering status of both JBoss server instances can also be checked from the CLI.

```
[jboss-user@FCU-R20QAAPP01 ~]$ cd /eap/EAP-7.2.0/bin/
[jboss-user@FCU-R20QAAPP01 bin]$ ./jboss-cli.sh
You are disconnected at the moment. Type 'connect' to connect to the server or 'help' for the list of supported commands.
[disconnected /] connect 127.0.0.1:9990
[standalone@127.0.0.1:9990 /] /subsystem=jgroups/channel=ee:read-attribute(name=view,include-defaults=true)
{
    "outcome" => "success",
    "result" => "[node2|3] (2) [node2, node1]"
}

[standalone@127.0.0.1:9990 /] exit
[jboss-user@FCU-R20QAAPP01 bin]$ ./jboss-cli.sh
You are disconnected at the moment. Type 'connect' to connect to the server or 'help' for the list of supported commands.
[disconnected /] connect 127.0.0.1:10090
[standalone@127.0.0.1:10090 /] /subsystem=jgroups/channel=ee:read-attribute(name=view,include-defaults=true)
{
    "outcome" => "success",
    "result" => "[node2|3] (2) [node2, node1]"
}

[standalone@127.0.0.1:10090 /] exit
[jboss-user@FCU-R20QAAPP01 bin]$
```

Q2. How to know an application is cluster-ready?

A clustered application contains a <distributable/> tag within the application's web.xml file.

- Below steps can be followed to manually embed <distributable/> tag inside the web.xml file if not present.

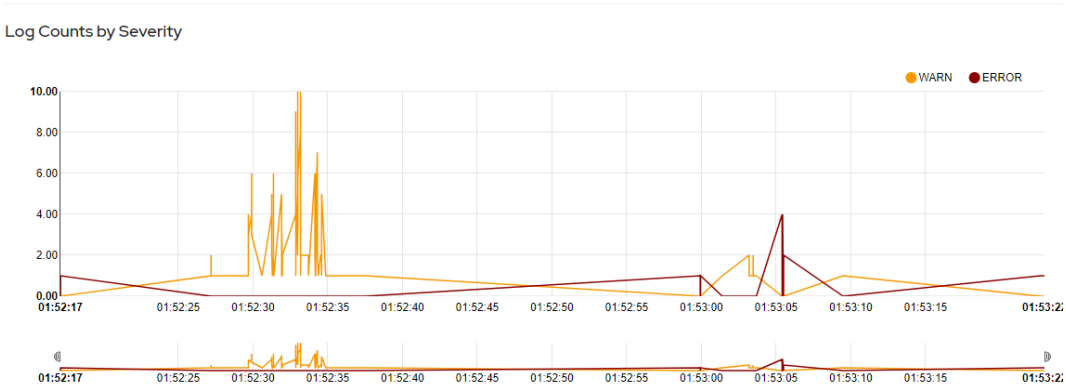
```
# File listing:

$ unzip -l my.war

# If you need to pull out a single file, modify it, then put it back in the archive:

$ unzip my.war WEB-INF/web.xml -d .
$ vi WEB-INF/web.xml    # add <distributable /> tag inside <web-app>
$ zip my.war WEB-INF/web.xml

# You can validate the content was changed using the command below, which just outputs the content from the archive to stdout.

$ unzip -p my.war WEB-INF/web.xml
$ rm -rf WEB-INF/
```

- Below are the logs generated when the application is clustered.

```
SyncConsistentHashFactory@1ffffd8e9, hashFunction=MurmurHash3, numSegments=256, numOwners=2, timeout=240000, totalOrder=false, cacheMode=DIST_SYNC, persistentUUID
=8abfd9e3-2f9f-4a48-889f-474f54429f06, persistentStateChecksum=Optional.empty}, topologyId=0, rebalanceId=0, currentCH=null, pendingCH=null, availabilityMode=
null, phase=null, actualMembers=null, throwable=null, viewId=5}
2021-05-14 01:53:05,686 DEBUG [org.infinispan.topology.LocalTopologyManagerImpl] (ServerService Thread Pool -- 97) Node node1 joining cache r20qa.war
2021-05-14 01:53:05,686 TRACE [org.infinispan.commons.marshall.AdaptiveBufferSizePredictor] (ServerService Thread Pool -- 90) Next predicted buffer size for
object type 'org.infinispan.topology.CacheTopologyControlCommand' will be 480
```

```
org.jboss.as.clustering.infinispan.subsystem.CacheContainerServiceConfigurator@29c296c3 passing event EventImpl{type=CACHE_STARTED, newMembers=null, oldMembers=
null, localAddress=null, viewId=0, subgroupsMerged=null, mergeView=false}
2021-05-14 01:53:06,249 INFO  [org.jboss.as.clustering.infinispan] (ServerService Thread Pool -- 97) WFLYCLINF0002: Started r20qa.war cache from web container
2021-05-14 01:53:06,250 DEBUG [org.infinispan.cache.impl.CacheImpl] (ServerService Thread Pool -- 97) Started cache r20qa.war on node1
2021-05-14 01:53:06,250 TRACE [org.infinispan.manager.DefaultCacheManager] (ServerService Thread Pool -- 97) Cache r20qa.war started
2021-05-14 01:53:06,250 DEBUG [org.infinispan.cache.impl.CacheImpl] (ServerService Thread Pool -- 97) Started cache r20qa.war on node1
2021-05-14 01:53:06,266 TRACE [org.infinispan.remoting.transport.jgroups.JGroupsTransport] (thread-13,ejb,node1) node1 received command from node2:
```

Sample analysis of generated server logs:



Log Stats (374 log entries parsed spanning ~a minute)

- 350 WARN
- 24 ERROR

Solution Recommendations

Click a ▼ to focus these recommendations.

Soluti...	Title
62969...	Why am I seeing "Could not parse url [resource:jboss-...
23325...	ipa-replica-install fails with "Error while updating secu...
13789...	JON agent's 'config export' command generates an i...
123178...	log4j:WARN No appenders could be found for logger ...
36760...	Artemis unable to start with exception - The element ...
33870...	How to configure the Multi-JSF feature in EAP 7.1 ?
79549...	WFLYSRV0059 / JBAS015960: Class Path entry ... d...
21796...	General SSSD Debugging Procedures

Top WARN in message

- 5 WFLYJSF0005: Unknown JSF version 'NONE'. Default version 'main' will be used instead.
- 3 WFLYSRV0059: Class Path entry tcommon-20.0.3.jar in /content/tocfee.ear/tocfplugin-ra.rar/ofsml.j...
- 3 WFLYSRV0059: Class Path entry tcommon-20.0.3.jar in /content/tocfee.ear/lib/ofsml.jar does not p...
- 3 WFLYEE0007: Not installing optional component com.sun.xml.ws.transport.http.servlet.WSAsyncListen...
- 2 WFLYEE0007: Not installing optional component org.springframework.web.context.request.async.Stand...

Top ERROR in message

- 4 log4j:WARN Continuable parsing error 2 and column 31
- 2 log4j:WARN Fatal parsing error 49 and column 7
- 2 log4j:WARN Document root element "Configuration", must match DOCTYPE root "null".
- 2 log4j:WARN Document is invalid: no grammar found.
- 2 log4j:WARN The element type "category" must be terminated by the matching end-tag "</category>".

Top WARN in thread

- 159 MSC service thread 1-5
- 49 MSC service thread 1-8
- 40 MSC service thread 1-1
- 24 MSC service thread 1-4
- 24 MSC service thread 1-2

Top ERROR in thread

- 18 MSC service thread 1-8
- 3 Controller Boot Thread
- 1 MSC service thread 1-3
- 1 default task-324
- 1 MSC service thread 1-1

Top WARN in category

- 322 org.jboss.as.server.deployment
- 10 org.jboss.as.ee
- 5 org.jboss.as.jsf
- 4 org.jgroups.protocols.UDP
- 2 org.jboss.as.jaxrs

Top ERROR in category

- 19 stderr
- 2 org.jboss.msc.service.fail
- 2 org.jboss.as.controller.management-operation
- 1 org.jboss.as

Log Entries

Capped at 250, click a row to view the entry

Timestamp	Severity	Category	Thread	Message
5/14/2021, 1:53:22 AM	ERROR	org.jboss.as	Controller Boot Thread	WFLYSRV0026: JBoss EAP ...
5/14/2021, 1:53:22 AM	ERROR	org.jboss.as.controller.mana...	Controller Boot Thread	WFLYCTL0013: Operation (...
5/14/2021, 1:53:22 AM	ERROR	org.jboss.as.controller.mana...	Controller Boot Thread	WFLYCTL0013: Operation (...
5/14/2021, 1:53:09 AM	WARN	org.jboss.weld.Bootstrap	MSC service thread 1-8	WELD-000146: BeforeBean...
5/14/2021, 1:53:05 AM	ERROR	stderr	MSC service thread 1-8	log4j:WARN Please initialize ...
5/14/2021, 1:53:05 AM	ERROR	stderr	MSC service thread 1-8	log4j:WARN No appenders c...
5/14/2021, 1:53:05 AM	WARN	org.jboss.as.jaxrs	MSC service thread 1-7	WFLYRS0018: Explicit usag...
5/14/2021, 1:53:05 AM	ERROR	stderr	MSC service thread 1-8	org.xml.sax.SAXParseExcep...
5/14/2021, 1:53:05 AM	ERROR	stderr	MSC service thread 1-8	log4j:ERROR Could not pars...
5/14/2021, 1:53:05 AM	ERROR	stderr	MSC service thread 1-8	log4j:WARN The element ty...
5/14/2021, 1:53:05 AM	ERROR	stderr	MSC service thread 1-8	log4j:WARN Fatal parsing er...
5/14/2021, 1:53:05 AM	ERROR	stderr	MSC service thread 1-8	log4j:WARN Document is in...
5/14/2021, 1:53:05 AM	ERROR	stderr	MSC service thread 1-8	log4j:WARN Continuable pa...
5/14/2021, 1:53:05 AM	ERROR	stderr	MSC service thread 1-8	log4j:WARN Document root ...
5/14/2021, 1:53:05 AM	ERROR	stderr	MSC service thread 1-8	log4j:WARN Continuable pa...
5/14/2021, 1:53:05 AM	ERROR	stderr	MSC service thread 1-8	org.xml.sax.SAXParseExcep...
5/14/2021, 1:53:05 AM	ERROR	stderr	MSC service thread 1-8	log4j:ERROR Could not pars...

Proposed Cluster Plan

- We will have 4 node JBoss EAP in each machine with flat deployment model (i.e., no tiers).
- For frontend load balancing, we can use a Software Load Balancer (SLB) or a Hardware Load Balancer (HLB).
- Stateless Session Beans (SSB) and Messaging Queues will be in JBoss Cluster replicated by Infinispan.
- Based on temenos response, except EbillMDB.jar, all other temenos jars, wars etc. are cluster-ready. Thus, if we are using this component then we have to prepare a Singleton deployment of the same, need more details on the component.

Summary

- As of now, all the jar, war files etc. are currently deployed on the reverse engineered cluster.
- Basic sanity testing has been done for applications present in the cluster.
- Need more test cases and scripts to check cluster scenarios like message replication, cache invalidation etc.

PHASE 2:

Deliverables

Proposed Plan

The below activities that were initially planned to be performed as part of Phase-2 delivery.

Switch to Cluster Profile – Fix Test Cycle	**Weeks**
-- Cluster Startup	2
-- Log Analysis	
-- Identify Issues	
-- Study Root Cause	
-- Propose Solution	
-- Apply Solution	
-- Test Solution	
-- Restart and cycle back	
-- Stop if no issues found	
Validate Benchmark (in collab with FCU)	**Weeks**
-- Non-Functional Test Cases	2
-- Functional Test Cases	
-- Log Analysis	
-- Identify Issues	
-- Study Root Cause	
-- Propose Solution	
-- Apply Solution	
-- Test Solution	
-- Restart and cycle back	
-- Stop if no issues found	
Documentation & Handover	**Weeks**
Documentation, Walk-through & Handover	1