This Ansible playbook installs Oracle database 19c Single Instance Database on AIX operating system

Description

This playbook assumes the following:

- That the user is familiar with Ansible and should have basic knowledge on YMAL, for the purpose of running this playbook
- That the user is familiar with Oracle Database Configuration
- That the user is familiar with the AIX Operating system
- That the version of AIX is 7.2 TL4 SP1 or later. (It should work on other versions of AIX supported by the oracle database AIX OS requirements, but has not been tested). Playbook assumes a New AIX LPAR for execution
- That the targeted AIX LPAR for installing the Oracle single instance database will be referred within the rest of the document as the 'host' or 'managed host'.
- That the version of Oracle Standalone Database is version 19.3.0.0. Later versions should work but have not been tested.

To get started with Ansible refer

https://docs.ansible.com/ansible/latest/user_guide/intro_getting_started.html

To get started with Oracle Database on AIX refer

https://docs.oracle.com/en/database/oracle/oracle-database/19/axdbi/index.html

https://www.ibm.com/support/pages/oracle-db-rac-19c-ibm-aix-tips-and-considerations

To get started with AIX refer

https://www.ibm.com/support/knowledgecenter/ssw_aix_72/navigation/welcome.html

System Configuration

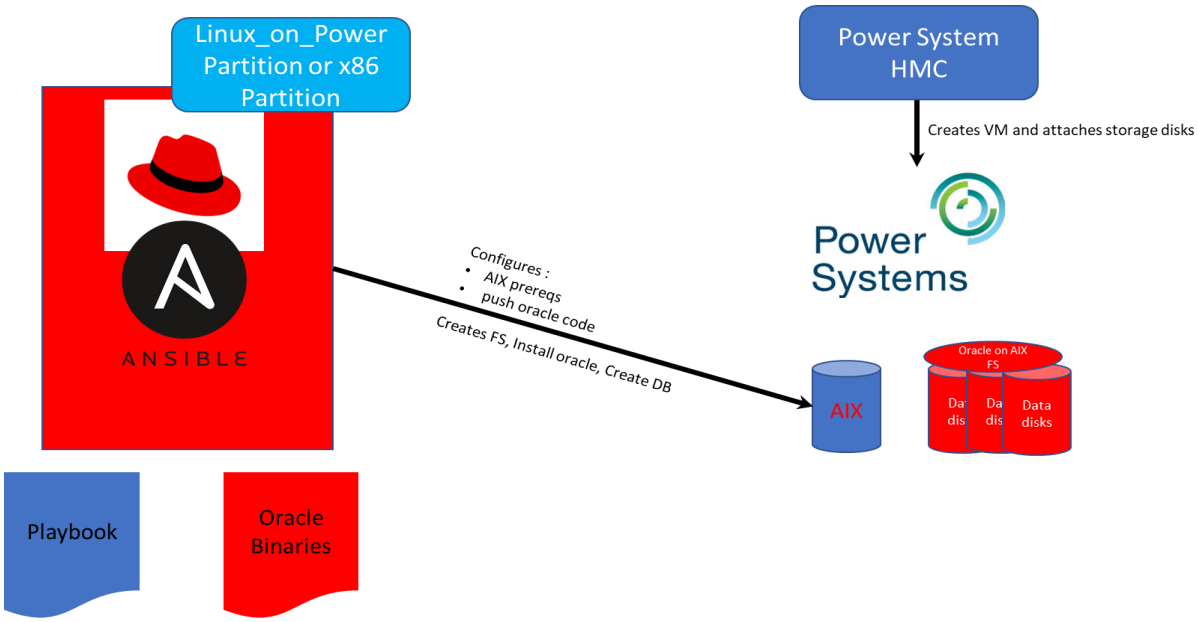


Figure. System Topology

Below is the system configuration that we have used for testing

We have used two servers one Linux_on_Power server used for running Ansible Engine and second one AIX server used for installation and configuration on oracle 19c Database software.

a) Linux_on_Power server :

Operating System : RHEL 8.2

Ansible Engine Version : 2.10.2

For Ansible Engine prerequisites refer to below link

https://docs.ansible.com/ansible/latest/installation_guide/index.html

b) AIX server :

Operating System : AIX72TL4SP01

Oracle DB Version : 19.3.0.0.0

CPUs : 4

RAM : 64GB

Storage Disks : 2X40GB (one rootvg and another for oracle DB)

Refer below link to get details of minimum software/hardware requirements that are need to run oracle 19c database on AIX operating system

https://docs.oracle.com/en/database/oracle/oracle-database/19/axdbi/oracle-database-installation-checklist.html

Steps Followed

1. Install Ansible Engine on your preferred operation system. We have installed and tested Ansible Engine on x86 server and Linux-on-Power server

   Refer : https://docs.ansible.com/ansible/latest/installation_guide/intro_installation.html

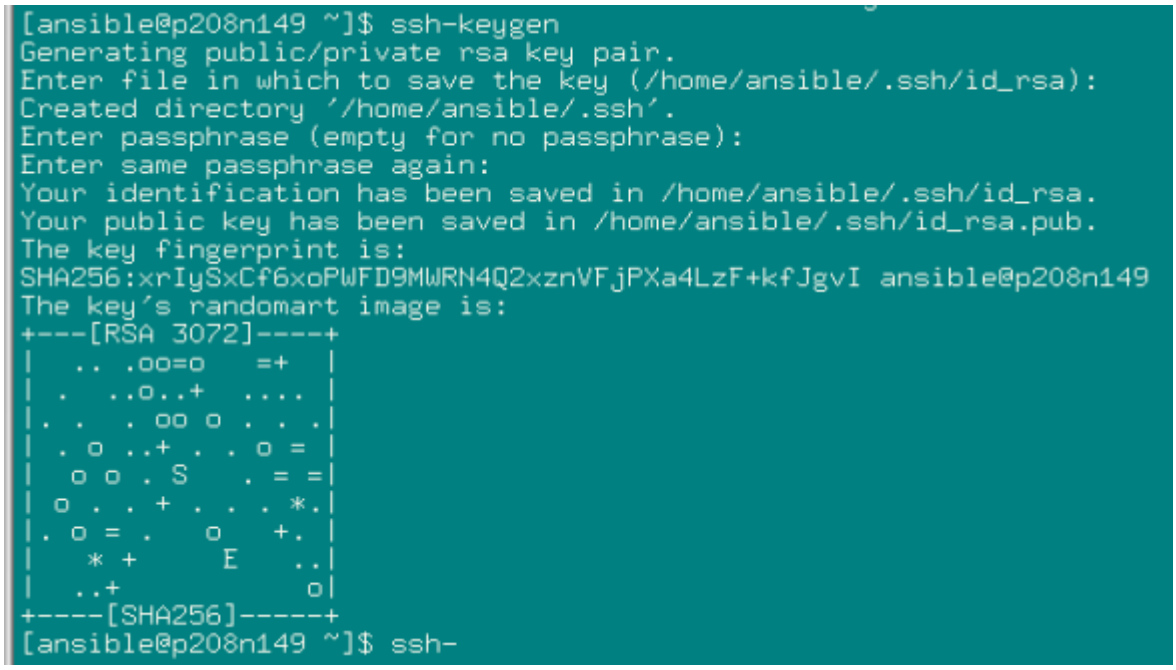
   We have created a user “ansible” on LoP server and considered /home/ansible as working Directory.

2. Setup ssh Equivalence with managed host(AIX) server

   If this is a first time using ssh, then you probably haven’t created your ssh keys. To check go to ~/.ssh and see if id_rsa file exists. If not you must create the ssh keys.

   To create the ssh keys, run the following:

```
➢ ssh-keygen
```



   Next copy the keys to the managed host.

```
➢ ssh-copy-id root@<managed_host>
```

   Eg: ssh-copy-id root@p227n241

```
[ansible@p208n149 ~]$ ssh-copy-id root@p227n241
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/ansible/.ssh/id_rsa.pub"
The authenticity of host 'p227n241 (129.40.76.241)' can't be established.
ECDSA key fingerprint is SHA256:ykIrGsVK+rc17RPwujt6WhZ1mITZsjx90NfK+MVReHM.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s),
  to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed --
  if you are prompted now it is to install the new keys
root@p227n241's password:
sh: test: argument expected

Number of key(s) added: 1

Now try logging into the machine, with:   "ssh 'root@p227n241'"
and check to make sure that only the key(s) you wanted were added.
```

As per the last step instructions from the previous step, test that you can access the managed host:

```
➢  ssh 'root@p337n241'
```

```
> ssh 'root@p227n241'
Last login: Tue Mar 16 17:05:45 2021 on /dev/pts/1 from 129.40.76.149
*******************************************************************************
*                                                                             *
*                                                                             *
*  Welcome to AIX Version 7.2!                                                *
*                                                                             *
*                                                                             *
*  Please see the README file in /usr/lpp/bos for information pertinent to    *
*  this release of the AIX Operating System.                                  *
*                                                                             *
*                                                                             *
*******************************************************************************
# exit
Connection to p227n241 closed.
>
```

3. Preparing to run the oracle playbook

- Download the Oracle AIX playbook ansible collection from ansible galaxy or github.
  https://galaxy.ansible.com/bhargava250/power_aix_oracle
  https://github.com/IBM/ansible-power-aix-oracle

Download the power_aix_oracle tarball from ansible-galaxy and extract it to some directory for offline use **or** you can run the ansible-galaxy installation command:

```
➢  ansible-galaxy collection install bhargava250.power_aix_oracle
```

The above command will install power_aix_oracle collection at location ~/.ansible/collections

For more information regarding ansible collections refer below link

https://docs.ansible.com/ansible/latest/user_guide/collections_using.html

Before running the playbook you should do

a) Download the Oracle 19c software from OTN or oracle edelivery site
   https://edelivery.oracle.com/osdc/faces/SoftwareDelivery

https://www.oracle.com/database/technologies/oracle19c-aix-193000-downloads.html

b) Modify the Oracle Binary location path variable "oracledbaix19c" in file "roles/preconfig/defaults/main.yml"
c) Check other Oracle related parameters in file "roles/preconfig/defaults/main.yml", modify it based on your need
d) Based on your environment update resolv.conf and netsvc.conf files at "roles/preconfig/files/"
e) There should be atleast one free disk available other than rootvg for Oracle DB Installation and test database creation on JFS filesystem. Make sure disk header information is clean. You can check the header information using "lquerypv -h /dev/hdiskX". These free disks are used for staging oracle software binary and oracle datafiles. Minimum 40GB disk storage is needed for running this Oracle playbook.

The oracle playbook contains below four roles

- **power_aix_bootstrap** : This role is used for configuring yum and python on AIX managed host. The code for this role is taken from power_aix collection available in ansible galaxy and GIT hub.
  https://ibm.github.io/ansible-power-aix/index.html
  https://galaxy.ansible.com/ibm/power_aix
  https://github.com/IBM/ansible-power-aix

- **preconfig** : This role will perform AIX configuration tasks that are needed for oracle installation
- **oracle_install** : This role performs oracle binary installation
- **oracle_createdb** : This role creates test database "orcl" using dbca utility

Inside power_aix_oracle collection go to "playbooks" directory

```
$ cat demo_play_aix.yml
- hosts: all
  gather_facts: no
  roles:
    - role: power_aix_bootstrap
      vars:
        download_dir: "~"
        target_dir: "/tmp/.ansible.cpdir"
      tags: bootstrap
- hosts: all
  gather_facts: yes
  roles:
    - role: preconfig
      tags: preconfig
    - role: oracle_install
      tags: oracle_install
    - role: oracle_createdb
      tags: oracle_createdb
```

Create/Update ansible.cfg and inventory files in collections “playbooks” directory. On managed host(AIX) “/tmp” filesystem is used for ansible remote temporary activities. Since we need to transfer and extract oracle binary software files, the playbook will automatically set the /tmp filesystem size to 12G. “inventory” file should contain the list on managed hosts (AIX lpars).

```
$ cat ansible.cfg
[defaults]
inventory = ./inventory
interpreter_python = /usr/bin/python
remote_user = root
host_key_checking = False
remote_tmp = /tmp/.ansible
callback_whitelist = profile_tasks
```

```
$ cat inventory
p227n241
```

4. Execute playbook using below command

- `ansible-playbook demo_play_aix.yml`

You can also run each role separately using ansible tags

To run only bootstrap tasks

$ ansible-playbook demo_play_aix.yml --tags “bootstrap”

To run only preconfig tasks

$ ansible-playbook demo_play_aix.yml --tags “preconfig”

If you want to run preconfig and oracle_install tasks

$ ansible-playbook demo_play_aix.yml --tags “preconfig,oracle_install”

If you want to skip database creation tasks then you can also try

$ ansible-playbook demo_play_aix.yml --skip-tags=”oracle_createdb”

Playbook Roles

As discussed earlier this playbook has four roles

1) **power_aix_bootstrap** : This role contains two tasks one installation of yum and other one is installation of python. The code for this role is taken from power_aix collection which is available at ansible galaxy and GIT hub.
   https://ibm.github.io/ansible-power-aix/index.html
   https://galaxy.ansible.com/ibm/power_aix
   https://github.com/IBM/ansible-power-aix

   We have downloaded ansible power_aix collection 1.2.1 and copied the role " power_aix_bootstrap".
   We have modified tasks files yum_install.yml and python_install.yml roles/power_aix_bootstrap/tasks

   Changes done to yum_install.yml

   - For downloading yum_bundle.tar file we have changed the code from using ftp.software.ibm.com/aix/freeSoftware/aixtoolbox/INSTALLP/ppc to wget https://public.dhe.ibm.com/aix/freeSoftware/aixtoolbox/ezinstall/ppc/

Note: For latest yum bundle files refer to https://public.dhe.ibm.com/aix/freeSoftware/aixtoolbox/ezinstall/ppc/

Changes done to python_install.yml file

- Changed ibm.power_aix.filesystem module to aix_filesystem
- Changed attributes for /opt: size=+400M to size=+500M if filesystem size < 500M
- Changed attributes for /var: size=+100M to size=+750M if filesystem size < 750M

The configuration yum/python on AIX can be done is two ways

a) Option1 – using power_aix ansible collection
b) Option2 – Manual method

Steps for both methods are mentioned in detail in Appendix section

2) **preconfig** :

- Expand /var and /opt filesystems
- Running cfgmgr to discover new devices
- Changes /tmp to 12G size, holds ansible temp files
- Changing ulimits for default user to unlimited
- Setting DNS
- Setting DNS order
- Checking /etc/hosts file on managed host and adding entry if needed
- Changes maxuproc
- Checking and setting iocp attribute to "available". Rebooting the lpar if needed

3) oracle_install:

- Detecting oracle version to install
- Listing available disks
- Creating volume group using all available disks
- Creating oracle groups and user
- Creating and mounting filesystem for oracle staging
- Updating .profile file with Oracle env details
- Generating oracle response file
- Create directories for ORACLE_HOME and ORACLE_BASE
- Changing the permissions
- Copying oracle Single instance source files
- Running rootpre.sh
- Install-home-db | Install Oracle Database Server
- Running orainstRoot.sh
- Running root.sh

4) oracle_createdb:

- Check /etc/oratab file for DB existence
- Create and mount filesystems for datafiles and redo logfiles
- Check and changing permissions of Filesystems
- Generate Database creation template file
- Generate database creation script for oracle version
- Creating database
- Creating and configuring oracle listener
- Check Oracle PMON background process status

Appendix

In this section we will discuss different ways of installing yum/python on AIX

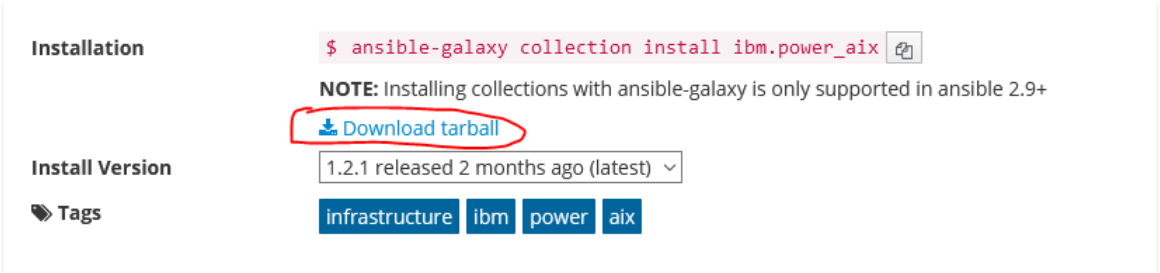
On the AIX managed host, check if yum and python are installed.

```
> which yum

no yum in /usr/bin /etc /usr/sbin /usr/ucb /usr/bin/X11 /sbin
/usr/java8_64/jre/bin /usr/java8_64/bin

> which python

no python in /usr/bin /etc /usr/sbin /usr/ucb /usr/bin/X11 /sbin
/usr/java8_64/jre/bin /usr/java8_64/bin
```

if not, The following procedures will help you install the components.

Option A, Using the ansible playbook collection: ansible-power-aix to install missing components

- Install and configure yum, python on the managed host. You can do this using anisble power-aix collection. Power-aix collection can also perform other AIX admin tasks too.
  https://ibm.github.io/ansible-power-aix/index.html
  https://galaxy.ansible.com/ibm/power_aix
  https://github.com/IBM/ansible-power-aix



Download the power-aix tarball from ansible-galaxy for offline use or you can run the installation command:

```
➢  ansible-galaxy collection install ibm.power_aix
```

```
[ansible@p208n149 zips]$ ansible-galaxy collection install ibm.power_aix
Process install dependency map
Starting collection install process
Installing 'ibm.power_aix:1.2.1' to '/home/ansible/.ansible/collections/ansible_collections/ibm/power_aix'
```

The above command will install power_aix collection at location ~/.ansible/collections

For more information regarding ansible collections refer below link

https://docs.ansible.com/ansible/latest/user_guide/collections_using.html

a) Prepare bootstrap.yml using "~/.ansible/collections/ansible_collections/ibm/power_aix/playbooks/demo_bootstrap.yml"

```
$ cat bootstrap.yml
---
- name: "Bootstrap Yum on AIX"
  hosts: all
  gather_facts: no
  collections:
  - ibm.power_aix
  tasks:

# CHECK for Yum on inventory host
  - import_role:
      name: power_aix_bootstrap
    vars:
      pkgtype: "yum"
      download_dir: "~"
      target_dir: "/tmp/.ansible.cpdir"

# INSTALL / UPDATE Python on inventory host
- name: "Bootstrap Python on AIX"
  hosts: all
  gather_facts: no
  collections:
  - ibm.power_aix
  tasks:

  - import_role:
      name: power_aix_bootstrap
    vars:
      pkgtype: "python"
```

b) Prepare ansible.cfg, inventory files for playbook execution. “p227n241” is AIX managed host mentioned in inventory file. Update the “roles_path” to power-aix collection roles directory.

```
$ cat ansible.cfg

[defaults]

inventory = ./inventory

interpreter_python = /usr/bin/python

remote_user = root

host_key_checking = False

remote_tmp = /tmp/.ansible

roles_path    =
/home/ansible/.ansible/collections/ansible_collections/ibm/power_aix /roles


$ cat inventory

p227n241
```

c) Executing bootstrap playbook

$ ansible-playbook bootstrap.yml

d) Bootstrap playbook creates below files in user home directory. You can do a cleanup if needed

#+ cleanup of files created in $HOME

(cd $HOME; rm -f rpm.rte yum_bundle.tar yum_installer.sh

Option B, installing them manually onto the managed host.

https://public.dhe.ibm.com/aix/freeSoftware/aixtoolbox/ezinstall/ppc/

Please go through the README-yum file for instructions

https://public.dhe.ibm.com/aix/freeSoftware/aixtoolbox/ezinstall/ppc/README-yum