Deploy and Configure

Installation guides for popular and unknown software packages.

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Automation

or the lie that is DevOps

Automation

Ansible inventory from a csv file.

General

Create an Ansible inventory in YAML format using the following steps.

Assuming that the CSV file has the following structure:

```
Hostname,IP Address,Variable1,Variable2,Variable3
host1,192.168.1.1,value1,value2,value3
host2,192.168.1.2,value4,value5,value6
```

Local Use

1. Convert the CSV file to a YAML file format
2. Use Ansible's `yaml_inventory_plugin` to parse the YAML file and create the inventory

Sample playbook

```
---
- hosts: localhost
  gather_facts: no

  vars:
    csv_file: /path/to/csv/file.csv
    yaml_file: /path/to/yaml/file.yaml

  tasks:
    - name: Convert CSV to YAML
      community.general.csv_to_yaml:
```

```
    path: "{{ csv_file }}"
    output_file: "{{ yaml_file }}"

- name: Create inventory from YAML
  ansible.builtin.add_host:
    name: "{{ item.Hostname }}"
    ansible_host: "{{ item['IP Address'] }}"
    variable1: "{{ item.Variable1 }}"
    variable2: "{{ item.Variable2 }}"
    variable3: "{{ item.Variable3 }}"
  loop: "{{ lookup('yaml', yaml_file) }}"
```

In this example, the csv_to_yaml Ansible Galaxy module is used to convert the CSV file to YAML format. The add_host module is then used to create the inventory based on the YAML file contents.

You can run this playbook with the following command:

```
ansible-playbook -i localhost, inventory.yml
```

AWX/AAP/Tower

Assuming that the CSV file has the following structure:

```
group,host,IP Address,Variable1,Variable2,Variable3
group1,host1,192.168.1.1,value1,value2,value3
group2,host2,192.168.1.2,value4,value5,value6
group2,host3,192.168.1.3,value4,value5,value6
```

Here's an example Ansible playbook that reads a CSV file and creates an inventory in Ansible AWX, or Ansible Automation Platform.

You'll need to fill in the values for `tower_host`, `tower_username`, `tower_password`, `tower_org`, `tower_inventory_name`, and `csv_file`.

The playbook has four tasks:

1. Load CSV file: This task loads the CSV file and stores the content in the csv_content variable.
2. Create groups in Ansible Tower: This task creates groups in Ansible Tower based on the values in the group column of the CSV file. The loop parameter iterates over the unique values of the group column.

3. Create hosts in Ansible Tower: This task creates hosts in Ansible Tower based on the values in the host column of the CSV file. The loop parameter iterates over the unique values of the host column.
4. Add host variables to Ansible Tower hosts: This task adds variables to the hosts in Ansible Tower based on the values in the CSV file. The loop parameter iterates over each row in the CSV file.

```
---
- name: Create Ansible Tower Inventory from CSV
  hosts: localhost
  gather_facts: no

  vars:
    csv_file: /path/to/csv/file.csv
    tower_host: <Ansible Tower Host>
    tower_username: <Ansible Tower Username>
    tower_password: <Ansible Tower Password>
    tower_org: <Ansible Tower Organization>
    tower_inventory_name: <Ansible Tower Inventory Name>

  tasks:
    - name: Load CSV file
      read_csv:
        path: "{{ csv_file }}"
        delimiter: ","
      register: csv_content

    - name: Create groups in Ansible Tower
      tower_group:
        tower_host: "{{ tower_host }}"
        tower_username: "{{ tower_username }}"
        tower_password: "{{ tower_password }}"
        tower_organization: "{{ tower_org }}"
        name: "{{ item.group }}"
        state: present
      loop: "{{ csv_content.list | unique('group') }}"

    - name: Create hosts in Ansible Tower
      tower_host:
        tower_host: "{{ tower_host }}"
        tower_username: "{{ tower_username }}"
```

```
      tower_password: "{{ tower_password }}"
      tower_organization: "{{ tower_org }}"
      inventory_name: "{{ tower_inventory_name }}"
      name: "{{ item.host }}"
      state: present
    loop: "{{ csv_content.list | unique('host') }}"

  - name: Add host variables to Ansible Tower hosts
    tower_host:
      tower_host: "{{ tower_host }}"
      tower_username: "{{ tower_username }}"
      tower_password: "{{ tower_password }}"
      tower_organization: "{{ tower_org }}"
      inventory_name: "{{ tower_inventory_name }}"
      name: "{{ item.host }}"
      variables: "{{ item.vars }}"
      state: present
    loop: "{{ csv_content.list }}"
```

A config file can be used in place of credentials being located in the playbook.

The ~/.tower_cli.cfg file is a configuration file used by the Ansible Tower CLI tool, tower-cli. It is located in the home directory of the user running tower-cli.

This file stores configuration settings for tower-cli such as the URL of the Ansible Tower server, the username and password used to authenticate to the server, and other options related to the tool's behavior.

```
[tower]
host = https://my-ansible-tower-server.com
username = my-username
password = my-password
verify_ssl = false
```

In this example, the [tower] section specifies the configuration settings for the Ansible Tower server. The host parameter specifies the URL of the server, while the username and password parameters specify the credentials used to authenticate to the server. The verify_ssl parameter can be set to true or false to indicate whether SSL certificates should be verified when making requests to the server.

By default, tower-cli looks for the ~/.tower_cli.cfg file in the user's home directory. However, you can specify a different location for the configuration file by setting the TOWERCLI_CONFIG environment variable to the path of the file.

Automation

AWX on CentOS 8

Log in to your CentOS 8 server, open a terminal window, and issue the following commands:

```
sudo dnf install epel-release -y
sudo dnf install git gcc gcc-c++ ansible nodejs gettext device-mapper-persistent-data lvm2 bzip2 python3-pip -y
```

How to install Docker and Docker Compose

(Podman coming soon.)

We now need to install both Docker and Docker Compose. The first thing to do is add the necessary repository with the command:

```
sudo dnf config-manager --add-repo=https://download.docker.com/linux/centos/docker-ce.repo
```

Once the repository is added, install the latest version of Docker with the command:

```
sudo dnf install docker-ce-3:18.09.1-3.el7 -y
```

Start and enable the Docker engine with the commands:

```
sudo systemctl start docker
sudo systemctl enable docker
```

Add your user to the docker group with the command:

```
sudo usermod -aG docker $USER
```

Log out and log back in.

Install docker-compose via pip3 with the command:

```
sudo pip3 install docker-compose
```

Finally, set python to use Python 3 with the command:

```
alternatives --set python /usr/bin/python3
```

How to install AWX

Now we can finally install AWX. Clone the latest release with the command:

```
git clone https://github.com/ansible/awx.git
```

Next, generate a secret encryption key with the command:

```
openssl rand -base64 30
```

Copy the key that is generated to your clipboard.

Change into the newly downloaded AWX directory with the command:

```
cd awx/installer
```

Open the AWX inventory file with the command:

```
nano inventory
```

In that file, you'll need to (at a minimum), edit the following configuration options. First, locate the line:

```
secret_key=
```

In that line, paste the secret key you generated earlier.

Next, look for the line:

```
admin_password=password
```

Change the password to a strong, unique password.

Finally, look for the line that starts with:

```
#awx_alternate_dns_servers=
```

Change that line to:

```
awx_alternate_dns_servers="8.8.8.8,8.8.4.4"
```

You can then go through the rest of the inventory file and edit as needed. But, the above changes should result in a successful installation.

Create a directory for Postgres with the command:

```
sudo mkdir /var/lib/pgdocker
```

Install AWX with the command:

```
sudo ansible-playbook -i inventory install.yml
```

This should take about five to10 minutes to complete.

SELinux and firewall

Before we can access the AWX site, we need to disable SELinux. Issue the command:

```
sudo nano /etc/sysconfig/selinux
```

Change the line:

```
SELINUX=enforcing
```

To:

```
SELINUX=disabled
```

Save and close the file. Restart your system so the changes will take effect.

The last step is to modify the firewall. This is done with the following commands:

```
sudo firewall-cmd --zone=public --add-masquerade --permanent
sudo firewall-cmd --permanent --add-service=http
sudo firewall-cmd --permanent --add-service=https
sudo firewall-cmd --reload
```

Control Node Setup

A deployment controller could be a dedicated server or a workstation.

From command line

Clone the Private Data System repository

```
git clone https://github.com/clusterapps/PrivateSystem.git
```

Review required settings.

From Tower or AWX

A:) Clone and modify for your own environment

```
git clone https://git.clusterapps.com/ansible/tower-pds-base.git
```

B:) Create a new Project and assign to specific groups.

step-by-step coming soon

Additional Settings

Additional items for a Windows environment.

Download the Windows virtio drivers. These drivers are needed to Windows guests running on KVM.

On a web server or software distribution server:

```
wget https://fedorapeople.org/groups/virt/virtio-win/virtio-win.repo -O /etc/yum.repos.d/virtio-win.repo
yum install -y virtio-win
cp /usr/share/virtio-win/virtio-win.iso /var/www/html/iso/
```

Automation

Inventory from gathered facts.

Playbook example

```
---
- name: Generate YAML Inventory File from Gathered Facts
  hosts: all
  gather_facts: true
  tasks:
    - name: Gather facts from hosts
      setup:

    - name: Create YAML inventory file
      copy:
        content: |
          all:
            children:
              hosts:
                hosts:
          {{ hostvars[item].inventory_hostname }}:
            ansible_host: {{ hostvars[item].ansible_host }}
            ansible_user: {{ hostvars[item].ansible_user }}
            ansible_port: {{ hostvars[item].ansible_port }}
            ansible_ssh_pass: {{ hostvars[item].ansible_ssh_pass | default('') }}
            ansible_ssh_private_key_file: {{ hostvars[item].ansible_ssh_private_key_file | default('') }}
          inventory_hostname: {{ hostvars[item].inventory_hostname }}
        dest: /path/to/your/output/inventory.yaml
        mode: 0644
      loop: "{{ ansible_play_batch }}"
      run_once: yes
```

We define a play named "Generate YAML Inventory File from Gathered Facts" that runs on all hosts (hosts: all) and enables fact gathering with gather_facts: true.

In the first task, we use the setup module to gather facts from the hosts.

In the second task, we use the copy module to create the YAML inventory file. We loop through each host in ansible_play_batch (which contains all the hosts that ran this play) and format the gathered facts into the inventory file.

ansible_host, ansible_user, ansible_port, ansible_ssh_pass, ansible_ssh_private_key_file, and inventory_hostname are some of the facts we include in the inventory file.

The inventory file is saved at the specified destination path (/path/to/your/output/inventory.yaml) with appropriate file permissions (mode 0644).

Make sure to replace /path/to/your/output/inventory.yaml with the actual path where you want to save the generated YAML inventory file.

You can run this playbook with the ansible-playbook command:

Automation

oVirt - Windows Template

To create an Ansible playbook that deploys a Windows VM from a template on oVirt, customizes the OS with sysprep, sets unique hostname and static IP, and performs other specified configurations, follow the structure below. This example assumes you have a sysprep file ready for Windows customization and your oVirt environment is properly set up for Ansible integration.

First, ensure you have the `ovirt.ovirt` collection installed, which includes modules for interacting with oVirt. If not, you can install it using Ansible Galaxy:

```
ansible-galaxy collection install ovirt.ovirt
```

Here's an example playbook that meets your requirements. You'll need to adjust variables and possibly the paths to files (like the sysprep file) to match your environment.

```
---
- name: Deploy and customize a Windows VM on oVirt
  hosts: localhost
  gather_facts: no
  collections:
    - ovirt.ovirt

  vars:
    ovirt_engine_url: https://ovirt-engine.example.com/ovirt-engine/api
    ovirt_engine_username: admin@internal
    ovirt_engine_password: your_password
    ovirt_engine_cafile: /path/to/your/ovirt-engine.ca
    vm_domain: "example.com"
    vm_subnet: "255.255.255.0"
    vm_gateway: "10.10.10.1"
    vm_dns: "10.1.10.10"
    additional_disk_size: 20GB
    machines:
      - { name: dc01, memory: 4GiB, cluster: kvm_worker, template: Windows2022Core, datasize: 90, storage: data-kvm2, tag: lab, ip: 10.10.10.12}
      - { name: dc02, memory: 4GiB, cluster: kvm_worker, template: Windows2022Core, datasize: 90, storage: data-kvm2, tag: lab, ip: 10.10.10.11}
```

```
    - { name: wadm01, memory: 8GiB, cluster: kvm_worker,  template: Windows2022, datasize: 90, storage: data-kvm2, tag: lab, ip: 10.10.10.10}

  tasks:
    - name: Log into oVirt
      ovirt.ovirt.ovirt_auth:
        url: "{{ ovirt_engine_url }}"
        username: "{{ ovirt_engine_username }}"
        password: "{{ ovirt_engine_password }}"
        ca_file: "{{ ovirt_engine_cafile }}"
        state: present

    - name: Deploy VMs
      ovirt.ovirt.ovirt_vm:
        auth: "{{ ovirt_auth }}"
        name: "{{ item.name }}.{{ vm_domain }}"
        template: "{{ item.template }}"
        cluster: "{{ item.cluster }}"
        cpu_cores: 2
        cpu_sockets: 1
        memory: "{{ item.memory }}"
        sysprep:
          hostname: "{{ item.name | upper}}"
          ip: "{{ item.ip }}"
          netmask: "{{ vm_subnet }}"
          gateway: "{{ vm_gateway }}"
          dns_servers: "{{ vm_dns }}"
          domain: "{{ vm_domain }}"
          root_password: "{{ vm_admin }}"
        state: present
      with_items:
        - "{{ machines }}"

    - name: Add Software Storage
      ovirt.ovirt.ovirt_disk:
        auth: "{{ ovirt_auth }}"
        name: "{{ item.name }}-Disk2"
        vm_name: "{{ item.name }}.{{ vm_domain }}"
        size: "{{ item.datasize }}GiB"
        format: cow
```

```
      interface: virtio_scsi
      storage_domain: "{{ item.storage }}"
    with_items:
      - "{{ machines }}"

  - name: Start VMs
    ovirt.ovirt.ovirt_vm:
      auth: "{{ ovirt_auth }}"
      name: "{{ item.name }}.{{ vm_domain }}"
      state: running
    with_items:
      - "{{ machines }}"

  - name: Tag machines
    ovirt.ovirt.ovirt_tag:
      auth: "{{ ovirt_auth }}"
      name: "{{ item.tag }}"
      state: attached
      vms:
        - "{{ item.name }}.{{ vm_domain }}"
    with_items:
      - "{{ machines }}"



  # Assuming the VM is to be powered on after setup
  - name: VMs should be running
    ovirt.ovirt.ovirt_vm:
      auth: "{{ ovirt_auth }}"
      name: "{{ vm_hostname }}"
      state: running

  - name: Logout from oVirt
    ovirt.ovirt.ovirt_auth:
      state: absent
      auth: "{{ ovirt_auth }}"
```

Remember to replace placeholders (like URLs, credentials, paths, domain names, and the storage domain) with your actual data. Also, ensure your sysprep file is correctly set up in your template or specified directly in the playbook if needed.

This playbook performs the following actions:

1. Logs into the oVirt engine.
2. Creates a VM from a specified template with a unique hostname and configures it with sysprep.
3. Adds an additional 100GB disk to the VM.
4. Configures the VM's network interface.
5. Powers on the VM after setup.
6. Logs out from the oVirt engine.

Test this playbook in a development environment before using it in production. Adjustments may be necessary based on your specific oVirt setup, Windows template, and network configuration.

Automation

vCenter - Linux Templates

To deploy multiple VMs with different hostnames and IP addresses while utilizing the customization capabilities provided by the `vmware_guest` module in Ansible, you can use VMware's customization specifications. This approach allows for more advanced customization options, such as setting the domain, hostname, and network settings directly within the playbook. Below is an example of how to modify the playbook to use VMware's customization feature for deploying 3 VMs with distinct configurations:

Inventory

To create a separate inventory file with all the variables used in the provided playbook, you'll need to organize these variables in a structured way. Ansible inventory files can be in INI or YAML format, but for complex configurations like this, YAML is more suitable due to its support for hierarchical data.

Below is an example of how to create an Ansible inventory file in YAML format (`inventory.yml`) that defines all the variables required by your playbook. This example demonstrates setting up variables for deploying three VMs, but you can adjust the quantities and details as needed:

```
all:
  vars:
    vcenter_hostname: vcenter.example.com
    vcenter_username: admin@vsphere.local
    vcenter_password: securepassword
    vcenter_datacenter: DC1
    vcenter_folder: /DC1/vm/ansible_managed_vms
    vcenter_cluster: Cluster1
    vm_template: CentOS_Template
    vm_network: VM_Network
    vm_netmask: 255.255.255.0
    vm_gateway: 192.168.1.1
    dns01: 8.8.8.8
    dns02: 8.8.4.4
    hosts:
      vm01:
```

```
  vm_name: vm01
  vm_ip: 192.168.1.101
  vm_ram: 2048
  vm_cores: 2
  vm_sockets: 1
  vm_notes: "VM01 Notes"
  vm_department: "department1"
  vm_application: "Application1"
  vm_role: "Role1"
  vm_env: "Development"
  vm_buildcode: "Build01"
  vm_lifecycle: "Lifecycle1"
  vm_contact: "Contact1"

vm02:
  vm_name: vm02
  vm_ip: 192.168.1.102
  vm_ram: 4096
  vm_cores: 4
  vm_sockets: 2
  vm_notes: "VM02 Notes"
  vm_department: "department2"
  vm_application: "Application2"
  vm_role: "Role2"
  vm_env: "Testing"
  vm_buildcode: "Build02"
  vm_lifecycle: "Lifecycle2"
  vm_contact: "Contact2"

vm03:
  vm_name: vm03
  vm_ip: 192.168.1.103
  vm_ram: 8192
  vm_cores: 4
  vm_sockets: 2
  vm_notes: "VM03 Notes"
  vm_department: "department3"
  vm_application: "Application3"
  vm_role: "Role3"
```

```
      vm_env: "Production"
      vm_buildcode: "Build03"
      vm_lifecycle: "Lifecycle3"
      vm_contact: "Contact3"
```

Adjusting the Inventory

- **Hosts and Variables**: The example above assumes you are deploying three VMs (`vm01`, `vm02`, and `vm03`). Each VM has its set of variables defined under `hosts`. You can add more VMs or adjust the existing definitions as needed.
- **Global Variables**: Variables that are common across all VMs are defined under `all: vars`. This includes vCenter connection details, network configuration, and Infoblox provider details. These can be overridden at the host level if necessary.
- **Customization**: Tailor the inventory to match your environment's specifics, including vCenter details, template names, network settings, and VM specifications.

This approach allows you to manage your infrastructure as code, making deployments repeatable and reducing the likelihood of human error.

Playbook: `deploy_vms.yml`

```
---
- name: Deploy Multiple VMs on vCenter
  hosts: all
  gather_facts: false

  tasks:
    - name: Setting Facts
      set_fact:
        vm_guest_name: "{{ vm_name | upper }}"
        vm_hostname: "{{ vm_name | lower }}"

    - name: Deploy or Clone Linux VM
      vmware_guest:
        hostname: "{{ vcenter_hostname }}"
        username: "{{ vcenter_username }}"
        password: "{{ vcenter_password }}"
        validate_certs: no
        datacenter: "{{ vcenter_datacenter }}"
```

```
    folder: "{{ vcenter_folder }}"
    name: "{{ vm_guest_name }}"
    cluster: "{{ vcenter_cluster }}"
    state: poweredon
    template: "{{ vm_template }}"
    annotation: "{{ vm_notes }}"
    hardware:
      memory_mb: "{{ vm_ram }}"
      num_cpus: "{{ vm_cores }}"
      num_cpu_cores_per_socket: "{{ vm_sockets }}"
    networks:
      - name: "{{ vm_network }}"
        ip: "{{ vm_ip }}"
        netmask: "{{ vm_netmask }}"
        gateway: "{{ vm_gateway }}"
    wait_for_ip_address: yes
    wait_for_customization: yes
    cdrom:
      type: none
    customization:
      hostname: "{{ vm_hostname }}"
      domain: "example.com"
      timezone: "America/New_York"
      dns_servers:
        - "{{ dns01 }}"
        - "{{ dns02 }}"
  delegate_to: localhost
  register: vmcreate


- name: Add Custom Attributes to the VM
  vmware_guest_custom_attributes:
    hostname: "{{ vcenter_hostname }}"
    username: "{{ vcenter_username }}"
    password: "{{ vcenter_password }}"
    validate_certs: no
    name: "{{ vm_guest_name }}"
    attributes:
      - name: Department
```

```
      value: "{{ vm_department | default('') }}"
    - name: Application
      value: "{{ vm_application | default('') }}"
    - name: Role
      value: "{{ vm_role | default('') }}"
    - name: Environment
      value: "{{ vm_env | default('') }}"
    - name: Automation
      value: "Baseline"
    - name: buildcode
      value: "{{ vm_buildcode | default('') }}"
    - name: lifecycle
      value: "{{ vm_lifecycle | default('') }}"
    - name: Contact
      value: "{{ vm_contact | default('') }}"
```

Explanation of Each Task

1. **Setting Facts**: Converts the VM name to uppercase and lowercase versions for different uses, such as the display name in vCenter (`vm_guest_name`) and the internal hostname of the VM (`vm_hostname`).
2. **Deploy or Clone Linux VM**: Uses the `vmware_guest` module to either deploy a new VM or clone an existing one from a template specified in the inventory. This task includes configuring the VM's hardware specifications, network settings, and customization specifications like the hostname and DNS settings. It waits for the IP address to be assigned and customization to complete before proceeding.
3. **Add Custom Attributes to the VM**: Adds custom attributes to the newly created VM in vCenter. These attributes can include metadata such as the department, application, role, and environment the VM is associated with. This helps in organizing and managing VMs based on these metadata.

Running the Playbook

To run this playbook, use the following command, ensuring you specify the inventory file:

```
ansible-playbook -i inventory.yml deploy_vms.yml
```

This command tells Ansible to deploy VMs as configured in `inventory.yml`, applying the settings and customizations specified for each VM.

Notes:

- **Template Requirements**: The template you use must be prepared for customization. For Linux VMs, ensure VMware Tools is installed, and the Perl scripting language is available for the customization scripts to run.
- **Customization Script**: VMware's customization mechanism uses a script that runs on the first boot. If the customization does not apply, troubleshooting may involve checking that VMware Tools is correctly installed and that the template is properly prepared for cloning and customization.
- **Ansible and VMware Versions**: Ensure you are using recent versions of Ansible and the VMware modules, as improvements and bug fixes are regularly added.

This method leverages VMware's powerful customization engine, allowing for a wide range of customization options beyond what was demonstrated here.

Automation

Windows Build Server

A service for building custom WIM images for deployments.

The WIM images may contain additional drivers or post setup deployment scripts.

WIM images can be server or desktop OS and are useful in virtual and physical environment deployments.

Build

To build the server, start with a fresh install of Windows Server. This example will be based on Windows Server 2016. The example should work on Windows Server 2019 with little to no modification.

Only a few modifications were changed to the installation.

- Server name
- Network Settings
- Driver installation
- Disable IE lock down settings. (Needed to download drivers)
- Create new local user in the administrators group. (Security will be configured later)
- Remote Desktop enabled for easy of use.
- Ansible prep powershell script run. Download Here.

Download the Windows Builder role or Private Data System playbook to deploy the build server.

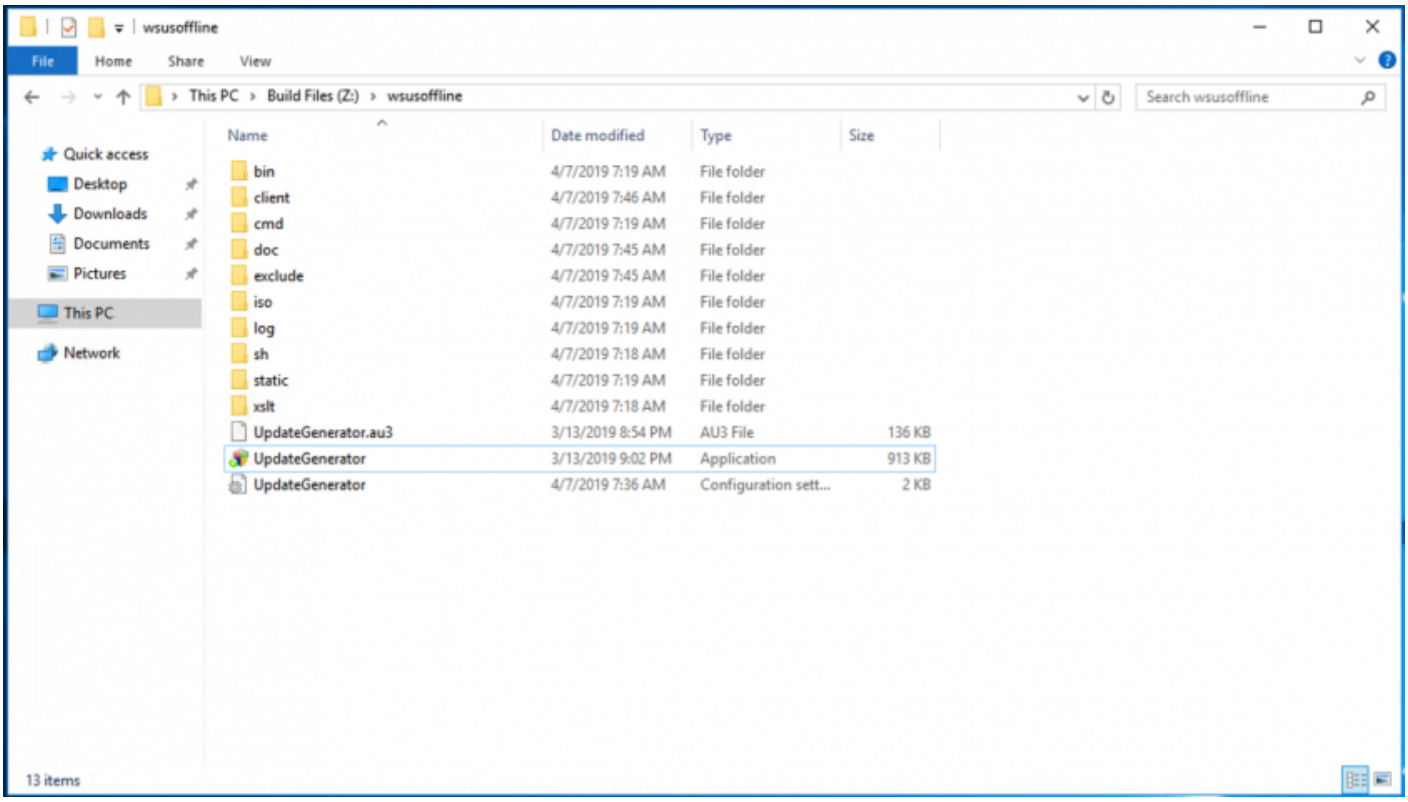
Update the inventory file.

Run the deploy-winbuild playbook.

Configure

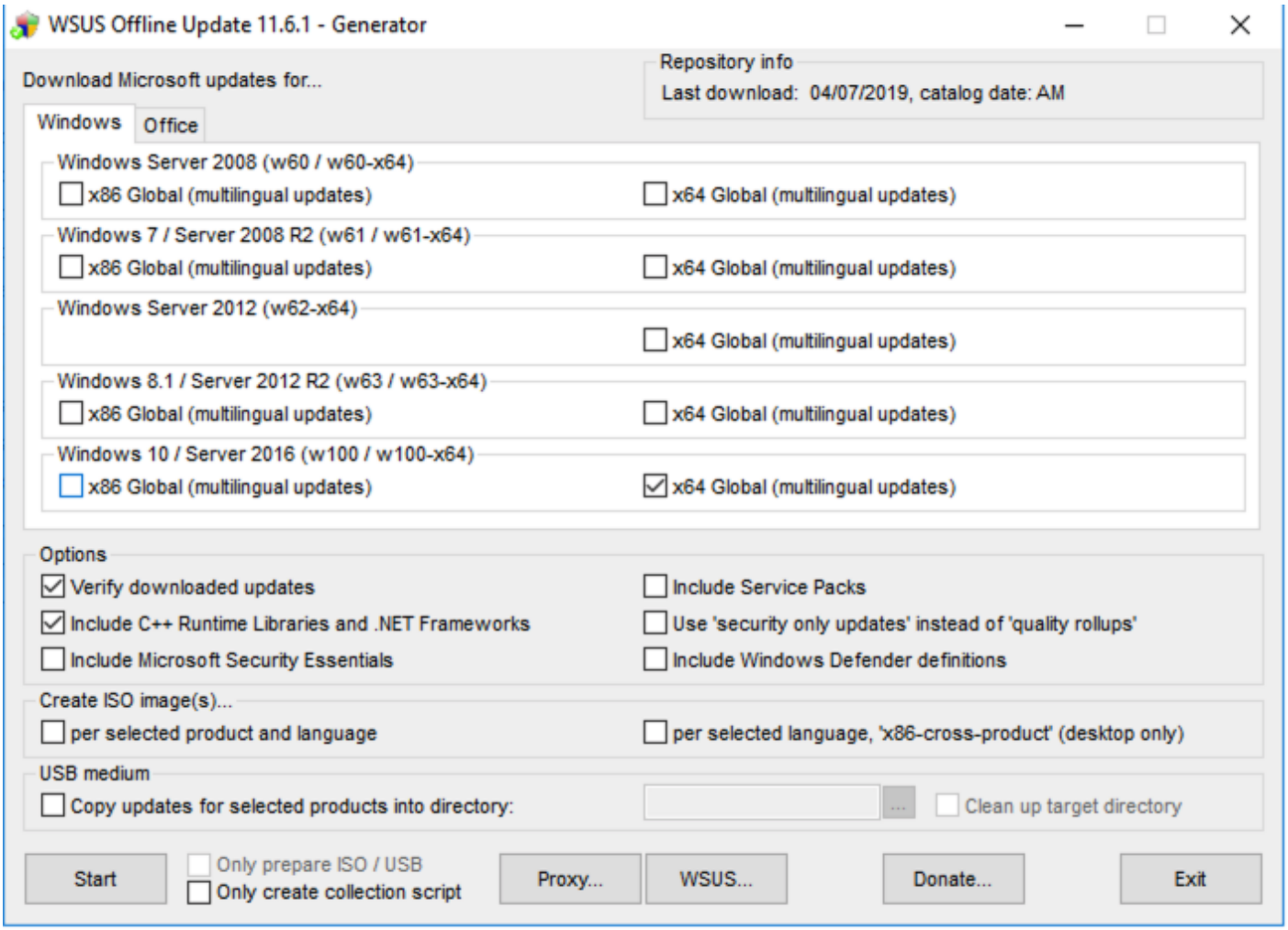
Updates.
The Windows update portion of the build can be very time consuming. To speed up the build time and the WIM updating process, the updates will be downloaded ahead of time. This is not necessary to run manually since the buld scripts will run the updates tools too.

Sign in to the Windows Build Server and go to the <wsus-offline-updater> folder.



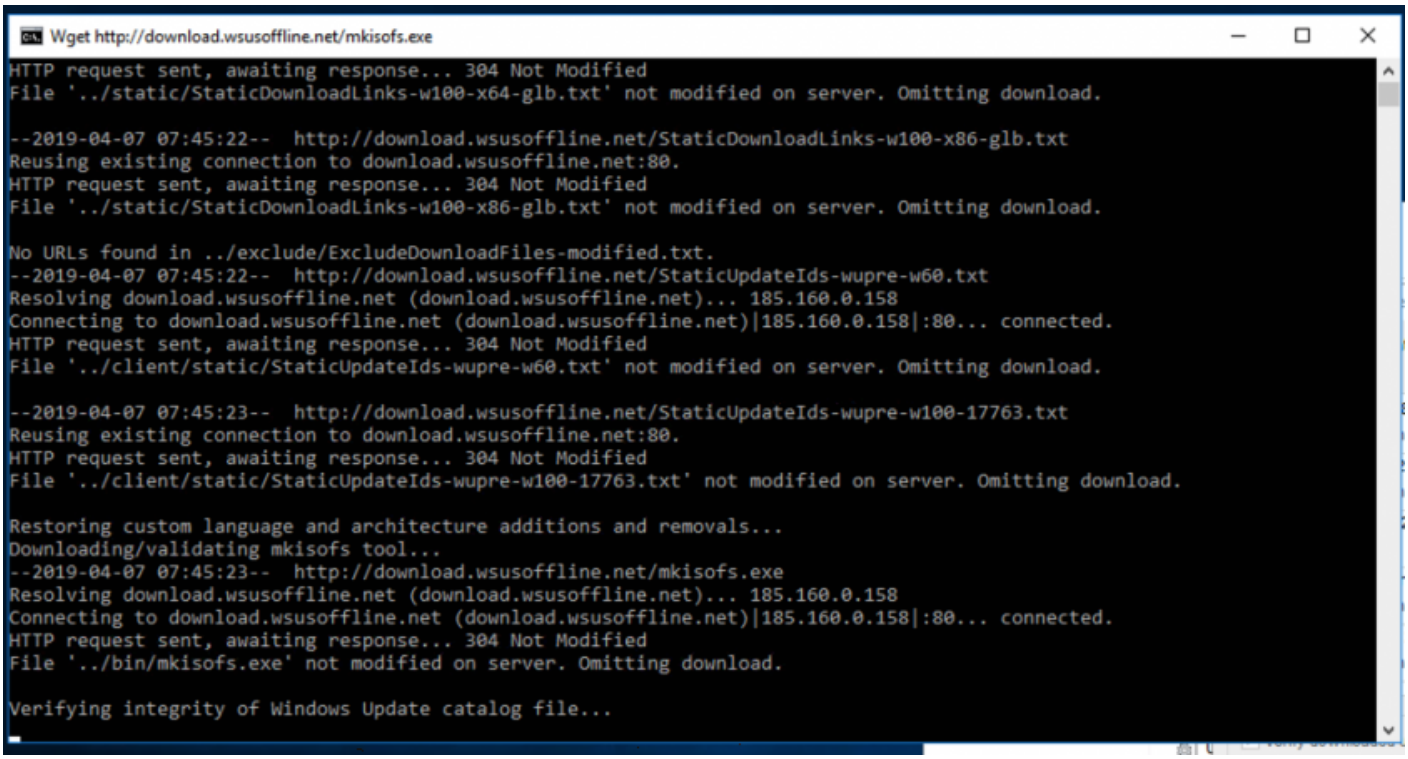
Run the UpdateGenerator.exe

Select the version(s) of Windows to download updates for.



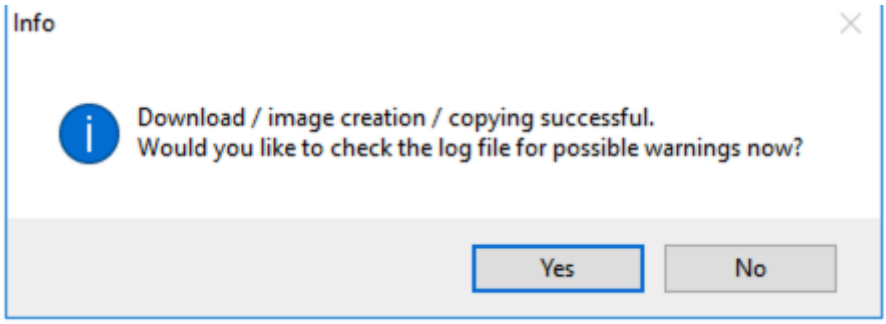
This example will only download updates for Windows 10 and Windows Server 2016.

After a few moments the UpdateGenerator will begin to run.



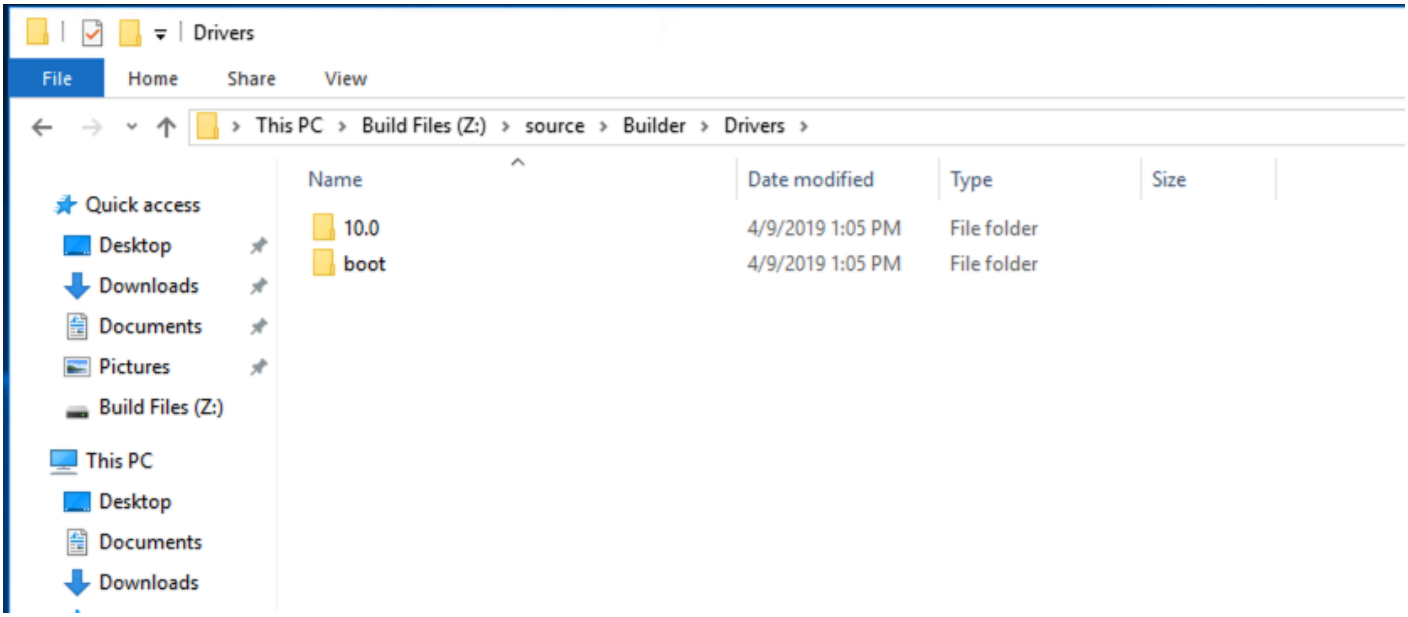
This process may take a very long time depending on the number of versions selected and if Office was included.

When the process is complete, a prompt will appear to review the logs.



Drivers

Sign in to the Windows Build Server and go to the source\Builder\Drivers folder.



There are folders for each Windows version that can be deployed. The boot directory is for WinPE and 10.0 is for Windows Server 2016. Note that Windows Server 2019 will also build in the 10.0 folder. (For now)

Copy the drivers that are needed to the folders. The folders are recursively scanned, so add as many as you need. To keep the WinPE size to a minimum, only place drivers required for install in the boot folder. At a minimum, this would be the storage and networking drivers. For this example, the hypervisor is KVM. The virtstor and netkvm drivers were added to the folders. For the actual OS image place all of the needed inf in the folder. Multiple drivers for multiple hardware platforms can be copied to the folders to allow for a simple image to be used on many platforms.

If drivers require a setup file to be run, we'll add those to the post install playbooks. More on that later.

Images

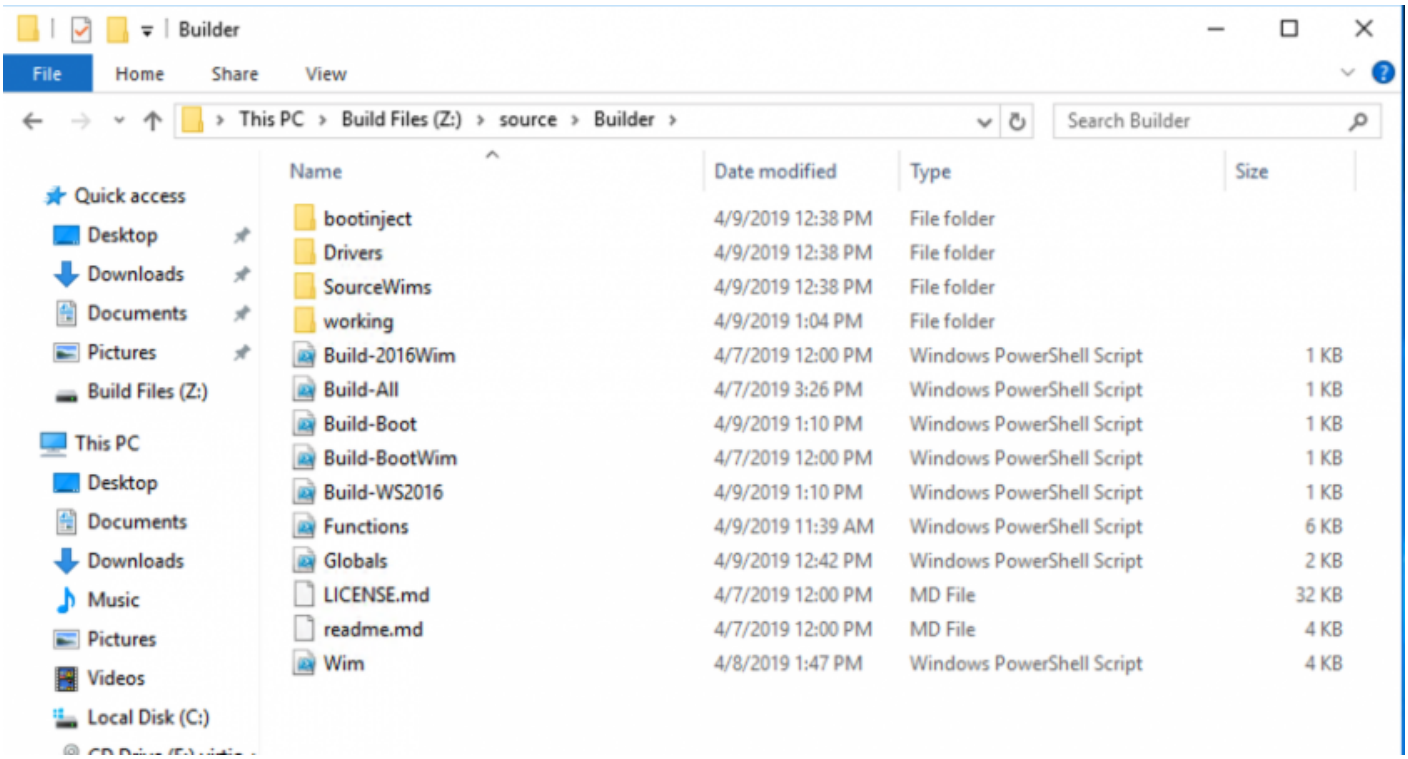
There are two base WIM files that will be needed to build the custom ones. You will need a copy of the Windows Server ISO along with the Windows Assessment and Deployment Kit, and the Windows Assessment and Deployment Kit Windows Preinstallation Environment Add-on. Both Windows ADK components are installed when using the deploy-winbuild playbook.

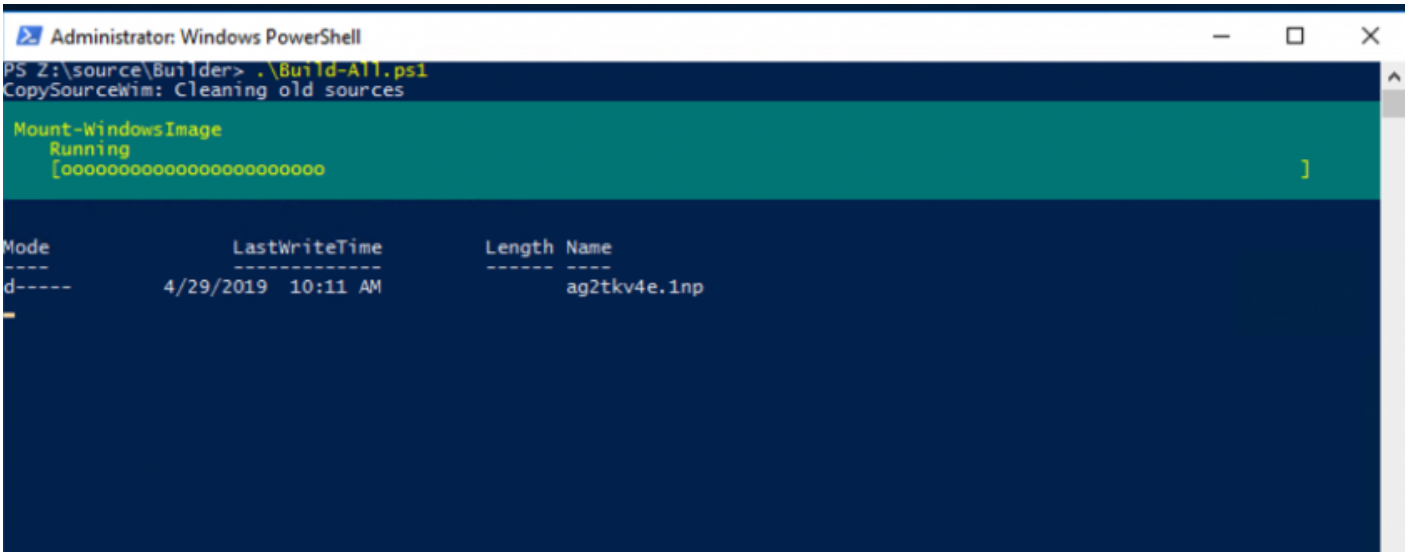
boot.wim: Copy the winpe.wim file from `C:\Program Files (x86)\Windows Kits\10\Assessment and Deployment Kit\Windows Preinstallation Environment\amd64\en-us` to `\source\Builder\SourceWims\boot` *and rename the files boot.wim.*

install.wim: You will need a licensed copy of the Windows Server installation media for this step. If you configured the playbook to download the ISO file it will be located in the `\source\ISO` directory on the build system. Copy the `DVD:\sources\install.wim` file to `\source\Builder\SourceWims\boot`. Do not change the file name.

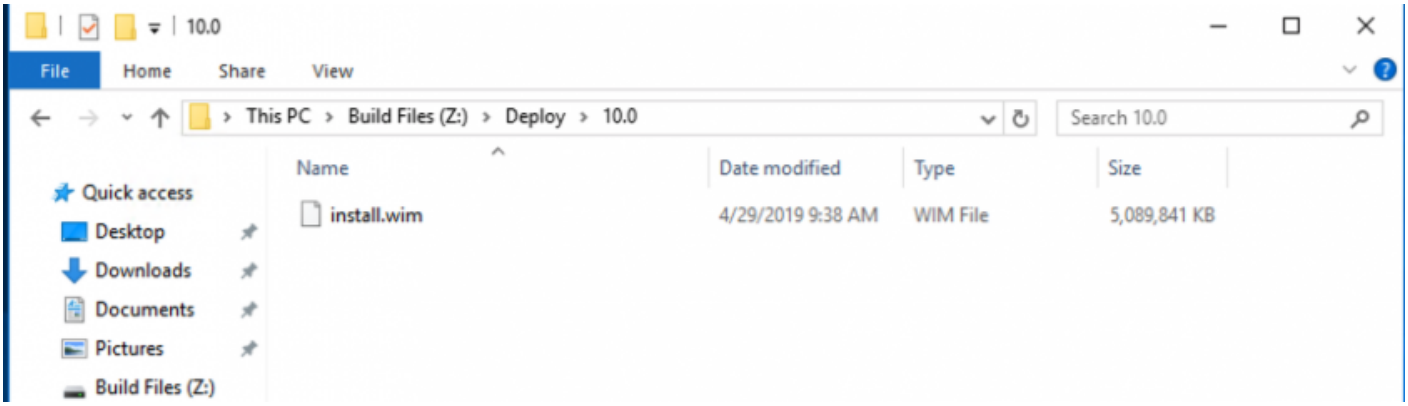
Building Images

Once all of the base requirements are in place, it is time to run the build scripts. These script are modified versions of the Foreman build scripts. Open the \source\Builder folder and run the Build-All.ps1 in an elevated PowerShell console.





After the build scrips have created the new WIM files, they will be located in the \Deploy directory on the build server. Review the date modified and the file size to determine that the file has recently been updated. Unless the build scripts fail, most error messages can be ignored.



The deploy-winbuild playbook automatically shared this folder to the network. These files are now ready for deployment and can be used with your favorite deployment tools.

Windows Managed Node Setup

Setup a Windows host - local UI

Setting up a Windows Server to be managed by Ansible involves a few key steps. Ansible communicates with Windows servers over WinRM (Windows Remote Management), which is a Windows-native remote management protocol based on WS-Management (Web Services-Management). The setup process generally includes configuring WinRM on the Windows server and preparing the Ansible control machine to manage Windows hosts.

Here are the steps to prepare a Windows Server for management with Ansible:

1. Configure WinRM on the Windows Server

The easiest way to configure WinRM for Ansible is to use the `ConfigureRemotingForAnsible.ps1` script, which is provided in the Ansible documentation. This script sets up WinRM to use basic authentication and configures it to allow connections from Ansible.

1. **Download the Script**: On the Windows Server, open PowerShell as an Administrator and run the following command to download the script:

   ```
   Invoke-WebRequest -Uri "https://raw.githubusercontent.com/ansible/ansible-documentation/devel/examples/scripts/ConfigureRemotingForAnsible.ps1" -OutFile "ConfigureRemotingForAnsible.ps1"
   ```

2. **Run the Script**: Execute the script you just downloaded:

   ```
   .\ConfigureRemotingForAnsible.ps1
   ```

   This script will configure WinRM to use HTTP (port 5985), enable basic authentication, and create a firewall rule to allow WinRM traffic.

3. **Note**: For a production environment, it's recommended to use HTTPS (port 5986) with certificate-based authentication for increased security. This setup is more complex and requires installing a valid certificate on the Windows Server and additional WinRM configuration.

2. Prepare the Ansible Control Machine

On the Ansible control machine, which is typically a Linux system, you need to install `pywinrm` to enable WinRM support. This can be done using pip:

```
pip install pywinrm
```

3. Configure Ansible Inventory

Edit your Ansible inventory file to include your Windows hosts. You can define them under a specific group `[windows]` and specify the necessary variables:

```
[windows]
windows-server.example.com

[windows:vars]
ansible_user=Administrator
ansible_password=YourPassword
ansible_connection=winrm
ansible_winrm_server_cert_validation=ignore
```

Security Note: Storing passwords in plaintext in the inventory file is not secure. Consider using Ansible Vault to encrypt sensitive data.

4. Test the Configuration

Now, test your setup by running a simple Ansible command to ping the Windows server:

```
ansible windows -m win_ping
```

If everything is configured correctly, the `win_ping` module should return a success message.

Additional Notes

- Ensure network connectivity between the Ansible control machine and the Windows Server, specifically that the required WinRM port (5985 for HTTP, 5986 for HTTPS) is open.
- The setup process might vary slightly depending on the specific version of Windows Server you are using.
- For production environments, it's highly recommended to use Kerberos or NTLM with WinRM over HTTPS for secure authentication and encryption.

By following these steps, you should have a Windows Server ready to be managed by Ansible.

Remote install / fleet deployments

To remotely set up a Windows Server to be managed by Ansible, you need to configure WinRM (Windows Remote Management) on the target server. This process can be challenging since it ideally requires remote execution of a configuration script on the Windows server. If you have physical access or remote desktop (RDP) access to the server, it's usually easier to set up WinRM directly. However, if you need to do this entirely remotely, here are some methods you can consider:

1. Using PowerShell Remoting

If PowerShell Remoting is already enabled on the target server, you can use it to configure WinRM for Ansible.

1. **Connect to the Windows Server via PowerShell Remoting**:

   ```
   $credential = Get-Credential
   Enter-PSSession -ComputerName <Target-Server-IP-or-Hostname> -Credential $credential
   ```

2. **Run the Ansible WinRM Configuration Script**: Download and execute the `ConfigureRemotingForAnsible.ps1` script within the remote session.

   ```
   Invoke-WebRequest -Uri "https://raw.githubusercontent.com/ansible/ansible-documentation/devel/examples/scripts/ConfigureRemotingForAnsible.ps1" -OutFile "ConfigureRemotingForAnsible.ps1"
   .\ConfigureRemotingForAnsible.ps1
   ```

3. **Exit the Remote Session**:

   ```
   Exit-PSSession
   ```

2. Using Group Policy (For Domain-Joined Servers)

If the server is part of an Active Directory domain, you can use Group Policy to configure WinRM on multiple servers at once.

1. **Create a new GPO** in your Group Policy Management Console.
2. **Edit the GPO** to include the WinRM service configuration. Typically, you need to set up the service to start automatically and configure the listener for HTTP and/or HTTPS.
3. **Link the GPO** to an OU that contains your servers.

3. Using a Configuration Management Tool

If you have a configuration management tool like SCCM (System Center Configuration Manager), you can use it to push out a script or configuration to enable and configure WinRM on Windows servers.

4. Using a Remote Execution Tool

If you have access to a remote execution tool like PSExec (part of Sysinternals), you can use it to run commands or scripts on the remote Windows server.

For example:

```
psexec \\target-server -u username -p password -h powershell.exe -ExecutionPolicy Bypass -File ConfigureRemotingForAnsible.ps1
```

Security Considerations

- When setting up WinRM, especially over HTTP, be aware of security implications. HTTP traffic is not encrypted, which can expose sensitive data. For production environments, HTTPS with certificate-based authentication is recommended.
- Ensure that the WinRM service is properly secured and accessible only from trusted networks or hosts.

Testing the Setup

After setting up WinRM, test the connection from your Ansible control machine:

```
ansible windows -i inventory_file -m win_ping
```

Replace `inventory_file` with the path to your Ansible inventory file where your Windows host is defined.

Conclusion

The method you choose depends on your current infrastructure, the tools you have available, and your access level to the Windows Server. For security and simplicity, direct access (like RDP) to set up WinRM is generally preferred, but in environments where this is not feasible, remote methods are necessary.

Citrix Virtual Apps and Desktops

Export and Import Policies

Exporting the Policy

Complete the following procedure to export the policy:

1. From the Desktop Delivery Controller as an Administrator role account.
2. Open PowerShell : `Add-PSSnapin Citrix*`
3. `Export-BrokerDesktopPolicy | Out-File -FilePath "C:\Temp\CitrixExportPolicy.txt"`

The preceding commands exports the policy to a binary file.

Importing the Policy

Complete the following procedure to import the policy:

1. From the Desktop Delivery Controller as an Administrator role account.
2. Open PowerShell : `Add-PSSnapin Citrix*`
3. `Import-BrokerDesktopPolicy (Get-Content "C:\Temp\CitrixExportPolicy.txt")`

Intro to Citrix

Lifecycle

Current Releases will reach End of Maintenance 6 months after the release date. Current Release. Current Releases will reach End of Life 18 months after the release date.

A Long Term Service Release will reach End of Life 5 years after the release date. A Long Term Service Release will reach End of Extended Support 10 years after the release date.

Upgrading Client VDA

To upgrade VDAs installed on machines running Windows 8.x or Window 7 to Windows 10, Citrix recommends reimaging Windows 7 and Windows 8.x machines to Windows 10 and then installing the supported VDA for Windows 10. If reimaging is not an option, uninstall the VDA before upgrading the operating system; otherwise, the VDA will be in an unsupported state.

Upgrading Components

Upgrade procedure

Insert the installation media or mount the ISO drive for the new release. Double-click AutoSelect.

To use the command-line interface, see Install using the command line.

1. Install more than one core component is installed on the same server (for example, the Controller, Studio, and License Server) and several of those components have new versions available, they will all be upgraded when you run the installer on that server.

If any core components are installed on machines other than the Controller, run the installer on each of those machines. The recommended order is: License Server, StoreFront, and then Director.

2. Run the product installer on machines containing VDAs. (See Step 9 for master images and Machine Creation Services.)
3. If Studio is installed on a different machine than one you've already upgraded, run the installer on the machine where Studio is installed.
4. From the newly upgraded Studio, upgrade the Site database.
5. From the newly upgraded Studio, select Citrix Studio *site-name* in the navigation pane. Select the Common Tasks Select Upgrade remaining Delivery Controllers.
6. After completing the upgrade close and then reopen Studio. Studio might prompt for an additional Site upgrade.
7. In the Site Configuration section of the Common Tasks page, select Perform registration. Registering the Controllers makes them available to the Site.
8. After upgrading components, the database, and the Site, test the newly-upgraded Site. From Studio, select Citrix Studio *site-name* in the navigation pane. Select the Common Tasks tab and then select Test Site. These tests were run automatically after you upgraded the database, but you can run them again at any time.
9. After you upgrade and test the deployment, update the VDA used in the master images (if you haven't done that already). Update master images that use those VDAs. See Update or create a new master image. Then update machine catalogs that use those master images, and upgrade Delivery Groups that use those catalogs.

Upgrading the Site and Database

Upgrade Steps

After upgrading the core components and VDAs, use the newly upgraded Studio to initiate an automatic or manual database and Site upgrade.

Remember: Check the Preparation section above for permission requirements.

- For an automatic database upgrade, the Studio user's permissions must include the ability to update the SQL Server database schema.
- For a manual upgrade, the Studio user runs some of the generated scripts from Studio. The database administrator runs other scripts, using either the SQLCMD utility or the SQL Server Management Studio in SQLCMD mode. Otherwise, inaccurate errors can result.

Citrix strongly recommends that you back up the database before upgrading. See CTX135207. During a database upgrade, product services are disabled. During that time, Controllers cannot broker new connections for the site, so plan carefully.

After the database upgrade completes and product services are enabled, Studio tests the environment and configuration, and then generates an HTML report. If problems are identified, you can restore the database backup. After resolving issues, you can upgrade the database again.

Upgrade the database and site automatically:

Launch the newly upgraded Studio. After you choose to start the site upgrade automatically and confirm that you are ready, the database and site upgrade proceeds.

Identity and Access Management

Foreman Smart Proxy - FreeIPA DNS

The SmartProxy DNS module can update any DNS server that complies with the ISC Dynamic DNS Update standard. Updates can also be made using GSS-TSIG, additional providers are available for managing libvirt's embedded DNS server, and Microsoft Active Directory using dnscmd, for static DNS records.

This guide will focus on FreeIPA and kerberos for SmartProxy DNS management.

FreeIPA configuration

A service principal is required for the Smart Proxy

`foremanproxy/proxy.example.com@EXAMPLE.COM`.

Create a new service principal for the SmartProxy. On any IPA server or controller node:

`ipa service-add foremanproxy/proxy.example.com@EXAMPLE.COM`.

On the SmartProxy host, get the keytab file

`ipa-getkeytab -p foremanproxy/proxy.example.com@EXAMPLE.COM -s ipa-server.example.com -k /etc/foreman-proxy/dns.keytab`

Set permissions and owner for the keytab.

`chmod 0600 /etc/foreman-proxy/dns.keytab && chown foreman-proxy /etc/foreman-proxy/dns.keytab`

In the FreeIPA web UI, go to the DNS zone, then to the Settings tab, verify that "Dynamic update" is set to "True", and add the following to the BIND update policy a new grant:

```
grant foremanproxy\047proxy.example.com@EXAMPLE.COM wildcard * ANY;
```

ACLs should be updated for both forward and reverse zones.
Note the `\047` is written verbatim, and don't forget the semicolon.

Proxy configuration

Update the proxy DNS configuration file (`/etc/foreman-proxy/settings.d/dns.yml`) with the following setting:

```
:use_provider: dns_nsupdate_gss
```

And the DNS GSS configuration file (`/etc/foreman-proxy/settings.d/dns_nsupdate_gss.yml`) with:

```
:dns_server: 127.0.0.1 or ip of DNS
:dns_tsig_keytab: /etc/foreman-proxy/dns.keytab
:dns_tsig_principal: foremanproxy/proxy.example.com@EXAMPLE.COM
```

Ensure the `dns_key` setting is not specified, or is commented out.

Restart the smart proxy service.

`systemctl restart foreman-proxy`

check the log file for any errors or warnings.

`tail -fn100 /var/log/foreman-proxy/proxy.log`

Update Foreman

After adding a Smart Proxy plugin, you must instruct Foreman to rescan the configuration.

In Foreman, Go to the Smart Proxies Use the Actions drop-down menu and select “Refresh Features” .

Add the Smart Proxy as a DNS proxy on the subnets and domains as needed.

IPA - Basic Commands

A basic list of command to manage FreeIPA services.

DNS

Add new a record and reverse record.

An A record is used to map an FQDN to an IP address. The A record is created using the following:

`ipa dnsrecord-add <forward-zone>  <short-name> --a-rec <IP of A record>`

The reverse, or pointer, record is used to map the IP to a hostname. The command to create a pointer is:

`ipa dnsrecord-add <reverse-zone> <num> --ptr-rec <host-FQDN>.`

Note the trailing dot. This is very important.

This is an example of adding server1.i.example.com with the IP of 192.168.4.11 to the FreeIPA DNS.

```
ipa dnsrecord-add i.example.com  server1 --a-rec 192.168.4.11
ipa dnsrecord-add 4.168.192.in-addr.arpa 11 --ptr-rec server1.i.example.com.
```

Hosts

Remove a failed or dead host.

```
ipa host-del server1 --updatedns
```

Including the `--updatedns` option will also remove all of the linked DNS entries for this host.

Services

The service must include the service / FQDN of the host.

```
ipa service-add nfs/server1.i.example.com
```

Users

Add a new user *lab1*

```
ipa user-add lab1
```

Change the new user's password

```
ipa passwd lab1
```

IPA - Fast and Dirty

This guide explains how to deploy FreeIPA the quickest way possible.

This is not for production.

You will need a fresh install of CentOS 7. The latest edition will be fine.

As root, update the server and install the requirements.

```
yum update -y
yum install -y ipa-server bind-dyndb-ldap ipa-server-dns
```

Open the firewall ports and reload the firewall.

```
firewall-cmd --permanent --add-service={http,https,ftp,ldap,ldaps,kerberos,kpasswd,dns,ntp}
firewall-cmd --reload
```

Run the IPA Server install.

```
ipa-server-install --setup-dns --allow-zone-overlap
kinit admin
```

Follow the install prompts. Answer each item. If you don't know, choose the default option.

```
kinit admin
<enter password entered durring ipa setup>
klist # to view the ticket.
```

Check the IPA Server status.

```
ipactl status
```

Example:

```
# ipactl status
Directory Service: RUNNING
krb5kdc Service: RUNNING
```

```
kadmin Service: RUNNING
named Service: RUNNING
ipa_memcached Service: RUNNING
httpd Service: RUNNING
pki-tomcatd Service: RUNNING
ipa-otpd Service: RUNNING
ipa: INFO: The ipactl command was successful
```

If there were no errors, then you have a running IPA Server. Log in to the IPA server to begin management tasks. To use the web interface go to https://<fqdn of the IPA server.

To setup a simple method for transferring the CA certificate is ftp. In this example vsftpd is used. The firewall ports were already opened during the IPA setup.

```
yum install -y vsftpd
systemctl enable --now vsftpd # or systemctl enable vsftpd; systemctl start vsftpd
cp /etc/ipa/ca.crt /var/ftp/pub
```

Now non-IPA clients will be able to securely access the LDAP. Add this certificate to web browsers or other application to trust web services that use the IPA sever as a CA.

Oracle Things

APEX on Docker

```
docker network create ora
```

```
docker run --name oracledb \
--network=ora \
-p 1521:1521 \
-p 5500:5500 \
-v ~/oradata:/opt/oracle/oradata \
-v ~/apex/images/apex:/tmp/apex_install \
-e TZ=America/New_York \oracle/database:18.3.0-se2
```

```
docker exec oracledb ./setPassword.sh Oradoc_db1
```

```
# Install and configure APEXdocker exec -it oracledb bash -c "source /home/oracle/.bashrc; bash"
```

```
cd /tmp/apex-installsqlplus sys/Oradoc_db1@localhost/orclpdb1 as sysdba
```

```
-- Install APEX@apexins.sql SYSAUX SYSAUX TEMP /i/
```

```
-- APEX REST configuration@apex_rest_config_core.sql oracle oracle
```

```
alter user apex_public_user identified by oracle account unlock;
```

-- From the blog: "Create a network ACE for APEX (this is used when consuming Web services or sending outbound mail):"

```
declare
l_acl_path varchar2(4000);
l_apex_schema varchar2(100);
begin
for c1 in (select schema
from sys.dba_registry
where comp_id = 'APEX') loop
l_apex_schema := c1.schema;
```

```
end loop;
sys.dbms_network_acl_admin.append_host_ace(
host => '*',
ace => xs$ace_type(privilege_list => xs$name_list('connect'),
principal_name => l_apex_schema,
principal_type => xs_acl.ptype_db));
commit;
end;
/
```

```
begin
apex_util.set_security_group_id( 10 );
apex_util.create_user(
p_user_name => 'ADMIN',
p_email_address => 'systems@example.com',
p_web_password => 'oracle',
p_developer_privs => 'ADMIN' );
apex_util.set_security_group_id( null );
commit;
end;
/
```

```
-- Exit SQLexit
```

ORDS

-- Assuming that you have a folder called ~/docker/ordscd ~/docker/ords

```
git clone https://github.com/martindsouza/docker-ords.git
cd docker-ords
```

```
-- Extract the ords.war file from the ords.zip downloadunzip ~/Downloads/ords.*.zip ords.war
```

```
cd ~/ords/docker-ords
ORDS_VERSION=18.3.0
docker build -t ords:$ORDS_VERSION .
```

```
docker run --name ords\
--network=ora \
-e TZ=America/New_York \
-e DB_HOSTNAME=oracledb \
-e DATABASE_SERVICENAME="orclpdb1" \
-e DB_PORT=1521 \
-e APEX_PUBLIC_USER_PASS=oracle \
-e APEX_LISTENER_PASS=oracle \
-e APEX_REST_PASS=oracle \
-e ORDS_PASS=oracle \
-e SYS_PASS=Oradoc_db1 \
--volume ~/ords/ords-18.3.0/config:/opt/ords \
--volume ~/apex/images/apex/images:/ords/apex-images \
-p 8080:8080 \
ords:18.3.0
```

```
docker run -t -i \
--name ords \
--network=ora \
-e DATABASE_HOSTNAME="oracledb" \
-e DATABASE_PORT="1521" \
-e DATABASE_SERVICENAME="ORCLPDB1" \
-e DATABASE_PUBLIC_USER_PASS=oracle \
-e APEX_LISTENER_PASS=oracle \
-e APEX_REST_PASS=oracle \
-e ORDS_PASS=oracle \
--volume ~/apex/images:/usr/local/tomcat/webapps/i \
-p 8080:8080 \
lucassampsouza/ords_apex:3.0.9
```

OCI CLI setup

Setup OCI

You'll need a terminal and a browser. Log in to OCI and go to your profile. You'll need the user OCID and the tenant OCID. Note the region you are in.

Install oci

- Oracle Linux 8

```
sudo dnf -y install oraclelinux-developer-release-el8
sudo dnf install python36-oci-cli
```

- Other Linux

```
bash -c "$(curl -L https://raw.githubusercontent.com/oracle/oci-cli/master/scripts/install/install.sh)"
```

- MacOS

```
brew upgrade && brew update && brew install oci-cli
```

- Windows

```
lol. No. Get a Linux box or use WSL.
```

Configure

At the command line:

```
oci setup config
```

In a browser open the OCI console copy the user OCID.

Open the Profile menu (User menu icon) and click User Settings.

Copy the user OCID and return to the command line. Paste the user OCID at the User OCID prompt and hit return.

Return to the OCI console and navigate to Administration > Tenancy Details. In the Tenancy Information tab, click Copy to copy the OCID.

Return to the command line and paste the value at the OICD prompt and hit return.

Enter the associated region, hit enter.

Generate or enter the path to the private PEM file. For example, ~/.oci/oci_api_key.pem If required, enter the passphrase used with the key. Enter y or no to the prompt asking about whether to store the passphrase.

The configuration process is complete.

CLI Concepts

Oracle Database 19c EE

Download the following software:

- Oracle Linux 7 (x86_64)
- Oracle Database (x86_64) 19c Enterprise Edition
- Oracle APEX

OS setup

Install Oracle Linux 7. Select Server with a GUI. or Minimal.

As the root user, configure the OS and create the directory structure.

```
yum install -y oracle-database-preinstall-19c wget
mkdir -p /u01/app/oracle/product/19.0.0/dbhome_1
mkdir -p /u02/oradata
chown -R oracle:oinstall /u01 /u02
chmod -R 775 /u01 /u02
```

Database installation.

As the oracle user:

Make a scripts folder

```
mkdir /home/oracle/scripts
```

Create an environment script. This will hold all of the settings.

```
cat > /home/oracle/scripts/setEnv.sh <<EOF
# Oracle Settings
export TMP=/tmp
export TMPDIR=\$TMP
export ORACLE_HOSTNAME=ora19c.core.example.com
export ORACLE_UNQNAME=cdb1
export ORACLE_BASE=/u01/app/oracle
```

```
export ORACLE_HOME=\$ORACLE_BASE/product/19.0.0/dbhome_1
export ORA_INVENTORY=/u01/app/oraInventory
export ORACLE_SID=cdb1
export PDB_NAME=pdb1
export DATA_DIR=/u02/oradata
export PATH=/usr/sbin:/usr/local/bin:\$PATH
export PATH=\$ORACLE_HOME/bin:\$PATH
export LD_LIBRARY_PATH=\$ORACLE_HOME/lib:/lib:/usr/lib
export CLASSPATH=\$ORACLE_HOME/jlib:\$ORACLE_HOME/rdbms/jlib
EOF
```

Add the contents of setEnv.sh to Oracle's .bash_profile.

```
echo ". /home/oracle/scripts/setEnv.sh" >> /home/oracle/.bash_profile
```

Create a start script.

```
cat > /home/oracle/scripts/start_all.sh <<EOF
#!/bin/bash
. /home/oracle/scripts/setEnv.sh

export ORAENV_ASK=NO
. oraenv
export ORAENV_ASK=YES

dbstart \$ORACLE_HOME
EOF
```

Create a stop script.

```
cat > /home/oracle/scripts/stop_all.sh <<EOF
#!/bin/bash
. /home/oracle/scripts/setEnv.sh

export ORAENV_ASK=NO
. oraenv
export ORAENV_ASK=YES

dbshut \$ORACLE_HOME
EOF
```

Set the owner and folder and execute on the scripts.

```
chown -R oracle:oinstall /home/oracle/scripts
chmod u+x /home/oracle/scripts/*.sh
```

Load the environment.

```
source /home/oracle/.bash_profile
```

Unzip the installer.

```
cd $ORACLE_HOME
unzip -oq /tmp/LINUX.X64_193000_db_home.zip
```

Run the installer.

```
./runInstaller -ignorePrereq -waitforcompletion -silent                       \
    -responseFile ${ORACLE_HOME}/install/response/db_install.rsp              \
    oracle.install.option=INSTALL_DB_SWONLY                                   \
    ORACLE_HOSTNAME=${ORACLE_HOSTNAME}                                        \
    UNIX_GROUP_NAME=oinstall                                                  \
    INVENTORY_LOCATION=${ORA_INVENTORY}                                       \
    SELECTED_LANGUAGES=en,en_US                                               \
    ORACLE_HOME=${ORACLE_HOME}                                                \
    ORACLE_BASE=${ORACLE_BASE}                                                \
    oracle.install.db.InstallEdition=EE                                       \
    oracle.install.db.OSDBA_GROUP=dba                                         \
    oracle.install.db.OSBACKUPDBA_GROUP=dba                                   \
    oracle.install.db.OSDGDBA_GROUP=dba                                       \
    oracle.install.db.OSKMDBA_GROUP=dba                                       \
    oracle.install.db.OSRACDBA_GROUP=dba                                      \
    SECURITY_UPDATES_VIA_MYORACLESUPPORT=false                                \
    DECLINE_SECURITY_UPDATES=true
```

As a **root** user, execute the following:

```
/u01/app/oraInventory/orainstRoot.sh
/u01/app/oracle/product/19.0.0/dbhome_1/root.sh
```

As the **oracle** user:

Start the listener

```
lsnrctl start
```

Create the first database.

```
dbca -silent -createDatabase                                \
     -templateName General_Purpose.dbc                      \
     -gdbname ${ORACLE_SID} -sid  ${ORACLE_SID} -responseFile NO_VALUE        \
     -characterSet AL32UTF8                                 \
     -sysPassword Som3bTt3rpwd                              \
     -systemPassword Som3bTt3rpwd                           \
     -createAsContainerDatabase true                       \
     -numberOfPDBs 1                                        \
     -pdbName ${PDB_NAME}                                   \
     -pdbAdminPassword Som3bTt3rpwd                         \
     -databaseType MULTIPURPOSE                             \
     -automaticMemoryManagement false                       \
     -totalMemory 2000                                      \
     -storageType FS                                        \
     -datafileDestination "${DATA_DIR}"                     \
     -redoLogFileSize 50                                    \
     -emConfiguration NONE                                  \
     -ignorePreReqs
```

Edit the "/etc/oratab" file setting the restart flag for each instance to 'Y'.
Example:

cdb1:/u01/app/oracle/product/19.0.0/db_1:Y

Enable Oracle Managed Files and make the PDB start when the instance starts

```
sqlplus / as sysdba <<EOF
alter system set db_create_file_dest='/u02/oradata';
alter pluggable database pdb1 save state;
exit;
EOF
```

APEX

As the **oracle** user:

Make the apex directory and unzip the apex files.

```
mkdir -p /home/oracle/apex
unzip /tmp/apex_20.*.zip -d /home/oracle
chown -R oracle:oinstall /home/oracle/apex
cd /home/oracle/apex
```

Create an ACL script. This will be needed later.

```
cat > apex_acl.sql << EOF
BEGIN
  BEGIN
    dbms_network_acl_admin.drop_acl(acl => 'all-network-PUBLIC.xml');
  EXCEPTION
    WHEN OTHERS THEN
      NULL;
  END;
  dbms_network_acl_admin.create_acl(acl         => 'all-network-PUBLIC.xml',
                                    description => 'Allow all network traffic',
                                    principal   => 'PUBLIC',
                                    is_grant    => TRUE,
                                    privilege   => 'connect');
  dbms_network_acl_admin.add_privilege(acl       => 'all-network-PUBLIC.xml',
                                       principal => 'PUBLIC',
                                       is_grant  => TRUE,
                                       privilege => 'resolve');
  dbms_network_acl_admin.assign_acl(acl  => 'all-network-PUBLIC.xml',
                                    host => '*');
END;
/
sho err
COMMIT;
/
EOF
```

Connect to the database

```
sqlplus /nolog
```

Change roles

```
CONN pdb1 AS SYSDBA
```

```
alter session set container=PDB1;
```

Run the script to install a full development environment

```
@apexins.sql SYSAUX SYSAUX TEMP /i/
```

Create an instance administrator user and set their password

```
@apxchpwd.sql
```

Configure REST Data Services

```
@apex_rest_config.sql
```

Run the ACL setup script created earlier.

```
@apex_acl.sql
```

Unlock APEX users

```
ALTER USER APEX_PUBLIC_USER ACCOUNT UNLOCK;
ALTER USER APEX_PUBLIC_USER IDENTIFIED BY "Som3bTt3rpwd";
ALTER USER APEX_REST_PUBLIC_USER IDENTIFIED BY "Som3bTt3rpwd" ACCOUNT UNLOCK;
ALTER USER APEX_LISTENER IDENTIFIED BY "Som3bTt3rpwd" ACCOUNT UNLOCK;
```

Oracle Database 21c

Download the following software:

- Oracle Linux 8 (x86_64)
- Oracle Database 21c Enterprise Edition (x86_64)

NOTICE

This is a very basic install. It should only be used as a guide.

OS setup

Install Oracle Linux 8. "Minimal" installation.

As the root user, configure the OS and create the required directory structure.

```
dnf install -y oracle-database-preinstall-21c wget
mkdir -p /u01/app/oracle/product/21.0.0/dbhome_1
mkdir -p /u02/oradata
chown -R oracle:oinstall /u01 /u02
chmod -R 775 /u01 /u02
```

Database installation

As the oracle user:

Create a scripts folder:

```
mkdir /home/oracle/scripts
```

Create an environment script. This will hold all the necessary settings.

```
cat > /home/oracle/scripts/setEnv.sh <<EOF
# Oracle Settings
export TMP=/tmp
export TMPDIR=\$TMP
export ORACLE_HOSTNAME=ora21c.example.com
```

```
export ORACLE_UNQNAME=cdb1
export ORACLE_BASE=/u01/app/oracle
export ORACLE_HOME=\$ORACLE_BASE/product/21.0.0/dbhome_1
export ORA_INVENTORY=/u01/app/oraInventory
export ORACLE_SID=cdb1
export PDB_NAME=pdb1
export DATA_DIR=/u02/oradata
export PATH=/usr/sbin:/usr/local/bin:\$PATH
export PATH=\$ORACLE_HOME/bin:\$PATH
export LD_LIBRARY_PATH=\$ORACLE_HOME/lib:/lib:/usr/lib
export CLASSPATH=\$ORACLE_HOME/jlib:\$ORACLE_HOME/rdbms/jlib
EOF
```

Add the contents of `setEnv.sh` to Oracle's `.bash_profile`.

```
echo ". /home/oracle/scripts/setEnv.sh" >> /home/oracle/.bash_profile
```

Create a start script.

```
cat > /home/oracle/scripts/start_all.sh <<EOF
#!/bin/bash
. /home/oracle/scripts/setEnv.sh

export ORAENV_ASK=NO
. oraenv
export ORAENV_ASK=YES

dbstart \$ORACLE_HOME
EOF
```

Create a stop script.

```
cat > /home/oracle/scripts/stop_all.sh <<EOF
#!/bin/bash
. /home/oracle/scripts/setEnv.sh

export ORAENV_ASK=NO
. oraenv
export ORAENV_ASK=YES

dbshut \$ORACLE_HOME
```

```
EOF
```

Set the owner and permissions for the scripts.

```
chown -R oracle:oinstall /home/oracle/scripts
chmod u+x /home/oracle/scripts/*.sh
```

Load the environment.

```
source /home/oracle/.bash_profile
```

Unzip the database installer.

```
cd $ORACLE_HOME
unzip -oq /tmp/LINUX.X64_210000_db_home.zip
```

Run the installer.

```
./runInstaller -ignorePrereq -waitforcompletion -silent                       \
    -responseFile ${ORACLE_HOME}/install/response/db_install.rsp              \
    oracle.install.option=INSTALL_DB_SWONLY                                   \
    ORACLE_HOSTNAME=${ORACLE_HOSTNAME}                                        \
    UNIX_GROUP_NAME=oinstall                                                  \
    INVENTORY_LOCATION=${ORA_INVENTORY}                                       \
    SELECTED_LANGUAGES=en,en_US                                               \
    ORACLE_HOME=${ORACLE_HOME}                                                \
    ORACLE_BASE=${ORACLE_BASE}                                                \
    oracle.install.db.InstallEdition=EE                                       \
    oracle.install.db.OSDBA_GROUP=dba                                         \
    oracle.install.db.OSBACKUPDBA_GROUP=dba                                   \
    oracle.install.db.OSDGDBA_GROUP=dba                                       \
    oracle.install.db.OSKMDBA_GROUP=dba                                       \
    oracle.install.db.OSRACDBA_GROUP=dba                                      \
    SECURITY_UPDATES_VIA_MYORACLESUPPORT=false                                \
    DECLINE_SECURITY_UPDATES=true
```

As a **root** user, execute the following:

```
/u01/app/oraInventory/orainstRoot.sh
/u01/app/oracle/product/21.0.0/dbhome_1/root.sh
```

As the **oracle** user:

Start the listener.

```
lsnrctl start
```

Create the database.

```
dbca -silent -createDatabase                                 \
     -templateName General_Purpose.dbc                             \
     -gdbname ${ORACLE_SID} -sid  ${ORACLE_SID} -responseFile NO_VALUE       \
     -characterSet AL32UTF8                                  \
     -sysPassword Som3bTt3rpwd                                  \
     -systemPassword Som3bTt3rpwd                                  \
     -createAsContainerDatabase true                                  \
     -numberOfPDBs 1                                  \
     -pdbName ${PDB_NAME}                                  \
     -pdbAdminPassword Som3bTt3rpwd                                  \
     -databaseType MULTIPURPOSE                                  \
     -automaticMemoryManagement false                                  \
     -totalMemory 2000                                  \
     -storageType FS                                  \
     -datafileDestination "${DATA_DIR}"                                  \
     -redoLogFileSize 50                                  \
     -emConfiguration NONE                                  \
     -ignorePreReqs
```

Edit the `/etc/oratab` file setting the restart flag for each instance to 'Y'.
Example:

cdb1:/u01/app/oracle/product/21.0.0/db_1:Y

Enable Oracle Managed Files and make the PDB start when the instance starts.

```
sqlplus / as sysdba <<EOF
alter system set db_create_file_dest='/u02/oradata';
alter pluggable database pdb1 save state;
exit;
EOF
```

Oracle Enterprise Manager 13.5 on OL8

Oracle Enterprise Manager Cloud Control 13c on Oracle Linux 8

Step 1: Download Required Software

First, ensure you have downloaded the necessary software from Oracle's official website:

- Oracle Linux 8 ISO from Oracle Linux Download
- Oracle Database 19c (or latest) from Oracle Database Downloads
- Oracle Enterprise Manager Cloud Control 13c Release 5 (or latest) from Enterprise Manager Downloads

Step 2: Install Oracle Linux 8

1. **Install Oracle Linux 8**: Boot from the Oracle Linux 8 ISO and follow the installation prompts. If a GUI is needed, make sure to select the "Workstation" or "Server with GUI" base environment during installation.
2. **Set Up Network and Hostname**: Configure your network settings and hostname during or after installation as required.

Step 3: Prepare the Operating System

1. **Update the System**: Ensure your system is up-to-date.

```
dnf update -y
```

2. **Install Required Packages**: The `oracle-database-preinstall-19c` package will automatically install dependencies and configure system parameters.

```
dnf install -y oracle-database-preinstall-19c wget
```

3. **Additional Dependencies**: If there are specific additional dependencies for Oracle Database 19c or the Enterprise Manager, install them as needed.

Step 4: Configure System Settings and Users

1. **Directory Structure**: Create directories for Oracle software and data files.

```
mkdir -p /u01/app/oracle/product/19.0.0/dbhome_1
mkdir -p /u01/app/oracle/middleware
mkdir -p /u01/app/oracle/agent
mkdir -p /u01/tmp
mkdir -p /u01/oradata
chown -R oracle:oinstall /u01
chmod -R 775 /u01
```

2. **Environment Variables**: As the `oracle` user, configure environment variables.
   - Create a script `/home/oracle/scripts/setEnv.sh` with the following content:

```
export TMP=/tmp
export TMPDIR=$TMP

export ORACLE_HOSTNAME=<your_hostname>
export ORACLE_UNQNAME=emcdb
export ORACLE_BASE=/u01/app/oracle
export ORACLE_HOME=$ORACLE_BASE/product/19.0.0/dbhome_1
export ORACLE_SID=emcdb

export PATH=/usr/sbin:/usr/local/bin:$PATH
export PATH=$ORACLE_HOME/bin:$PATH

export LD_LIBRARY_PATH=$ORACLE_HOME/lib:/lib:/usr/lib
export CLASSPATH=$ORACLE_HOME/jlib:$ORACLE_HOME/rdbms/jlib

export OMS_HOME=/u01/app/oracle/middleware
export AGENT_HOME=/u01/app/oracle/agent/agent_inst

export MW_HOME=${ORACLE_BASE}/middleware
```

```
export OMS_HOME=${MW_HOME}
export GC_INST=${ORACLE_BASE}/gc_inst
export AGENT_BASE=${ORACLE_BASE}/agent
```

- Add the script to the oracle user's `.bash_profile`.

```
echo ". /home/oracle/scripts/setEnv.sh" >> /home/oracle/.bash_profile
```

Step 5: Install Oracle Database

1. **Prepare the Database Installation**: Unzip the Oracle Database software and prepare a response file for a silent installation.

```
mkdir /u01/software/
cd /u01/software
unzip <path_to_your_downloaded_db_software>.zip
cd database
```

2. **Run the Database Installer**: Execute the silent installation using parameters.

```
./runInstaller -ignorePrereq -waitforcompletion -silent                  \
-responseFile ${ORACLE_HOME}/install/response/db_install.rsp             \
oracle.install.option=INSTALL_DB_SWONLY                                  \
ORACLE_HOSTNAME=${ORACLE_HOSTNAME}                                       \
UNIX_GROUP_NAME=oinstall                                                 \
INVENTORY_LOCATION=${ORA_INVENTORY}                                      \
SELECTED_LANGUAGES=en,en_US                                              \
ORACLE_HOME=${ORACLE_HOME}                                               \
ORACLE_BASE=${ORACLE_BASE}                                               \
oracle.install.db.InstallEdition=EE                                      \
oracle.install.db.OSDBA_GROUP=dba                                        \
oracle.install.db.OSBACKUPDBA_GROUP=dba                                  \
oracle.install.db.OSDGDBA_GROUP=dba                                      \
oracle.install.db.OSKMDBA_GROUP=dba                                      \
oracle.install.db.OSRACDBA_GROUP=dba                                     \
SECURITY_UPDATES_VIA_MYORACLESUPPORT=false                               \
DECLINE_SECURITY_UPDATES=true
```

3. **Configure the Listener and Database**: Use the `netca` and `dbca` tools to configure the network and create the database, respectively. These can be automated with response files or command-line options for silent operations.

Start the listener:

```
lsnrctl start
```

Create the database:

```
dbca -silent -createDatabase                                 \
   -templateName General_Purpose.dbc                             \
   -gdbname ${ORACLE_SID} -sid  ${ORACLE_SID} -responseFile NO_VALUE      \
   -characterSet AL32UTF8                                      \
   -sysPassword Som3bTt3rpwd                                     \
   -systemPassword Som3bTt3rpwd                                    \
   -createAsContainerDatabase true                                \
   -numberOfPDBs 1                                           \
   -pdbName ${PDB_NAME}                                          \
   -pdbAdminPassword Som3bTt3rpwd                                    \
   -databaseType MULTIPURPOSE                                    \
   -automaticMemoryManagement false                                  \
   -totalMemory 8000                                          \
   -storageType FS                                           \
   -datafileDestination "${DATA_DIR}"                                \
   -redoLogFileSize 50                                          \
   -emConfiguration NONE                                         \
   -ignorePreReqs
```

4. Set the pluggable database to auto-start.

```
sqlplus / as sysdba <<EOF
alter system set db_create_file_dest='/u01/oradata';
alter pluggable database emrep save state;

-- Recommended settings
alter system set "_allow_insert_with_update_check"=true scope=both;
alter system set session_cached_cursors=200 scope=spfile;
alter system set sga_target=800M scope=both;
alter system set pga_aggregate_target=450M scope=both;

EOF
```

Step 6: Install Oracle Enterprise Manager Cloud Control

1. **Prepare for Installation**: Unzip

the Enterprise Manager software to `/u01/software/em` and navigate to the directory.

2. **Enterprise Manager Install Response File**: Similar to the database, prepare a response file for the Enterprise Manager installation.
   Setup the environment:

```
export ORA_INVENTORY=/u01/app/oraInventory
export PDB_NAME=emrep
export SYS_PASSWORD=SysAdminpW1
export UNIX_GROUP_NAME=oinstall
export MW_HOME=${ORACLE_BASE}/middleware
export OMS_HOME=${MW_HOME}
export GC_INST=${ORACLE_BASE}/gc_inst
export AGENT_BASE=${ORACLE_BASE}/agent
export WLS_USERNAME=weblogic
export WLS_PASSWORD=SysAdminpW1
export SYSMAN_PASSWORD=${WLS_PASSWORD}
export AGENT_PASSWORD=${WLS_PASSWORD}
export SOFTWARE_LIBRARY=${ORACLE_BASE}/swlib
export DATABASE_HOSTNAME=localhost
export LISTENER_PORT=1521
export SOFTWARE_DIR=/u01/software/em
```

   Create the responce file:

```
cat > /tmp/install.rsp <<EOF
RESPONSEFILE_VERSION=2.2.1.0.0
UNIX_GROUP_NAME=${UNIX_GROUP_NAME}
INVENTORY_LOCATION=${ORA_INVENTORY}
SECURITY_UPDATES_VIA_MYORACLESUPPORT=false
DECLINE_SECURITY_UPDATES=true
INSTALL_UPDATES_SELECTION=skip
ORACLE_MIDDLEWARE_HOME_LOCATION=${MW_HOME}
ORACLE_HOSTNAME=${ORACLE_HOSTNAME}
AGENT_BASE_DIR=${AGENT_BASE}
```

```
WLS_ADMIN_SERVER_USERNAME=${WLS_USERNAME}
WLS_ADMIN_SERVER_PASSWORD=${WLS_PASSWORD}
WLS_ADMIN_SERVER_CONFIRM_PASSWORD=${WLS_PASSWORD}
NODE_MANAGER_PASSWORD=${WLS_PASSWORD}
NODE_MANAGER_CONFIRM_PASSWORD=${WLS_PASSWORD}
ORACLE_INSTANCE_HOME_LOCATION=${GC_INST}
CONFIGURE_ORACLE_SOFTWARE_LIBRARY=true
SOFTWARE_LIBRARY_LOCATION=${SOFTWARE_LIBRARY}
DATABASE_HOSTNAME=${DATABASE_HOSTNAME}
LISTENER_PORT=${LISTENER_PORT}
SERVICENAME_OR_SID=${PDB_NAME}
SYS_PASSWORD=${SYS_PASSWORD}
SYSMAN_PASSWORD=${SYSMAN_PASSWORD}
SYSMAN_CONFIRM_PASSWORD=${SYSMAN_PASSWORD}
DEPLOYMENT_SIZE=SMALL
AGENT_REGISTRATION_PASSWORD=${AGENT_PASSWORD}
AGENT_REGISTRATION_CONFIRM_PASSWORD=${AGENT_PASSWORD}
PLUGIN_SELECTION={}
b_upgrade=false
EM_INSTALL_TYPE=NOSEED
CONFIGURATION_TYPE=LATER
CONFIGURE_SHARED_LOCATION_BIP=false
EOF
```

3. **Run the Installer**: Execute the silent installation using the response file.

```
./em13500_linux64.bin silent -responseFile /tmp/install.rsp -J-Djava.io.tmpdir=/u01/tmp/
```

4. **Post-Installation Steps**:
   At the end of a successful install, run the root script.
   As root

```
sh ${MW_HOME}/allroot.sh
```

   Return to Oracle user
   Create the the configuration response file..

```
cat > /tmp/config.rsp <<EOF
RESPONSEFILE_VERSION=2.2.1.0.0
UNIX_GROUP_NAME=${UNIX_GROUP_NAME}
INVENTORY_LOCATION=${ORA_INVENTORY}
```

```
SECURITY_UPDATES_VIA_MYORACLESUPPORT=false
DECLINE_SECURITY_UPDATES=true
INSTALL_UPDATES_SELECTION=skip
ORACLE_MIDDLEWARE_HOME_LOCATION=${MW_HOME}
ORACLE_HOSTNAME=${ORACLE_HOSTNAME}
AGENT_BASE_DIR=${AGENT_BASE}
WLS_ADMIN_SERVER_USERNAME=${WLS_USERNAME}
WLS_ADMIN_SERVER_PASSWORD=${WLS_PASSWORD}
WLS_ADMIN_SERVER_CONFIRM_PASSWORD=${WLS_PASSWORD}
NODE_MANAGER_PASSWORD=${WLS_PASSWORD}
NODE_MANAGER_CONFIRM_PASSWORD=${WLS_PASSWORD}
ORACLE_INSTANCE_HOME_LOCATION=${GC_INST}
CONFIGURE_ORACLE_SOFTWARE_LIBRARY=true
SOFTWARE_LIBRARY_LOCATION=${SOFTWARE_LIBRARY}
DATABASE_HOSTNAME=${DATABASE_HOSTNAME}
LISTENER_PORT=${LISTENER_PORT}
SERVICENAME_OR_SID=${PDB_NAME}
SYS_PASSWORD=${SYS_PASSWORD}
SYSMAN_PASSWORD=${SYSMAN_PASSWORD}
SYSMAN_CONFIRM_PASSWORD=${SYSMAN_PASSWORD}
DEPLOYMENT_SIZE=SMALL
AGENT_REGISTRATION_PASSWORD=${AGENT_PASSWORD}
AGENT_REGISTRATION_CONFIRM_PASSWORD=${AGENT_PASSWORD}
PLUGIN_SELECTION={}
b_upgrade=false
EM_INSTALL_TYPE=NOSEED
CONFIGURATION_TYPE=ADVANCED
CONFIGURE_SHARED_LOCATION_BIP=false
EOF
```

Run the configuration. This will take a very long time.

```
${MW_HOME}/sysman/install/ConfigureGC.sh -silent -responseFile /tmp/config.rsp
```

At the end of the installation you'll be provided a list of URLs and post-installation steps. Follow any post-installation steps such as deploying agents, as described in the Enterprise Manager documentation.

Step 7: Finalize Installation

- **Start Services**: Ensure that the Oracle database and the Enterprise Manager services are started.
- **Verify Installation**: Access the Enterprise Manager web interface to confirm that the installation was successful.

Notes:

- **Response Files**: The details on what to include in response files for both the database and Enterprise Manager can be found in the official Oracle documentation. These files control installation options, such as directories, components to install, and initial setup parameters.
- **Oracle Documentation**: For detailed options for the `dbca`, `netca`, and Enterprise Manager silent installation parameters, refer to Oracle's official documentation.

This guide outlines a general approach to installing Oracle Database and Oracle Enterprise Manager Cloud Control on Oracle Linux 8. Tailor the response files to your environment's specific needs, referring to Oracle's documentation for the most accurate and detailed instructions.

Oracle Enterprise Manager Cloud Control 13c

Download the following software:

- Oracle Linux 7 (x86_64)
- Oracle Database (x86_64) 12c, 18c or 19c Enterprise Edition
- Enterprise Manager Cloud Control 13c Release 3 (13.3.0.0) (x86_64)

OS Installation

Install Oracle Linux 7. Choose "Server with a GUI" during installation.

Do the following as root.

1. Install required packages

```
yum install oracle-database-server-12cR2-preinstall -y
yum install wget -y
yum install make -y
yum install binutils -y
yum install gcc -y
yum install libaio -y
yum install glibc-common -y
yum install libstdc++ -y
yum install sysstat -y
yum install glibc -y
yum install glibc-devel.i686 -y
yum install glibc-devel -y
yum install libXtst -y
```

2. Create the directory structures

```
mkdir -p /u01/app/oracle/product/12.2.0.1/db_1
mkdir -p /u01/app/oracle/middleware
```

```
mkdir -p /u01/app/oracle/agent
mkdir -p /u01/tmp
mkdir -p /u01/oradata
chown -R oracle:oinstall /u01
chmod -R 775 /u01
```

Database Installation

Do the following as the oracle user

1. Create a scripts directory.

```
mkdir /home/oracle/scripts
```

2. Create `/home/oracle/scripts/setEnv.sh` with the following contents:

```
export TMP=/tmp
export TMPDIR=$TMP

export ORACLE_HOSTNAME=oraem.servers-farm.io
export ORACLE_UNQNAME=emcdb
export ORACLE_BASE=/u01/app/oracle
export ORACLE_HOME=$ORACLE_BASE/product/12.2.0.1/db_1
export ORACLE_SID=emcdb

export PATH=/usr/sbin:/usr/local/bin:$PATH
export PATH=$ORACLE_HOME/bin:$PATH

export LD_LIBRARY_PATH=$ORACLE_HOME/lib:/lib:/usr/lib
export CLASSPATH=$ORACLE_HOME/jlib:$ORACLE_HOME/rdbms/jlib

export OMS_HOME=/u01/app/oracle/middleware
export AGENT_HOME=/u01/app/oracle/agent/agent_inst

export MW_HOME=${ORACLE_BASE}/middleware
export OMS_HOME=${MW_HOME}
export GC_INST=${ORACLE_BASE}/gc_inst
export AGENT_BASE=${ORACLE_BASE}/agent
```

3. Add the new script to your bash profile.

```
echo ". /home/oracle/scripts/setEnv.sh" >> /home/oracle/.bash_profile
```

4. Create a software folder and unzip the database.zip download in it.

```
mkdir /u01/software/
cd /u01/software
unzip ~/odb12c.zip
cd database
```

5. Run the silent database install.

```
./runInstaller -ignorePrereq -waitforcompletion -silent                         \
        -responseFile /u01/software/database/response/db_install.rsp            \
        oracle.install.option=INSTALL_DB_SWONLY                                 \
        ORACLE_HOSTNAME=${HOSTNAME}                                             \
        UNIX_GROUP_NAME=oinstall                                                \
        INVENTORY_LOCATION=/u01/app/oraInventory                                \
        SELECTED_LANGUAGES=en,en_US                                             \
        ORACLE_HOME=${ORACLE_HOME}                                              \
        ORACLE_BASE=${ORACLE_BASE}                                              \
        oracle.install.db.InstallEdition=EE                                     \
        oracle.install.db.OSDBA_GROUP=dba                                       \
        oracle.install.db.OSBACKUPDBA_GROUP=dba                                 \
        oracle.install.db.OSDGDBA_GROUP=dba                                     \
        oracle.install.db.OSKMDBA_GROUP=dba                                     \
        oracle.install.db.OSRACDBA_GROUP=dba                                    \
        SECURITY_UPDATES_VIA_MYORACLESUPPORT=false                              \
        DECLINE_SECURITY_UPDATES=true
```

6. Start the listener

```
lsnrctl start
```

7. Create the repository database

```
dbca -silent -createDatabase                                            \
    -templateName General_Purpose.dbc                                   \
    -gdbname emcdb -sid emcdb -responseFile NO_VALUE                    \
    -characterSet AL32UTF8                                              \
    -sysPassword SysAdminpW1                                            \
    -systemPassword SysAdminpW1                                         \
```

```
    -createAsContainerDatabase true                                 \
    -numberOfPDBs 1                                                 \
    -pdbName emrep                                                  \
    -pdbAdminPassword SysAdminpW1                                   \
    -databaseType MULTIPURPOSE                                      \
    -automaticMemoryManagement false                                \
    -totalMemory 2000                                               \
    -storageType FS                                                 \
    -datafileDestination /u01/oradata                               \
    -redoLogFileSize 50                                             \
    -emConfiguration NONE                                           \
    -ignorePreReqs
```

8. Set the pluggable database to auto-start.

```
sqlplus / as sysdba <<EOF
  alter system set db_create_file_dest='/u01/oradata';
  alter pluggable database emrep save state;

  -- Recommended settings
  alter system set "_allow_insert_with_update_check"=true scope=both;
  alter system set session_cached_cursors=200 scope=spfile;
  alter system set sga_target=800M scope=both;
  alter system set pga_aggregate_target=450M scope=both;

  -- For 12.1.0.2
  alter system set optimizer_adaptive_features=false scope=both;
  exit;
EOF
```

Enterprise Manager Installation

Do the following as the oracle user.

1. Follow the extraction guide downloaded with the EM files. Place all of the files in /u01/software/em.

2, Setup the environment

```
export ORA_INVENTORY=/u01/app/oraInventory
export PDB_NAME=emrep
export SYS_PASSWORD=SysAdminpW1
export UNIX_GROUP_NAME=oinstall
export MW_HOME=${ORACLE_BASE}/middleware
export OMS_HOME=${MW_HOME}
export GC_INST=${ORACLE_BASE}/gc_inst
export AGENT_BASE=${ORACLE_BASE}/agent
export WLS_USERNAME=weblogic
export WLS_PASSWORD=SysAdminpW1
export SYSMAN_PASSWORD=${WLS_PASSWORD}
export AGENT_PASSWORD=${WLS_PASSWORD}
export SOFTWARE_LIBRARY=${ORACLE_BASE}/swlib
export DATABASE_HOSTNAME=localhost
export LISTENER_PORT=1521
export SOFTWARE_DIR=/u01/software/em
```

2. Change to the software directory and create a response file.

```
cat > /tmp/install.rsp <<EOF
RESPONSEFILE_VERSION=2.2.1.0.0
UNIX_GROUP_NAME=${UNIX_GROUP_NAME}
INVENTORY_LOCATION=${ORA_INVENTORY}
SECURITY_UPDATES_VIA_MYORACLESUPPORT=false
DECLINE_SECURITY_UPDATES=true
INSTALL_UPDATES_SELECTION=skip
ORACLE_MIDDLEWARE_HOME_LOCATION=${MW_HOME}
ORACLE_HOSTNAME=${ORACLE_HOSTNAME}
AGENT_BASE_DIR=${AGENT_BASE}
WLS_ADMIN_SERVER_USERNAME=${WLS_USERNAME}
WLS_ADMIN_SERVER_PASSWORD=${WLS_PASSWORD}
WLS_ADMIN_SERVER_CONFIRM_PASSWORD=${WLS_PASSWORD}
NODE_MANAGER_PASSWORD=${WLS_PASSWORD}
NODE_MANAGER_CONFIRM_PASSWORD=${WLS_PASSWORD}
ORACLE_INSTANCE_HOME_LOCATION=${GC_INST}
CONFIGURE_ORACLE_SOFTWARE_LIBRARY=true
SOFTWARE_LIBRARY_LOCATION=${SOFTWARE_LIBRARY}
DATABASE_HOSTNAME=${DATABASE_HOSTNAME}
LISTENER_PORT=${LISTENER_PORT}
SERVICENAME_OR_SID=${PDB_NAME}
```

```
SYS_PASSWORD=${SYS_PASSWORD}
SYSMAN_PASSWORD=${SYSMAN_PASSWORD}
SYSMAN_CONFIRM_PASSWORD=${SYSMAN_PASSWORD}
DEPLOYMENT_SIZE=SMALL
AGENT_REGISTRATION_PASSWORD=${AGENT_PASSWORD}
AGENT_REGISTRATION_CONFIRM_PASSWORD=${AGENT_PASSWORD}
PLUGIN_SELECTION={}
b_upgrade=false
EM_INSTALL_TYPE=NOSEED
CONFIGURATION_TYPE=LATER
CONFIGURE_SHARED_LOCATION_BIP=false
EOF
```

3. Run the installer.

```
./em13300_linux64.bin -silent -responseFile /tmp/install.rsp -J-Djava.io.tmpdir=/u01/tmp/
```

4. The the end of a successful install, run the root script.

```
sh ${MW_HOME}/allroot.sh
```

5. Create the the configuration response file..

```
cat > /tmp/config.rsp <<EOF
RESPONSEFILE_VERSION=2.2.1.0.0
UNIX_GROUP_NAME=${UNIX_GROUP_NAME}
INVENTORY_LOCATION=${ORA_INVENTORY}
SECURITY_UPDATES_VIA_MYORACLESUPPORT=false
DECLINE_SECURITY_UPDATES=true
INSTALL_UPDATES_SELECTION=skip
ORACLE_MIDDLEWARE_HOME_LOCATION=${MW_HOME}
ORACLE_HOSTNAME=${ORACLE_HOSTNAME}
AGENT_BASE_DIR=${AGENT_BASE}
WLS_ADMIN_SERVER_USERNAME=${WLS_USERNAME}
WLS_ADMIN_SERVER_PASSWORD=${WLS_PASSWORD}
WLS_ADMIN_SERVER_CONFIRM_PASSWORD=${WLS_PASSWORD}
NODE_MANAGER_PASSWORD=${WLS_PASSWORD}
NODE_MANAGER_CONFIRM_PASSWORD=${WLS_PASSWORD}
ORACLE_INSTANCE_HOME_LOCATION=${GC_INST}
CONFIGURE_ORACLE_SOFTWARE_LIBRARY=true
SOFTWARE_LIBRARY_LOCATION=${SOFTWARE_LIBRARY}
```

```
DATABASE_HOSTNAME=${DATABASE_HOSTNAME}
LISTENER_PORT=${LISTENER_PORT}
SERVICENAME_OR_SID=${PDB_NAME}
SYS_PASSWORD=${SYS_PASSWORD}
SYSMAN_PASSWORD=${SYSMAN_PASSWORD}
SYSMAN_CONFIRM_PASSWORD=${SYSMAN_PASSWORD}
DEPLOYMENT_SIZE=SMALL
AGENT_REGISTRATION_PASSWORD=${AGENT_PASSWORD}
AGENT_REGISTRATION_CONFIRM_PASSWORD=${AGENT_PASSWORD}
PLUGIN_SELECTION={}
b_upgrade=false
EM_INSTALL_TYPE=NOSEED
CONFIGURATION_TYPE=ADVANCED
CONFIGURE_SHARED_LOCATION_BIP=false
EOF
```

6. Run the configuration. This will take a very long time.

```
${MW_HOME}/sysman/install/ConfigureGC.sh -silent -responseFile /tmp/config.rsp
```

At the end of the installation you'll be provided a list of URLs and post-installation steps.

Oracle ORDS and Apache

Before using ORDS, you need a database and APEX. Go here to do that. Download ORDS at Oracle.

Installation of ORDS

The Oracle Rest Data Services (ORDS) installation consists of unzipping the downloaded archive, running the configuration command, then deploying. This setup is going to run ORDS in standalone mode with Apache HTTP to proxy requests.

As **oracle** user.

Download the ORDS zip to /tmp.

Extract the installer.

```
cd /tmp
mkdir -p /u01/ords
unzip ords-20.*.zip -d /u01/ords
```

Make a backup of the original properties file

```
mv /u01/ords/params/{ords_params.properties,ords_params.properties.orig}
```

Create a ords_params.properties file.

```
cat > /u01/ords/params/ords_params.properties <<EOF
db.hostname=ora19c.core.example.com
db.port=1521
db.servicename=pdb1
db.sid=cdb1
db.username=APEX_PUBLIC_USER
db.password=Som3bTt3rpwd
migrate.apex.rest=false
plsql.gateway.add=true
rest.services.apex.add=true
rest.services.ords.add=true
```

```
schema.tablespace.default=SYSAUX
schema.tablespace.temp=TEMP
standalone.mode=true
standalone.use.https=true
standalone.http.port=8080
standalone.static.path=/home/oracle/apex/images
user.apex.listener.password=Som3bTt3rpwd
user.apex.restpublic.password=Som3bTt3rpwd
user.public.password=Som3bTt3rpwd
user.tablespace.default=APEX
user.tablespace.temp=TEMP
sys.user=SYS
sys.password=Som3bTt3rpwd
restEnabledSql.active=true
feature.sdw=true
database.api.enabled=true
EOF
```

Change to the ords directory and start the standalone instance.

```
cd /u01/ords
$JAVA_HOME/bin/java -jar ords.war standalone
```

Configuration of Apache httpd to map ORDS

The last step is to configure Apache to map HTTP-requests to ORDS and therefore APEX engine.

For this, add a custom `httpd` configuration file. By default, every `.conf` file placed in the `etc/httpd/conf.d/` directory is read by `httpd` as an additional configuration file to the main `/etc/httpd/conf/httpd.conf` config file.

Create the `apex.conf` file in the `etc/httpd/conf.d/` directory with the contents as below:

```
# proxy ORDS
<VirtualHost *:80>
    # ServerName example.com
    # ServerAlias www.example.com
```

```
    # alias for APEX static files
    Alias "/i" "/var/www/apex/images/"

    # uncomment the line below if you want
    # to redirect traffic to ORDS from root path
    # RedirectMatch permanent "^/$" "/ords"

    # proxy ORDS requests to tomcat
    ProxyRequests off
    <Location "/ords">
       ProxyPass "https://localhost:8443/ords"
       ProxyPassReverse "https://localhost:8443/ords"
    </Location>
</VirtualHost>
```

Tell SELinux (Yes, that should be running) to allow Apache to communicate to ORDS.

```
setsebool httpd_can_network_connect on
```

Oracle Response Files

Oracle Database Install

Creating a response file for a silent installation of Oracle Database is a common task that allows you to automate the installation process without needing to interact with the graphical user interface. Below is an example response file for installing Oracle Database 19c on a Linux system. Keep in mind that response files can significantly vary depending on the Oracle Database version and the specific configurations you need. Adjustments may be required to fit your particular environment and requirements.

This example assumes you're installing Oracle Database 19c with a typical installation type, which includes the creation of a general-purpose database. You'll need to replace placeholders (like `<YOUR_VALUE_HERE>`) with actual values relevant to your setup.

Create a file named `db_install.rsp` and include the following content:

```
[GENERAL]
oracle.install.responseFileVersion=/oracle/install/rspfmt_dbinstall_response_schema_v19.0.0
oracle.install.option=INSTALL_DB_SWONLY
ORACLE_HOSTNAME=<YOUR_HOSTNAME>
UNIX_GROUP_NAME=oinstall
INVENTORY_LOCATION=/u01/app/oraInventory
SELECTED_LANGUAGES=en
ORACLE_HOME=/u01/app/oracle/product/19.0.0/dbhome_1
ORACLE_BASE=/u01/app/oracle

[INSTALL]
nodelist=<YOUR_HOSTNAME>
oracle.install.db.InstallEdition=EE
oracle.install.db.OSDBA_GROUP=dba
oracle.install.db.OSOPER_GROUP=dba
oracle.install.db.OSBACKUPDBA_GROUP=dba
oracle.install.db.OSDGDBA_GROUP=dba
oracle.install.db.OSKMDBA_GROUP=dba
oracle.install.db.OSRACDBA_GROUP=dba
```

```
oracle.install.db.rootconfig.executeRootScript=true
oracle.install.db.config.starterdb.type=GENERAL_PURPOSE
oracle.install.db.config.starterdb.globalDBName=<YOUR_GLOBAL_DBNAME>
oracle.install.db.config.starterdb.SID=<YOUR_SID>
oracle.install.db.ConfigureAsContainerDB=false
oracle.install.db.config.PDBName=<YOUR_PDB_NAME>
oracle.install.db.config.starterdb.characterSet=<YOUR_CHARACTER_SET>
oracle.install.db.config.starterdb.memoryOption=true
oracle.install.db.config.starterdb.memoryLimit=<MEMORY_LIMIT_IN_MB>
oracle.install.db.config.starterdb.installExampleSchemas=false
oracle.install.db.config.starterdb.password.ALL=<YOUR_PASSWORD>
oracle.install.db.config.starterdb.storageType=FS
oracle.install.db.config.starterdb.dataLocation=/u01/oradata
oracle.install.db.config.starterdb.recoveryLocation=<YOUR_RECOVERY_LOCATION>
oracle.install.db.config.starterdb.enableSecuritySettings=true
oracle.install.db.config.starterdb.registerWithDirService=false
oracle.install.db.config.starterdb.listeners=<LISTENER_NAME>

[DELPHIX]
DELPHIX_DB_CONF=<DELPHIX_CONFIGURATION_OPTION>
```

Replace the placeholders with your specific configuration:

- `<YOUR_HOSTNAME>`: The hostname of your server.
- `<YOUR_GLOBAL_DBNAME>`: The global database name.
- `<YOUR_SID>`: The system identifier for your database.
- `<YOUR_PDB_NAME>`: The pluggable database name, if you're using the multitenant architecture.
- `<YOUR_CHARACTER_SET>`: The character set for your database (e.g., `AL32UTF8`).
- `<MEMORY_LIMIT_IN_MB>`: The memory limit for your database in megabytes.
- `<YOUR_PASSWORD>`: The password for SYS, SYSTEM, and other default administrative accounts.
- `<YOUR_RECOVERY_LOCATION>`: The path for the recovery area.
- `<LISTENER_NAME>`: The name of the Oracle Net listener.
- `<DELPHIX_CONFIGURATION_OPTION>`: Specific to your Delphix configuration, if applicable.

To run the Oracle Database installer silently using your response file, execute the following command from the directory where your Oracle Database installation files are located:

```
./runInstaller -silent -responseFile /path/to/db_install.rsp -ignorePrereqFailure
```

Replace `/path/to/db_install.rsp` with the actual path to your response file.

Important Notes:

- Ensure that all prerequisites for Oracle Database installation are met before running the installer, including any required packages, kernel parameters, and user and group configurations.
- The `-ignorePrereqFailure` flag is optional and allows the installer to continue even if some prerequisites are not met. It's generally recommended to address all prerequisite checks for a production environment.
- Running the root scripts (`/u01/app/oraInventory/orainstRoot.sh` and `/u01/app/oracle/product/19.0.0/dbhome_1/root.sh`) as the root user is typically required to complete the installation. The installer will prompt you for this if not included in the response file.
- This example does not cover all possible configurations and options. Review the Oracle Database Installation Guide for your specific version and adjust the response file accordingly.

Database Creation

To create a new Oracle Database that includes a new Container Database (CDB) with a Pluggable Database (PDB), and to ensure that logs, archive logs, data files, and the Fast Recovery Area are on different volumes, you will use a response file tailored for the database creation process using the Database Configuration Assistant (DBCA).

The character set compatible with WebLogic SOA Suite RCU is typically AL32UTF8, as it supports Unicode and is widely used for applications requiring extensive character support.

Given the specifications, the response file will be crafted to meet the following requirements:

- Create a new CDB and PDB
- Allocate 6GB of RAM to the database and enable Automatic Memory Management
- Place logs, archive logs, data files, and the Fast Recovery Area on different volumes
- Use `AL32UTF8` as the character set to ensure compatibility with WebLogic SOA Suite RCU

Below is an example response file template for creating a new Oracle CDB with a PDB. Please adjust paths and names to suit your environment.

```
[GENERAL]
responseFileVersion=/oracle/assistants/dbca/rspfmt_dbca.rsp
GDBNAME = "cdb1.example.com"
SID = "cdb1"
CREATEASCONTAINERDATABASE = true
NUMBEROFPDBS = 1
PDBNAME = "pdb1"
PDBADMINPASSWORD = "<Your_PDB_Admin_Password>"
```

```
TEMPLATENAME = "General_Purpose.dbc"
CHARACTERSET = "AL32UTF8"
NATIONALCHARACTERSET= "AL16UTF16"
DATABASETYPE = "MULTIPURPOSE"

[createDatabase]
gdbName = cdb1
sid = cdb1
createAsContainerDatabase=true
numberOfPDBs=1
pdbName=pdb1
templateName=General_Purpose.dbc
characterSet=AL32UTF8
nationalCharacterSet=AL16UTF16
databaseType=MULTIPURPOSE
automaticMemoryManagement=true
totalMemory=6000
storageType=FS
datafileDestination=/u02/oradata
recoveryAreaDestination=/u03/fast_recovery_area
redoLogFileSize=300
emConfiguration=NONE
listeners=LISTENER

[createContainerDatabase]
gdbName = cdb1
templateName = General_Purpose.dbc
sid = cdb1
createAsContainerDatabase = true
numberOfPDBs = 1
pdbName = pdb1
createPDBTemplate = "PDB Admin Managed Template"
pdbAdminUserName = admin
pdbAdminPassword = <Your_PDB_Admin_Password>
datafileDestination = /u02/oradata/cdb1/
recoveryAreaDestination = /u03/fast_recovery_area/cdb1/
storageType = FS

[CONFIGUREDATABASE]
LOGFILEDEST_1 = "/u04/logs/"
```

```
LOGFILEDEST_2 = "/u05/archive_logs/"
LOGFILEDEST_3 = "/u02/oradata/"
```

Replace `<Your_PDB_Admin_Password>` with a secure password for your PDB admin user.

Notes:

- **Paths**: `/u02/oradata`, `/u03/fast_recovery_area`, `/u04/logs`, and `/u05/archive_logs` should be replaced with the actual mount points or directories you've set up on your system for data files, the Fast Recovery Area, logs, and archive logs, respectively.
- **Total Memory**: The `totalMemory` parameter is set to 6000, representing approximately 6GB of RAM dedicated to the Oracle instance. Oracle will manage this memory automatically because `automaticMemoryManagement` is set to true.
- **Character Sets**: `CHARACTERSET` is set to `AL32UTF8`, and `NATIONALCHARACTERSET` is set to `AL16UTF16`, which are suitable for globalized applications and compatibility with WebLogic SOA Suite RCU.
- **Listeners**: This template assumes a listener named `LISTENER` is already configured on the default port (1521). Adjust as necessary for your environment.

Execution

To create the database using the response file, you would typically use the `dbca` command-line tool, specifying the response file with the `-silent` and `-responseFile` options:

```
dbca -silent -createDatabase -responseFile /path/to/your_response_file.rsp
```

Make sure to replace `/path/to/your_response_file.rsp` with the actual path to your response file.

Important: This response file template is provided as a starting point. You may need to adjust values and paths according to your specific Oracle Database version, system architecture, and requirements. Always review the Oracle Database documentation for the version you're installing to ensure compatibility and correctness.

Oracle XE and APEX on CentOS 7

Downloading the software

The first thing to do is download the software from Oracle Technology Network:

- Database Downloads - you will need *the package for Linux x64* and the *preinstall RPM package*.
- Developer Tools/Oracle REST Data Services/Downloads
- Developer Tools/Application Express/Downloads

After the files have been downloaded, transfer them to the server.

Installation of RDBMS

After you checked them, to install the RDBMS, you need to install the *preinstall RPM package* first and then install the database software as following:

```
wget https://yum.oracle.com/repo/OracleLinux/OL7/latest/x86_64/getPackage/oracle-database-preinstall-18c-1.0-1.el7.x86_64.rpm
yum install oracle-database-preinstall-18c* -y
yum install oracle-database-xe-18c* -y
yum install httpd tomcat  -y
```

The user `oracle` and the group `oinstall` are created during the package installation. A default user environment is created during the set up process. You can set a password for this user by invoking `passwd oracle` command. This user is the owner of the `/opt/oracle` directory where the Oracle Database is located and this must stay unchanged.

```
chown oracle:oinstall /opt/oracle
```

When the packages are installed and the user is set up, you need to run the initial database configuration script and answer all of the questions.

```
/etc/init.d/oracle-xe-18c configure
```

After answering the questions it is going to take several minutes to initialize the database.

Setting up environment

Set up Oracle Database environment variables .

```
echo 'ORACLE_SID=XE' >> /etc/profile.d/oraenv.sh
echo 'ORAENV_ASK=NO' >> /etc/profile.d/oraenv.sh
echo '. /opt/oracle/product/18c/dbhomeXE/bin/oraenv -s' >> /etc/profile.d/oraenv.sh
. /etc/profile.d/oraenv.sh
```

Enable Oracle Database XE service for automatic startup:

```
systemctl enable oracle-xe-18c
```

Connecting to database

And we are ready to log into the database.

```
sqlplus /nolog
```

Check if everything is good.

```
-- connect to the database
sqlplus /nolog

-- change role
CONNECT SYS as SYSDBA

-- basic query to check everything came up right
select * from dual;

-- exit the database
exit
```

To make it easier to connect to the pluggable database, edit thetnsnames.ora file and add there a new connection descriptor

```
vim /opt/oracle/product/18c/dbhomeXE/network/admin/tnsnames.ora
```

Add the following after the standard XE record:

```
PDB1 =
 (DESCRIPTION =
  (ADDRESS = (PROTOCOL = TCP)(HOST = localhost)(PORT = 1521))
  (CONNECT_DATA =
   (SERVER = DEDICATED)
   (SERVICE_NAME = XEPDB1)
  )
 )
```

Installation of APEX

Change your directory back to `/root`, unzip the *APEX* archive and make the user `oracle` the owner of the directory. Considering we are installing the 19.2 version of *APEX*, it would look like this.

```
cd /root
mkdir -p /opt/oracle/apex
unzip apex_19.*.zip -d /opt/oracle
chown -R oracle:oinstall /opt/oracle/apex
```

Create an allow all ACL for APEX sql file in the APEX directory. This one is called apex_acl.sql.

```
BEGIN
 BEGIN
  dbms_network_acl_admin.drop_acl(acl => 'all-network-PUBLIC.xml');
 EXCEPTION
  WHEN OTHERS THEN
   NULL;
 END;
 dbms_network_acl_admin.create_acl(acl         => 'all-network-PUBLIC.xml',
                                   description => 'Allow all network traffic',
                                   principal   => 'PUBLIC',
                                   is_grant    => TRUE,
                                   privilege   => 'connect');
 dbms_network_acl_admin.add_privilege(acl       => 'all-network-PUBLIC.xml',
                                      principal => 'PUBLIC',
                                      is_grant  => TRUE,
```

```
                                  privilege => 'resolve');
  dbms_network_acl_admin.assign_acl(acl  => 'all-network-PUBLIC.xml',
                                  host => '*');
END;
/
sho err
COMMIT;
/
```

From the APEX directory connect to the pluggable database as `sysdba` and run the installation scripts.

```
cd /opt/oracle/apex
-- connect to the database
sqlplus /nolog

-- change role
CONN sys@pdb1 AS SYSDBA
```

```
-- run the script to install a full development environment
@apexins.sql SYSAUX SYSAUX TEMP /i/

 -- create an instance administrator user and set their password
@apxchpwd.sql

-- unlock APEX public user
ALTER USER APEX_PUBLIC_USER ACCOUNT UNLOCK;
ALTER USER APEX_PUBLIC_USER IDENTIFIED BY "S0m3aw3s0m3Pw!";

-- configure REST Data Services
@apex_rest_config.sql

-- run the ACL setup
@apex_acl.sql

-- disconnect from the database
exit
```

Copy APEX static files to the web server directory. They will be used to serve static images from the proxy.

```
mkdir -p /var/www/apex/images
cp -a /opt/oracle/apex/images/. /var/www/apex/images
```

The Application Express installation is complete.

Installation of ORDS

The Oracle Rest Data Services (ORDS) installation consists of unzipping the downloaded archive, running the configuration command, and then deploying the `ords.war` file into the Tomcat webapps folder.

```
cd /root
mkdir -p /opt/oracle/ords
unzip ords-19.*.zip -d /opt/oracle/ords
```

Run the ORDS configuration command with the advanced mode to run the interactive installation process.

```
cd /opt/oracle/ords
java -jar ords.war install advanced
```

When prompted for *ORDS* configuration directory, enter `config`.
Then provide the connection info to your pluggable database `XEPDB1`

Follow the on screen instructions.

After the configuration is completed, the values are saved in `opt/oracle/ords/config/ords/defaults.xml` file. It can be modified there. See more at Oracle Docs.

The `tomcat` user (created as part of *Tomcat* install) must have read-write access to the *ORDS* configuration folder:

```
chown -R tomcat:tomcat /opt/oracle/ords/config
```

Deploy *ORDS* to Tomcat application server. Copy the `ords.war` into the *Tomcat* `webapps` directory for this

```
cp -a /opt/oracle/ords/ords.war /usr/share/tomcat/webapps/
```

Done with ORDS and Tomcat, on to Apache.

Configuration of Apache httpd to map ORDS

The last step is to configure Apache to map HTTP-requests to ORDS and therefore APEX engine.

For this, add a custom `httpd` configuration file. By default, every `.conf` file placed in the `etc/httpd/conf.d/` directory is read by `httpd` as an additional configuration file to the main `/etc/httpd/conf/httpd.conf` config file.

Create the `apex.conf` file in the `etc/httpd/conf.d/` directory with the contents as below:

```
# forward ORDS tomcat
<VirtualHost *:80>
    # uncomment the lines below if you plan to serve different domains
    # on this web server, don't forget to change the domain name
    # ServerName yourdomain.tld
    # ServerAlias www.yourdomain.tld

    # alias for APEX static files
    Alias "/i" "/var/www/apex/images/"

    # uncomment the line below if you want
    # to redirect traffic to ORDS from root path
    # RedirectMatch permanent "^/$" "/ords"

    # proxy ORDS requests to tomcat
    ProxyRequests off
    <Location "/ords">
        ProxyPass "ajp://localhost:8009/ords"
        ProxyPassReverse "ajp://localhost:8009/ords"
    </Location>
</VirtualHost>
```

Tell SELinux (Yes, that should be running) to allow Apache to communicate to tomcat.

```
setsebool httpd_can_network_connect on
```

Now you are ready to save the configuration file and restart the services.

```
systemctl restart httpd
systemctl restart tomcat
```

Open a few firewall ports. Yes, the the firewall should also be on.

```
firewall-cmd --permanent --add-service={http,https}
firewall-cmd --reload
```

And finally, access APEX from your web browser using a link like `http://yourdomain.tld/ords` (or `http://yourdomain.tld` in case you switched on force redirection), where `yourdomain.tld` is the domain name or the IP-address of your server.

Web Applications

Web Applications

BookStack on CentOS 7

BookStack is a simple, self-hosted, easy-to-use platform for sharing and storing information.

What you need:

Fresh install of CentOS 7 or other RHEL7 clone.

EPEL and IUS Community Project repositories.

Add the repositories

`yum -y install epel-release`

`yum -y install https://centos7.iuscommunity.org/ius-release.rpm`

Update the system and install the packages

`yum update -y && reboot`

`yum -y install git mariadb101u-server nginx php72u php72u-cli php72u-fpm php72u-gd php72u-json php72u-mbstring php72u-mysqlnd php72u-openssl php72u-tidy php72u-tokenizer php72u-xml php72u-ldap`

Start and secure MySQL

```
systemctl restart mariadb.service   # Start MySQL service
mysql_secure_installation   # Set root password
mysql -u root -p   # Enter root password
```

Create database and user

```
CREATE DATABASE IF NOT EXISTS bookstackdb DEFAULT CHARACTER SET utf8 COLLATE utf8_general_ci;
GRANT ALL PRIVILEGES ON bookstackdb.* TO 'bookstackuser'@'localhost' IDENTIFIED BY
'YourAwesomePassword' WITH GRANT OPTION;
FLUSH PRIVILEGES;
quit
```

Configure Nginx

Update SOCKS permissions for php-fpm

Update `/etc/php-fpm.d/www.conf` configuration. Look for and update the following settings.

```
listen = /var/run/php-fpm.sock
listen.owner = nginx ; SOCKS permission
listen.group = nginx ; SOCKS permission
listen.mode = 0660 ; SOCKS permission
user = nginx ; PHP-FPM running user
group = nginx ; PHP-FPM running group
php_value[session.save_path]    = /var/www/sessions
```

Backup original Nginx configuration file

`mv /etc/nginx/nginx.conf /etc/nginx/nginx.conf.orig\`

Create a new config file

`vim /etc/nginx/nginx.conf`

```
user nginx;
worker_processes auto;
error_log /var/log/nginx/error.log;
pid /run/nginx.pid;

include /usr/share/nginx/modules/*.conf;

events {
    worker_connections 1024;
}

http {
    log_format  main  '$remote_addr - $remote_user [$time_local] "$request" '
                      '$status $body_bytes_sent "$http_referer" '
                      '"$http_user_agent" "$http_x_forwarded_for"';

    access_log  /var/log/nginx/access.log  main;

    sendfile            on;
    tcp_nopush          on;
    tcp_nodelay         on;
    keepalive_timeout   65;
    types_hash_max_size 2048;
```

```
    include             /etc/nginx/mime.types;
    default_type        application/octet-stream;

    include /etc/nginx/conf.d/*.conf;
}
```

Bookstack configuration

`vim /etc/nginx/conf.d/bookstack.conf`

```
server {
  listen 80;
  server_name localhost;
  root /var/www/BookStack/public;

  access_log  /var/log/nginx/bookstack_access.log;
  error_log  /var/log/nginx/bookstack_error.log;

  client_max_body_size 1G;
  fastcgi_buffers 64 4K;

  index  index.php;

  location / {
    try_files $uri $uri/ /index.php?$query_string;
  }

  location ~ ^/(?:\.htaccess|data|config|db_structure\.xml|README) {
    deny all;
  }

  location ~ \.php(?:$|/) {
    fastcgi_split_path_info ^(.+\.php)(/.+)$;
    include fastcgi_params;
    fastcgi_param SCRIPT_FILENAME $document_root$fastcgi_script_name;
    fastcgi_param PATH_INFO $fastcgi_path_info;
    fastcgi_pass unix:/var/run/php-fpm.sock;
  }
```

```
  location ~* \.(?:jpg|jpeg|gif|bmp|ico|png|css|js|swf)$ {
    expires 30d;
    access_log off;
  }
}
```

Setting up composer

```
cd /usr/local/bin   # Enter the directory where composer will be installed
curl -sS https://getcomposer.org/installer | php   # Install composer
mv composer.phar composer   # Rename composer
```

Download BookStack code

```
cd /var/www   # Change to where BookStack will be installed
mkdir /var/www/sessions   # Create php sessions directory
git clone https://github.com/BookStackApp/BookStack.git --branch release --single-branch   # Clone the latest
from the release branch
cd BookStack && composer install   # Change to the BookStack directory, and let composer do the rest
```

Create the .env file
Update the database settings. The rest of the parameters are safe defaults. A sample is available here:

```
cp .env.example .env   # Copy the example config
vim .env   # Update the new config with database.
```

Set permissions and generate the database. You should still be in the BookStack directory.

```
php artisan key:generate --force   # Generate and update APP_KEY
chown -R nginx:nginx /var/www/{BookStack,sessions}   # Change ownership to the webserver
php artisan migrate --force   # Generate database tables
```

Setup Let's Encrypt

```
yum install -y certbot-nginx # Install certbot
certbot --nginx -d books.clusterapps.com # Run certbot. Follow the prompts.
```

Final cleanup

```
firewall-cmd --permanent --add-service={http,https}
systemctl enable nginx.service mariadb.service php-fpm.service
systemctl reboot
```

Once the system has finished booting, open a browser and head to https://your.url

Web Applications

Evergreen ILS on Ubuntu 18.04

Evergreen is highly-scalable software for libraries that helps library patrons find library materials, and helps libraries manage, catalog, and circulate those materials, no matter how large or complex the libraries.

Evergreen is open source software, licensed under the GNU GPL, version 2 or later.

Learn more here. This guide will be on an Ubuntu 18.04 server.

Some reference for the installation

- The **user** Linux account is the account that you use to log onto the Linux system as a regular user.
- The **root** Linux account is an account that has system administrator privileges. Look for # on the console. Sometimes `sudo` will be used to run single commands as the root user.
- The **opensrf** Linux account is an account that you will create as part of installing OpenSRF.
- The minimum supported version of OpenSRF is 3.0.0.
- **PostgreSQL** is required The minimum supported version is 9.4.
- The **postgres** Linux account is created automatically when you install the PostgreSQL database server.
- The **evergreen** PostgreSQL account is a superuser that you will create to connect to the database server.
- The **egadmin** Evergreen account is an administrator account for Evergreen.
-
    -

OpenSRF

First download and unpack the OpenSRF source as the Linux **user**.

```
wget https://evergreen-ils.org/downloads/opensrf-3.1.0.tar.gz
tar -xvf opensrf-3.1.0.tar.gz
cd opensrf-3.1.0/
```

Issue the following commands from the opensrf folder as the **root** Linux account to install prerequisites.

```
sudo apt-get install make
sudo make -f src/extras/Makefile.install ubuntu-bionic
```

As the Linux **user,** use the `configure` command to configure OpenSRF, and the `make` command to build OpenSRF. The default installation prefix (PREFIX) for OpenSRF is `/opensrf/`.

```
./configure --prefix=/openils --sysconfdir=/openils/conf
make
```

If there were no build errors, then as **root** run the make install.

```
sudo make install
```

Create the **opensrf** user as the **root** user.

```
sudo useradd -m -s /bin/bash opensrf
sudo su -c 'echo "export PATH=\$PATH:/openils/bin" >> /home/opensrf/.bashrc'
sudo passwd opensrf
sudo chown -R opensrf:opensrf /openils
```

Define your public and private OpenSRF domains.
This is a single server setup so the /etc/hosts file will be used to add the public and private addresses.
Use the **root** user to add the following to /etc/hosts file.

```
127.0.1.2       public.localhost        public
127.0.1.3       private.localhost       private
```

Adjusting the system dynamic library path.

```
sudo su -c 'echo /openils/lib > /etc/ld.so.conf.d/opensrf.conf'
sudo ldconfig
```

OpenSRF requires an XMPP (Jabber) server. The ejabberd packages will be used.
First stop the existing service.

```
sudo systemctl stop ejabberd.service
```

Open `/etc/ejabberd/ejabberd.yml` and make the following changes as the **root** user:

> If you don't want to edit this file, download a preconfigured one fromhere

1. Define your public and private domains in the `hosts` directive. For example:
   ```
   hosts:
     - "localhost"
     - "private.localhost"
     - "public.localhost"
   ```
2. Change `starttls_required` to false
3. Change `auth_password_format` to plain
4. Change `shaper:` `normal` and `fast` values to 500000
5. Increase the `max_user_sessions:` `all:` value to 10000
6. Comment out the `mod_offline` directive
   ```
   ##mod_offline:
   ##access_max_user_messages: max_user_offline_messages
   ```
7. Uncomment the `mod_legacy_auth` directive

Or use the downloaded file.

```
sudo mv /etc/ejabberd/{ejabberd.yml,ejabberd.yml.org}
sudo wget -O /etc/ejabberd/ejabberd.yml https://git.clusterapps.com/snippets/6/raw
```

Start the ejabberd server:

```
sudo systemctl start ejabberd.service
```

On each domain, you need two Jabber users to manage the OpenSRF communications:

- a `router` user, to whom all requests to connect to an OpenSRF service will be routed; this Jabber user must be named `router`
- an `opensrf` user, which clients use to connect to OpenSRF services; this user can be named anything.

```
sudo ejabberdctl register router private.localhost UseARealPasswordNotthisone
sudo ejabberdctl register opensrf private.localhost UseARealPasswordNotthisone
sudo ejabberdctl register router public.localhost UseARealPasswordNotthisone
sudo ejabberdctl register opensrf public.localhost UseARealPasswordNotthisone
```

As the **opensrf** Linux account, copy the example configuration files to create your locally OpenSRF configuration.

```
sudo su - opensrf
cd /openils/conf
cp opensrf_core.xml.example opensrf_core.xml
cp opensrf.xml.example opensrf.xml
```

Edit `opensrf_core.xml` file to update the username / password pairs to match the Jabber user accounts you created.

1. `<config><opensrf>` = use the private Jabber `opensrf` user
2. `<config><gateway>` = use the public Jabber `opensrf` user
3. `<config><routers><router>` = use the public Jabber `router` user
4. `<config><routers><router>` = use the private Jabber `router` user

Enable the opensrf Linux account to use `srfsh` as the **opensrf** user.

```
cp /openils/conf/srfsh.xml.example /home/opensrf/.srfsh.xml
```

Update the password to match the password you set for the Jabber `opensrf` user at the `private.localhost` domain.

```
vim /home/opensrf/.srfsh.xml
```

Start all OpenSRF services as the **opensrf** Linux account.

```
osrf_control --localhost --start-all
```

1. Start the `srfsh` interactive OpenSRF shell by issuing the following command as the **opensrf** Linux account:
   Starting the `srfsh` interactive OpenSRF shell
   ```
   srfsh
   ```
2. Issue the following request to test the `opensrf.math` service:
   ```
   srfsh# request opensrf.math add 2,2
   ```
   You should receive the value `4`.

Install WebSockets as the **root** user.

```
apt-get install git-core
cd /tmp
git clone https://github.com/disconnect/apache-websocket
cd apache-websocket
apxs2 -i -a -c mod_websocket.c
```

Create the websocket Apache instance

```
sh /usr/share/doc/apache2/examples/setup-instance websockets
```

Remove from the main apache instance

```
a2dismod websocket
```

Change to the directory into which you unpacked OpenSRF, then copy config files.

```
cp examples/apache_24/websockets/apache2.conf /etc/apache2-websockets/
```

Add configuration variables to the end of /etc/apache2-websockets/envvars.

```
export OSRF_WEBSOCKET_IDLE_TIMEOUT=120
export OSRF_WEBSOCKET_IDLE_CHECK_INTERVAL=5
export OSRF_WEBSOCKET_CONFIG_FILE=/openils/conf/opensrf_core.xml
export OSRF_WEBSOCKET_CONFIG_CTXT=gateway
export OSRF_WEBSOCKET_MAX_REQUEST_WAIT_TIME=600
```

Before you can start websockets, you must install a valid SSL certificate in `/etc/apache2/ssl/`.

Evergreen application

Download and extract the archive as the Linux **user.**

```
wget https://evergreen-ils.org/downloads/Evergreen-ILS-3.3.0.tar.gz
tar -xvf Evergreen-ILS-3.3.0.tar.gz
cd Evergreen-ILS-3.3.0/
```

Issue the following commands as the **root** Linux account to install prerequisites using the `Makefile.install` prerequisite installer

```
make -f Open-ILS/src/extras/Makefile.install ubuntu-bionic
```

From the Evergreen source directory, issue the following commands as the **user** Linux account to configure and build Evergreen:

```
PATH=/openils/bin:$PATH ./configure --prefix=/openils --sysconfdir=/openils/conf
make
```

Issue the following command as the **root** Linux account to install Evergreen

```
sudo make install
```

Change ownership of the Evergreen files

```
sudo chown -R opensrf:opensrf /openils
```

Run ldconfig as the **root** Linux account.

```
sudo ldconfig
```

Issue the following commands as the **root** Linux account to copy the Apache configuration files from the Evergreen source archive.

```
sudo cp Open-ILS/examples/apache_24/eg_24.conf /etc/apache2/sites-available/eg.conf
sudo cp Open-ILS/examples/apache_24/eg_vhost_24.conf /etc/apache2/eg_vhost.conf
sudo cp Open-ILS/examples/apache_24/eg_startup /etc/apache2/
```

As the **root** Linux account, edit the `eg.conf` file that you copied.

To enable access to the offline upload / execute interface from any workstation on any network, make the following change (and note that you **must** secure this for a production instance):

- Replace `Require host 10.0.0.0/8` with `Require all granted`

As the **root** Linux account, edit `/etc/apache2/envvars`. Change `export APACHE_RUN_USER=www-data` to `export APACHE_RUN_USER=opensrf`.

As **root** edit `/etc/apache2/apache2.conf` and make the following changes.

```
sudo vim /etc/apache2/apache2.conf
```

1. Change `KeepAliveTimeout` to `1`.
2. Change `MaxKeepAliveRequests` to `100`.

As the **root** Linux account, configure the prefork module to start and keep enough Apache servers available to provide quick responses to clients.

```
sudo vim /etc/apache2/mods-available/mpm_prefork.conf
```

```
<IfModule mpm_prefork_module>
  StartServers          15
  MinSpareServers        5
  MaxSpareServers       15
```

```
    MaxRequestWorkers       75
    MaxConnectionsPerChild 500
</IfModule>
```

As the **root** user, enable the mpm_prefork module:

```
sudo a2dismod mpm_event
sudo a2enmod mpm_prefork
```

As the **root** Linux account, enable the Evergreen site:

```
sudo a2dissite 000-default
sudo a2ensite eg.conf
```

As the **root** Linux account, enable Apache to write to the lock directory

```
sudo chown opensrf /var/lock/apache2
```

To configure OpenSRF for Evergreen, issue the following commands as the **opensrf** Linux account. (Yes you did edit these files earlier but now there are more settings)

```
cp -b /openils/conf/opensrf_core.xml.example /openils/conf/opensrf_core.xml
cp -b /openils/conf/opensrf.xml.example /openils/conf/opensrf.xml
```

Edited the `opensrf_core.xml` as the **opensrf** user and enter the same passwords from the OpenSRF install steps.

To enable the default set of hooks, issue the following command as the **opensrf** Linux account:

```
cp -b /openils/conf/action_trigger_filters.json.example /openils/conf/action_trigger_filters.json
```

Evergreen database

In production environments, this would be on a dedicated server or cluster. For this deployment the database will be on the same server. If you are serious about your setup you would never install the application and the database on the same server. This is for testing only. For the best performance, run PostgreSQL on RHEL or Solaris.

Installing PostgreSQL server packages as **root**. Use the Makefile provided in the Evergreen archive.

```
sudo make -f Open-ILS/src/extras/Makefile.install postgres-server-ubuntu-bionic
```

Issue the following command as the **postgres** Linux account to create a new PostgreSQL superuser named `evergreen`.

```
sudo su - postgres
createuser -s -P evergreen
```

Issue the following command as the **root** Linux account from inside the Evergreen source directory, replacing <user>, <password>, <hostname>, <port>, and <dbname> with the appropriate values for your PostgreSQL database (where <user> and <password> are for the **evergreen** PostgreSQL account you just created), and replace <admin-user> and <admin-pass> with the values you want for the **egadmin** Evergreen administrator account:

```
perl Open-ILS/src/support-scripts/eg_db_config --update-config \
 --service all --create-database --create-schema --create-offline \
 --user <user> --password <password> --hostname <hostname> --port <port> \
 --database <dbname> --admin-user <admin-user> --admin-pass <admin-pass>
```

If you add the `--load-all-sample` parameter to the `eg_db_config` command, a set of authority and bibliographic records, call numbers, copies, staff and regular users, and transactions will be loaded into your target database. This sample dataset is commonly referred to as the *concerto* sample data, and can be useful for testing out Evergreen functionality and for creating problem reports that developers can easily recreate with their own copy of the *concerto* sample data.

Starting Evergreen

Start the `memcached` and `ejabberd` services

```
sudo systemctl enable --now ejabberd
sudo systemctl enable --now memcached
```

As the **opensrf** Linux account, start Evergreen. The `-l` flag in the following command is only necessary if you want to force Evergreen to treat the hostname as `localhost`;

```
osrf_control -l --start-all
```

if you configured `opensrf.xml` using the real hostname of your machine as returned by `perl -ENet::Domain 'print Net::Domain::hostfqdn() . "\n";'`, you should not use the `-l` flag. In a multi server setup, do not use localhost.

As the **opensrf** Linux account, generate the Web files needed by the web staff client and catalogue and update the organization unit proximity. Do this the first time you start Evergreen, and after that each time you change the library org unit configuration.

```
autogen.sh
```

As the **root** Linux account, restart the Apache Web server:

```
systemctl restart apache2
```

Testing connections

Once you have installed and started Evergreen, test your connection to Evergreen via `srfsh`.
As the **opensrf** Linux account. <admin-user> <admin-pass> are the egadmin username and password created earlier.

```
/openils/bin/srfsh
srfsh% login <admin-user> <admin-pass>
```

The output should look like this:

```
##############################################
Received Data: "$2a$10$londKQogYvvF71H92Wwpme"

------------------------------------
Request Completed Successfully
Request Time in seconds: 0.052501
------------------------------------

Received Data: {
"ilsevent":0,
"textcode":"SUCCESS",
"desc":"Success",
"pid":32474,
"stacktrace":"oils_auth.c:636",
"payload":{
"authtoken":"bd4f67a646ee4c39e923a272dc6c79a3",
"authtime":420
}
}

------------------------------------
Request Completed Successfully
Request Time in seconds: 0.171812
------------------------------------
Login Session: bd4f67a646ee4c39e923a272dc6c79a3. Session timeout: 420.000000

##############################################
```

Web Applications

Matomo on CentOS 7

Installing Matomo

Matomo, formerly known as Piwik, is an open source web analytics application. It rivals Google Analytics and includes even more features and allows you to brand your brand and send out custom daily, weekly, and monthly reports to your clients.

First let’s start by ensuring your system is up-to-date and has the needed repositories.

```
yum -y install epel-release
yum -y install https://centos7.iuscommunity.org/ius-release.rpm
yum clean all
yum -y update
reboot # if kernel updated
```

Install needed packages

```
yum -y install wget mariadb mariadb-server mysql httpd openssl mod_ssl php72u-json mod_php72u php72u-gd php72u-imap php72u-ldap php72u-odbc pear1u php72u-xml php72u-xmlrpc php72u-mbstring php72u-mysqlnd php72u-snmp php72u-soap php72u-tidy curl curl-devel mcrypt
```

Configure MySQL

```
systemctl restart mariadb.service   # Start MySQL service
mysql_secure_installation   # Set root password
mysql -u root -p   # Enter root password
```

Add the database and user.

```
CREATE DATABASE IF NOT EXISTS matomodb DEFAULT CHARACTER SET utf8 COLLATE utf8_general_ci;
GRANT ALL PRIVILEGES ON matomodb.* TO 'matomouser'@'localhost' IDENTIFIED BY 'YourAwesomePassword'
WITH GRANT OPTION;
FLUSH PRIVILEGES;
quit
```

Installing Matomo on CentOS 7.

```
cd /var/www
wget https://builds.matomo.org/piwik.zip
```

Unpack the Matomo archive to the document root directory on your server.

```
unzip piwik.zip -d /var/www/html/
mv /var/www/html/piwik/ /var/www/html/matomo/
```

Update owner on Matomo files and folders

`chown -R apache:apache /var/www/html/matomo`

Configure Apache
Create Apache virtual host for Matomo . First create ‘/etc/httpd/conf.d/vhosts.conf’ file

`vim /etc/httpd/conf.d/vhosts.conf`

```
IncludeOptional vhosts.d/*.conf
```

Create the virtual host.

```
mkdir /etc/httpd/vhosts.d/
vim /etc/httpd/vhosts.d/yourdomain.com.conf
```

Add the following to the new vhost config.

```
<VirtualHost YOUR_SERVER_IP:80>
ServerAdmin webmaster@yourdomain.com
DocumentRoot /var/www/html/matomo
ServerName yourdomain.com
ServerAlias www.yourdomain.com
ErrorLog "/var/log/httpd/yourdomain.com-error_log"
CustomLog "/var/log/httpd/yourdomain.com-access_log" combined

<Directory "/var/www/html/matomo/">
DirectoryIndex index.html index.php
Options FollowSymLinks
AllowOverride All
Require all granted
</Directory>
</VirtualHost>
```

Start Apache

```
systemctl start httpd
```

Verify that Apache is running by checking the status of the service:

```
systemctl status httpd
```

Install certbot to handle SSL

```
yum install -y mod_ssl python-certbot-apache
```

Run Certbot to secure the Apache site

```
certbot --apache -d site.example.com
```

Enable services and reboot the server and make sure it works.

```
systemctl enable httpd mariadb
reboot
```

Browse to https://your.sitename.com and follow the Matomo setup steps.

For details see https://matomo.org/docs/installation/

Installing libmaxminddb

Install git and PHP development libraries.

```
yum -y install php72u-devel git automake autoconf libtool
```

To install the library you need to download it's latest tar ball and extract it, or clone their git repository

```
git clone --recursive https://github.com/maxmind/libmaxminddb
```

When cloning from git, run `./bootstrap` from the libmaxminddb directory and then run the commands.

```
./configure
make
sudo make install
sudo ldconfig
```

You can find more details about installing the library in their README

Installing Extension

After successfully installing libmaxmindb, you need to download or checkout MaxMind-DB-Reader-php.
Then run the following commands from the top-level directory of this distribution:

```
cd ext
phpize
./configure
make
sudo make install
```

You then must load your extension. The recommend method is to add the following to your php.ini file:

```
extension=maxminddb.so
```

Now restart the webserver and the GeoIP 2 PHP provider should mention if the extension is loaded in Matomo (Piwik) > Settings > Geolocation.

Note: You may need to install the PHP development package on your OS such as php5-dev for Debian-based systems or php-devel for RedHat/Fedora-based ones.

If after installing, you receive an error that `libmaxminddb.so.0` is missing you may need to add the `lib` directory in your `prefix` to your library path. On most Linux distributions when using the default prefix (`/usr/local`), you can do this by running the following commands:

```
echo /usr/local/lib  >> /etc/ld.so.conf.d/local.conf
ldconfig
```

Download the GeoIP database and copy it to Matomo's path/to/matomo/misc/ subdirectory.

```
wget https://geolite.maxmind.com/download/geoip/database/GeoLite2-City.tar.gz
cp GeoLite2-City_20190312/GeoLite2-City.mmdb /path/to/matomo/misc/
```

Web Applications

mod_GeoIP on CentOS 7

Mod_GeoIP is an Apache module that can be used to get the geographic location of IP address of the visitor into the Apache web server. The module allows you to determine the visitor's country and location. It is specially useful for Geo Ad Serving, Target Content, Spam Fighting, Fraud Detection, Redirecting/Blocking visitors based on their country and much more.

GeoIP module allows system administrators to redirect or block web traffic according on the client geographical location. The geographical location is learned via client IP address.

Mod_GeoIP has two versions, one is Free and another one is Paid.

Enable EPEL Repository

Mod_Geoip is not available under official repository, install and enable third party EPEL repository.

```
yum install epel-release
```

Install Mod_GeoIP

Once you've **EPEL** repository enabled on your system, you can simple install **mod_geoip** by running following command with their dependency packages.

```
yum install mod_geoip GeoIP GeoIP-devel GeoIP-data zlib-devel
```

Download latest Geo Databases

It's good idea to download latest **Geo City** and **Country Database** to stay updated.

```
cd /usr/share/GeoIP/
mv GeoIP.dat GeoIP.dat_org
wget http://geolite.maxmind.com/download/geoip/database/GeoLite2-Country.tar.gz
wget http://geolite.maxmind.com/download/geoip/database/GeoLite2-City.tar.gz
gunzip GeoLite2-Country.tar.gz
gunzip GeoLite2-City.tar.gz
```

Enable Mod_GeoIP in Apache

After the module has been installed, open and edit the module main configuration file, with a command line text editor such as **vim**, and activate the module server-wide, as illustrated in the below excerpt.

```
vim /etc/httpd/conf.d/geoip.conf
```

Set the line GeoIPEnable from **Off** to **On**. Also, make sure you add the absolute path to GeoIP database file.

```
<IfModule mod_geoip.c>
GeoIPEnable On
GeoIPDBFile /usr/share/GeoIP/GeoIP.dat MemoryCache
</IfModule>
```

Restart the **Apache** service to reflect changes.

```
systemctl restart httpd
```

If you are running multiple sites, It’s not recommended to turn on GeoIP module server-wide. You should enable the GeoIP module only in `<Location>` or `<Directory>` blocks where you would actually perform the traffic redirection or block.

Updating GeoIP Database

GeoIP database is updated beginning of every month. So, its is very important to keep GeoIP database up-to-date. To download latest version of database use the following command.

```
cd /usr/share/GeoIP/
mv GeoIP.dat GeoIP.dat_org
wget http://geolite.maxmind.com/download/geoip/database/GeoLite2-Country.tar.gz
wget http://geolite.maxmind.com/download/geoip/database/GeoLite2-City.tar.gz
gunzip GeoLite2-Country.tar.gz
gunzip GeoLite2-City.tar.gz
```

For more information about mod_geoip and its usage can be found at

http://www.maxmind.com/app/mod_geoip.

XCP-ng / Citrix Hypervisor

Check boot filesystem

To check the file system of a Citrix XenServer Host, complete the following procedure:

1. Insert the installation CD 1 of the XenServer host into CD-ROM drive where the file system to check is located.
2. Start the installation process and stop when it displays the **Confirm Installation** dialog box and to click **Install XenServer**. From the message displayed in the dialog box, note the path for the disk. For example: "Please confirm you wish to proceed: all data on disk /dev/sda will be destroyed."
3. Press **ALT + F2** (you can toggle between the installation screen and the command prompt using ALT + F1 and ALT + F2). It prompts you to log on. Log on as the root user and the following prompt is displayed:
   [root@(none)~]#
4. Run the **fsck** command as follows:
   [root@(none)~]# fsck /dev/sda1
5. **reboot**

Generate SSL Certificates

Clear the “request was aborted:Could not create ssl/tls secure channel” error.

Issue:
The generated SSL cert on the pool master isn’t good enough for Windows 10.

Fix:
Make a new certificate.

Modify the shell script `/opt/xensource/libexec/generate_ssl_cert` and find the section that reads:

```
openssl genrsa > privkey.rsa
openssl req -batch -new -x509 -key privkey.rsa -days 3650 -config config -out cert.csr
openssl dhparam 512 > dh.pem
```

Change it to the following:

```
openssl genrsa 1024 > privkey.rsa
openssl req -batch -new -x509 -key privkey.rsa -days 3650 -config config -out cert.csr
openssl dhparam 1024 > dh.pem
```

Run the following commands

```
mv /etc/xensource/xapi-ssl.pem /etc/xensource/xapi-ssl.pem.bak
/opt/xensource/libexec/generate_ssl_cert "/etc/xensource/xapi-ssl.pem" $(hostname -f)
xe-toolstack-restart
```

You should see it generating 1024 bit keys.

A reboot might be needed.

Install - Network

Requirements

The PXE server requires a Dynamic Host Configuration Protocol (DHCP) server to provide IP addresses to the PXE-booting systems, and either an NFS, FTP, or an HTTP server to house the installation files. Files can all co-exist on the same server, or be distributed on different servers on the network. Each XCP host needs a PXE boot-enabled Ethernet card.

TFTP setup: For tips on installing a TFTP server see Tech Notes.

A copy of the extracted ISO file should be accessible by the host via http. This path could also be used for rolling pool upgrades. See Tech notes for additional steps and features for configuring local repositories.

PXELinux

Add an XCP entry into pxelinux.cfg/default

```
LABEL xcp
MENU LABEL XCP-ng
KERNEL mboot.c32
APPEND xcp/xen.gz dom0_max_vcpus=1-2 dom0_mem=1024M,max:1024M com1=115200,8n1
console=com1,vga --- xcp/vmlinuz xencons=hvc console=hvc0 console=tty0 install --- xcp/install.img
```

Copy the files mboot.c32 from /usr/lib/syslinux to the /var/lib//tftboot directory.

Copy the files install.img, vmlinuz*, and all files in the boot directory from the installation CD to /var/lib/tftpboot/xcp.

The xcp directory should look simalar to this:

```
xcp/□□□□□<- Most of these files come from /boot on the .iso
├── efiboot.img
├── gcdx64.efi
├── grubx64.efi
├── install.img□□□<- This is /install.img on the .iso
├── isolinux
│   ├── boot.cat
```

```
│   ├── isolinux.bin
│   ├── isolinux.cfg
│   ├── mboot.c32□□<- From /boot/pxelinux on the iso
│   ├── memtest□□□
│   ├── menu.c32□□<- From /boot/pxelinux on the iso
│   ├── pg_help
│   ├── pg_main
│   └── splash.lss
├── vmlinuz
└── xen.gz
```

Answer files

The Answerfile documentation is lacking at the Citrix website. Somethings you'll just have to experiment with.

A simple Answerfile.

```
<?xml version="1.0"?>
<installation>
    <keymap>en-us</keymap>
    <primary-disk>sda</primary-disk>
    <guest-disk>sdb</guest-disk>
    <root-password>StrongPassword</root-password>
    <source type="url">http://fqdn-or-ip/xcp/76/</source>
    <admin-interface name="eth0" proto="dhcp" />
    <timezone>America/New_York</timezone>
</installation>
```

Install - Physical Media

XenServer installation overview.

All hosts have at least one IP address associated with them. To configure a static IP address for the host (instead of using DHCP), have the static IP address and hostname on hand before beginning this procedure.

To install the XenServer host:

1. Burn the installation files for XenServer to a CD or use a USB boot drive
2. Back up data you want to preserve. Installing XenServer overwrites data on any hard drives that you select to use for the installation.
3. Insert the installation CD into the DVD drive of the host computer.
4. Restart the host computer.
5. Boot from the DVD drive or USB
6. Following the initial boot messages
7. Select Ok to do a clean installation.
8. If you have multiple hard disks, choose a Primary Disk for the installation. Select Ok.

Choose which disks you want to use for virtual machine storage. Choose Ok.

9. Set up the management interface to use to connect to XenCenter.
10. Configure the Management NIC IP address with a static IP address
11. Specify the hostname and the DNS configuration
12. Follow the remaining installation screens
13. Select Install XenServer.
14. From the Installation Complete screen, eject the installation CD from the drive, and then select *Ok to reboot the server.
15. Finish configuration using XenCenter
    1. Apply latest patches
    2. Create new pool
    3. Configure Networking
    4. Join other nodes to pool

Networking

Command line tools for XenServer host networking.

Master

Slave

Reset slave host networking

```
xe-reset-networking --mode= static --ip=$ip --netmask=$mask --gateway=$gateway --dns=$dns --master=$masterip
```

Pool

Storage Repositories

New local SR

```
xe sr-create host-uuid=<uuid> content-type=user name-label="<name>" \  shared=false device-config:device="</dev/disk/by-id/device>" type=ext
```

Fixes

Fix the *Command not permitted while global/metadata_read_only is set* message when removing lvm partitions or pv.

```
pvremove /dev/sda --config global{metadata_read_only=0}
```

VM Networking

Change Network

`xe vm-list`
Copy the uuid for the VM you want to remove the interface.
`xe vif-list vm-uuid=<vm-uuid>`
Copy the uuid for the vif you want to destroy.
`xe vif-destroy uuid=<vif-uuid>`
Note you will need to know which device you want to remove if there is more than one interface attached to the VM.
Add:

`xe network-list` ("name-label=<label>")
Copy the networks uuid.
`xe vif-create network-uuid=<network-uuid> vm-uuid=<vm-uuid> device=0`

Assign IP addressing to VM

```
xe vm-param-set uuid=8bc00eab-9f3e-4e9c-c7bb-f01dfabc758d xenstore-data:vm-data/ip=10.10.0.89 xenstore-data:vm-data/netmask=255.255.255.0 xenstore-data:vm-data/gateway=10.10.0.2 xenstore-data:vm-data/dns=10.10.0.3
```

ZFS

If you do this, you will break something. DO NOT run production on this SR. If you do, I hope you trust your backups.

Install/enable ZFS on your hosts

On each host that you want to run ZFS:

```
yum install --enablerepo="xcp-ng-extras" blktap vhd-tool
```

Install ZFS packages built for XCP-ng: (check version)

```
yum install --enablerepo="xcp-ng-extras" kmod-spl-4.4.0+10 kmod-zfs-4.4.0+10 spl zfs
```

Enable the module with

`depmod -a && modprobe zfs`.

Create a new ZFS pool:

Create the new SR.

Disable sync.

```
zfs set sync=disabled tank
```