Installation of Oracle OSB using Live-Scripting medthod

Andreas Wittmann

October 22, 2023

This project demonstrates the installation of Oracle FMW and OSB using the Live-Scripting method.

Documentation (PDF)	https://anwi.gmbh/labs/live-scripting_osb/live-scripting_osb.pdf
Documentation (HTML)	https://anwi.gmbh/labs/live-scripting_osb/live-scripting_osb.html
Project on GitHub	https://github.com/andreaswittmann/live-scripting_osb

Contents

1 Introduction

This project demonstrates the live-scripting process, which combines command-line-work and documentation in the context of an Oracle Service Bus installation.

1.1 Motivation

Oracle Service Bus (OSB) is widely utilized, boasting a substantial installation base. Although new projects are currently rare, its complex environment prevails. Expertise is often sought after for version migrations and the integration of new solutions. In the context of Oracle Service Bus (OSB) installation, live-scripting is a powerful approach that combines the execution of command-line operations with detailed documentation to create a reliable and well-documented installation process. Live-scripting benefits OSB installation in the following ways:

Reproducibility: Live-scripting ensures that the OSB installation process is reproducible, meaning that anyone following the documented steps can achieve the same results. This is particularly important in enterprise environments, where consistency and reliability are paramount. Even if the installation needs to be repeated months or years later, the documented process guarantees the same outcome.

Documentation: The process of live-scripting creates precise documentation that captures each step involved in the process. This documentation goes beyond simple command lists; it includes explanations, diagrams, attachments and solutions to potential issues that may arise. This detailed documentation is invaluable for troubleshooting, auditing, and knowledge transfer within an organization.

Quality Assurance: Live-scripting serves as a form of quality assurance. The fact that the documented process has been tested and verified during writing, ensures that the documented solution is reliably working and the chances of errors and misconfigurations is minimal.

Knowledge Sharing: The live-scripting approach makes knowledge sharing much more accessible. Team members can easily follow the step-by-step instructions, regardless of their level of expertise. Even if they don't want to use Emacs, the solution can be reproduced using a copy-and-paste approach. It accelerates the training process for new team members and can help disseminate best practices across the organization.

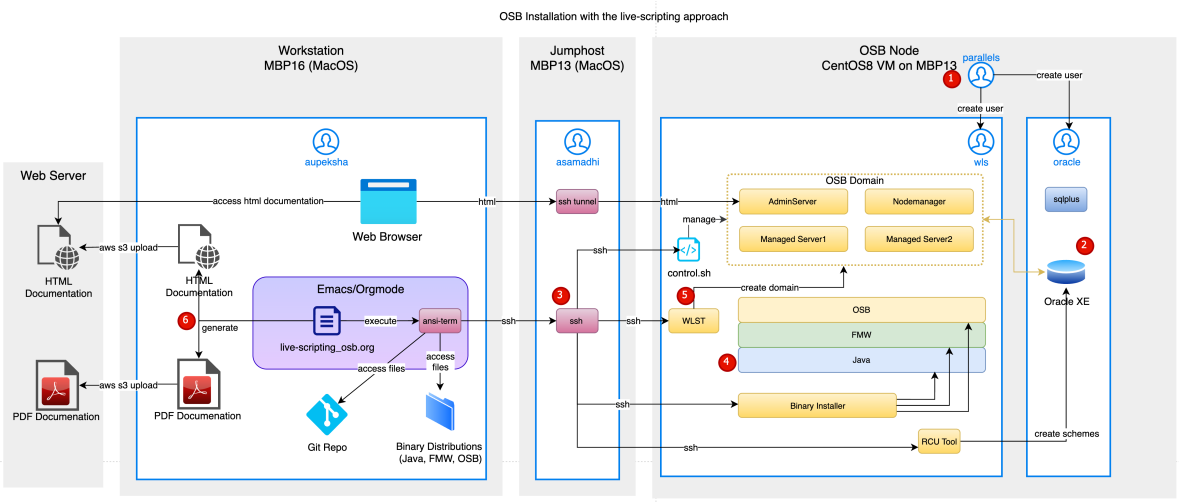
Flexibility and adaptability: Live-scripting isn't limited to a one-size-fits-all approach. It can be adapted and extended as needed. Users can modify the documented process to accommodate unique requirements or make improvements over time without sacrificing the stability and reliability of the installation.

Efficiency: Live-scripting streamlines the installation process by providing a clear and efficient path from start to finish. It minimizes the time and effort required to set up OSB, making it more accessible for both experienced and novice users.

In contrast to a fully automated setup, which is often used in large OSB installations, encompassing hundreds of domains and environments, the approach proposed by live-scripting does not require to write, test and maintain automation code. Live-scripting is best used in situations where only a limited number of environments are required. It ranges between a classical manual approach on the one hand and a fully automated solution on the other. In summary, live-scripting is a powerful methodology in the context of command-line-centered work, especially during OSB installation. It ensures a reproducible, well-documented, and reliable installation process, which is crucial in complex enterprise environments. This approach not only guarantees quality and consistency but also promotes knowledge sharing, adaptability, and efficiency in managing installations.

1.2 Architecture

The architecture of the OSB domain is simple, it consists of an admin server and two cluster nodes, all running on a single machine. The architecture diagram, however, also depicts the machines and components required to install and set up the OSB domain.



It uses three machines: A workstation for development and installation tasks, a jump host which adds a level of security and limits access to the OSB environment, and a Linux node for running all components of the OSB domain. Since this project demonstrates the live-scripting approach, the workstation contains an Emacs installation that is prepared to execute shell commands in an *ansi-term*. It uses ssh to connect to the target machine via the jump server. The whole installation process can conceptually be broken down into six steps, which are depicted by the red numbered dots in the diagram.

Step 1: In this step, the machine of the OSB node is provisioned. In my case, it is a virtual machine running on a MacBook Pro using Parallels as the hypervisor. The workstation is connected to the jump host using tailscale. It has no direct network connection to the VM. This situation resembles a typical setup in on-premise data centers and cloud environments. The Unix user *parallels* on this machine is used to create two additional users: *oracle* and *wls*, which will become the installation users for the database and the OSB environment, respectively.

Step 2: In this step, I install an Oracle Express Edition database, which is required for all FMW installations. It stores metadata for the operation of the OSB domain.

Step 3: During this step, I will provide the prerequisites for the subsequent installations. This includes establishing ssh trust for the workstation user *aupeksha* to access the jump host and the OSB-Node and to copy the software distribution to the target machine.

Step 4: This step consists of the software installation for Java, FMW and OSB. In a multi-machine environment, it would be necessary for every OSB node. In this simple example, however, there is only one machine.

Step 5: In this step, the OSB domain is created. This starts with creating the database schemas using the RCU tool. The domain will be created with the WLST (WebLogic Scripting Tool), which executes a Python script that runs the necessary installation and configuration tasks.

Step 6: The documentation is an integral part of the live-scripting approach. It is generated directly in the Emacs editor as a static HTML page and a PDF file. Both are published to a web server.

2 Linux Installation

I create a new CentOS VM, using *Parallels Desktop*.

2.1 Download and Check Sums

I use the Download Mirror. https://ftp.fau.de/centos/8-stream/isos/x86_64/

```
# Listing: Verifying Checksum of CentOS8 installation file in a terminal
## On VM host machine: Samadhi
whoami; hostname; pwd

cd ~/Downloads
#SHA256 (CentOS-Stream-8-20231009.1-x86_64-dvd1.iso) =
↪  e9b7a2026ac7abc315638bcb2efe9482576b4fd7ff0e8759c6ec6861b1549be8
shasum -a 256 CentOS-Stream-8-20231009.1-x86_64-dvd1.iso # ok.
```

Result: The ISO-image for the installation of Centos 8 is available for installation with parallels desktop. The checksum is verified against the values from the down load website.

2.2 Installing the VM

On the *Parallels Host* machine *Samadhi*, I will now install the ISO image with the Prallels GUI Installer. Screenshots of the installation: Screenshots.pdf After the installation I login via ssh and check the os version .

```
# Listing:  Basic Setup of CentOS VM
### Login to Linux Machine via Jump Host
ssh asamadhi@samadhi #Jumphost
password1

#Centos8 VM
## user/pw parallels/ham2burg
ssh parallels@10.211.55.5 # Centos_8
ham2burg
whoami; hostname; pwd

## Check Release
cat /etc/os-release
cat /etc/centos-release
```

The release is printed out on the terminal. It is CentOS Version 8.

```
# Listing:  Displaying the OS Version
[parallels@localhost ~]$ ## Check Release
[parallels@localhost ~]$ cat /etc/os-release
NAME="CentOS Stream"
VERSION="8"
ID="centos"
ID_LIKE="rhel fedora"
VERSION_ID="8"
PLATFORM_ID="platform:el8"
PRETTY_NAME="CentOS Stream 8"
ANSI_COLOR="0;31"
CPE_NAME="cpe:/o:centos:centos:8"
HOME_URL="https://centos.org/"
BUG_REPORT_URL="https://bugzilla.redhat.com/"
REDHAT_SUPPORT_PRODUCT="Red Hat Enterprise Linux 8"
REDHAT_SUPPORT_PRODUCT_VERSION="CentOS Stream"
[parallels@localhost ~]$ cat /etc/centos-release
CentOS Stream release 8
```

I want to allow user *parallels* to sudo without password. This can be done with visudo which is an interactive editing task.

```
# Listing:   Sudo configuration for user parallels
# User /parallels/ is allowed to sudo without password

# Use   ~sudo visudo~  and insert this line.
/parallels ALL=(ALL) NOPASSWD: ALL/
```

Result: The CentOS8 VM is installed. Access via ssh is working. The user *parallels* can execute sudo without password.

2.3 Snapshot01

I take a snapshot of the CentOS_8 VM with the following contents.

Snapshot01: *[2023-10-12 Thu 12:03]*

- ☒ Download CentOS Stream 8 using the Parallels Desktop GUI
- ☒ Installation CentOS Stream 8
- ☒ User=parallels, password=ham2burg
- ☒ Parallels Tools Installation
- ☒ Automatic Login, Screensaver off, Autopower-off=false.
- ☒ Settings Network->Wired= on
- ☒ SSH Login with: parallels@10.211.55.5
- ☒ yum udpate
- ☒ Renaming VM to *CentOS_8*
- ☒ Allocating 4 CPUs and 8 GB RAM
- ☒ Creating *Snapshot01*

2.4 Conclusion

The Centos_8 VM is set up. Remote login with user parallels is working. A snapshot of the VM is saved.

3 Database Setup

The FMW-installation requires a database for configuration data and runtime metrics. In this step I will setup and configure the *Oracle Express Edition Database*.

3.1 Creating SSH Trust for the user *parallels*

[2023-10-12 Thu 12:21] I want to have key-based ssh-login for the users *parallels*. It should share a common key-pair with other users: *lab_key*.

```
# Listing: Creating SSH Trust for user parallels

### We start on the workstation
## Test connection to Jumphost and VM
ssh asamadhi@samadhi "hostname; whoami"   # JumpHost via tailscale
ssh -J asamadhi@samadhi   parallels@10.211.55.5 "hostname; whoami"
password1
password2
### Create public/private key-pair for communication with multiple machines on jump host
hostname; whoami
cd ~/.ssh
ls -la
ssh-keygen -t ed25519 -C "lab_key"
lab_key


## copy public+private key to jumphost
ls -la
scp asamadhi.pub asamadhi@samadhi:/Users/asamadhi/.ssh/
scp lab_key.pub asamadhi@samadhi:/Users/asamadhi/.ssh/
scp lab_key asamadhi@samadhi:/Users/asamadhi/.ssh/
password1
## paste public key to authorized keys for user asamadhi
ssh asamadhi@samadhi  "cat /Users/asamadhi/.ssh/lab_key.pub >> /Users/asamadhi/.ssh/authorized_keys"
ssh asamadhi@samadhi  "chmod 600 /Users/asamadhi/.ssh/authorized_keys"
ssh asamadhi@samadhi  "cat  /Users/asamadhi/.ssh/authorized_keys"
ssh asamadhi@samadhi  "ls -la  /Users/asamadhi/.ssh/"
password1

## Add config entry for jumphost
cat ~/.ssh/config
cat << 'EOF' >>  ~/.ssh/config
Host jumphost
     IdentitiesOnly yes
     IdentityFile ~/.ssh/lab_key
     Hostname samadhi
     User asamadhi
EOF

# Test ssh trust
ssh -i ~/.ssh/lab_key asamadhi@samadhi  "whoami; hostname; date"
ssh jumphost  "whoami; hostname; date"

### copy public key to VM from JumpHost
ssh -i ~/.ssh/lab_key asamadhi@samadhi
hostname; whoami; pwd
ls -la ~/.ssh/
scp ~/.ssh/lab_key.pub parallels@10.211.55.5:/tmp/lab_key.pub
ham2burg
```

```
## paste public key to authorized keys for user parallels
ssh parallels@10.211.55.5
ham2burg
mkdir -p /home/parallels/.ssh
cat /tmp/lab_key.pub > /home/parallels/.ssh/authorized_keys
chmod 600 /home/parallels/.ssh/authorized_keys
cat /home/parallels/.ssh/authorized_keys
exit
# Test ssh trust on jumphost to CentOS8
ssh -i ~/.ssh/lab_key parallels@10.211.55.5 "whoami; date"
ls -la  ~/.ssh/

exit #samadhi

### Access via JumpHost
ssh -J  jumphost -i ~/.ssh/lab_key  parallels@10.211.55.5 "whoami; hostname; date"

## Add config entry for centos VM
cat ~/.ssh/config
cat << 'EOF' >>  ~/.ssh/config
Host centos8_parallels
     IdentitiesOnly yes
     IdentityFile ~/.ssh/lab_key
     Hostname 10.211.55.5
     User parallels
     ProxyJump jumphost
EOF

## Test direct access to centos VM via jumphost using config file
ssh centos8_parallels "whoami; hostname; pwd"
```

Result: SSH Trust ist now established for the users *parallels* using config file and key-authentication. This enables password-less ssh access via a jumphost to the centos VM.

3.1.1 DONE Problem: SSH-Connection with public keys does not work.

[2023-10-12 Thu 12:52] Although I provide a valid key, the ssh command prompts for a password.
Analysis: I ran ssh with debug flag (-vvv)

```
# Listing:  Debug output from the SSH command
debug1: Offering public key: /Users/asamadhi/.ssh/lab_key ED25519
↪  SHA256:VlBgbKyKKJocYsRRVD9Qi9nN9XFDXf2uXN1wGf2P4Dg explicit
debug3: send packet: type 50
debug2: we sent a publickey packet, wait for reply
debug3: receive packet: type 51
Debug1: Authentications that can continue: publickey,gssapi-keyex,gssapi-with-mic,password
```

Solution: Changing the permissions of the directory *.ssh* on the CentOS8 machine solves the problem.
`chmod 700 ~/.ssh`

3.2 Database Installation

The database can be downlaoded: Oracle Database Express Edition (XE) Downloads | Oracle Deutschland

Oracle Database 21c Express Edition for Linux x64 (OL8) (2,339,651,768 bytes - September 08, 2021) [SI

Now I copy the database binaries to the target machine and start the installer. After successful installation I configure a database and verify that it is working and the the listener is started.

```
# Listing:  Installation of Oracle Database including Smoke Tests.

## preparing target dist directory
ssh  centos8_parallels
whoami; hostname; pwd
sudo su
ham2burg
mkdir -p /opt/install/db
chown parallels:parallels /opt/install
chown parallels:parallels /opt/install/db
exit #root
exit #centos8_parallles

## Checking and copying distribution form local workstation to centos VM
cd ~/LocalProjects/dist/db
ls -la

## Check SHA256 of RPM
#Sha256sum: f8357b432de33478549a76557e8c5220ec243710ed86115c65b0c2bc00a848db
sha256sum oracle-database-xe-21c-1.0-1.ol8.x86_64.rpm # ok.


## Copy distributions VM
ls -la
rsync -aP oracle-database-preinstall-21c-1.0-1.el8.x86_64.rpm \
          oracle-database-xe-21c-1.0-1.ol8.x86_64.rpm  centos8_parallels:/opt/install/db

## Check distributions as user parallels
ssh centos8_parallels  "ls -la  /opt/install/db"

### Installation of Database as root
ssh  centos8_parallels
whoami; hostname; pwd
sudo su -

## Preinstallation
cd /opt/install/db
yum -y localinstall  oracle-database-preinstall-21c-1.0-1.el8.x86_64.rpm

## Install Database
yum -y localinstall  oracle-database-xe-21c-1.0-1.ol8.x86_64.rpm
# ok.

### Creating a Database
ls /etc/init.d/oracle-xe*
/etc/init.d/oracle-xe-21c configure
ham2burg
ham2burg
# ok.

exit #root
whoami
### Testing the Database: as user user oracle
sudo su - oracle
export ORACLE_SID=XE
export ORAENV_ASK=NO
ls /opt/oracle/product/21c/dbhomeXE/bin/oraenv
```

```
. /opt/oracle/product/21c/dbhomeXE/bin/oraenv
set ORACLE_HOME = [] ? /opt/oracle/product/21c/dbhomeXE
echo $ORACLE_HOME
ls -la $ORACLE_HOME

## start sqlplus
#sqlplus sys/ham2burg@//localhost.localdomain:1521/XEPDB1 as sysdba
sqlplus sys/ham2burg@//localhost:1521/XEPDB1 as sysdba

## Check PDBs
select name from v$pdbs;

## connecting to default PDB
#conn sys/ham2burg@//localhost.localdomain:1521/XEPDB1 as sysdba
conn sys/ham2burg@//localhost:1521/XEPDB1 as sysdba
## Ok. Successfully connected.

exit #sqlplus
exit #oracle

## check listener
lsnrctl status
```

Result: The Oracle database is now installed. The listener is configured and started. Connection via sqlplus is working.

3.3 Autostart Configuration

I want to configure the database for automatic start after machine boot. This is done on the Linux level.

```
# Listing:  Configuration of automatic database start
ssh centos8_parallels
whoami; hostname

sudo su

systemctl daemon-reload
systemctl enable oracle-xe-21c

exit #root
exit #parallels
```

Result: The linux operating system is configured to start the database service automatically on machine boot.

3.4 Database Operation

The database can be started and stop with the *sysctl utility.*

```
# Listing:  Starting, stopping and testing the database
## work on the CentOS8 as user parallels.
ssh centos8_parallels
whoami; hostname

# Show Usage Message
sudo  /etc/init.d/oracle-xe-21c
# Datenbank starten
```

```
sudo  /etc/init.d/oracle-xe-21c status
sudo  /etc/init.d/oracle-xe-21c stop
sudo  /etc/init.d/oracle-xe-21c start

### Checking the Listner

### User must be oracle
sudo su - oracle
### Setting Envrionment and checking listner
export ORACLE_SID=XE
export ORAENV_ASK=NO
. /opt/oracle/product/21c/dbhomeXE/bin/oraenv
set ORACLE_HOME = [] ? /opt/oracle/product/21c/dbhomeXE
echo $ORACLE_HOME
ls -la $ORACLE_HOME

## check listener
lsnrctl status
exit #oracle
exit #centos8_paralles
whoami
```

Result: This listing demonsrates how to control the database. It can be used to check the status of the database and the listener and to start and stop the database.

3.5 Snapshot02

I take a snapshot of the CentOS_8 VM with the following contents.

Snapshot02: *[2023-10-12 Thu 14:45]*

- ☒ Uploading RPMs for Oracle-Database-XE-21c Database
- ☒ Setting up SSH-Trust for user parallels.
- ☒ Installation of Oracle-Database-XE-21c Database
- ☒ Testing the database
- ☒ Lifecycle operations on database
- ☒ Automatic database start after reboot is tested.
- ☒ VM is powered of
- ☒ Creating *Snapshot02*

3.6 Conclusion

At this stage of development, the Oracle-Database-XE-21c is installed and starts automatically with the VM. The commands to start and stop the database are tested.

4 Preparing the FMW Installation

4.1 Setup of the installation user

I want to install OSB with a dedicated unix user: *wls*. It should be a login user and I want to establish ssh-trust for key-based ssh login.

```
# Listing:   Creating unix user wls and setting the password
### Login to VM
ssh centos8_parallels
```

```
4
5  ### create user wls
6  sudo useradd --defaults
7  sudo useradd  --comment "OSB User"  --create-home  --user-group  wls
8  sudo passwd wls
9  ham2burg
10 ham2burg
11
12 exit
```

Result: The user *wls* is now created and can login with a password.

4.2 Creating SSH Trust

[2023-10-06 Fri 10:06] I want to have key-based login for the user *wls*. It should share a common key-pair: *lab_key*. Therefore the user wls must accept the public key *lab_key.pub*.

```
1  # Listing:  Creating SSH Trust for user wls
2  ### We start on the workstation
3  ## copy public key to the VM
4  whoami; hostname
5
6  cd ~/.ssh/
7  ls -la
8  scp ~/.ssh/lab_key.pub centos8_parallels:/tmp/lab_key.pub
9  # Add public key to authoried hosts.
10 ssh centos8_parallels
11
12 ## paste public key to authorized keys for user wls
13 sudo su - wls
14 mkdir -p  /home/wls/.ssh/
15 chmod 700  /home/wls/.ssh
16 cat /tmp/lab_key.pub > /home/wls/.ssh/authorized_keys
17 chmod 600 /home/wls/.ssh/authorized_keys
18 exit #wls
19 exit #parallels
20
21
22 # Test ssh trust
23 ssh -J  jumphost -i ~/.ssh/lab_key  wls@10.211.55.5 "whoami; hostname; date"
24
25 ## Add config entry for centos VM
26 cat ~/.ssh/config
27 cat << 'EOF' >>  ~/.ssh/config
28 Host centos8_wls
29      IdentitiesOnly yes
30      IdentityFile ~/.ssh/lab_key
31      Hostname 10.211.55.5
32      User wls
33      ProxyJump jumphost
34 EOF
35
36 ## Test direct access to centos VM via jumphost using config file
37 ssh centos8_wls "whoami; hostname; pwd"
```

Result: SSH trust is now established for the users *parallels* and *wls* using config file and key-authentication. This enables password-less ssh access via a jumphost to the centos VM.

4.3 Copying the Oracle Distributions

I have already downloaded the distribution for java, fmw, and osb to the workstation. In this step I copy it to the target machine.

```
# Listing:  Copying installation media files using rsync.
###
whoami; hostname
ssh centos8_parallels
### create project installation base
sudo mkdir -p /opt/install/
sudo chown -R  wls:wls /opt/install
ls -la /opt/install
find /opt/install
exit

# create dir for distributions as wls user
ssh  centos8_wls
date; whoami; hostname
mkdir -p /opt/install/dist
exit


## Copy distributions (from workstations)
whoami; date; hostname
cd /Users/aupeksha/LocalProjects/dist/osb
ls -la
rsync -aP  fmw_12.2.1.4.0_infrastructure_Disk1_1of1.zip \
           p18143322_1800_Linux-x86-64.zip \
           p30188261_122140_Linux-x86-64.zip \
           p30188305_122140_Generic.zip       centos8_wls:/opt/install/dist

## Check distributions as user wls
ssh centos8_wls "ls -la  /opt/install/dist"
```

I also copy the project files to the VM with rsync. In this way I can edit the file on the workstation and update changed files.

```
# Listing:  Copying project files using rsync.
cd /Users/aupeksha/LocalProjects/live-scripting_osb/
## Copy or Update directory
rsync -aP  live-scripting_fmw  centos8_wls:/home/wls/

## Check distributions as user wls
ssh centos8_wls "ls -la  /home/wls/live-scripting_fmw"
ssh centos8_wls "find  /home/wls/live-scripting_fmw"
##
```

Result: The project files and software distributions are now available on the target machine under the user wls.

5 Installation für FMW

5.1 Templates

I want to use template mechanism to replace variables in configuration files. There is discussion on stackoverflow that compares different approaches. Bash Templating: How to build configuration files from

templates with Bash? - Stack Overflow I will use the templating approach using *substenv*. I will define some environment variables in the file *setEnv_osb.sh*, which will be sourced to the shell environment. Configuration and script files can now contain shell variables that will be replaced during the installation. Thus I can support different stages and environments with one set of script and configuration files.

5.2 Java Installation

Java is unpacked (unzip) to a temporary directory and subsequently installed to the target Java directory using tar.

```
# Listing: Java installation
### Install Java as user wls
ssh  centos8_wls
date; hostname; pwd;  whoami

# set project environment
cd ~/live-scripting_fmw; . ./setEnv_osb.sh

## unzip to temporary directory
mkdir -p $JAVA_TEMP_DIR
unzip $DIST_JAVA  -d $JAVA_TEMP_DIR

## untar jav
mkdir -p $JAVA_DIR
ls ${JAVA_TEMP_DIR}/jdk*.tar.gz
tar zxvf ${JAVA_TEMP_DIR}/jdk*.tar.gz -C $JAVA_DIR

ls $JAVA_DIR
echo $JAVA_HOME

## check java
$JAVA_HOME/bin/java -version  # java(TM) SE Runtime Environment (build 1.8.0_311-b25)
$JAVA_HOME/bin/jar -version

## clean up
rm -rf $JAVA_TEMP_DIR
ls $JAVA_TEMP_DIR

exit #centos_wls
```

Result: Java is installed into a dedicated directory and can be called after setting the JAVA_HOME variable.

5.3 FWM Installation

Now I will install the *Fusion Middleware* binaries on the target machine. A response file will be prepared using the template approach.

```
# Listing: FWM Installation using wls user
ssh  centos8_wls
date; hostname; pwd;  whoami

# set project environment
cd ~/live-scripting_fmw; . ./setEnv_osb.sh

# Installation of binaries
mkdir -p  ${TEMP_DIR_FMW}
```

```
unzip  ${DIST_FMW} -d ${TEMP_DIR_FMW}
ls -la  ${TEMP_DIR_FMW}

# Creating Response File
cd $PROJECT_HOME

envsubst < fmw.rsp.template > fmw.rsp
cat fmw.rsp

## Creating inventory log file
cat << EOF > ${INV_PTR_LOC}
inventory_loc=/home/wls/oraInventory
inst_group=wls
EOF

cat ${INV_PTR_LOC}
ls -la
# Checking prerequisites
ls ${TEMP_DIR_FMW}/*.jar
${JAVA_HOME}/bin/java -Djava.io.tmpdir=${TEMP_DIR_FMW} -jar ${TEMP_DIR_FMW}/*.jar \
                -responseFile ${PROJECT_HOME}/fmw.rsp \
                -invPtrLoc ${INV_PTR_LOC} \
                -silent \
                -executeSysPrereqs


## Installing FMW
${JAVA_HOME}/bin/java -Djava.io.tmpdir=${TEMP_DIR_FMW} -jar ${TEMP_DIR_FMW}/*.jar \
                -responseFile ${PROJECT_HOME}/fmw.rsp \
                -invPtrLoc ${INV_PTR_LOC} \
                -silent \
                -logLevel finest \
                -debug \
                -printdiskusage \
                -printmemory \
                -printtime

# clean up
rm -rf  ${TEMP_DIR_FMW}

exit # centos_wls
```

Result: The FMW Binaries are now installed.

5.4 OSB Installation

I now install the binaries for the OSB.

```
# Listing: OSB installation using wls user
ssh  centos8_wls
date; hostname; pwd;  whoami

# set project environment
cd ~/live-scripting_fmw; . ./setEnv_osb.sh

# Installation of binaries
mkdir -p  ${TEMP_DIR_FMW}
unzip  ${DIST_OSB} -d ${TEMP_DIR_FMW}
ls -la  ${TEMP_DIR_FMW}
```

```
12
13 # Creating Response File
14 cd $PROJECT_HOME
15 envsubst < osb.rsp.template > osb.rsp
16 cat osb.rsp
17
18
19 ls -la
20 # Checking prerequisites
21 ls ${TEMP_DIR_FMW}/*.jar
22 ${JAVA_HOME}/bin/java -Djava.io.tmpdir=${TEMP_DIR_FMW} -jar ${TEMP_DIR_FMW}/*.jar \
23                 -responseFile ${PROJECT_HOME}/osb.rsp \
24                 -invPtrLoc $INV_PTR_LOC \
25                 -silent \
26                 -executeSysPrereqs
27
28
29 ## Installing OSB
30 ${JAVA_HOME}/bin/java -Djava.io.tmpdir=${TEMP_DIR_FMW} -jar ${TEMP_DIR_FMW}/*.jar \
31                 -responseFile ${PROJECT_HOME}/osb.rsp \
32                 -invPtrLoc $INV_PTR_LOC \
33                 -silent \
34                 -logLevel finest \
35                 -debug \
36                 -printdiskusage \
37                 -printmemory \
38                 -printtime
39
40 # clean up
41 rm -rf  ${TEMP_DIR_FMW}
42 exit #centos_wls
```

Result: The OSB binaries are installed on the target machine. It is ready for domain creation.

5.5 Cleaning up

After installing the binaries, I delete the installation medias, to save space on the VM. Otherwise it will unecessarily waste disk space in the snapshots.

```
1  # Listing:  Cleaning up the VM
2  whoami; hostname
3  ## Login to VM as parallels users
4  ssh centos8_parallels
5  cd /opt/install/dist
6  ls -la
7  ## delete installation media for middleware
8  sudo rm p*
9  sudo rm fmw*
10 ## delel database installation media
11 cd /opt/install/db
12 sudo rm oracle*
13 ls -ls
14 exit
```

Result: The installation medias for the database and for java, fmw and osb are now removed from the vm, thus saving disk space in snapshots.

6 Creating the OSB Domain

There are several steps necessary to create the OSB domain. In a first step I will create the required database schemes using the RCU tool. The domain is will be created without the GUI installer. Instead WLST is used together with a python script, which runs the installation. The python script will be customized, using the template approach.

6.1 Checking the database

Before running the RCU tool I need to check that the database is started and listening.

6.1.1 Starting and stopping the database

This is done using the init.d script.

```
# Listing:  Starting and checking the database
ssh centos8_parallels
# Zeige die Usage Message
sudo  /etc/init.d/oracle-xe-21c
# Datenbank starten
sudo  /etc/init.d/oracle-xe-21c start
sudo  /etc/init.d/oracle-xe-21c restart
sudo  /etc/init.d/oracle-xe-21c status
```

Ok, the database is running. I know check the TNS listener.

6.1.2 Verifying the database listener

I change to the user oracle and set the environment for checking the listener with *lsnrctl*

```
# Listing: Checkomg the  database listener
### User must be oracle
sudo su - oracle
### Setting Envrionment and checking listner
export ORACLE_SID=XE
export ORAENV_ASK=NO
. /opt/oracle/product/21c/dbhomeXE/bin/oraenv
set ORACLE_HOME = [] ? /opt/oracle/product/21c/dbhomeXE
echo $ORACLE_HOME
ls -la $ORACLE_HOME

## check listener
lsnrctl status

exit #oracle
exit #centos8_paralles
```

Result: The database and the listner are started.

6.2 Running the RCU tool

I will use the RCU-Tool to create the database schemes, which is a prerequisite for OSB domain creation. I use the template approach to customize the response file. The execution of the RCU-Tool takes several minutes.

```
# LISTING:  Creating database schemes with the RCU tool.
### RCU execution using wls user
ssh  centos8_wls
date; hostname; pwd;  whoami

# set project environment
cd ~/live-scripting_fmw; . ./setEnv_osb.sh

# Creating Response File
cd $PROJECT_HOME
ls -la
envsubst < rcu_osb.rsp.template > rcu_osb.rsp
cat rcu_osb.rsp

### Checking prerequisites. It needs:
# - database password for user sys
# - schema pasword
${FMW_HOME}/oracle_common/bin/rcu  -silent -responseFile ${PROJECT_HOME}/rcu_osb.rsp  -validate
ham2burg
ham2burg
## Success=status 0

### Running RCU
${FMW_HOME}/oracle_common/bin/rcu  -silent -responseFile ${PROJECT_HOME}/rcu_osb.rsp
ham2burg
ham2burg

exit #centos_wls
```

Result: The database schemes for the OSB domain are created. The database is ready for osb domain creation.

6.3 OSB domain creation

I will now create the domain using WLST and the python script *createOSBDomain.py*. The python script originates from the OSB documentation and was modified to accept customization via the template approach.

```
# Listing:  Creating an OSB domain using wls user
ssh  centos8_wls
date; hostname; pwd;  whoami

# set project environment
cd ~/live-scripting_fmw; . ./setEnv_osb.sh

# Creating WLST File
cd $PROJECT_HOME
ls -la
envsubst < Template_createOSBDomain.py > createOSBDomain.py
cat createOSBDomain.py

## Create the domain
mkdir -p $DOMAINS
cd $PROJECT_HOME
ls -la

cd $FMW_HOME/oracle_common/common/bin/
./wlst.sh $PROJECT_HOME/createOSBDomain.py -oh "$FMW_HOME" -jh "$JAVA_HOME" -parent "$DOMAINS" -rcuDb
↪  "${CONNECT_STRING2}"
```

```
21
22 exit # centos_wls
```

Result: The osb domain is created and can be started in the next step.

6.4 Starting the OSB domain

I will use the start scripts from the OSB installation to start the Nodemanager and the Adminserver. As a prerequisite I create boot.properiies files which allow for password-less script-based domain start from the command line.

I also introduce a small self-developed control script to start and stop the domain and to produce a log file report, based on a perl script.

```
1  # Listing: Starting and Managing the OSB
2  ssh  centos8_wls
3  date; hostname; pwd;  whoami
4
5  # set project environment
6  cd ~/live-scripting_fmw; . ./setEnv_osb.sh
7  cd $DOMAIN_HOME; ls -la
8
9  ### Creating  boot.properties
10 mkdir -p  $DOMAIN_HOME/servers/AdminServer/security
11 cd $DOMAIN_HOME/servers/AdminServer/security
12 ls -la; pwd
13 echo username=${DOMAIN_USER} > boot.properties
14 echo password=${DOMAIN_PASSWORD} >> boot.properties
15 cat  boot.properties
16 #rm  boot.properties
17
18 ### Start the Nodemanager
19 cd $DOMAIN_HOME
20 #./bin/startNodeManager.sh
21 nohup ./bin/startNodeManager.sh  > NodeManager.out 2>&1 &
22
23 ## Start AdminServer (nohup)
24 nohup ./startWebLogic.sh > AdminServer.out 2>&1 &
25
26 ## Check satus
27 tail -f AdminServer.out
28 cat AdminServer.out | grep -e "Server state changed to"
29 cat AdminServer.out | grep -e "Server state changed to RUNNING."
30 cat servers/AdminServer/logs/AdminServer.log | grep "Server state changed to"
31 cat servers/AdminServer/logs/AdminServer.log | grep "Server state changed to RUNNING"
32
33 ## Wait for running state
34 while (( $(cat AdminServer.out | grep "Server state changed to RUNNING."| wc -m ) < 1 ))
35 do
36   sleep 5
37   cat AdminServer.out | grep "Server state changed to "
38 done
39
40 ## prevent perl warnings
41 export LC_ALL=C
42
43 ### Check for Running Server and NodeManager
44 ps -aelf | perl -ne '/^([^\s]+)\s+([^\s]+)\s+([^\s]+)\s+([^\s]+).*([w]eblogic.NodeManager)/g && print
   ↪  "$3 $4 $5\n" or/^([^\s]+)\s+([^\s]+)\s+([^\s]+)\s+([^\s]+).*([w]eblogic.Name=[^\s]+)/g && print "$3
   ↪  $4 $5\n"'
```

```
45
46 ### Use the control script
47 cd /home/wls/live-scripting_fmw/bin
48 ls -la
49
50 ## use control skript to control the domain
51 ./control.sh help
52 ./control.sh status
53 ./control.sh log_report -u
54 ./control.sh log_report -T
55 ./control.sh log_report -rwaS
56 ./control.sh kill
57
58 ./control.sh startNodemanager
59 ./control.sh startAdmin
60
61 exit # centos_wls
62
63
64 ### create tunnel for access via web browser.
65 whoami; hostname
66 ssh -L 7001:localhost:7001 centos8_wls
67 exit # centos_wls
```

The OSB is started and access to the web based administration tools is available.

Test URLs:

- http://localhost:7001/console (wls/ham2burg)
- http://localhost:7001/em
- http://localhost:7001/servicebus

Result: The OSB domain is created and started. I also started SSH tunnel that allow to call the OSB Web-Tools without direct network connection.

6.5 Snapshot03

I take a snapshot of the CentOS 8 VM with the following contents:

Snapshot03: *[2023-10-14 Sat 12:34]*

- ☒ Creating unix user wls
- ☒ Setting up ssh trust for wls
- ☒ Java is installed
- ☒ FMW is installed
- ☒ OSB is installed
- ☒ RCU is executed
- ☒ OSB is created
- ☒ OSB domain has been started and tested.
- ☒ Installation media for databases and middleware are deleted.
- ☒ Snapshot03 is created.

6.6 Conclusion

The necessary software distributions for the OSB, namely Java, FMW and OSB are installed on the CentOS VM. This was done with a dedicated installation user: *wls*. All steps to create a domain where executed, including RCU and domain configuration and creation with a Python script. The OSB domain

was started and testes. Access to the web based administration tools was established using an SSH tunnel.

7 Documentation

The documentation is an integral part of the live-scripting approach. The file live-scripting_osb.org is the documentation. It contains textual reports, listings, diagrams and attachments. This documentation will be shared in three different ways. First, the project, containing the org-mode-file, script, and configuration files will be uploaded into a separate GitHub project. Second, an HTML file will be generated from the orgmode file, containing all diagrams, listings and attachments, as well as style sheets. This constitutes a static web site that can be view directly with the browser from the file system. It will also be published to a web server. Although, GitHub is able to render orgmode files as HTML, this static web site uses style sheets based on the read-the-org project, which provides better overview and navigation. As a third option, a pdf file will be created from the orgmode file, using the Emacs export engine. It contains all links, listings and diagrams but does not include any attachments. It can be easily shared via eMail or be printed out and complements the documentation.

7.1 Project on GitHub

GitHub offers a command line interface which can be used to upload and commit the files of the project. I will use the GitHub CLI to create a new project and to upload a public key to the repository.

```
# Listing: Initializing git project and uploading it to GitHub

## installing github cli
brew install gh
gh --help

## initilize git project
cd ~/LocalProjects/live-scripting_osb

git init

## create .gitignore file
cat << 'EOF' >  .gitignore
.DS_*
*.bkp
EOF
cat .gitignore


## adding file to git
ls -la
git add live-scripting_osb.org
git add live-scripting_osb.pdf
git add live-scripting_osb.html
git add data
git add docs
git add live-scripting_fmw
git add aw-org-html-themes

git status
git commit -m "initial project commit"


```

```
## Creating a key pair for GitHub
ssh-keygen -t ed25519 -C "your_email@example.com"
/Users/aupeksha/.ssh/id_github


ls -la /Users/aupeksha/.ssh/


## Uploading to GitHub

gh auth login

SSH
github
GitHub CLI
web browser


## Ok

# Create a new Repo and upload a the public key to id_github.pub to the git account
gh repo list
gh repo create
Push an existing
.
live-scripting_osb
Project to demonstrate the insllation of OSB with the live-scripting approach.
Public
Y
origin
Y
yes


gh auth logout
## Push project to github
git branch -M main
git remote add origin https://github.com/andreaswittmann/live-scripting_osb.git
git push -u origin main
git pull origin

git status

### Change project level readme file
cd ~/LocalProjects/live-scripting_osb
mkdir .github
cd .github
ln -s ../live-scripting_osb.org README.org
ls -la

### Change project level readme file
cd ~/LocalProjects/live-scripting_osb
rm -rf .github
ln -s ./live-scripting_osb.org ./README.org
ls -la



# Use Magit to commit and push
```

Result: The project *live-scripting_osb* is now under git control. A new private-public key pair was created and the public key was uploaded to the GitHub account. The project is pushed to GitHub. Magit was used for further commits.

7.2 Project documentation on the web

I want to generate the project documentation and publish it on my web server at anwi.gmbh.

```
# Listing: Copying the static Web-Site to the web server
# Create root dir for static site
ssh ubuntu_wp_parallels
whoami; hostname
sudo su www-data
mkdir -p  /site/wordpress/labs/live-scripting_osb
cd  /site/wordpress/labs/live-scripting_osb
ls -la  /site/wordpress/labs/live-scripting_osb
ls -al

### Allow user paralels to copy files
chmod 777 /site/wordpress/labs/
chmod 777 /site/wordpress/labs/live-scripting_osb
ls -la
exit
exit

## copy files to web root
cd /Users/aupeksha/LocalProjects/live-scripting_osb
ls -la
## create exclude file for rsync
cat << 'EOF' > rsync_exclude.txt
.DS_*
*.bkp
.git
.gitignore
.idea
_minted*
README.org
live-scripting_fmw
*.tex
rsync_exclude.txt
.#*
EOF
cat rsync_exclude.txt

## transfer files or update web-server files
cd /Users/aupeksha/LocalProjects/live-scripting_osb
rsync --dry-run -avP --exclude-from='rsync_exclude.txt' ./
↪  ubuntu_wp_parallels:/site/wordpress/labs/live-scripting_osb/
rsync -avP --exclude-from='rsync_exclude.txt' ./
↪  ubuntu_wp_parallels:/site/wordpress/labs/live-scripting_osb/



### Change owner of files on web serve
ssh ubuntu_wp_parallels
whoami; hostname
cd  /site/wordpress/labs/live-scripting_osb
sudo chown www-data:www-data -R .
ls -la
```

```
50 exit
```

The https://ubuntu2204_wordpress/labs/live-scripting_osb/live-scripting_osb.html

8 Summary and Outlook