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| --- | --- |
| *L1, E1* | ***PC Deployment & Sizing Choices*** |
| *L1, E2* | **Enabling Calm**  Verify the Data Service IP configuration in Prism Element and enable Nutanix Calm on Prism Central.   1. Log on to Prism Element using the admin user. 2. Click the cluster name on the top bar to view the Cluster Details. Verify the Data Service IP field is populated. *<should this be configured upon deployment? What happens if this DSIP is not configured?> Yes, it is populated at deployment time.* 3. Log on to Prism Central using Prism Central using the admin user. 4. Click **?** icon on the top bar and click **New** in Prism Central. 5. Verify Enable app management has a green check mark. 6. If Enable app management did not have a green check mark, then you would click the In the Enable app management window, mark the Enable app management check box and click **Save**.   **Note:** Since the Enable Nutanix seeded blueprints check box is selected by default, a set of preconfigured blueprints will be included when Calm is enabled.   1. Log off Prism Central. |
| *~~L1, E3~~* | ***~~Image Service~~***  1. *~~Log on to Prism Central as the admin user.~~* 2. *~~Click the Entities menu (the three-lined hamburger icon) and go to~~* ***~~Virtual Infrastructure~~*** *~~>~~* ***~~Images~~****~~.~~* 3. *~~On the Images page, click~~* ***~~Add Image~~*** *~~to get the Add Images page.~~* 4. *~~Click the URL radio button. Add the following URL to the Enter Image URL field:~~* [*~~http://download.nutanix.com/calm/CentOS-7-x86\_64-GenericCloud.qcow2~~*](http://download.nutanix.com/calm/CentOS-7-x86_64-GenericCloud.qcow2)*~~.~~* 5. *~~Click~~* ***~~Upload~~******~~file~~****~~.~~* 6. *~~Change the Image Name to CentOS.qcow2 and click~~* ***~~Next~~****~~.~~* 7. *~~Leave the defaults and click~~* ***~~Save~~****~~.~~* 8. *~~Go to the Tasks view and follow the import progress.~~* |
| *L2, E1* | ***Configure SSH Key Pairs for secure access to Linux VMs?***   1. Click the Start menu on your desktop and select **Cygwin64 Terminal**. 2. In the Cygwin64 Terminal that opens, type in   **cd /cygdrive/c/cygwin64/workspace**  **mkdir .ssh**   1. After making the .ssh directory, type **ssh-keygen -t rsa** to create a new ssh keypair using the RSA algorithm. 2. When prompted to enter the file in which to save the key, enter the file path **./** (period, forward-slash) and press **Enter**. 3. Leave the **Enter passphrase (empty for no passphrase):** prompt blank, and press **Enter** to use an empty passphrase. 4. Leave the prompt blank and press **Enter**again to confirm using an empty passphrase. 5. A key fingerprint and randomart image will populate the screen, confirming you have successfully changed the SSH keypair. Press **Enter.** 6. On the following new command prompt, type:   **ssh-keygen -p -N "" -m pem -f id\_rsa**  This modifies the private key to ensure that the public key may be extracted from it and that the keypairs can be used for password-less SSH authentication.     1. Close the Cygwin64 Terminal window. |
| *L2, E2* | **Create a Calm Project**   1. Log on to Prism Central using the admin user. 2. Select the Entities menu (the three-lined hamburger icon) > Services and click **Calm**. If the Welcome to Calm pop-up window appears, close it. 3. Hover your cursor over the icons to the far left of the browser. Click the icon named **Projects**. 4. Click the **+ Create Project** button and use the values in the table below to complete the form.  |  |  | | --- | --- | | **Project Name** | Practice-Project | | **Description** | Test workloads |  1. To the right of Infrastructure, click **Select Provider** and select **Nutanix**:    1. The pre-selected account should be: NTNX\_LOCAL\_AZ    2. Click **Select Clusters & Subnets**.    3. In the Select Subnets dialog box, select your cluster.    4. Click the check box next to default-net and click **Confirm**. 2. Use the values in the table below to set Quotas:  |  |  | | --- | --- | | **vCPUs** | 20 | | **Storage** | 1000 | | **Memory** | 48 |  1. Click **Save** **& Configure Environment**. 2. A message appears showing Project data successfully accepted by server briefly appears. You will be switched to the Environment page. 3. On the Environment page, the Linux configuration should already be expanded. Use the table below to configure the VM:  |  |  | | --- | --- | | **vCPUs** | 2 | | **Cores per vCPU** | 1 | | **Memory (GiB)** | 4 |  1. Click the check box next to Guest Customization. Type or copy-paste the following text into the Script field:   #cloud-config  users:  - name: centos  ssh-authorized-keys:  - @@{CENTOS.public\_key}@@  sudo: ['ALL=(ALL) NOPASSWD:ALL']     1. Scroll down and expand the DISK (1) section to see the disk configuration. Use the table below to configure the disk:  |  |  | | --- | --- | | **Type** | Disk | | **Bus Type** | SCSI | | **Operation** | Clone from Image Service | | **Image** | CentOS.qcow2 | | **Bootable** | Select check box |  1. Scroll down to NETWORK ADAPTERS (NICS) and click the plus button to the right to add a NIC. Use the table below to configure the NIC:  |  |  | | --- | --- | | **NIC 1** | default-net | | **Private IP** | Select Dynamic |  1. Scroll down to Connection. Click the Credential drop-down menu and select **Add New Credential**. Use the table below to configure the new credential:  |  |  | | --- | --- | | **Credential Name** | CENTOS | | **Username** | centos | | **Secret Type** | SSH Private Key | | **SSH Private Key** | Click the arrow coming out of the box, navigate to **C:\cygwin64\workspace\.ssh\id\_rsa**  and select **Open.** |  1. Click **Done** then scroll to the bottom of the page and click **Save**. 2. Click the **Projects** icon to see Practice-Project in the Projects list.   **Note**: The Production-Project project shown in the Projects list has the same configuration as your Practice-Project. |
| *L2, E3* | **Publishing a Blueprint to the Marketplace**   1. Select the Entities menu (the three-lined hamburger icon) > Services and click **Calm**. If the Welcome to Calm pop-up window appears, close it. 2. Hover your cursor over the icons to the far left of the browser. Click the icon named **Marketplace Manager**. 3. Click the check box next to ExpressLaunch in the Marketplace Blueprints view. 4. In the ExpressLaunch panel at the far right of your browser, select **Practice-Project** from the Projects Shared With drop-down menu and click **Apply**. 5. In the ExpressLaunch panel, click **Publish** and verify that the Status column for the blueprint shows Published. 6. Hover your cursor over the icons to the far left of the browser. Click the icon named **Marketplace**. You should see ExpressLaunch listed. |
| *L2, E4* | **Launching a Blueprint from the Marketplace**   1. Select the Entities menu (the three-lined hamburger icon) > Services and click **Calm**. If the Welcome to Calm pop-up window appears, close it. 2. Click the **Marketplace** icon in the left column. 3. Click the **ExpressLaunch** blueprint and click **Launch**. 4. In the new view, in the Name of the Application field, type Express-App and click **Create**. 5. When the view changes and you see PROVISIONING, click **Audit**. Expand the provisioning view. Continue to expand each new component as it appears to follow the provisioning progress to completion. 6. Verify that you can login to the VM. At the upper right of the browser, click **Launch Console** to connect to the VM.  |  |  | | --- | --- | | **Username** | root | | **Password** | nutanix/4u |  1. After successful logon, type exit and close the console connection by closing the window. |
| *L2, E5* | **Deleting an Application**  1. Select the Entities menu (the three-lined hamburger icon) > Services and click **Calm**. If the Welcome to Calm pop-up window appears, close it. 2. Hover your cursor over the icons to the far left of the browser. Click the icon named **Applications**. 3. Select the checkbox next to Express-App. 4. Select **Delete** from the Action drop-down menu. 5. Click **Confirm** in the Delete Application dialog box. 6. Click **Audit** to monitor the Delete process. 7. Log off Prism Central. |
| *L3, E1* | **Creating a Single VM Blueprint**   1. Select the Entities menu (the three-lined hamburger icon) > Services and click **Calm**. If the Welcome to Calm pop-up window appears, close it. 2. Hover your cursor over the icons to the far left of the browser. Click the icon named **Blueprints**. 3. Click **+ Create Blueprint** drop-down menu and select **Single VM Blueprint**. 4. On the Blueprint Settings view, use the table below to complete the fields:  |  |  | | --- | --- | | **Name** | Single-VM-BP | | **Description** | Single VM test for Calm | | **Project** | Production-Project |  1. Click **VM Details >**. Verify the following fields are set as defined in the following table:  |  |  | | --- | --- | | **Name** | VM1 | | **Cloud** | Nutanix | | **Operating System** | Linux |  1. Click **VM Configuration >**. Use the table below to configure the VM:  |  |  | | --- | --- | | **vCPUs** | 2 | | **Cores per vCPU** | 1 | | **Memory (GiB)** | 4 |  1. Click the check box next to Guest Customization. Type or copy-paste the following text into the Script field:   #cloud-config  users:  - name: centos  ssh-authorized-keys:  - @@{CENTOS.public\_key}@@  sudo: ['ALL=(ALL) NOPASSWD:ALL']     1. Scroll down and expand the DISK (1) section to see the disk configuration. Use the table below to configure the disk:  |  |  | | --- | --- | | **Type** | Disk | | **Bus Type** | SCSI | | **Operation** | Clone from Image Service | | **Image** | CentOS.qcow2 | | **Bootable** | Select check box |  1. Scroll down to NETWORK ADAPTERS (NICS) and click the plus button to the right to add a NIC. Use the table below to configure the NIC:  |  |  | | --- | --- | | **NIC 1** | default-net | | **Private IP** | Select Dynamic |  1. Click **Advanced Options**. At the top of the browser page, click **Add/Edit Credentials**. 2. In the Credentials dialog box, click **+ Add Credentials**. Use the table below to configure the new credential:  |  |  | | --- | --- | | **Credential Name** | CENTOS | | **Username** | centos | | **Secret Type** | SSH Private Key | | **SSH Private Key** | Click the arrow coming out of the box, navigate to **C:\cygwin64\workspace\.ssh\id\_rsa**  and select **Open.** |  1. Click **Done**. 2. Under **Connection** Select **Check log-in upon create** 3. Select **CENTOS** from the **Credential** drop-down 4. Scroll to the bottom of the page and click **Save**. |
| *L3, E2* | **Saving and Launching the Blueprint**   1. Select the Entities menu (the three-lined hamburger icon) > Services and click **Calm**. If the Welcome to Calm pop-up window appears, close it. 2. Hover your cursor over the icons to the far left of the browser. Click the icon named **Blueprints**. 3. Click Single-VM-BP blueprint, then click **Download** at the upper right. 4. In the Download Blueprint dialog box, click the **Do you want to include credentials and secrets in the blueprint** check box (enabled). 5. Type **nutanix/4u** in the Enter Passphrase box and click **Continue** to save the file. 6. Open to the Downloads folder and copy the Single-VM-BP JSON file to the Workspace folder on the Frame Desktop. 7. At the upper right, click **Launch**. In the new view, you will see three tabs, with the **Profile Configuration** automatically selected. Type **TestApp** in the **Name of the Application** field. 8. Click **Create**. 9. When the view changes and you see PROVISIONING, click **Audit**. Expand the provisioning view. Continue to expand each new component as it appears to follow the provisioning progress to completion. 10. Verify that Calm can login to the VM during the post-provisioning steps, by confirming a **Green circle** around the **Check Login** step, under the **Substrate Create** tree. 11. Hover your cursor over the icons to the far left of the browser. Click the icon named **Applications**. You should see your VM running. 12. Click **Test-App**. When the new page opens, click **Manage**. 13. Hover your cursor over the Stop row and click the arrow. 14. In the Run Action: Stop dialog box, click **Run** to confirm stopping the VM. 15. Return to the Application page and view the State column to verify that your application is Stopping. |
| *L3, E3* | **Publishing a Blueprint to the Marketplace**   1. Select the Entities menu (the three-lined hamburger icon) > Services and click **Calm**. If the Welcome to Calm pop-up window appears, close it. 2. Hover your cursor over the icons to the far left of the browser. Click the icon named **Blueprints**. 3. Click **Single-VM-DP** and click **Publish** in the upper right corner of the browser window. 4. In the Publish Blueprint dialog box, verify Publish as a, is set to **New Marketplace Blueprint** and type **1.0.0** in the Initial Version field.   The name should default to Single-VM-BP and the Description should default to Single VM test for Calm.   1. Click **Submit for Approval**. 2. Hover your cursor over the icons to the far left of the browser. Click the icon named **Marketplace Manager**. 3. Click **Approval Pending** tab and click **Single-VM-BP**. A panel will appear on the right-side of the browser window. 4. Click the **Approve** button (box with a checkmark). 5. Return to the Marketplace Blueprints view and select the checkbox next to the Single-VM-BP blueprint. Observe the current Status of your blueprint, which should be Accepted. 6. On the right-side of the browser window, select **Production-Project** from the Projects Shared With drop-down menu and click **Apply**. 7. Click **Publish**. The blueprint Status column should now read Published. |
| *L3, E4* | **Launching a Blueprint from the Marketplace**   1. Select the Entities menu (the three-lined hamburger icon) > Services and click **Calm**. If the Welcome to Calm pop-up window appears, close it. 2. Hover your cursor over the icons to the far left of the browser. Click the icon named **Marketplace**. 3. Click **Single-VM-BP** blueprint and click **Launch**. 4. In the new view, you will see three tabs, type SingleVM-App in the Name of the Application field and click **Create**. 5. When the view changes and you see PROVISIONING, click **Audit**. Expand the provisioning view. Continue to expand each new component as it appears to follow the provisioning progress to completion. 6. Verify that you can login to the VM. At the upper right of the browser, click **Launch Console** to connect to the VM.  |  |  | | --- | --- | | **Username** | root | | **Password** | nutanix/4u |  1. After successful logon, type exit and close the console connection by closing the window. |
| *L3, E5* | **Unpublishing and Deleting a Blueprint**  1. Select the Entities menu (the three-lined hamburger icon) > Services and click **Calm**. If the Welcome to Calm pop-up window appears, close it. 2. Hover your cursor over the icons to the far left of the browser. Click the icon named **Applications**. 3. Select the **SingleVM-App** check box. 4. Select **Delete** from the Action drop-down menu. 5. Click **Confirm** in the Delete Application dialog box. 6. Click **Audit** to monitor the Delete process. 7. Repeat steps 1-6 for Test-App. 8. Click the **Marketplace Manager** icon on the left-side of your browser window and click **Single-VM-BP** blueprint. Click **Unpublish**.   The Status of the Single-VM-BP will change to Accepted.   1. Click the **trash can** icon and click **Delete** in the Confirm Delete dialog box. 2. Click the **Blueprints** icon on the far left of the browser and click the check box next to **Single-VM-BP** blueprint. 3. Select **Delete** from the Action drop-down menu and click **Delete** in the Confirm Delete dialog box. |
| *L3, E6* | **Uploading a Blueprint**  1. Select the Entities menu (the three-lined hamburger icon) > Services and click **Calm**. 2. Click the **Blueprints** icon. 3. Click **Upload Blueprint** and browse to the blueprint that you saved earlier. Select blueprint and click **Open**. 4. In the Upload Blueprint dialog box, select **Production-Project** from the Project drop-down menu and type nutanix/4u in the Passphrase field.   **Important:** If you are uploading a saved blueprint to a new or different cluster, you will need to upload a disk image to the Image Service and create a Project using that image. For example, if you were uploading your blueprint to a different cluster, the Production-Project must already exist or be recreated before uploading the blueprint.   1. Click **Upload**. You will be redirected to another page. 2. Click the **Blueprints** icon to view all blueprints in the Blueprints list. Your blueprint should now be listed. |
| *L4, E1* | **Web Server Configuration**   1. Log on to Prism Central with the admin user. 2. Select the Entities menu. In the drop-down menu, select Services and click **Calm.** 3. Select the **Blueprints** icon. 4. Click **+ Create Blueprint** and select **Multi VM/Pod Blueprint**. 5. Enter in Production for the Name field and select your **Production-Project** project. 6. Select **Proceed**. 7. Select **Credentials** in the upper right. 8. Click **+** and use the following table to complete the dialog box:  |  |  | | --- | --- | | **Credential Name** | CENTOS | | **Username** | centos | | **Secret Type** | SSH Private Key | | **SSH Private Key** | Click the arrow coming out of the box, navigate to **C:\cygwin64\workspace\.ssh\id\_rsa**  and select **Open.** |  1. Click **Save** and click **Back.** 2. Click **+** next to Variables on the right Configuration panel. 3. For this variable, click the **running man** icon to make it a runtime variable that is changeable upon blueprint deployment. 4. Add the following variable, click **+** to add the first instance:  |  |  |  |  | | --- | --- | --- | --- | | **Variable Name** | **Data Type | Value** | **Secret** | **Runtime** | | User\_initials | String | xyz |  | X |  1. Click **Save** and then click **Configuration.** 2. Click **+** next to Downloadable Image Configuration to add a URL for a networked image. 3. Use the values in the following table to complete the form:  |  |  | | --- | --- | | **Package Name** | CentOS\_7\_Cloud | | **Description** **Image** | CentOS 7 Cloud Image | | **Image Name** | CentOS\_7\_Cloud | | **Image Type** | **Disk Image** | | **Architecture** | X86\_64 | | **Source URI** | <http://download.nutanix.com/calm/CentOS-7-x86_64-GenericCloud.qcow2> | | **Product Name** | CentOS | | **Product Version** | **7** |  1. Click **Save**, then **Back**. 2. Select **+** next to Service in the Application Overview window on the bottom left. 3. The right pane will populate information about a new service entitled Service1; complete the wizard with the following information:  |  |  | | --- | --- | | **Service Name** | WebServer | | **Name** | WebServerAHV | | **Cloud** | Nutanix | | **OS** | Linux | | **VM Name** | @@{User\_initials}@@-WebServer-@@{calm\_time}@@ | | **vCPUs** | 2 | | **Cores per vCPU** | 1 | | **Memory (GiB)** | 4 | | **Guest Customization** | Select check box | | **Type** | Cloud-init | | **Script** | #cloud-config  users:  - name: centos  ssh-authorized-keys:  - @@{CENTOS.public\_key}@@  sudo: ['ALL=(ALL) NOPASSWD:ALL'] | | **Device Type** | Disk | | **Device Bus** | SCSI | | **Operation** | Clone from Image Service | | **Image** | CentOS\_7\_Cloud | | **Bootable** | Select check box | | **NETWORK ADAPTERS (NICS)** | Click **+** to add a new NIC:   * + Under **NIC 1** click the dropdown and select **default-net.**   + Select **Dynamic** next to **Private IP.**   + Select **CENTOS** in **Credential** underneath the **CONNECTION** section. |  1. Click **Save**. If any errors or warnings exist, hover your cursor over the red exclamation mark to see what remediation steps are required. 2. Select **Download** to save your blueprint to your workstation. Check the box for Downloading credentials and type the passphrase **nutanix/4u**. 3. Click **Continue** and save the file. Go to the Downloads folder and copy the file to your Workspace folder.   **Note**: Your Production blueprint is now saved up to this point for Lab 4. If you need to recover the blueprint anytime between this point and the next time the blueprint is saved, for example, you leave this lab session and start a new session (which will deploy a new cluster), you will need to perform the following steps:   * 1. Review the Production-Project settings.   2. Upload your saved Production blueprint.   3. In the blueprint, click **WebServer** in the WebServerAHV service and then the VM tab in the right configuration panel, scroll down to CONNECTIONS and re-add the NIC (see step 20 above).   4. Continue with step 23 below.  1. Scroll to the top of the Configuration panel on the right and select Package next to VM. 2. Type **WebServer\_PACKAGE** under Package Name. 3. Click **Configure Install**. 4. In the workspace pane, you will see Package Install appear within the WebServer app you have created. Click **+ Task** and configure the following in the right-hand Configuration panel:  |  |  | | --- | --- | | **Task Name** | Install\_WebServer | | **Type** | Execute | | **Script Type** | Shell | | **Credential** | CENTOS | | **Script** | #!/bin/bash  set -ex  sudo yum update -y  sudo yum -y install epel-release  sudo setenforce 0  sudo sed -i 's/enforcing/disabled/g' /etc/selinux/config /etc/selinux/config  sudo systemctl stop firewalld || true  sudo systemctl disable firewalld || true  sudo rpm -Uvh https://mirror.webtatic.com/yum/el7/webtatic-release.rpm  sudo yum update -y  sudo yum install -y nginx php56w-fpm php56w-cli php56w-mcrypt php56w-mysql php56w-mbstring php56w-dom git unzip  sudo mkdir -p /var/www/laravel  echo "server {  listen 80 default\_server;  listen [::]:80 default\_server ipv6only=on;  root /var/www/laravel/public/;  index index.php index.html index.htm;  location / {  try\_files \$uri \$uri/ /index.php?\$query\_string;  }  # pass the PHP scripts to FastCGI server listening on /var/run/php5-fpm.sock  location ~ \.php$ {  try\_files \$uri /index.php =404;  fastcgi\_split\_path\_info ^(.+\.php)(/.+)\$;  fastcgi\_pass 127.0.0.1:9000;  fastcgi\_index index.php;  fastcgi\_param SCRIPT\_FILENAME \$document\_root\$fastcgi\_script\_name;  include fastcgi\_params;  }  }" | sudo tee /etc/nginx/conf.d/laravel.conf  sudo sed -i 's/80 default\_server/80/g' /etc/nginx/nginx.conf  if `grep "cgi.fix\_pathinfo" /etc/php.ini` ; then  sudo sed -i 's/cgi.fix\_pathinfo=1/cgi.fix\_pathinfo=0/' /etc/php.ini  else  sudo sed -i 's/;cgi.fix\_pathinfo=1/cgi.fix\_pathinfo=0/' /etc/php.ini  fi  sudo systemctl enable php-fpm  sudo systemctl enable nginx  sudo systemctl restart php-fpm  sudo systemctl restart nginx  if [ ! -e /usr/local/bin/composer ]  then  curl -sS https://getcomposer.org/installer | php  sudo mv composer.phar /usr/local/bin/composer  sudo chmod +x /usr/local/bin/composer  fi  sudo git clone https://github.com/ideadevice/quickstart-basic.git /var/www/laravel  sudo sed -i 's/DB\_HOST=.\*/DB\_HOST=@@{MySQL.address}@@/' /var/www/laravel/.env  sudo su - -c "cd /var/www/laravel; composer install"  if [ "@@{calm\_array\_index}@@" == "0" ]; then  sudo su - -c "cd /var/www/laravel; php artisan migrate"  fi  sudo chown -R nginx:nginx /var/www/laravel  sudo chmod -R 777 /var/www/laravel/  sudo systemctl restart nginx |  1. Click **WebServer** in the WebServerAHV service icon in the Workspace and select the Package tab in the Configuration Panel. 2. Click **Configure uninstall**.    * Select **+ Task** in the WebServer service and fill out the following fields in the Configuration Panel:  |  |  | | --- | --- | | **Task Name** | Uninstall WebServer | | **Type** | Execute | | **Script Type** | Shell | | **Credential** | CENTOS | | **Script** | #!/bin/bash  set -ex  sudo rm -rf /var/www/laravel  sudo yum erase -y nginx |  1. Click **Save**.   **Note**: You may see a warning about MySQL. This is expected since MySQL has not yet been configured.   1. Click **WebServer** in the WebServerAHV service icon in the Workspace and select the Service tab in the Configuration Panel. 2. Click **Service** at the top of the Configuration Panel 3. Change the **Number of Replicas** to reflect the following values:  |  |  | | --- | --- | | **Default** | 2 | | **Min** | 2 | | **Max** | 4 |  1. Click **Save**. 2. Download the blueprint to your Frame desktop. Check the box for Downloading credentials and type the passphrase **nutanix/4u**. 3. Click **Continue** and save the file. Go to the Downloads folder and copy the file to your Workspace folder. *Save the most recent copy only!*   **Note**: Your Production blueprint is now saved and will be used in the next lab (Lab 4.) If you need to recover the blueprint anytime between this point and the next time the blueprint is saved, for example, you leave this lab session and start a new session (which will deploy a new cluster), you will need to perform the following steps:   * 1. Review the Production-Project settings.   2. Upload your saved Production blueprint.   3. In the blueprint, click **WebServer** in the WebServerAHV service and then the VM tab in the right configuration panel, scroll down to CONNECTIONS and re-add the NIC (see step 20 above).   4. Continue with Lab 4, Exercise 2 |
| *L4, E2* | **MySQL Configuration**   1. Log on to Prism Central as the admin user. 2. Select the **Entities** menu. In the drop-down menu, select **Services** and then select **Calm**. 3. Select the **Blueprints** icon. 4. Select your **Production** blueprint. 5. Select **+** next to **Service** in the Application Overview window on the bottom left. A new service will be added to the blueprint workspace. 6. The right pane will populate information about a new service entitled **Service2**; Click the VM tab and enter in the following information:  |  |  | | --- | --- | | **Service Name** | MySQL | | **Name** | MySQLAHV | | **Cloud** | Nutanix | | **OS** | Linux | | **VM Name** | @@{User\_initials}@@-MYSQL-@@{calm\_time}@@ | | **vCPUs** | 2 | | **Cores per vCPU** | 1 | | **Memory (GiB)** | 4 | | **Guest Customization** | Select check box | | **Type** | Cloud-init | | **Script** | #cloud-config  users:  - name: centos  ssh-authorized-keys:  - @@{CENTOS.public\_key}@@  sudo: ['ALL=(ALL) NOPASSWD:ALL'] | | **Device Type** | Disk | | **Device Bus** | SCSI | | **Operation** | Clone from Image Service | | **Image** | CentOS\_7\_Cloud | | **Bootable** | Select check box | | **NETWORK ADAPTERS (NICS)** | Click **+** to add a new NIC:   * + Under **NIC 1** click the dropdown and select **default-net.**   + Select **Dynamic** next to **Private IP.**   + Select **CENTOS** in **Credential** underneath the **CONNECTION** section. |  1. Select **Save.** If any errors or warnings appear, hover your cursor over the exclamation mark to see what remediation steps are required. 2. **Download** the blueprint to your desktop. Check the box for Downloading credentials and enter the passphrase **nutanix/4u**. 3. Click **Continue** and save the file. Go to the downloads folder and copy the file to your Workspace folder. Only keep the latest copy.   **Note**: Your Production blueprint is now saved up to this point for Lab 4. If you need to recover the blueprint anytime between this point and the next time the blueprint is saved, for example, you leave this lab session and start a new session (which will deploy a new cluster), you will need to perform the following steps:   * 1. Review the Production-Project settings.   2. Upload your saved Production blueprint.   3. In the blueprint, click **WebServer** in the WebServerAHV service and then the VM tab in the right configuration panel, scroll down to CONNECTIONS and re-add the NIC (Lesson 4, Exercise 1, step20).   4. In the blueprint, click MySQL in the MySQLAHV service and then the VM tab in the right configuration panel, scroll down to CONNECTIONS and re-add the NIC (see step 5 above).   5. Continue with step 8 below.  1. Scroll to the top of the Configuration panel on the right and select **Package** next to **VM**. 2. Type **MYSQL\_PACKAGE** under **Package Name**. 3. Select **Configure Install**. 4. In the workspace pane, you will see **Package Install** appear within the **MySQLAHV** service. Select **+ Task** and configure the following in the righthand Configuration panel:  |  |  | | --- | --- | | **Task Name** | Install\_sql | | **Type** | Execute | | **Script Type** | Shell | | **Credential** | CENTOS | | **Script** | #!/bin/bash  set -ex  sudo yum install -y "http://repo.mysql.com/mysql-community-release-el7-5.noarch.rpm"  sudo yum update -y  sudo setenforce 0  sudo sed -i 's/enforcing/disabled/g' /etc/selinux/config /etc/selinux/config  sudo systemctl stop firewalld || true  sudo systemctl disable firewalld || true  sudo yum install -y mysql-community-server.x86\_64  sudo /bin/systemctl start mysqld  sudo /bin/systemctl enable mysqld  #Mysql secure installation  mysql -u root<<-EOF  UPDATE mysql.user SET Password=PASSWORD('@@{Mysql\_password}@@') WHERE User='@@{Mysql\_user}@@';  DELETE FROM mysql.user WHERE User='@@{Mysql\_user}@@' AND Host NOT IN ('localhost', '127.0.0.1', '::1');  DELETE FROM mysql.user WHERE User='';  DELETE FROM mysql.db WHERE Db='test' OR Db='test\\_%';  FLUSH PRIVILEGES;  EOF  mysql -u @@{Mysql\_user}@@ -p@@{Mysql\_password}@@ <<-EOF  CREATE DATABASE @@{Database\_name}@@;  GRANT ALL PRIVILEGES ON homestead.\* TO '@@{Database\_name}@@'@'%' identified by 'secret';  FLUSH PRIVILEGES;  EOF |  1. Select **MySQL** in the **MySQLAHV** service in the workspace pane and select the **Package** tab in the **Configuration Panel**. 2. Click **Configure uninstall**. 3. Select **+ Task** in the **MySQLAHV** service and fill out the following fields in the **Configuration Panel**:  |  |  | | --- | --- | | **Task Name** | Uninstall\_sql | | **Type** | Execute | | **Script Type** | Shell | | **Credential** | CENTOS | | **Script** | #!/bin/bash  echo "Goodbye!" |  1. Select **MySQL** in the **MySQLAHV** service in the workspace pane and select the **Service** tab in the **Configuration Panel**. 2. Select the **+** next to **Variables** on the right Configuration panel. 3. Add each of the following variables, clicking **+** each time to add the next instance:  |  |  |  |  | | --- | --- | --- | --- | | **Variable Name** | **Data Type | Value** | **Secret** | **Runtime** | | Mysql\_user | String | root |  |  | | Mysql\_password | String | nutanix/4u | X |  | | Database\_name | String | homestead |  |  |  1. Select **Save**. 2. **Download** the blueprint to your desktop. Check the box for Downloading credentials and enter the passphrase **nutanix/4u**. Click **Continue** and save the file. Go to the downloads folder and copy the file to your Workspace folder. Only keep the latest copy.   **Note**: Your Production blueprint is now saved up to this point for Lab 4. If you need to recover the blueprint anytime between this point and the next time the blueprint is saved, for example, you leave this lab session and start a new session (which will deploy a new cluster), you will need to perform the following steps:   * 1. Review the Production-Project settings.   2. Upload your saved Production blueprint.   3. In the blueprint, click WebServer in the WebServerAHV service and then the VM tab in the right configuration panel, scroll down to CONNECTIONS and re-add the NIC (Lesson 4, Exercise 1, step20).   4. In the blueprint, click MySQL in the MySQLAHV service and then the VM tab in the right configuration panel, scroll down to CONNECTIONS and re-add the NIC (see step 5 above).   5. Continue with Lab 4 Exercise 3. |
| *L4, E3* | **HA Proxy Configuration**   1. Log on to Prism Central as the admin user. 2. Select the **Entities** menu. In the drop-down menu, select **Services** and then select **Calm**. 3. Select the **Blueprints** icon. 4. Select your **Production** blueprint. 5. Select **+** next to **Service** in the Application Overview window on the bottom left. 6. The right pane will populate information about a new service entitled **Service3**. Select the **VM** tab and enter in the following information:  |  |  | | --- | --- | | **Service Name** | HAProxy | | **Name** | HAProxyAHV | | **Cloud** | Nutanix | | **OS** | Linux | | **VM Name** | @@{User\_initials}@@-HAProxy-@@{calm\_time}@@ | | **vCPUs** | 2 | | **Cores per vCPU** | 1 | | **Memory (GiB)** | 4 | | **Guest Customization** | Select check box | | **Type** | Cloud-init | | **Script** | #cloud-config  users:  - name: centos  ssh-authorized-keys:  - @@{CENTOS.public\_key}@@  sudo: ['ALL=(ALL) NOPASSWD:ALL'] | | **Device Type** | Disk | | **Device Bus** | SCSI | | **Operation** | Clone from Image Service | | **Image** | CentOS\_7\_Cloud | | **Bootable** | Select check box | | **NETWORK ADAPTERS (NICS)** | Click **+** to add a new NIC:   * + Under **NIC 1** click the dropdown and select **default-net.**   + Select **Dynamic** next to **Private IP.**   + Select **CENTOS** in **Credential** underneath the **CONNECTION** section. |  1. Select **Save.** If any errors or warnings exist, hover your cursor over the exclamation mark to see what remediation steps are required. 2. Scroll to the top of the Configuration panel on the right and select **Package** next to **VM**. 3. Type **HAProxy\_PACKAGE** under **Package Name**. 4. Click **Configure Install**. 5. In the workspace pane, you will see **Package Install** appear within the **HAProxyAHV** service. Select **+ Task** and configure the following in the right-hand Configuration panel:  |  |  | | --- | --- | | **Task Name** | Install\_HAProxy | | **Type** | Execute | | **Script Type** | Shell | | **Credential** | CENTOS | | **Script** | #!/bin/bash  set -ex  sudo yum update -y  sudo yum install -y haproxy  sudo setenforce 0  sudo sed -i 's/enforcing/disabled/g' /etc/selinux/config /etc/selinux/config  sudo systemctl stop firewalld || true  sudo systemctl disable firewalld || true  echo "global  log 127.0.0.1 local0  log 127.0.0.1 local1 notice  maxconn 4096  quiet  user haproxy  group haproxy  defaults  log global  mode http  retries 3  timeout client 50s  timeout connect 5s  timeout server 50s  option dontlognull  option httplog  option redispatch  balance roundrobin  # Set up application listeners here.  listen admin  bind 127.0.0.1:22002  mode http  stats uri /  frontend http  maxconn 2000  bind 0.0.0.0:80  default\_backend servers-http  backend servers-http" | sudo tee /etc/haproxy/haproxy.cfg  hosts=$(echo "@@{WebServer.address}@@" | tr "," "\n")  port=80  for host in $hosts  do echo " server host-${host} ${host}:${port} weight 1 maxconn 100 check" | sudo tee -a /etc/haproxy/haproxy.cfg  done  sudo systemctl daemon-reload  sudo systemctl enable haproxy  sudo systemctl restart haproxy |  1. Select **HAProxy** within the **HAProxyAHV** service in the Workspace pane and select the **Package** tab in the **Configuration Panel**. 2. Click **Configure uninstall**. 3. Select **+ Task** and fill out the following fields in the **Configuration Panel**:  |  |  | | --- | --- | | **Task Name** | Uninstall\_HAProxy | | **Type** | Execute | | **Script Type** | Shell | | **Credential** | CENTOS | | **Script** | #!/bin/bash  set -ex  sudo  yum -y erase haproxy |  1. Select **Save**. 2. **Download** the blueprint to your desktop. Check the box for Downloading credentials and type the passphrase **nutanix/4u**. 3. Click **Continue** and save the file. Go to the downloads folder and copy the file to your Workspace folder. Only keep the latest copy.   **Note**: Your Production blueprint is now saved up to this point for Lab 4. If you need to recover the blueprint anytime between this point and the next time the blueprint is saved, for example, you leave this lab session and start a new session (which will deploy a new cluster), you will need to perform the following steps:   * 1. Review the Production-Project settings.   2. Upload your saved Production blueprint.   3. In the blueprint, click WebServer in the WebServerAHV service and then the VM tab in the right configuration panel, scroll down to CONNECTIONS and re-add the NIC.   4. In the blueprint, click MySQL in the MySQLAHV service and then the VM tab in the right configuration panel, scroll down to CONNECTIONS and re-add the NIC.   5. In the blueprint, click HAProxy in the HAProxyAHV service and then the VM tab in the right configuration panel, scroll down to CONNECTIONS and re-add the NIC.   6. Continue with Lab 5, Exercise 1. |
| *L5, E1* | **Adding Dependencies**   1. Log on to Prism Central as the admin user. 2. Select the **Entities** menu. In the drop-down menu, select **Services** and then select **Calm**. 3. Click the **Blueprints** icon and select your **Production** blueprint. 4. Expand the **Services box** at the bottom left so that **Application Profile** is visible and click **Create.** 5. Drag and Drop the Services so they are in order from left to right: **MySQLAHV, WebServerAHV** and **HAProxyAHV**. 6. Review the Orange **Orchestration Edges** that link the tasks together. 7. Select **Stop** in the Application Profile Action window. 8. Review the **Orchestration Edges** that connect the interdependencies when a Stop action is issued. 9. Select the **WebServer** application in the **WebServerAHV** service. 10. Hover over the **curved arrow** on the left menu, you should see **Create Dependency**. Click **Create Dependency.** 11. Drag the newly created arrow over to the **MySQLAHV** service and click on the **MySQL** box. An arrow will connect the **WebServer** app to the **MySQL** app. 12. Click the **HAProxy** appand **Create Dependency** for the **WebServer** app. 13. Click **Save.** 14. Review the orange **Orchestration Edges** and how they have now changed to reflect the dependencies you have just created. 15. **Download** the blueprint to your desktop. Check the box for Downloading credentials and enter the passphrase **nutanix/4u**. 16. Click **Continue** and save the file. Go to the downloads folder and copy the file to your Workspace folder. 17. Click **Launch** in the upper right of the **Blueprint Editor.** 18. Type *<student ID>***-3T-App** 19. Review all **Profile Configuration**, **Service Configuration**, and **Credentials** for accuracy. 20. Click **Create.** 21. Select the **Audit** Tab to review the provisioning process. 22. **Download** the blueprint to your desktop. Check the box for Downloading credentials and type the passphrase **nutanix/4u**. 23. Click **Continue** and save the file. Go to the downloads folder and copy the file to your Workspace folder. Only keep the latest copy.   **Note**: Your Production blueprint is now saved up to this point for Lab 4. If you need to recover the blueprint anytime between this point and the next time the blueprint is saved, for example, you leave this lab session and start a new session (which will deploy a new cluster), you will need to perform the following steps:   * 1. Review the Production-Project settings.   2. Upload your saved Production blueprint (Lesson 3, Exercise 6).   3. In the blueprint, click WebServer in the WebServerAHV service and then the VM tab in the right configuration panel, scroll down to CONNECTIONS and re-add the NIC (Lesson 4, Exercise 1, step20).   4. In the blueprint, click MySQL in the MySQLAHV service and then the VM tab in the right configuration panel, scroll down to CONNECTIONS and re-add the NIC (Lesson 4, Exercise 2, step 5).   5. In the blueprint, click HAProxy in the HAProxyAHV service and then the VM tab in the right configuration panel, scroll down to CONNECTIONS and re-add the NIC (Lesson 4, Exercise 2, step 6). |