knowledge15

April 19–24, 2015 • Mandalay Bay • Las Vegas, NV

Lab Guide

Orchestration 204:

Configuration Automation

Aaron Dixon & Ben Yukich

Default Login / Password:

admin / Knowledge15

itil / Knowledge15

employee / Knowledge15

This

Page

Intentionally

Left

Blank

Lab Goal

It is hard to do any configuration automation without a computer to configure… so, we provision a new virtual machine! We use the standard VM instance provisioning capabilities provided by ServiceNow. An AWS account and catalog item has already been configured. This should be a snap.

Lab 1.1
Spin up a Virtual Machine

Log on to Your Lab Instance

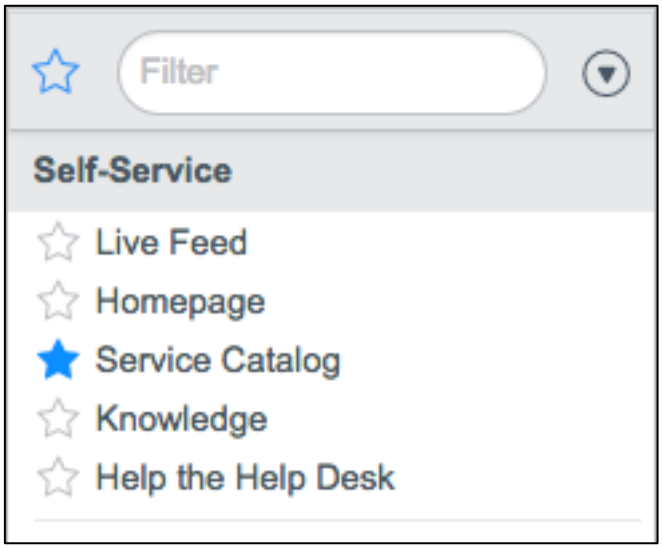
1. Navigate to the unique instance URL provided to you.
2. Log on with provided credentials.

That was not so bad, was it?

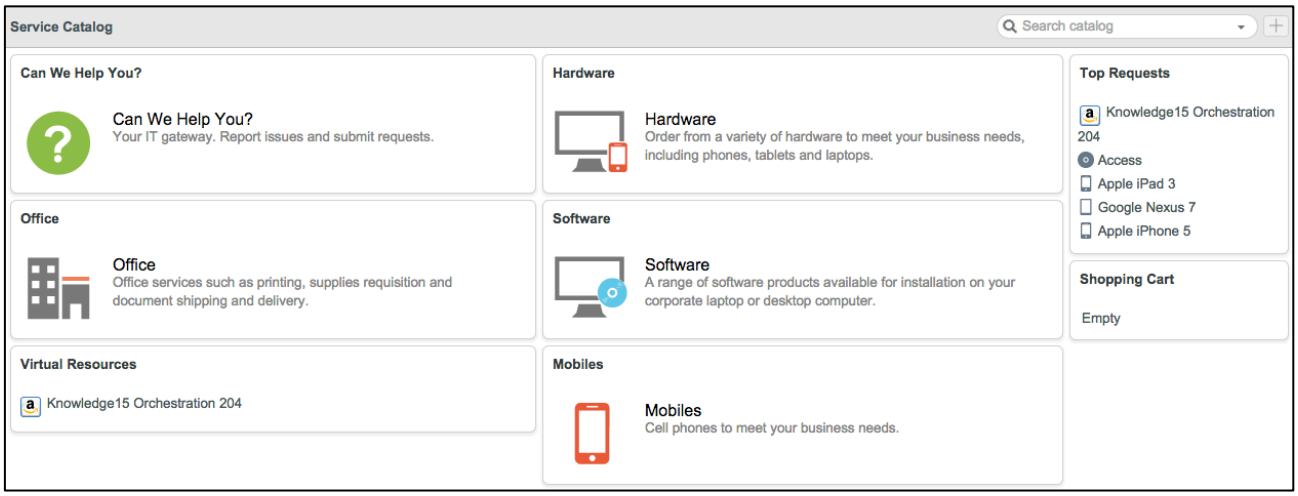
®2015 ServiceNow, Inc. All rights reserved.

Request a New Virtual Machine

1. Navigate to **Self-Service > Service Catalog**.

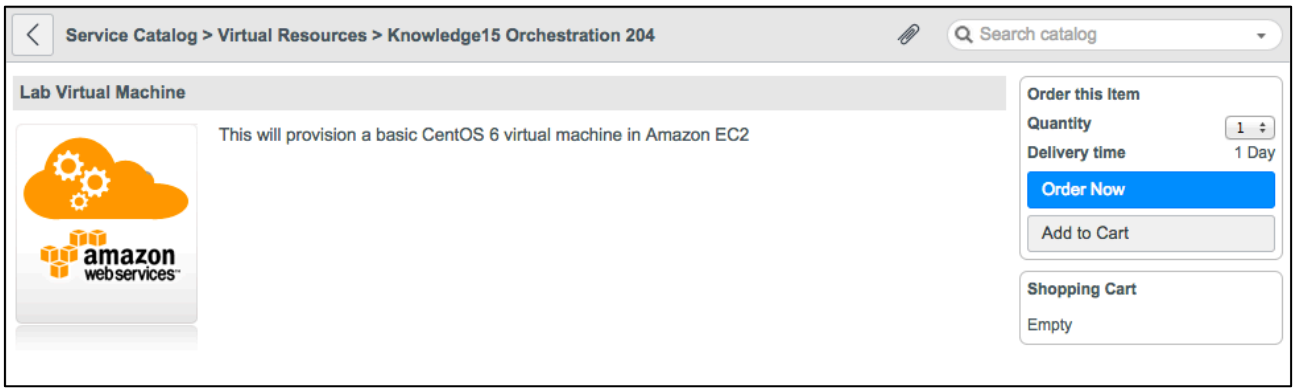


2. Select the **Knowledge15 Orchestration 204** catalog item (in the Virtual Resources category).

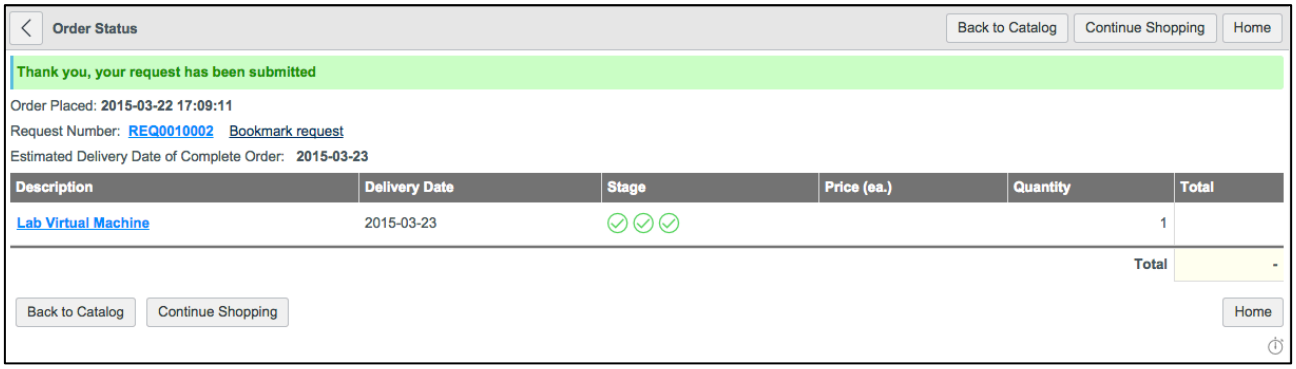


®2015 ServiceNow, Inc. All rights reserved.

3. Click **Order Now** to begin provisioning.

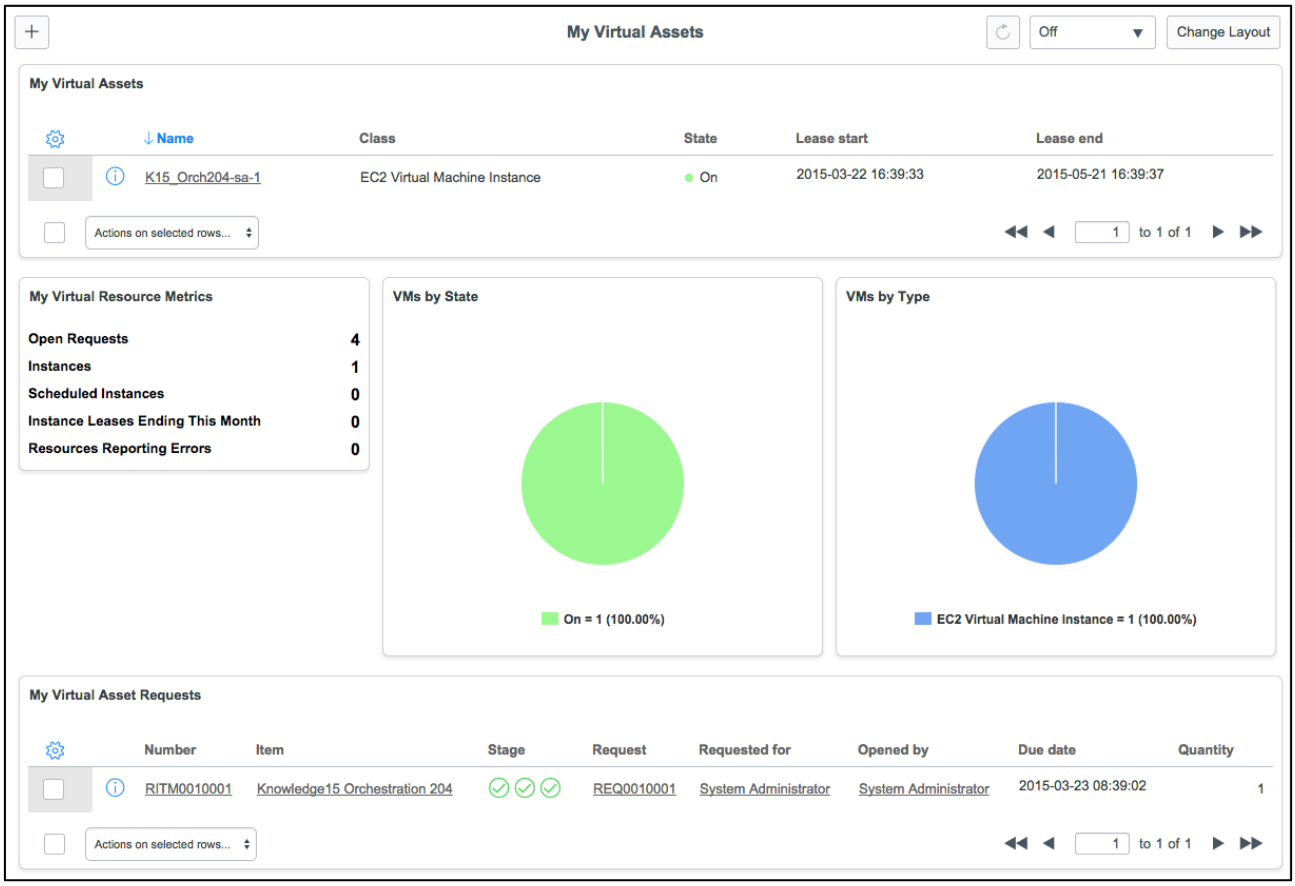


The Order Status screen confirms that the VM request is approved and scheduled.



®2015 ServiceNow, Inc. All rights reserved.

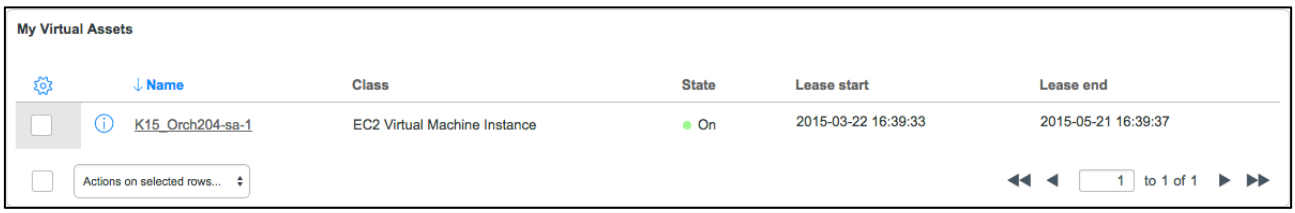
4. Navigate to **Self-Service > My Virtual Assets**. You should see a dashboard with the newly provisioned VM shown at the top of the screen.



Note: You may need to wait a moment and refresh this page to see your VM in an **On** state.

Lab Success Verification

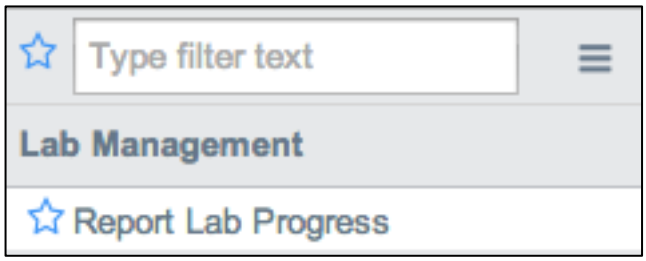
1. Your My Virtual Assets portal should show one **EC2 Virtual Machine** Instance with its State set to **On**.



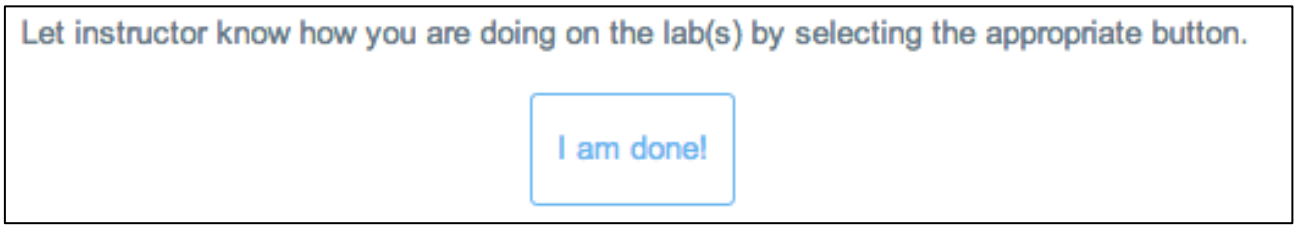
©2015 ServiceNow, Inc. All rights reserved.

Progress Report

1. Navigate to **Lab Management> Report Lab Progress**.



2. Click I am done!



®2015 ServiceNow, Inc. All rights reserved.

Lab Goal

Now that you have a virtual machine to manage, you need to tell ServiceNow Configuration Automation what the new system to look like. In this case, you define a template for a new Puppet Master!

Lab 2.1 Create a Config Template

Examine the Configuration Workflows

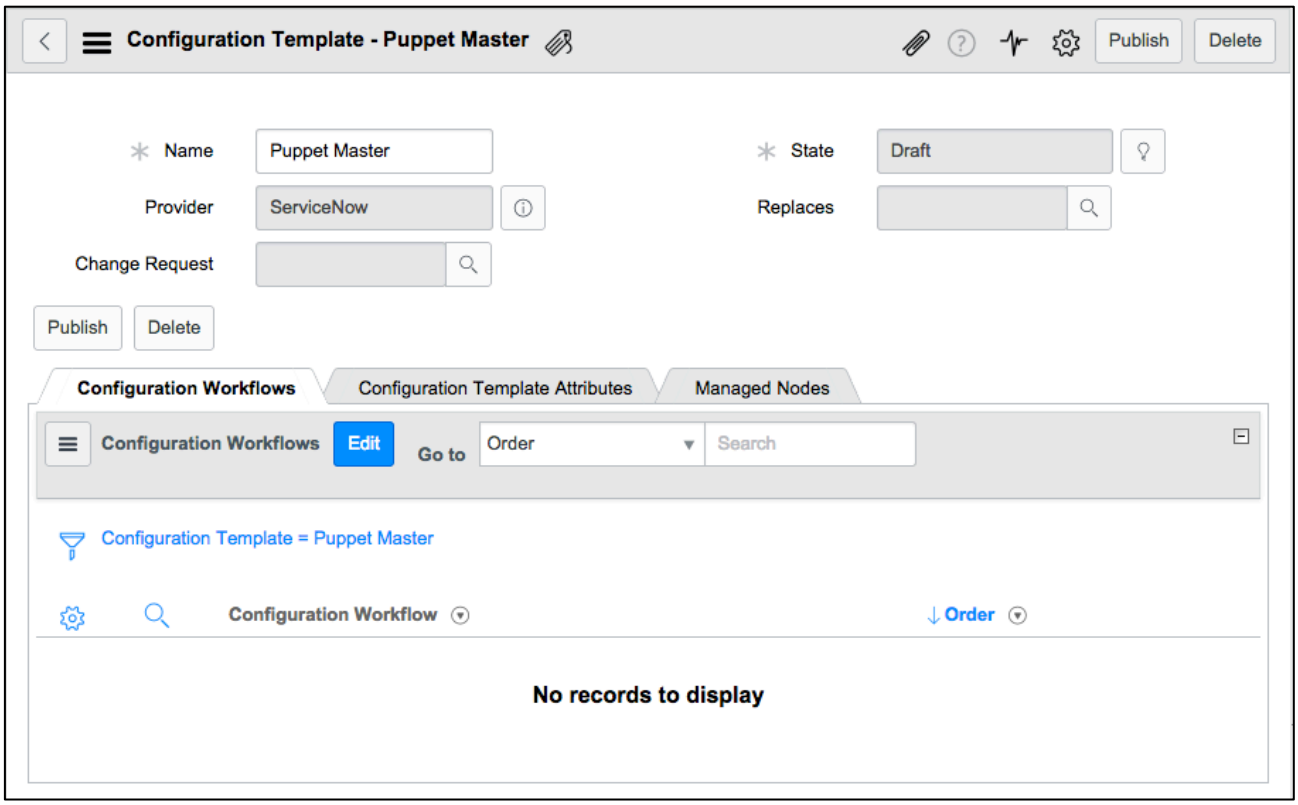
1. Navigate to **Configuration Automation > Configuration Workflows**.
2. Click any of the workflows present (e.g., **Install puppet-server**). These records are used to make orchestration workflows that automate the process of configuring a system consumable within the configuration automation application.

Create a Configuration Template

1. Navigate to **Configuration Automation > Configuration Templates**.
2. Click **New Draft**.
3. Name your Configuration Template **Puppet Master**.
4. Click the hamburger icon (☰), or right-click the header, and select **Save**.

®2015 ServiceNow, Inc. All rights reserved.

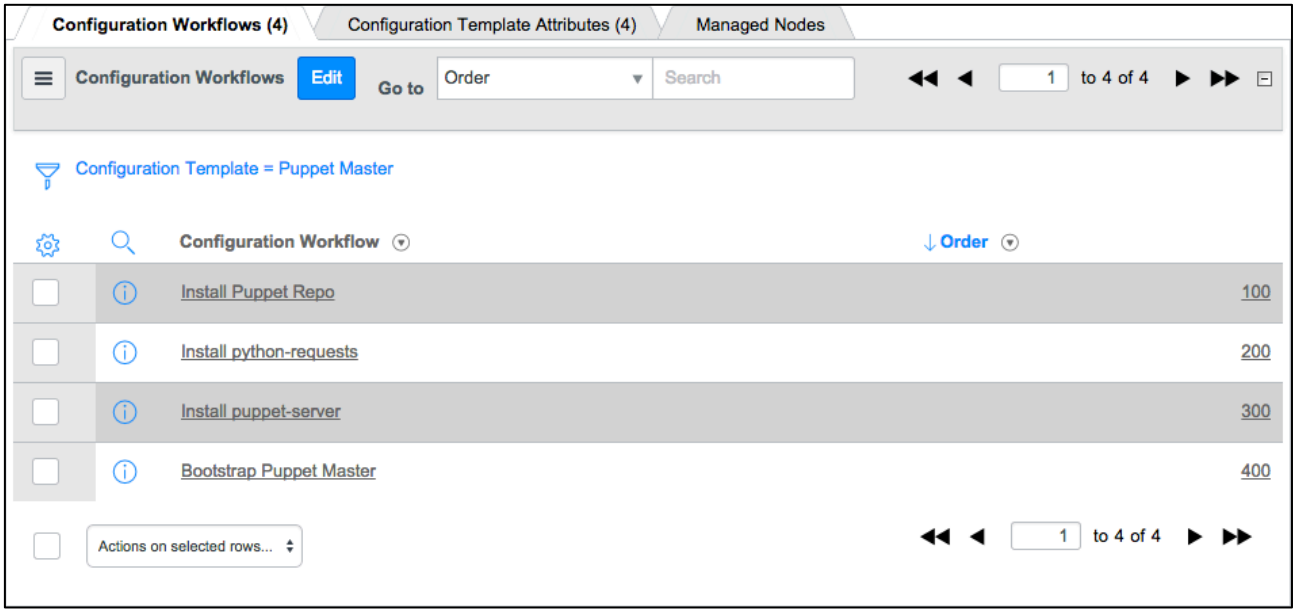
5. Click **Edit** in the **Configuration Workflows** related list.



6. Add **Install Puppet Repo**, **Install puppet-server**, **Install python-requests**, and **Bootstrap Puppet Master** workflows. Select **Save**.

®2015 ServiceNow, Inc. All rights reserved.

7. Edit the **Order** field so that the configuration workflows are in order of **Install Puppet Repo** first (lowest-order value, e.g., 100) to **Bootstrap Puppet Master** last (highest order value, e.g., 400).



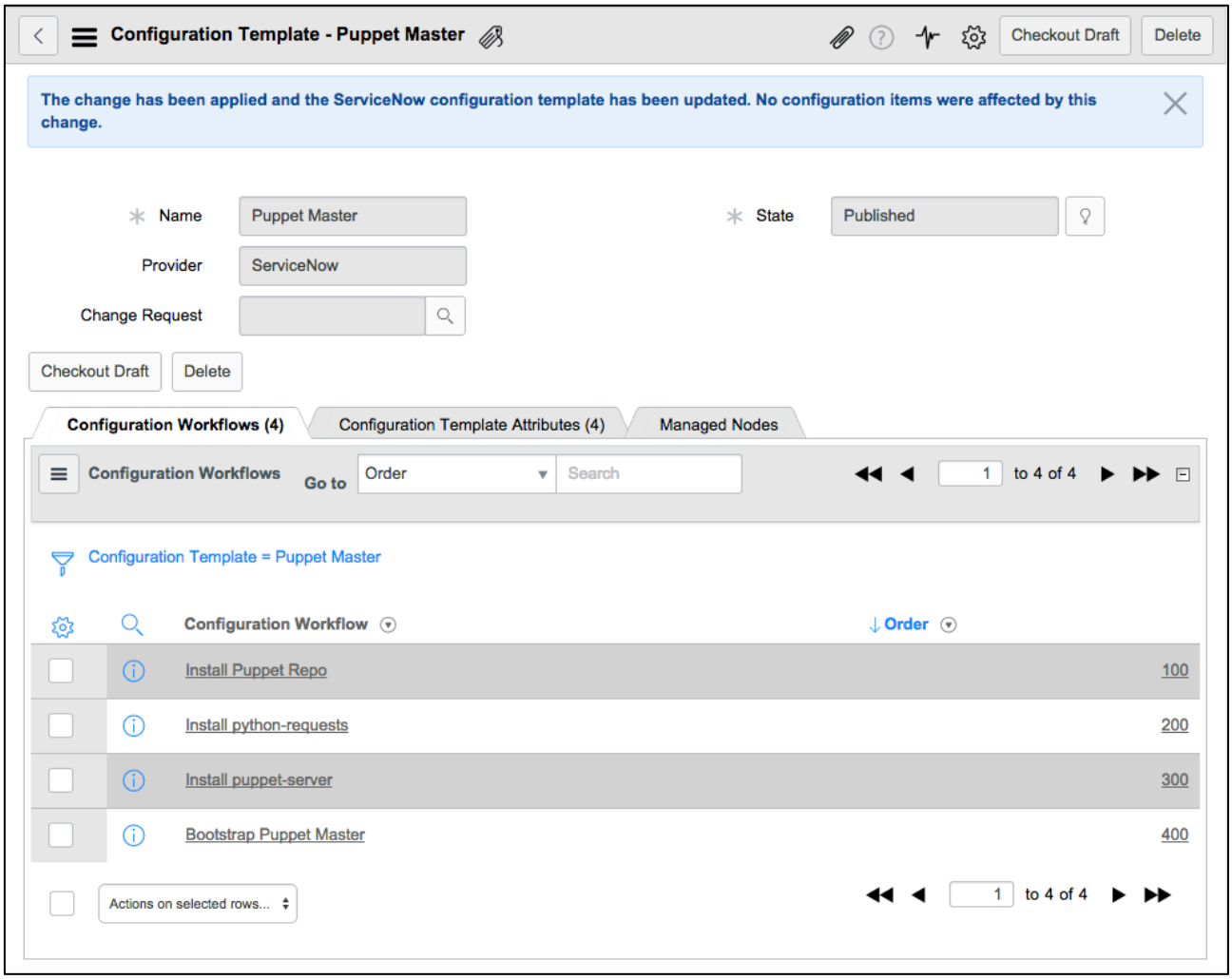
Note: The **Configuration Template Attributes** related list is automatically populated with the attributes that apply to the four configuration workflows you just added.

8. Click **Publish**.

©2015 ServiceNow, Inc. All rights reserved.

Lab Success Verification

1. You should now have a complete published **Configuration Template**.



2. Report lab status using **Lab Management > Report Lab Progress**.

®2015 ServiceNow, Inc. All rights reserved.

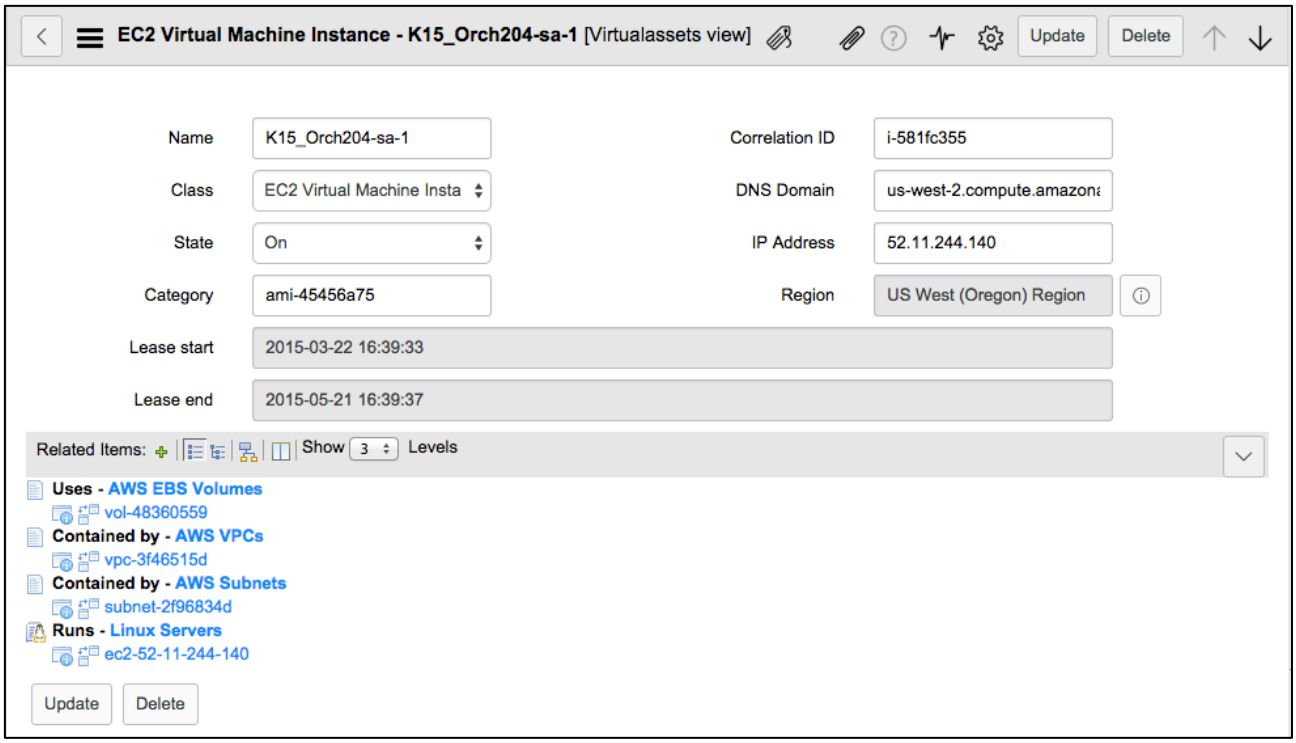
Lab Goal

Lab 2.2 Apply Config to your VM

Now you have a configuration template, and a VM that you can apply it to. try it out! You can apply the newly created configuration template the Linux virtual machine we spun up earlier to turn it into a puppet master server.

Navigate to Linux CI

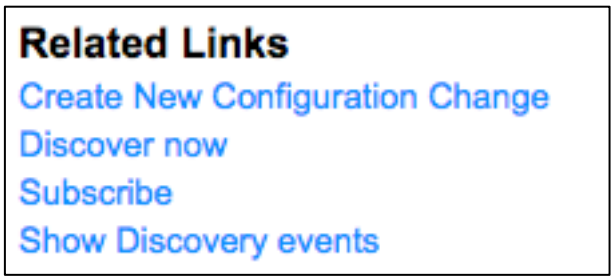
1. Navigate to **Self-Service > My Virtual Assets**.
2. Click the name of your virtual machine instance.
3. Notice a **Runs** relationship to a **Linux Server** on the form. Click the name of the Linux Server to navigate to that record (it will be something of the form **ec2-52-11-244-140**).



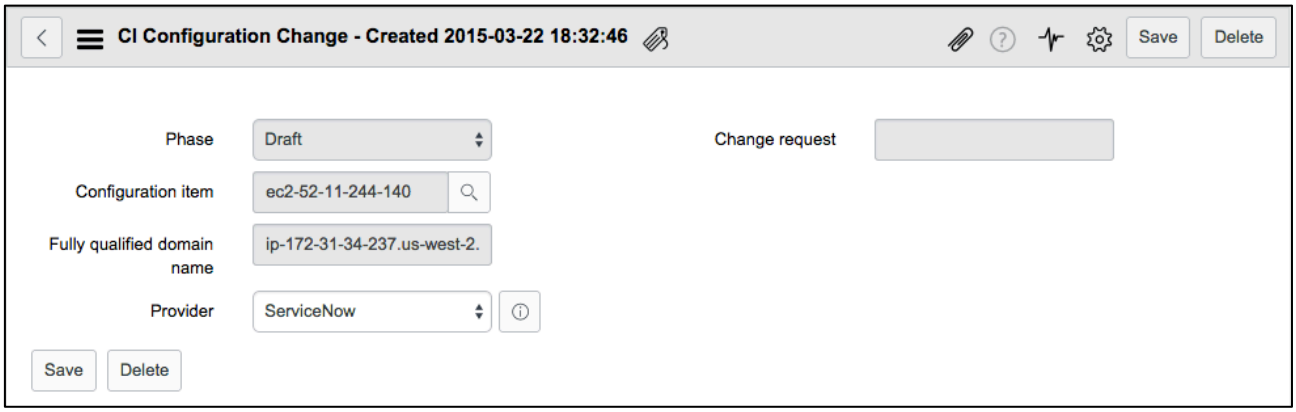
Note: You revisitthis server a couple times –make a note of it! The server record is fairly boring at first; you have not discovered any details about the guest OS. You may find it convenient to navigate to **Configuration > Linux** so that you can easily drag the server record as a bookmark into the power-edge on the left side of your screen.

®2015 ServiceNow, Inc. All rights reserved.

4. On the Linux Server record, click the **Create New Configuration Change** related link.



5. On the new CI Configuration Change form, select **ServiceNow** from the **Provider** drop-down.

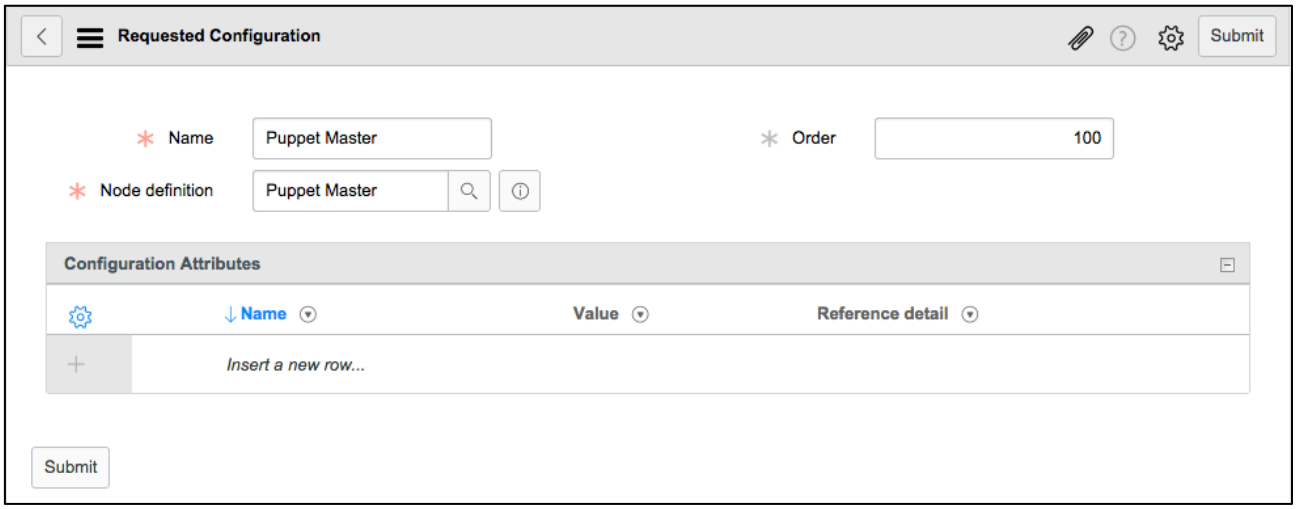


6. Click **Save**.

7. Click **New** in the **Requested Configuration** related list.

®2015 ServiceNow, Inc. All rights reserved.

8. Enter a memorable name (e.g., Puppet Master), and select **Puppet Master** as the **Node definition**.



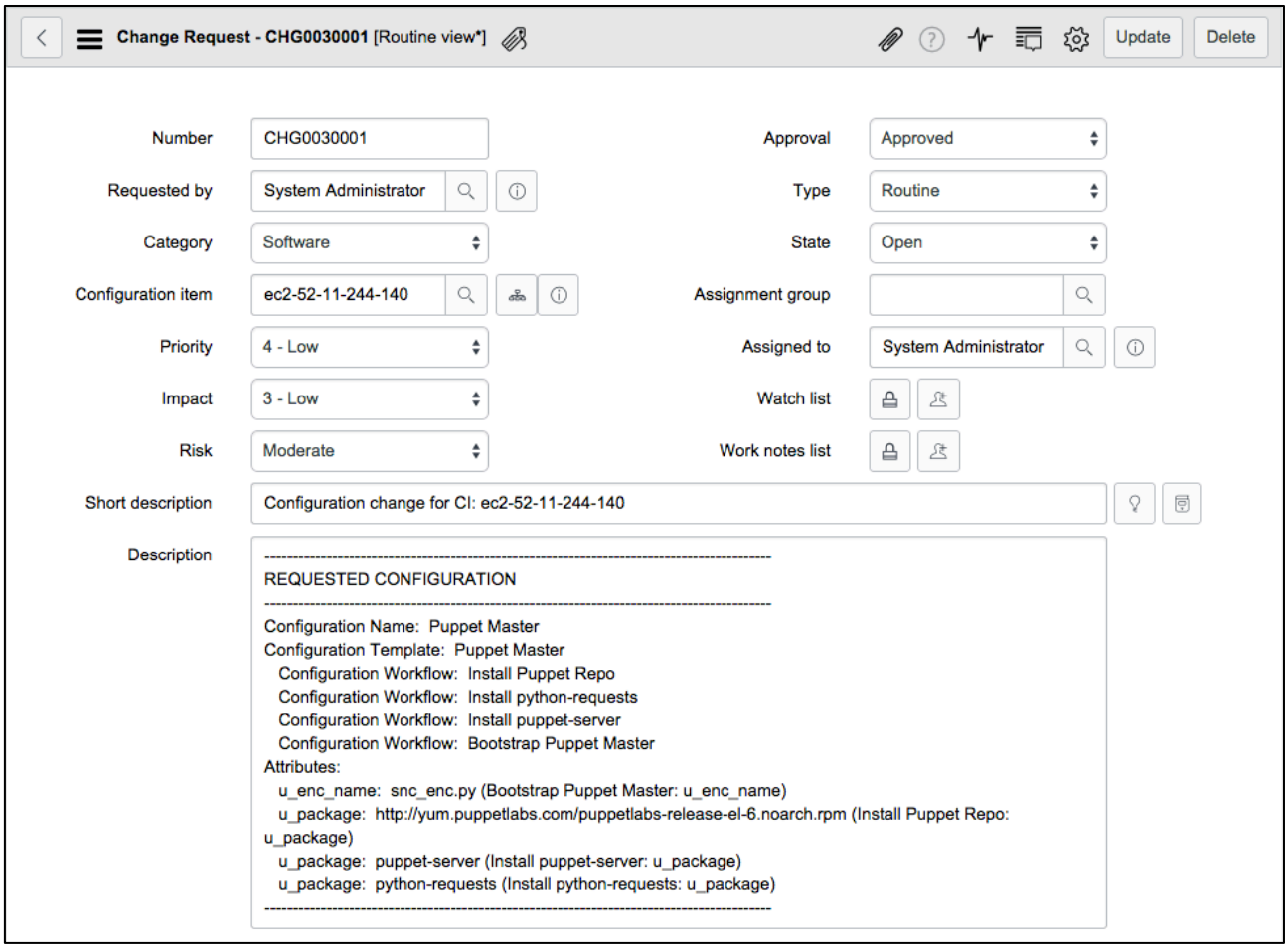
9. Click **Submit**.

®2015 ServiceNow, Inc. All rights reserved.

10. Click the **Request Change** related link on the CI Configuration Change form you just returned to. Click **OK** to proceed on the warning that pops up.



Note: For this lab, the change request you see is automatically approved – this can be configured like any other change request in ServiceNow. Take a moment to examine the details of the change request, in particular the details in the **Description** field.



®2015 ServiceNow, Inc. All rights reserved.

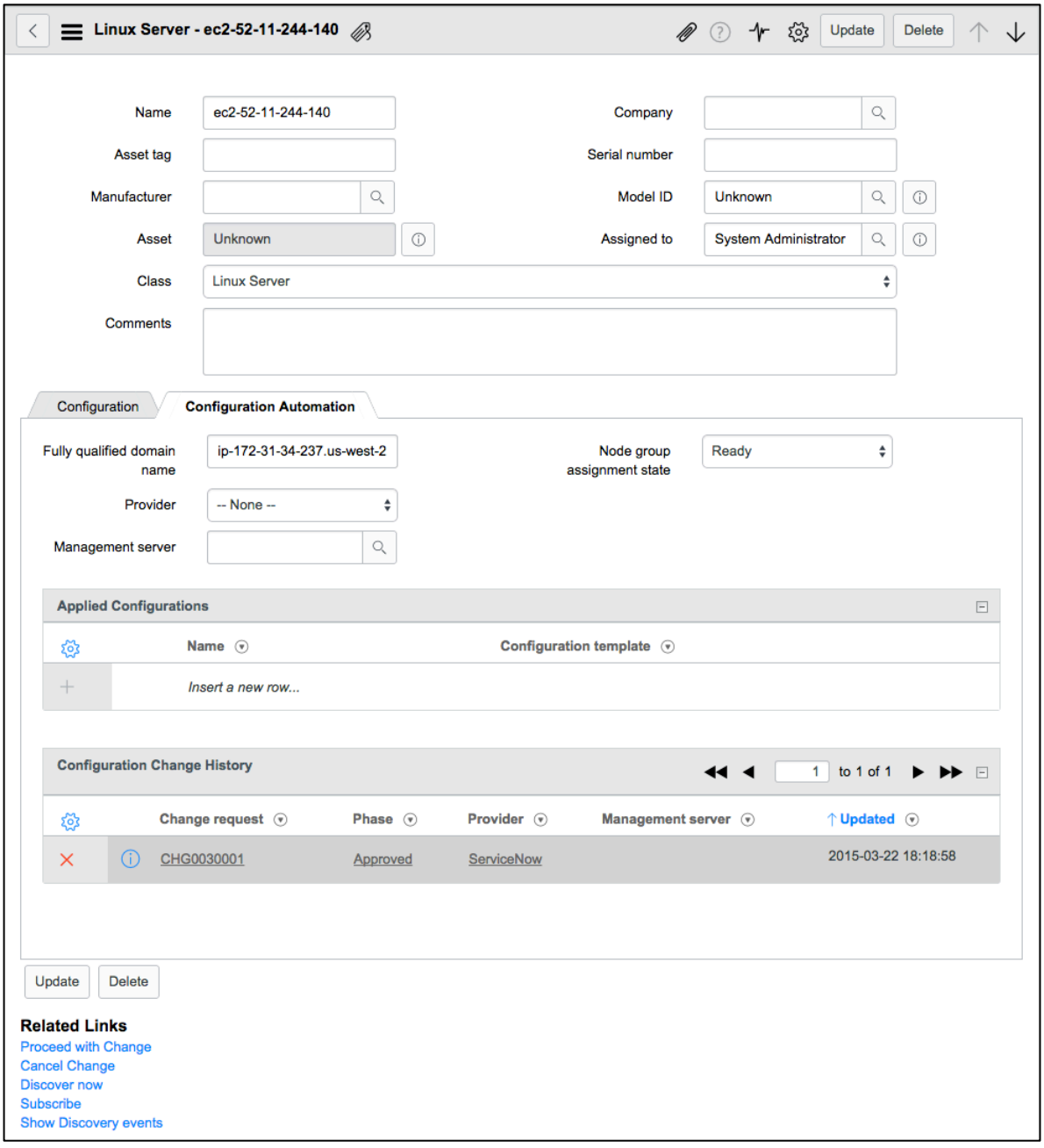
11. Click the info icon next to the configuration item field to return to the Linux server record.

12. On the Linux Server record, click the **Configuration Automation** tab.

    Note: This is where you see configuration details as they are applied and modified. Right now there is just a single approved configuration change shown, but no configuration currently applied.

©2015 ServiceNow, Inc. All rights reserved.

13. Click the **Proceed with Change** related link.



Note: You receive a message that notes that a configuration change is underway.



©2015 ServiceNow, Inc. All rights reserved.

Lab Success Verification

1. Navigate back to the configuration item (the Linux Server). You should see that the configuration change is **Installing** or **Completed**.

2. Report lab status using **Lab Management > Report Lab Progress**.

®2015 ServiceNow, Inc. All rights reserved.

Lab Goal

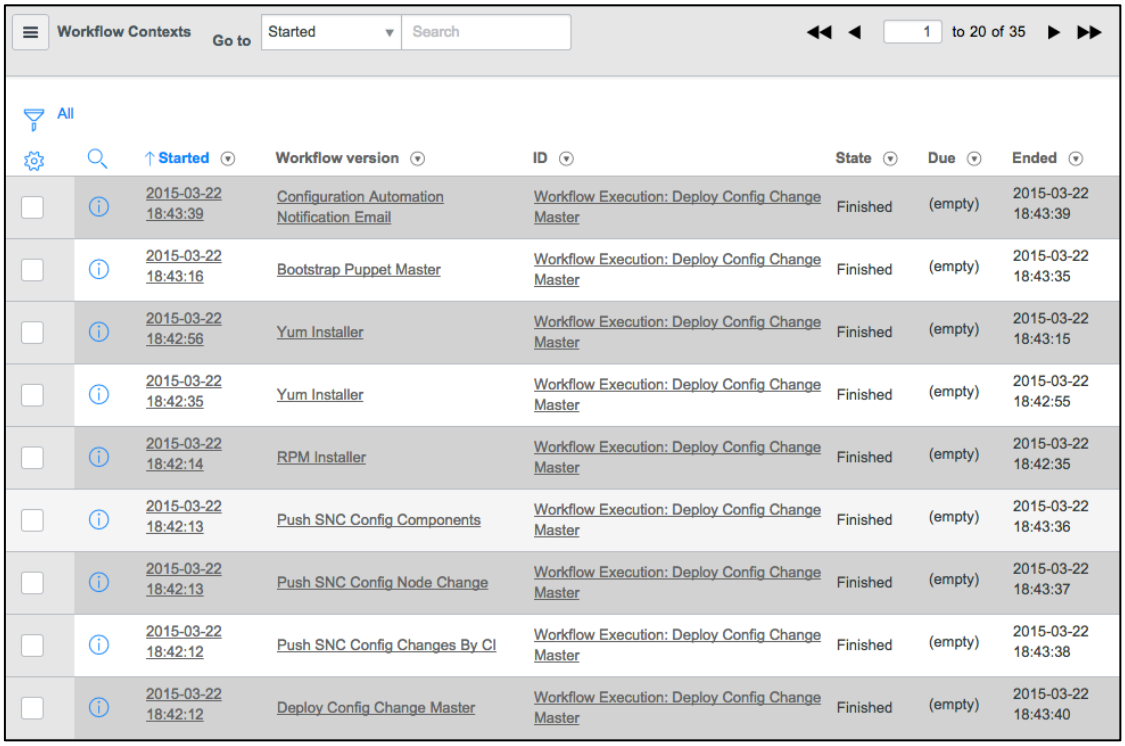
Now that you have spun up a VM, created a configuration template, and applied that configuration template to the guest operating system – it is time to verify that it actually worked as advertised!

Lab 2.3
Verify Config Applied

View Workflow Contexts

1. Navigate to **Workflow > All Contexts**.

2. Be sure to view the records with the newest at the top (you may need to click the **Started** column).



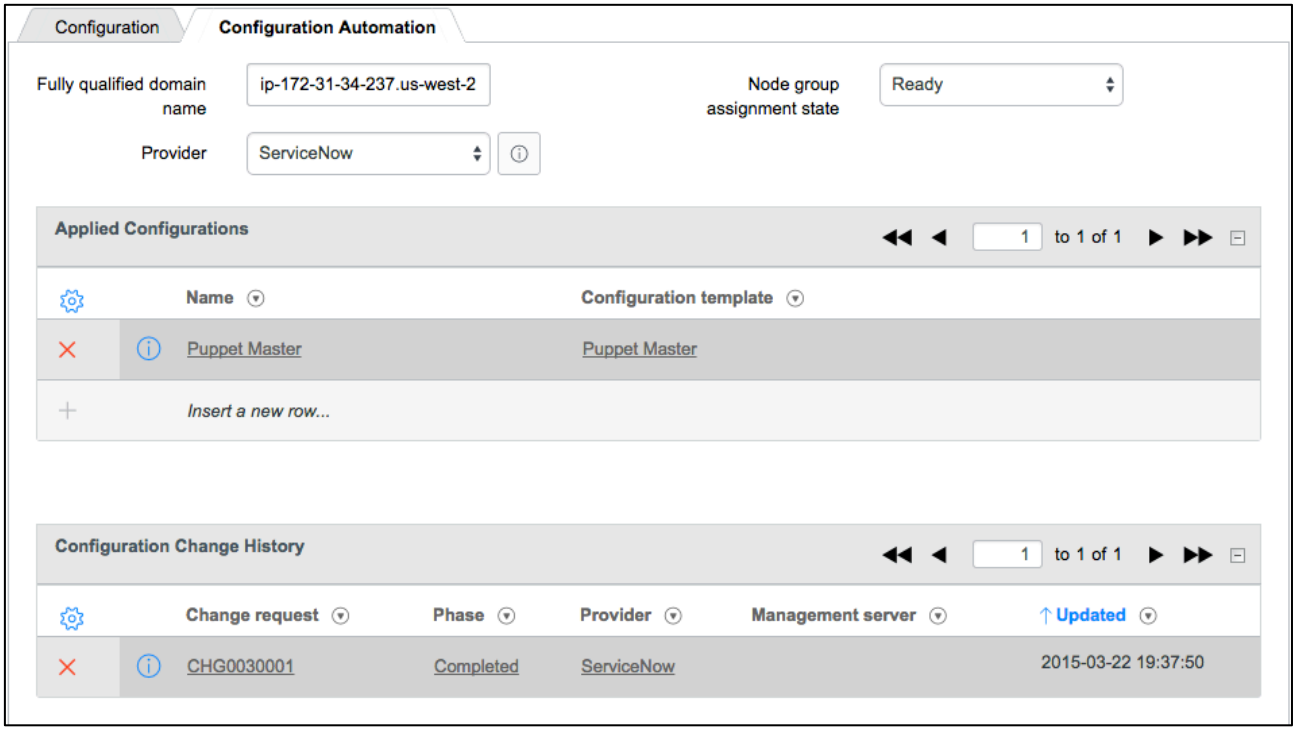
Workflow Contexts | Go to | Started | Search | 1 to 20 of 35 | All

Started	Workflow version	ID	State	Due	Ended
2015-03-22 18:43:39	Configuration Automation Notification Email	Workflow Execution: Deploy Config Change Master	Finished	(empty)	2015-03-22 18:43:39
2015-03-22 18:43:16	Bootstrap Puppet Master	Workflow Execution: Deploy Config Change Master	Finished	(empty)	2015-03-22 18:43:35
2015-03-22 18:42:56	Yum Installer	Workflow Execution: Deploy Config Change Master	Finished	(empty)	2015-03-22 18:43:15
2015-03-22 18:42:35	Yum Installer	Workflow Execution: Deploy Config Change Master	Finished	(empty)	2015-03-22 18:42:55
2015-03-22 18:42:14	RPM Installer	Workflow Execution: Deploy Config Change Master	Finished	(empty)	2015-03-22 18:42:35
2015-03-22 18:42:13	Push SNC Config Components	Workflow Execution: Deploy Config Change Master	Finished	(empty)	2015-03-22 18:43:36
2015-03-22 18:42:13	Push SNC Config Node Change	Workflow Execution: Deploy Config Change Master	Finished	(empty)	2015-03-22 18:43:37
2015-03-22 18:42:12	Push SNC Config Changes By CI	Workflow Execution: Deploy Config Change Master	Finished	(empty)	2015-03-22 18:43:38
2015-03-22 18:42:12	Deploy Config Change Master	Workflow Execution: Deploy Config Change Master	Finished	(empty)	2015-03-22 18:43:40

Note: You should see that several workflows have run successfully (or they may still be executing – give it a couple minutes). Specifically, you should see successful execution of the **RPM Installer**, **YUM Installer** (x2!), **and Bootstrap Puppet Master** workflows. Remember that these are the three workflows associated with the four Configuration Workflow records you added to the Configuration Template earlier. Neat!

©2015 ServiceNow, Inc. All rights reserved.

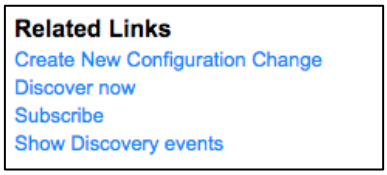
3. Once all configuration workflows complete execution, navigate back to the Linux Server record. You should now see the Puppet Master template listed as an **Applied Configuration**, with the Change Request below marked **Completed**!



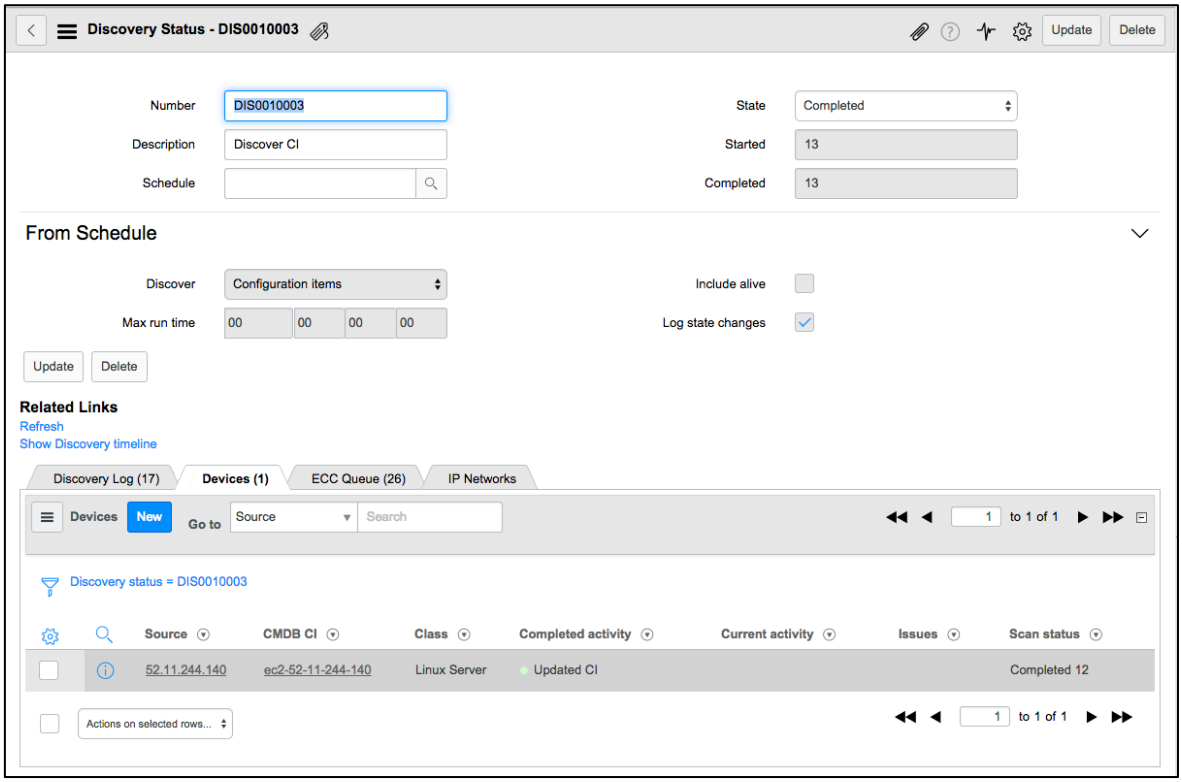
®2015 ServiceNow, Inc. All rights reserved.

Discover Linux Server

1. Click the **Discover now** related link.



2. You are redirected to a new Discovery Status record. Click the record number to observe the discovery run (e.g., DIS0010001). Explore the tabs – here you can see everything Discovery is doing to interrogate the guest operating system of the VM. Click the **Refresh** related link to update the status until Discovery completes.



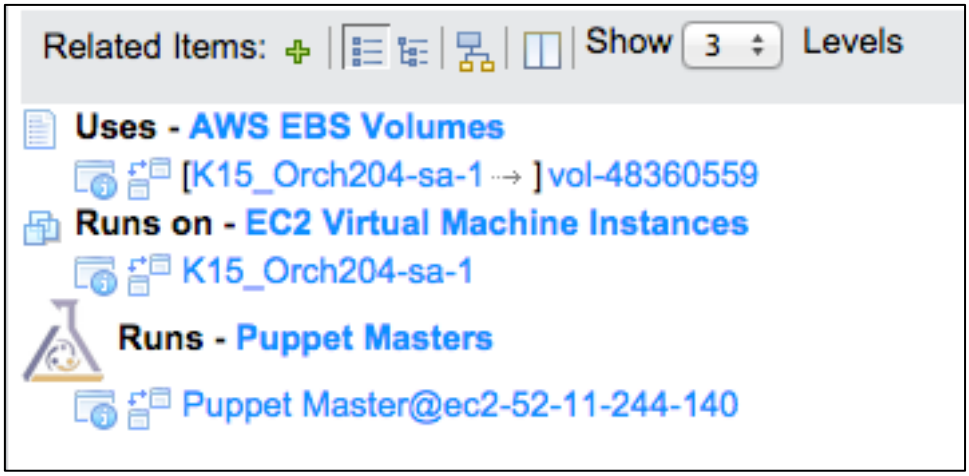
3. After completion, click into the Linux Server by clicking its name in the **CMDB CI** column of the **Devices** tab.

   Note: There are many more details on the Linux Server than before. One key piece of information displayed is a new relationship – visible when you click the **Configuration** tab. You should now see that the server has a **Runs** relationship to a Puppet Master record!

©2015 ServiceNow, Inc. All rights reserved.

Lab Success Verification

1. On the Linux Server record, click the **Configuration** tab. Confirm that there is now a **Runs** relationship to a **Puppet Master**. The Puppet Master record has a name similar to **Puppet Master@ec2-52-11-244-140**.



2. Report lab status using **Lab Management > Report Lab Progress**.

®2015 ServiceNow, Inc. All rights reserved.

Lab Goal

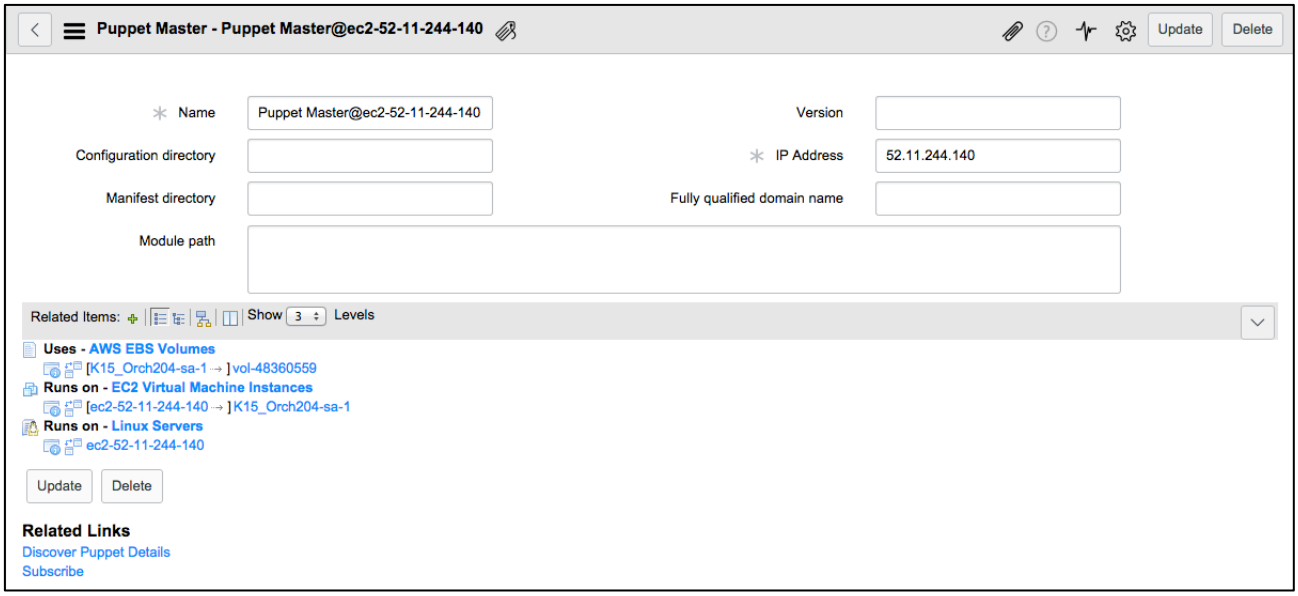
Now take the newly provisioned puppet master and define it as a configuration provider for other systems in the ServiceNow CMDB.

Lab 3.1 Discover new Puppet Master

Discover Puppet Master

1. Navigate to the Linux Server.

2. Click the (e.g.) **Puppet Master@ec2-52-11-244-140** related item to be taken to the Puppet Master record. The record is bare-bones, with just a name, IP address, and a few related items.



©2015 ServiceNow, Inc. All rights reserved.

3. Click the **Discover Puppet Details** related link.



Note: You will not actually be notified by email… and that is OK.

4. Navigate to **Workflow** > **All Contexts.** You should see an active (or finished) **Discover Puppet** workflow. Feel free to open the workflow and examine the discovery steps.

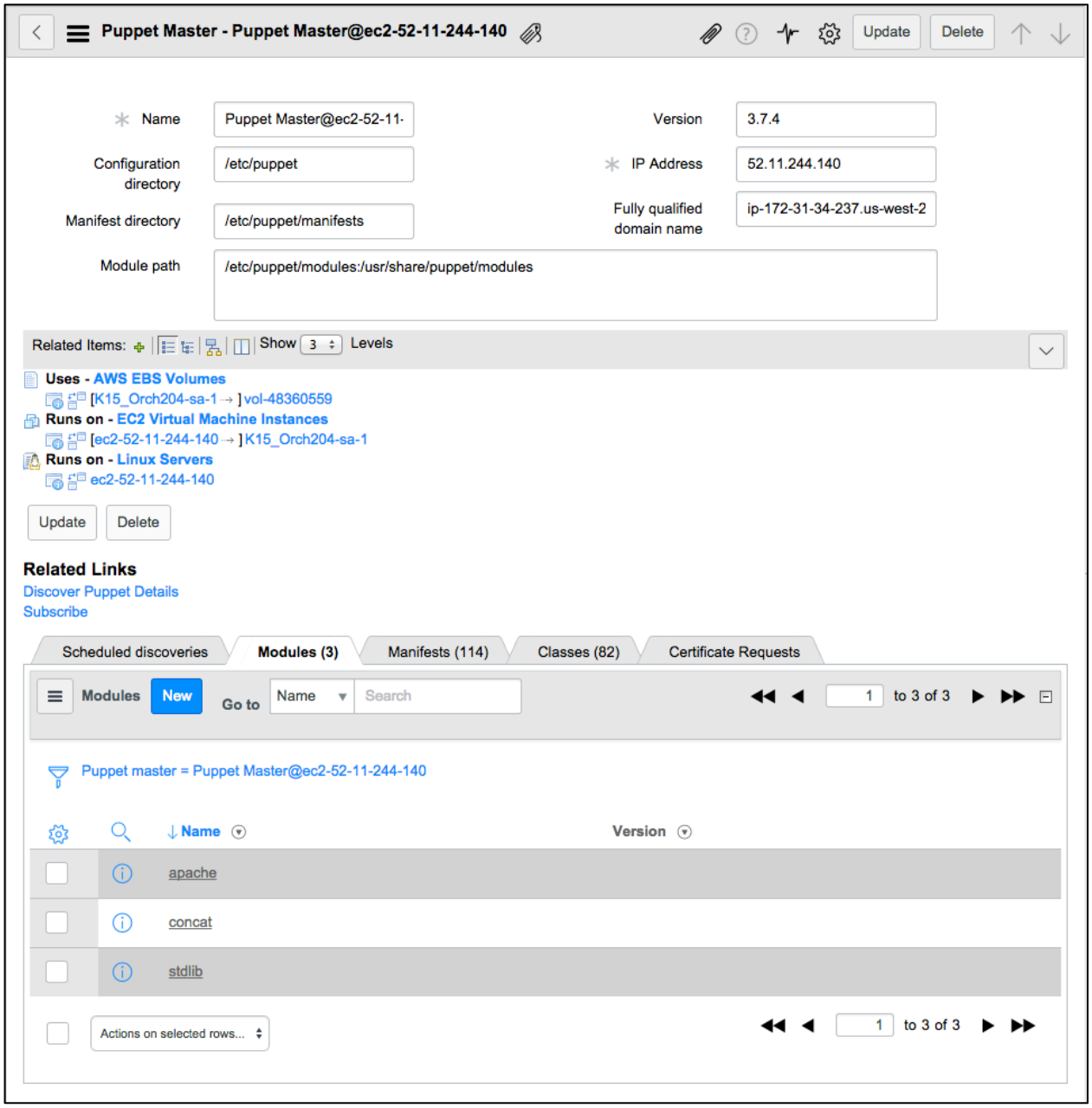
Lab Success Verification

1. Navigate to **Puppet > Puppet Masters** to see the Puppet Master instance (now with its version field populated).



®2015 ServiceNow, Inc. All rights reserved.

2. Click the name of the Puppet Master record.



3. Verify that the Puppet Master record has all visible fields populated, and that the **Modules**, **Manifests**, and **Classes** related lists are populated as shown in the screenshot above.

4. Report lab status using **Lab Management > Report Lab Progress**.

®2015 ServiceNow, Inc. All rights reserved.

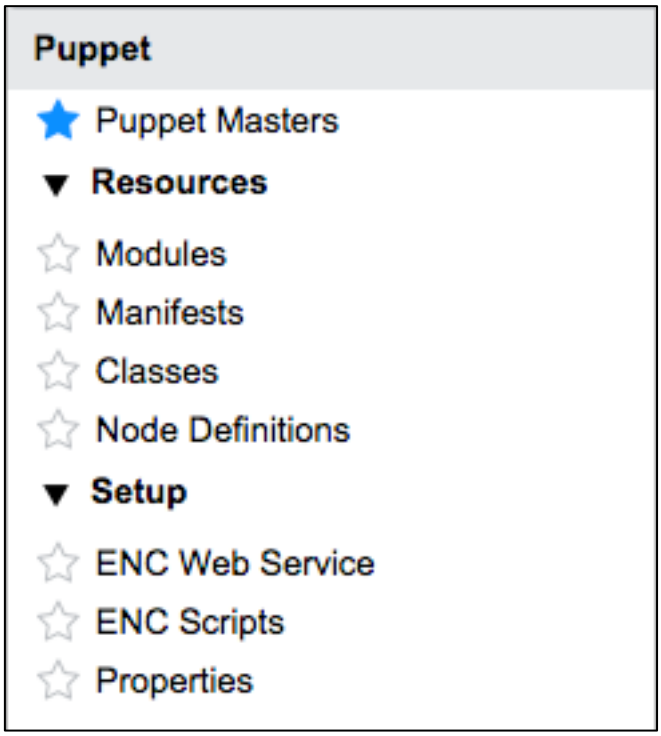
Lab Goal

Now that we have a new puppet master running in EC2, it is time to start putting it to use. The first step is to take advantage of the artifacts exposed by the discovery of this puppet environment to author a new Node Definition that can be applied to other systems in your environment. A Node Definition in puppet is identical in purpose to the Configuration Template authored earlier.

Lab 3.2 Create a Puppet Node Definition

Create a Puppet Node Definition

1. First, notice the artifacts that exist in the Puppet application: there are **Modules** that represent content packages installed in the puppet environment; **Manifests** which are the files containing puppet code within each module; and **Classes** which are consumable artifacts defined by puppet code in manifest files. Classes, and the parameters they define, are what you consume when making **Node Definitions** (created by you, these exist only in ServiceNow).



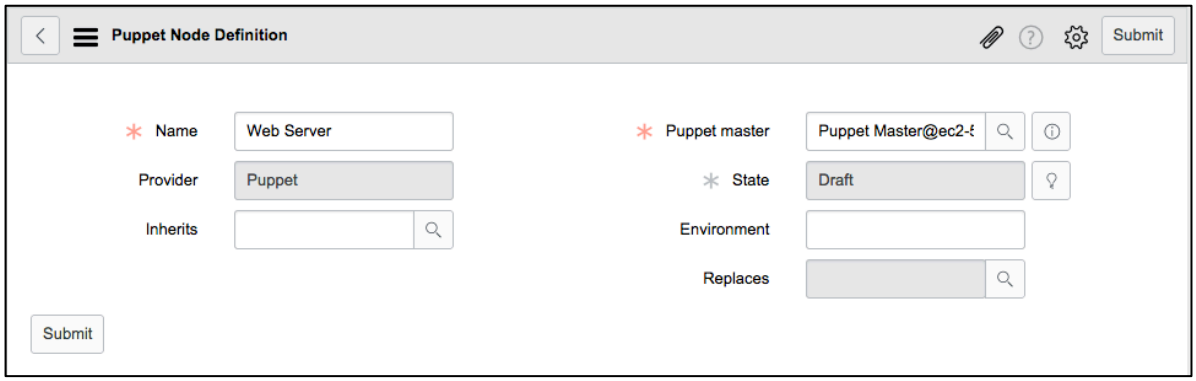
©2015 ServiceNow, Inc. All rights reserved.

2. Navigate to **Puppet > Node Definitions**.

3. Click **New Draft**. All new node definitions, just like configuration templates, must start as a draft and are not available to manage configuration against a system until being published.

   Enter information for the **Node Definition**:

   Name: **Web Server**
   Puppet **master: Puppet Master@ec2-52-11-244-140 (your name will** differ)



4. **Click the hamburger icon, or right**-click the header, a**nd select Save**.

5. Click **New** in the **Class Declarations** related list. The intent is to tell the puppet master that a specific class should be applied to any systems that are bound to this node definition.

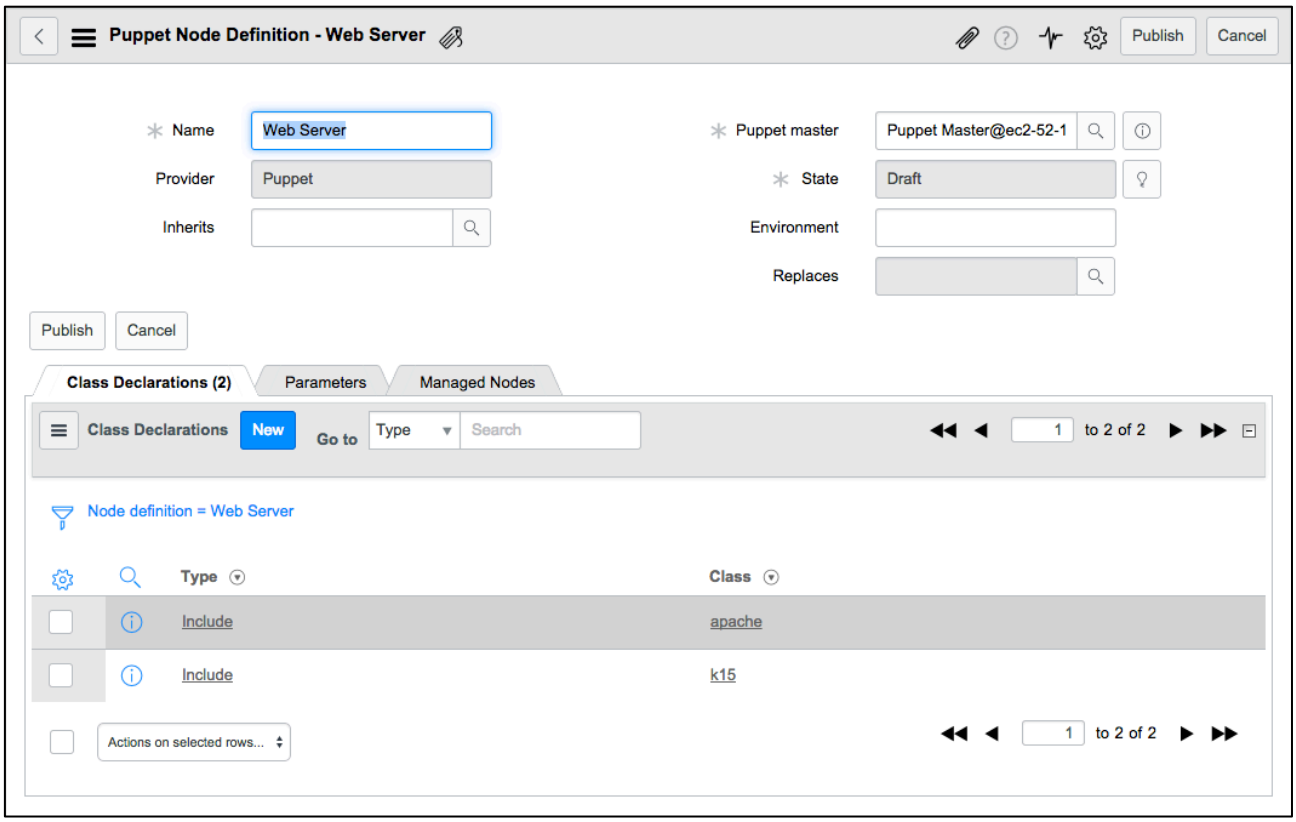
6. Enter **apache** as the Class. Click **Submit**.

7. Click **New** in the **Class Declarations** related list again.

8. Enter **k15** as the Class and click **Submit**.

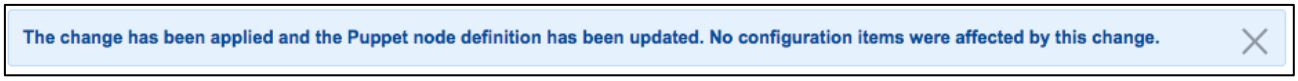
©2015 ServiceNow, Inc. All rights reserved.

9. Click **Publish** on the Node Definition record.

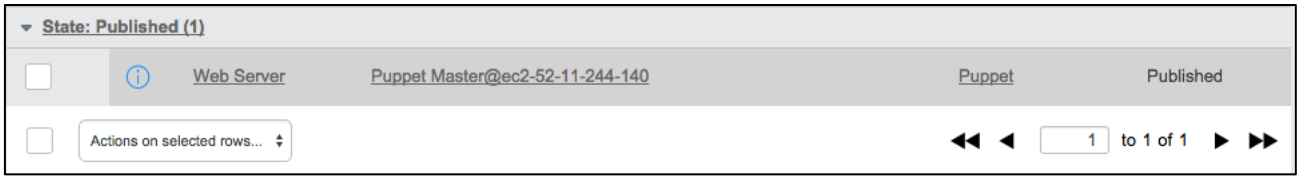


Lab Success Verification

1. You should receive confirmation that the change was applied, but that no configuration items were affected.



2. Navigating to **Puppet > Node Definitions** should show one published node definition, and nothing else (unless you have been playing…).



3. Hold that thought… you are going to save using this aspect of puppet for later!

4. Report lab status using **Lab Management > Report Lab Progress**.

©2015 ServiceNow, Inc. All rights reserved.

Lab Goal

OK, now things are getting interesting. You have spun up a VM and used the ServiceNow configuration automation capabilities to turn that fresh VM into a Puppet Master. Now that you have configured the Puppet Master to be managed through ServiceNow, set up a system to have it control.

Lab 4.1
Spin up a Virtual Machine (again…)

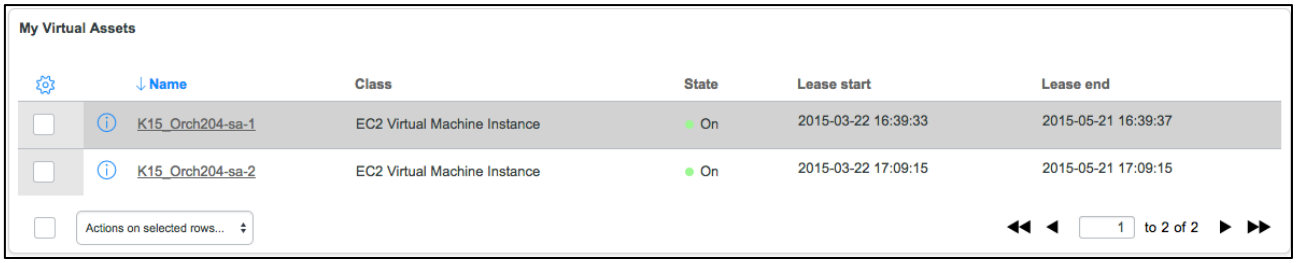
Request a New Virtual Machine

1. Navigate to **Self-Service > Service Catalog**.
2. Select the **Knowledge15 Orchestration 204** catalog item (in the Virtual Resources category).
3. Click **Order Now** to begin provisioning. The Order Status screen confirms that the VM request was approved and scheduled.
4. Navigate to **Self-Service > My Virtual Assets**. You should see a dashboard with the newly provisioned VM shown at the top of the screen. You may need to wait a moment and refresh this page to see your the in an **On** state.

   Note: This is easier the second time through, but if you need a visual aid, just flip back to the first lab.

Lab Success Verification

1. The **My Virtual Assets** portal should show TWO **EC2 Virtual Machine Instance**, each with their **State** set to **On**. You may need to wait a moment and refresh the page to see the second system powered on.



2. Report lab status using **Lab Management > Report Lab Progress**.

®2015 ServiceNow, Inc. All rights reserved.

Lab Goal

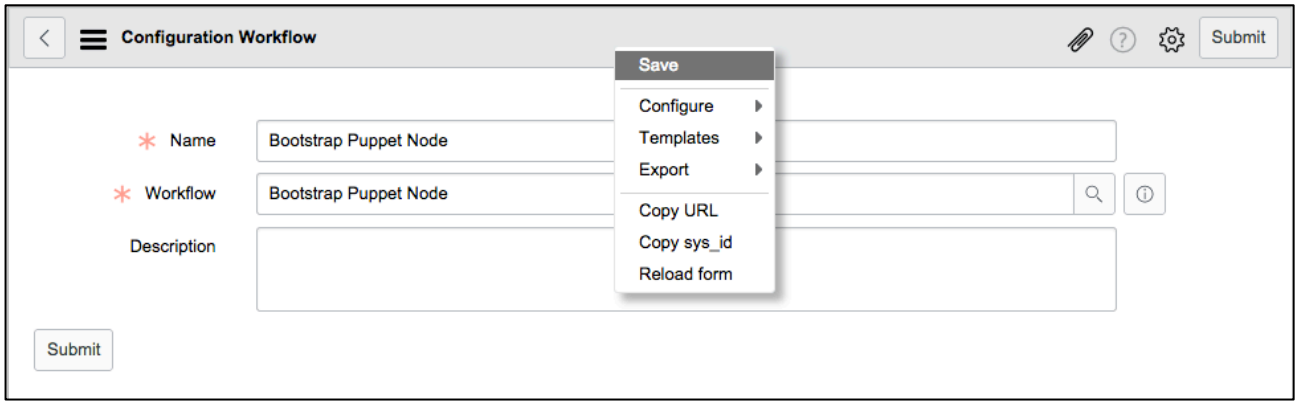
You are getting good at this! You repeat what you did earlier—create a configuration template. But this time, instead of using it to set up a puppet master, use it to set up a puppet node (the system that will be controlled by puppet). Begin with a step skipped earlier: creating the configuration workflow.

Lab 5.1
Create a Config Workflow

Create a New Configuration Workflow

1. Navigate to **Configuration Automation > Configuration Workflows**.
2. Click **New**.

   Enter Name: **Bootstrap Puppet Node** and Workflow: **Bootstrap Puppet Node**. Either click the hamburger to select save, or right-click the header and save.

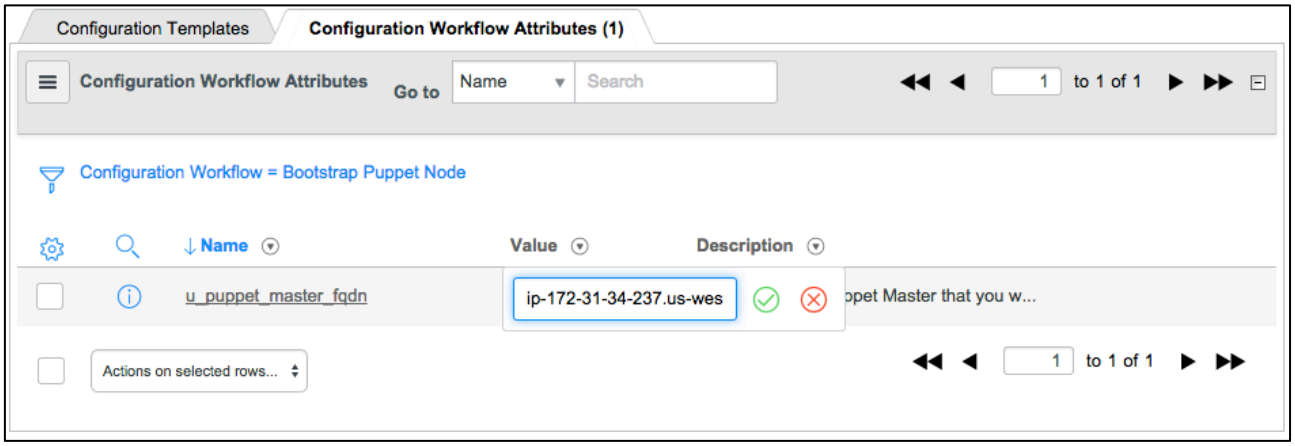


®2015 ServiceNow, Inc. All rights reserved.

3. Click the **Configuration Workflow Attributes** tab. Notice that there is one entry that has no value (yet…). This is how to pass a parameter to the configuration workflow. In this case, you need the fully qualified domain name (FQDN) of the puppet master. Navigate to your puppet master VM and look for the **Fully qualified domain name** field on the **Configuration Automation** tab.

   Note: it is extremely important that you choose the correct FQDN, otherwise subsequent steps do not work!

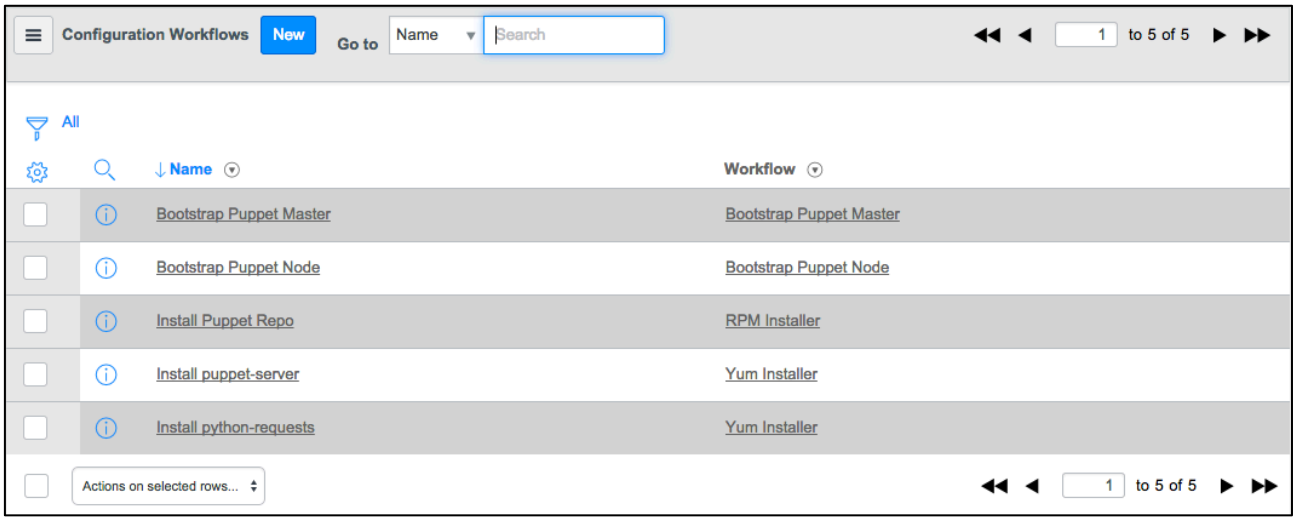
   Copy the appropriate FQDN, and navigate back to **Configuration Automation > Configuration Workflows.** Select **Bootstrap Puppet Node**. On the **Configuration Workflow Attributes** tab, double-click the form row below the **Value** field label to edit in the list. Paste in the FQDN of the puppet master and save or update the record.



®2015 ServiceNow, Inc. All rights reserved.

Lab Success Verification

1. You should now have five **Configuration Workflows** defined.



2. Report lab status using **Lab Management > Report Lab Progress**.

®2015 ServiceNow, Inc. All rights reserved.

Lab Goal

OK, now you are back to familiar ground: creating a configuration template. This time instead of bootstrapping a puppet master, you want ServiceNow to be able to bootstrap new puppet nodes that are coming into your environment. Specifically, you want them to talk to the new puppet master to get their configuration. You could do this by defining a template that talks to a specific master… but that would not be much fun now, would it?

Lab 5.2 Create a Config Template (again…)

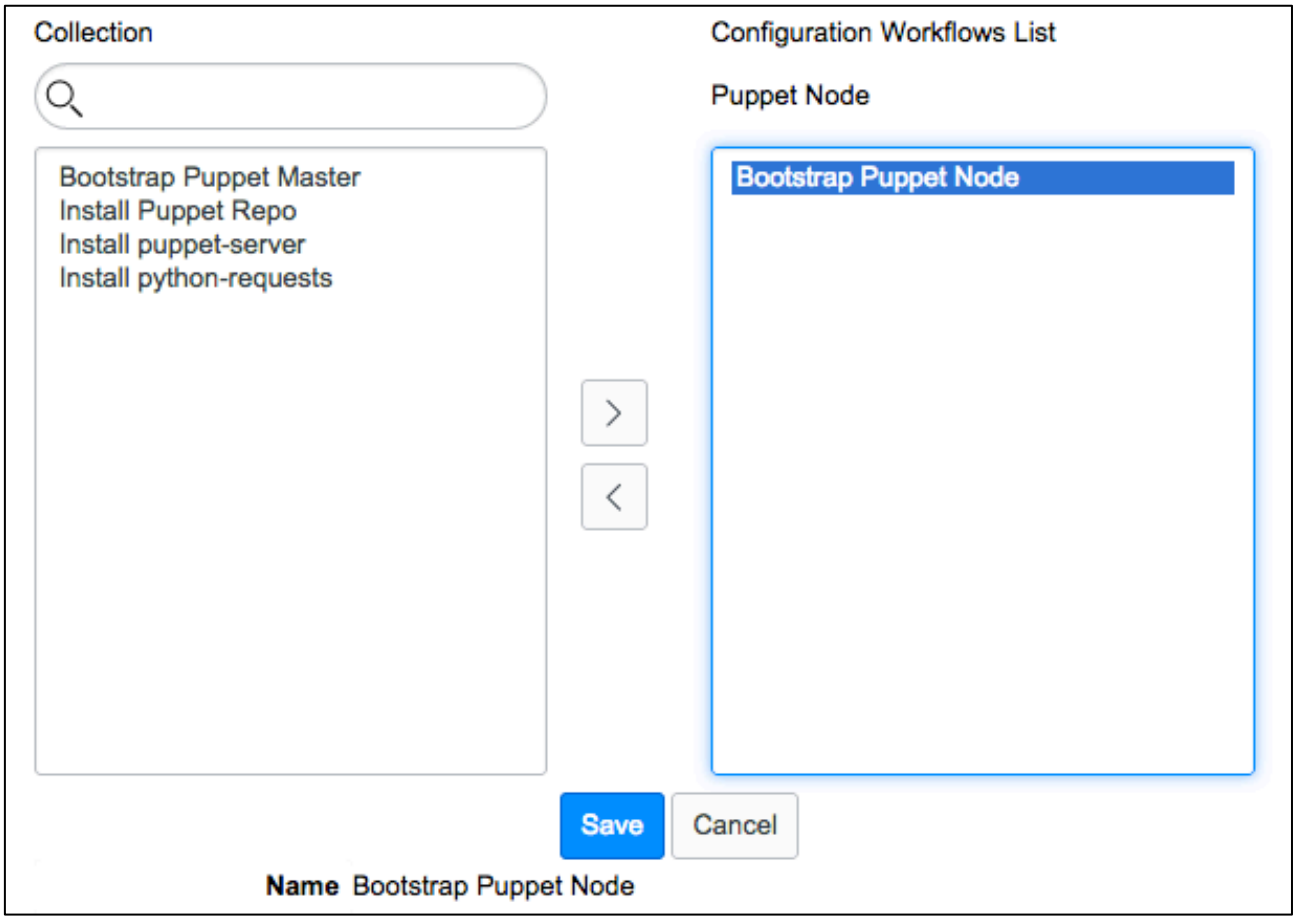
Create a New Configuration Template

1. Navigate to **Configuration Automation > Configuration Templates**.
2. Click **New Draft**.
3. Enter a Name of **Puppet Node**, then hamburger/right-click, and **Save** the record.



©2015 ServiceNow, Inc. All rights reserved.

4. In the **Configuration Workflows** related list, click **Edit**, double-click **Bootstrap Puppet Node** to move it to the right column, and click **Save**.

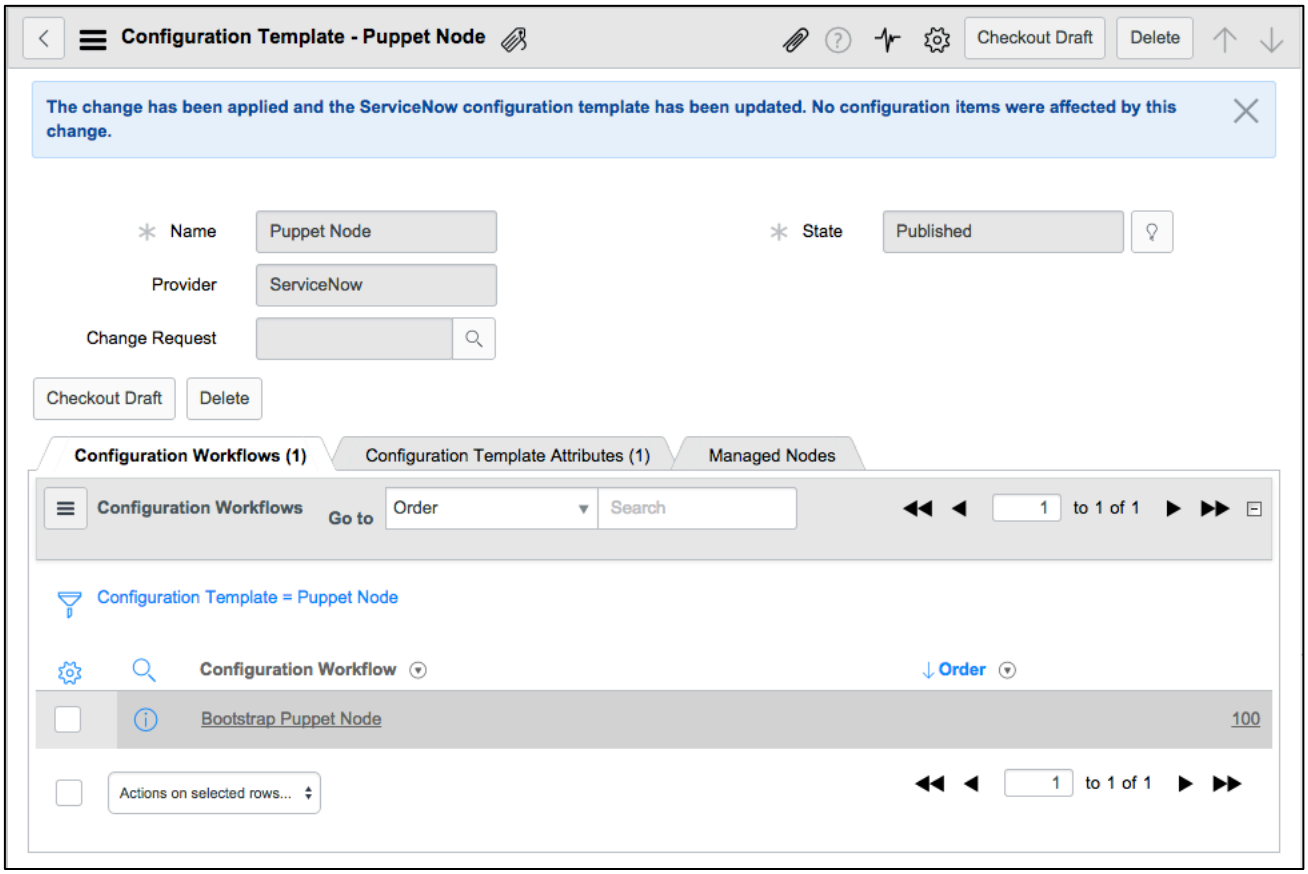


5. Back on the Configuration Template, click Publish.

©2015 ServiceNow, Inc. All rights reserved.

Lab Success Verification

1. You should now have a complete published **Configuration Template** that uses the newly created **Configuration Workflow**.



2. Report lab status using **Lab Management > Report Lab Progress**.

©2015 ServiceNow, Inc. All rights reserved.

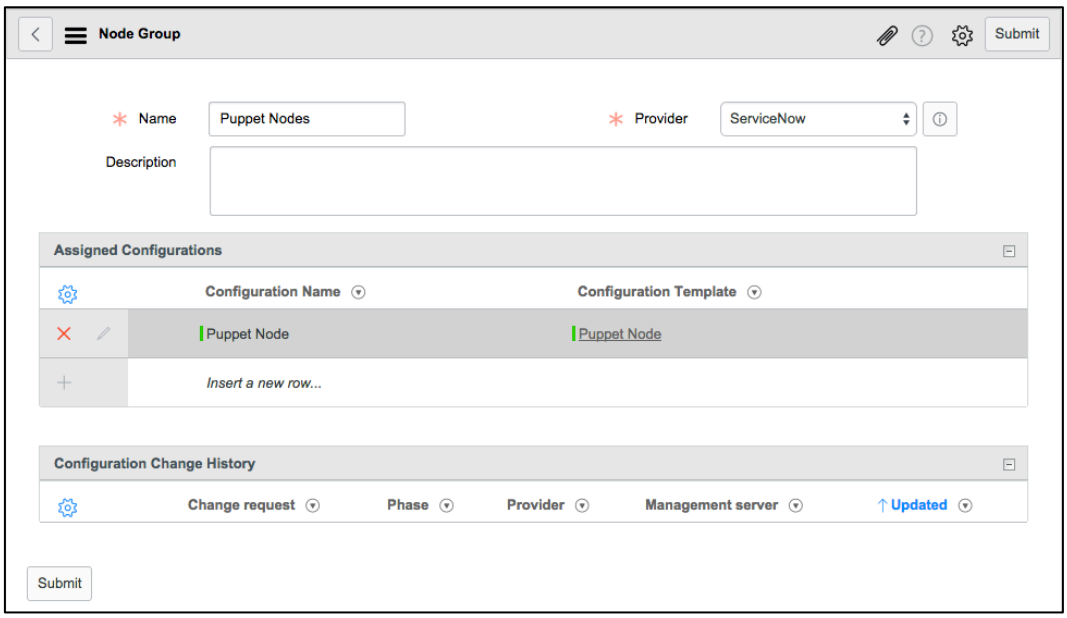
Lab Goal

Before, you manually assigned a configuration template to a specific system. But what do you do in a more real-world scenario where you may have tens or hundreds of systems being spun up? Node groups and assignment rules to the rescue! Node groups allow you to define a configuration that is applied to many systems rather than just one. Assignment rules allow you to automate the process of joining new (or existing) systems to the node group. In the end, this leaves you with fully automated system onboarding.

Lab 6.1 Create Assignment Rules

Create ServiceNow-Managed Node Group

1. Navigate to **Configuration Automation > Node Groups**.
2. Click **New**.
3. Enter Name: **Puppet Nodes** and Provider: **ServiceNow**.
4. In the **Assigned Configurations** embedded list, double-click to insert a new row and enter Configuration Name: **Puppet Node** and Configuration Template: **Puppet Node**. You can get more creative with the names. Click **Submit**.

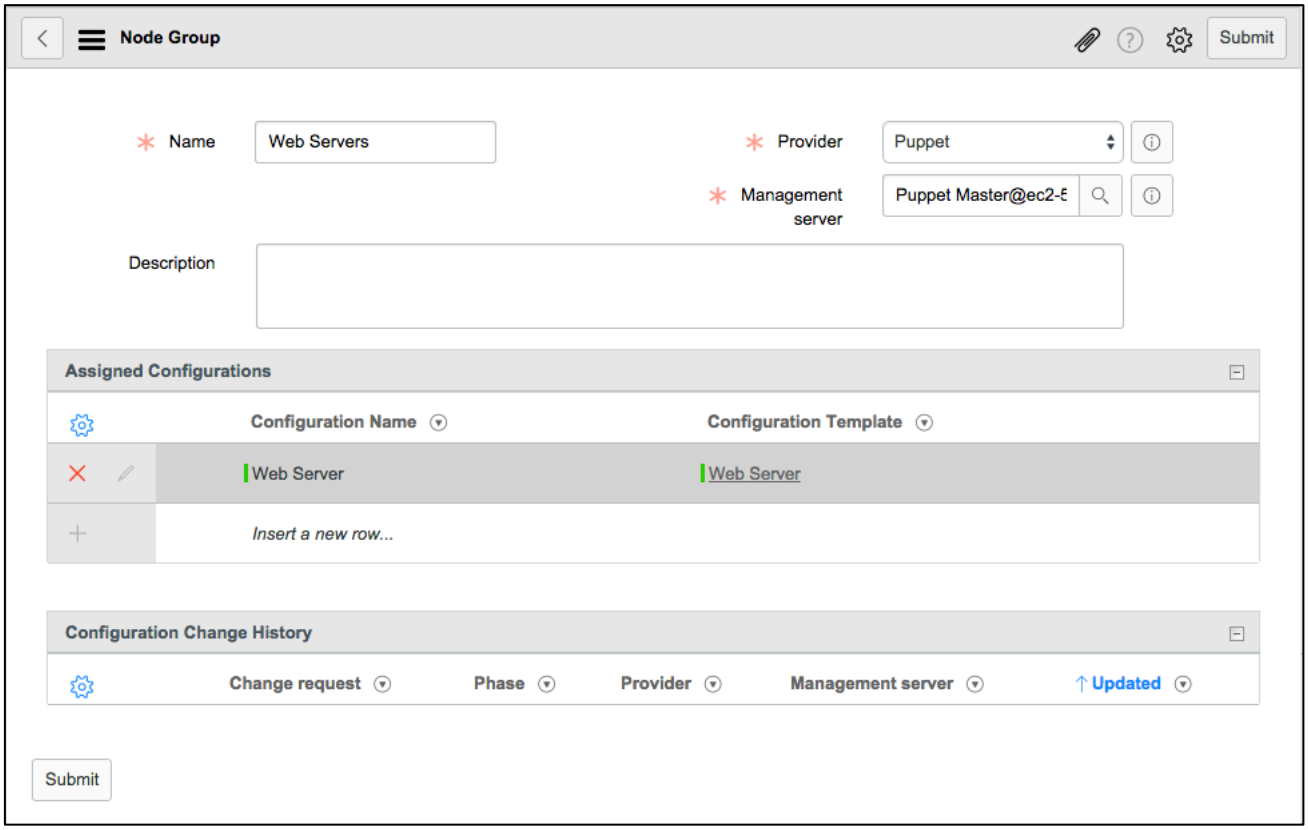


©2015 ServiceNow, Inc. All rights reserved.

Create Puppet-Managed Node Group

Note: Remember that Web Server puppet node definition you made earlier? Now put it to use!

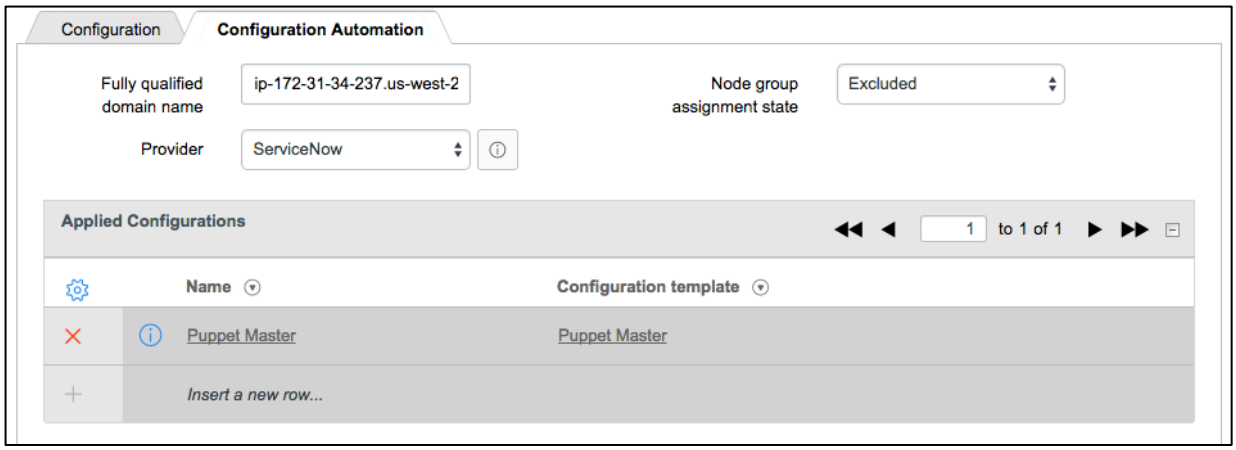
1. Navigate to **Configuration Automation > Node Groups**.
2. Click **New**.
3. Enter Name: **Web Servers**, Provider: **Puppet**, and Management server: **Puppet Master@ec2-52-11-244-140** (replace with the name of your puppet master).
4. In the **Assigned Configurations** embedded list, double-click to insert a new row and enter Configuration Name: **Web Server** and Configuration Template: **Web Server**. Click **Submit**.



©2015 ServiceNow, Inc. All rights reserved.

Protect the Puppet Master

1. Navigate to the Linux Server that runs your Puppet Master.
2. Click on the **Configuration Automation** tab.
3. Set Node group assignment state to **Excluded**. Click **Update**.



Note: Because you are going to have the assignment rules apply node definitions automatically (rather than being subject to change approval), it is important to exclude configuration items to which you do not want to apply a new configuration automatically.

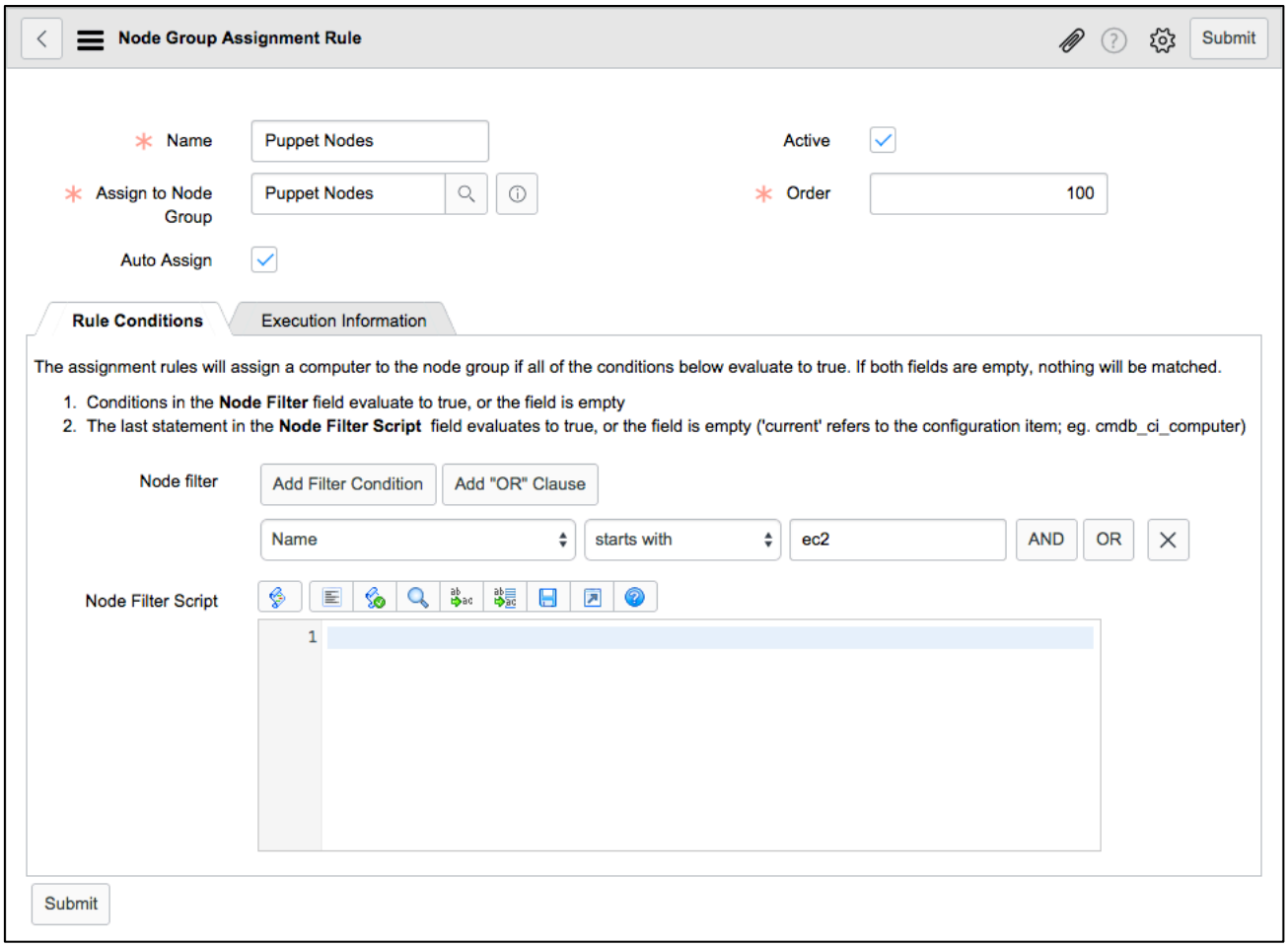
©2015 ServiceNow, Inc. All rights reserved.

Create Puppet Node Assignment Rule

1. Navigate to **Configuration Automation > Assignment Rules**.

2. Click **New**.

3. Enter Name: **Puppet Nodes**, Assign to Node Group: **Puppet Nodes**, and set Auto Assign to **True** (checked). On the **Rule Conditions** form section, create a simple filter that will match any new node that is provisioned, such as **Name** -> **starts with** -> **ec2**.



4. Click **Submit**.

©2015 ServiceNow, Inc. All rights reserved.

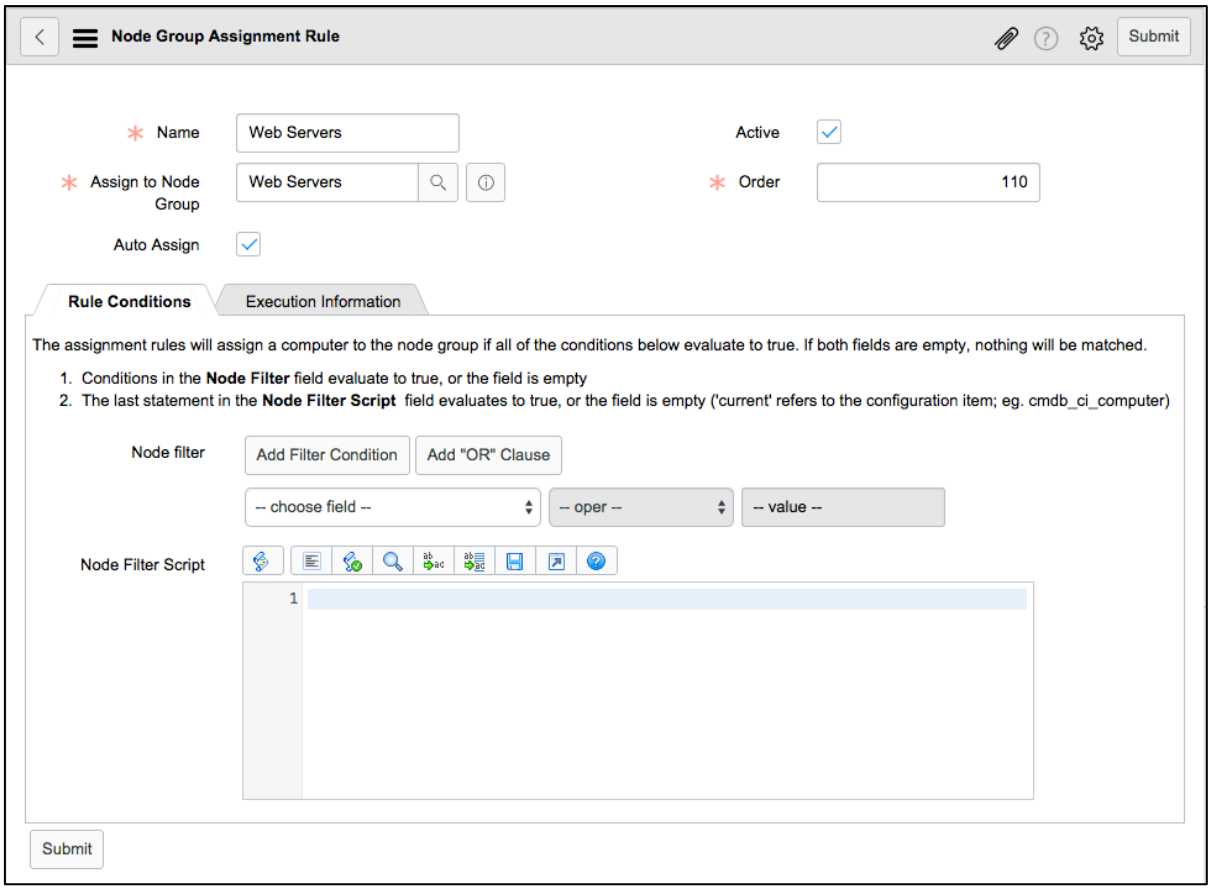
Create Web Server Assignment Rule

That was fun! Now do it again… but different.

1. Navigate to **Configuration Automation > Assignment Rules**.

2. Click **New**.

3. Enter Name: **Web Servers**, Assign to Node Group: **Web Servers**, and set Auto Assign to **True** (checked). On the **Rule Conditions** form section, create a simple filter that will match any new node that is provisioned, such as **Name** -> **starts with** -> **ec2**.



4. Click **Submit**.

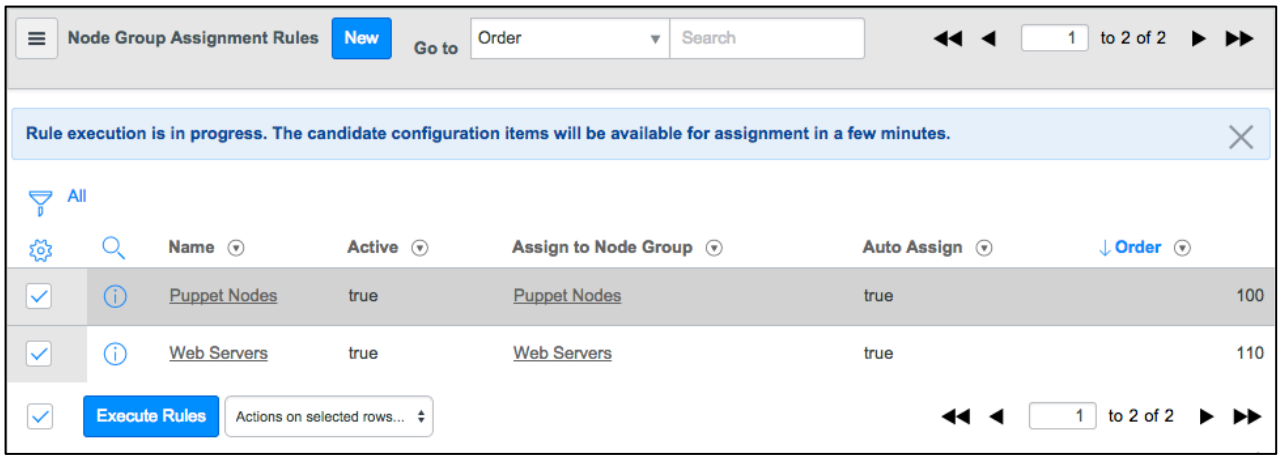
   Note: You may notice that the **Order** field was automatically made higher than the last rule created. This means it will run *after* the rule created first. The idea here is to use both ServiceNow *and* Puppet to manage the configuration of a certain class of systems, but you must take a layered approach.

©2015 ServiceNow, Inc. All rights reserved.

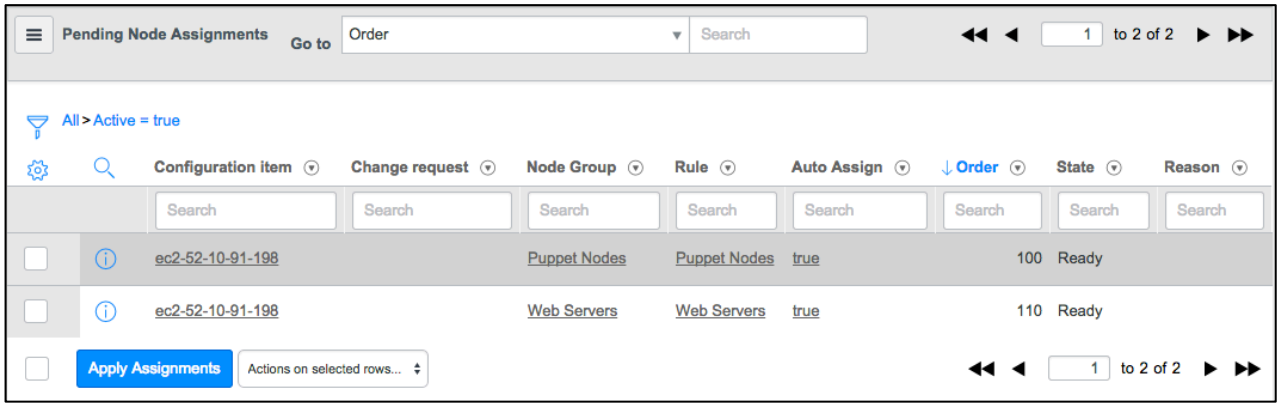
Aaaaaaand Action!

1. You are probably already there, but just in case you wandered off, navigate to **Configuration Automation > Assignment Rules**.

2. Mark the check box by both rules and click **Execute Rules**.

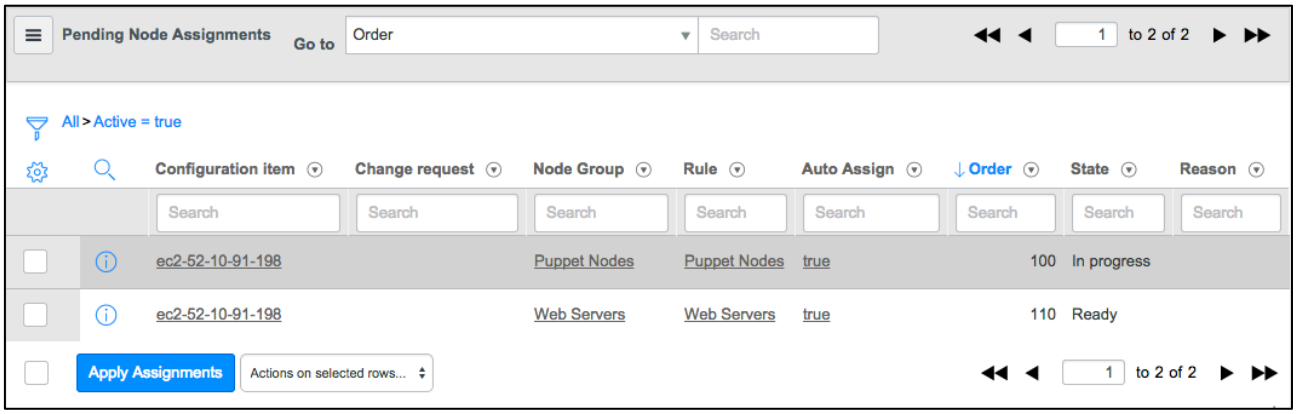


3. Navigate to **Configuration Automation > Pending Node Assignments**. It may take a moment, but note that two records appear representing the two assignments to be processed.

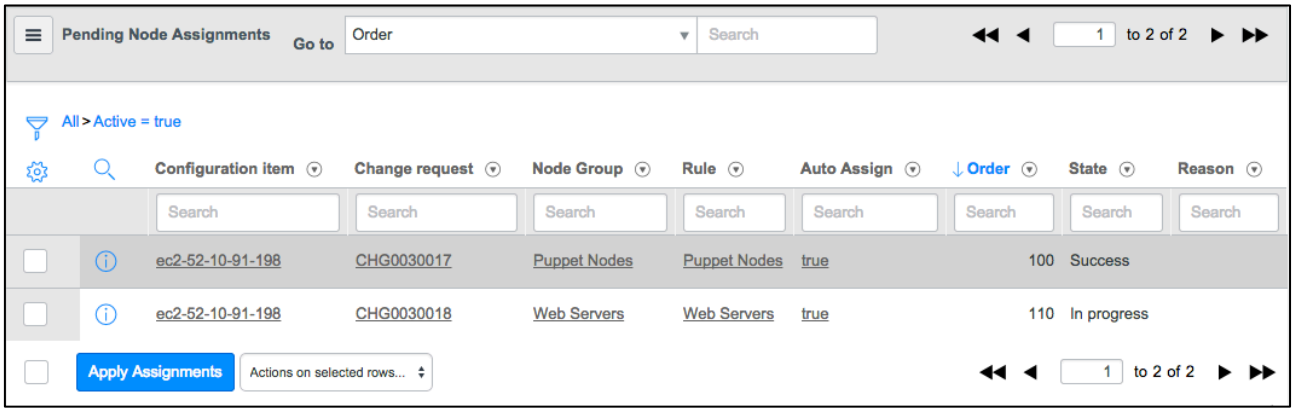


©2015 ServiceNow, Inc. All rights reserved.

4. It will take a moment, but refresh the list to see the first assignment move to **In progress**.



After being successfully applied, the second assignment moves to **In progress** as well.

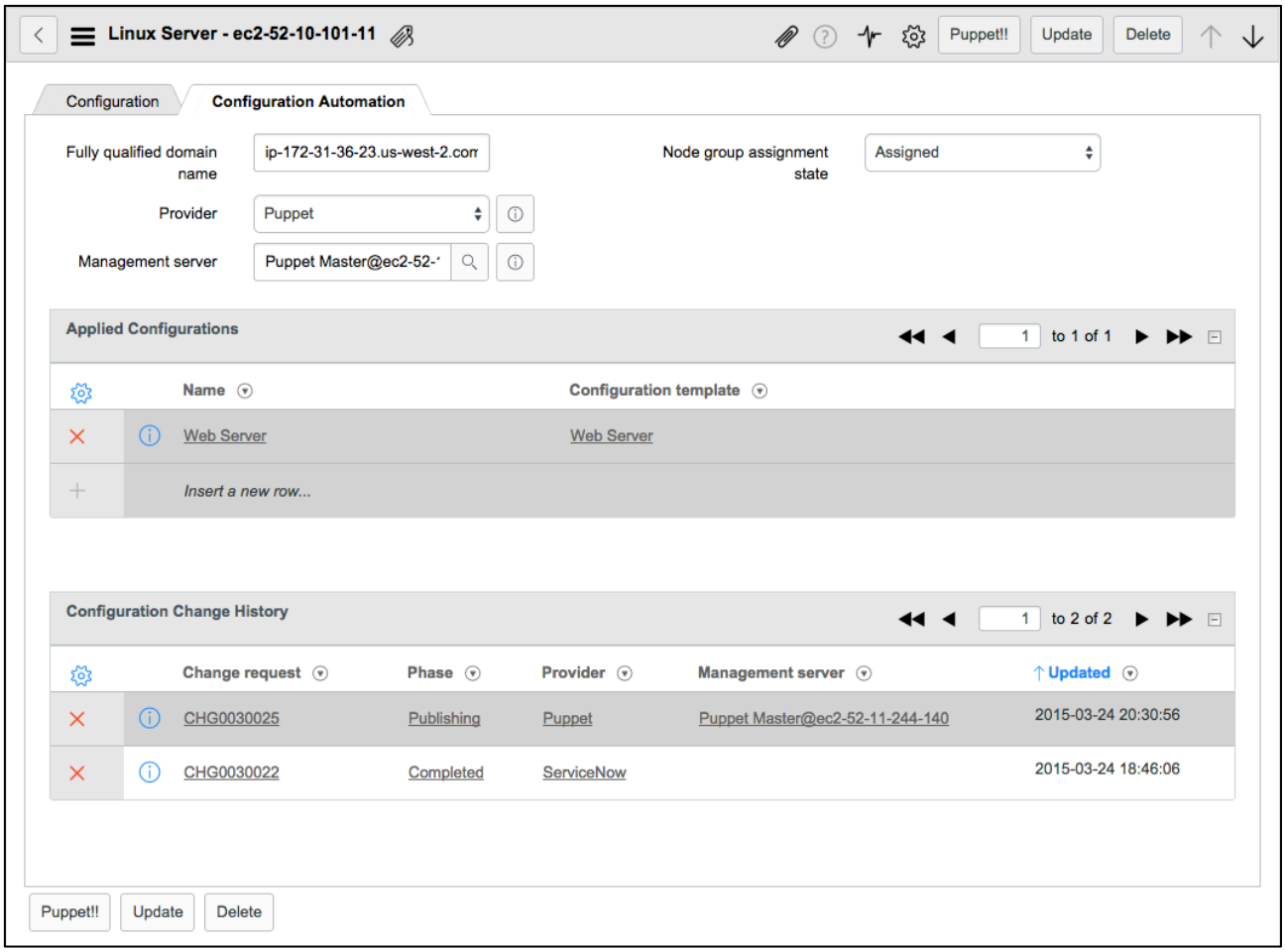


Note: You may see the second assignment temporarily move to an **Error** state. This occurs if the scheduler attempts to begin before the previous assignment has been completed. It starts up as expected in a moment.

5. Once the second assignment is marked **In progress**, click on the **Configuration Item** to go to the Linux Server form for (e.g.) **ec2-52-10-91-198**.

©2015 ServiceNow, Inc. All rights reserved.

6. On the **Configuration Automation** tab of the **Linux Server** form, notice a record in the **Configuration Change History** embedded list that has its Phase set to **Publishing**. This remains until the puppet node "phones home" to the puppet master. A UI Action is included to force this action on-demand: click the **Puppet!!** button at the top or bottom of the form.



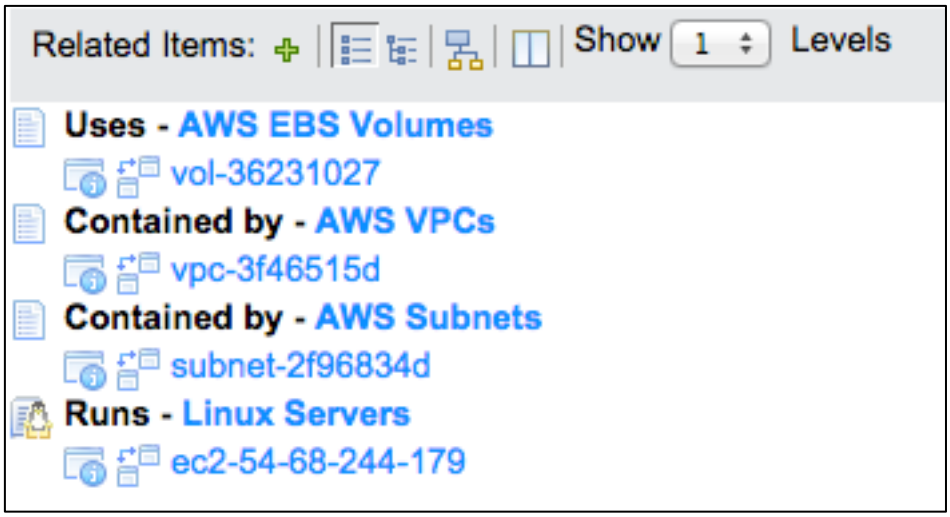
7. Wait a moment and reload the form until you see the record Phase change to **Completed**.

©2015 ServiceNow, Inc. All rights reserved.

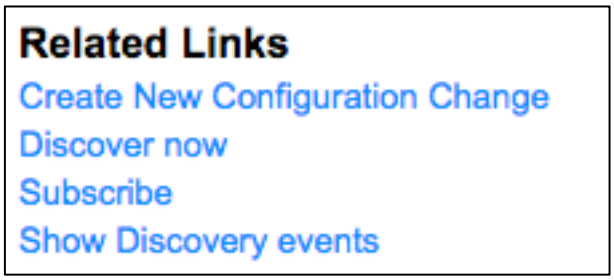
Discover the New Virtual Machine

1. Navigate to **Self Service > My Virtual Assets**.

2. Click into the newly provisioned VM (e.g., **K15_Orch204-sa-2**). Click the Linux Server with which it has a **Runs** relationship in the Related Items list (e.g., **ec2-54-68-244-179**).



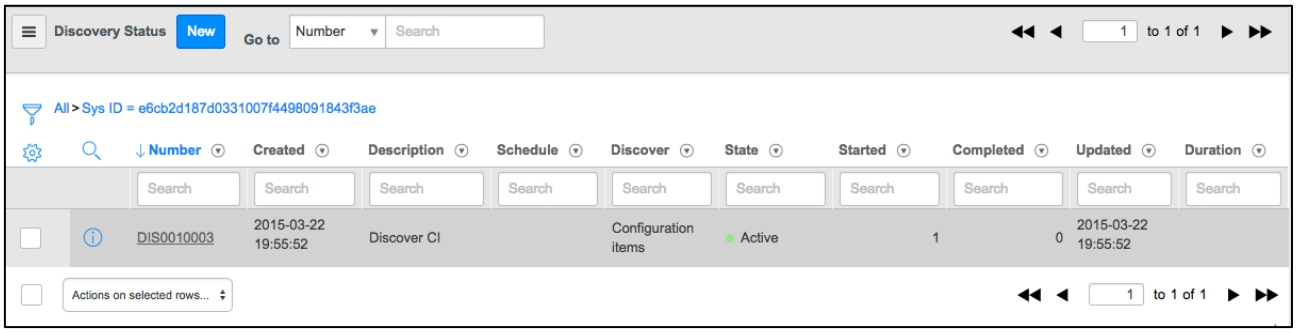
3. Click the **Discover now** related link.



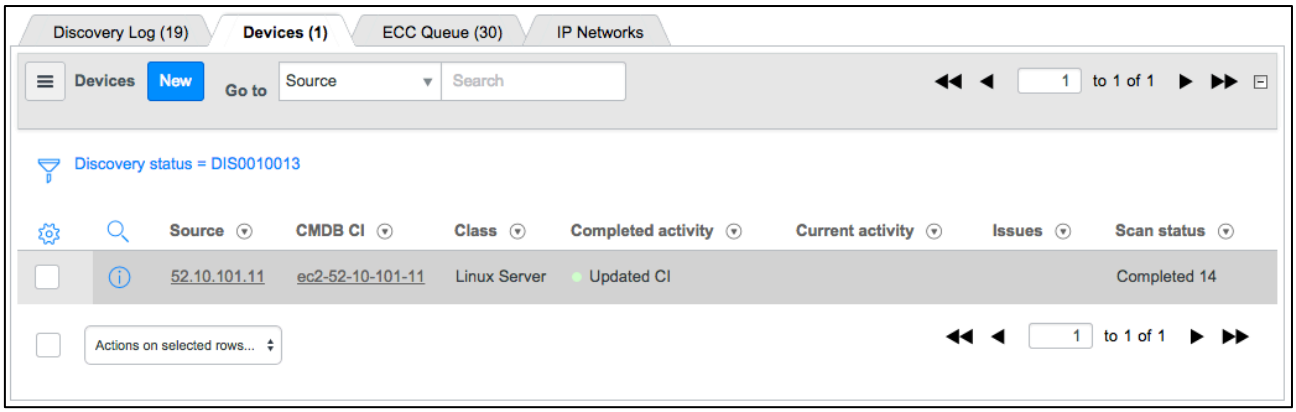
®2015 ServiceNow, Inc. All rights reserved.

Lab Success Verification

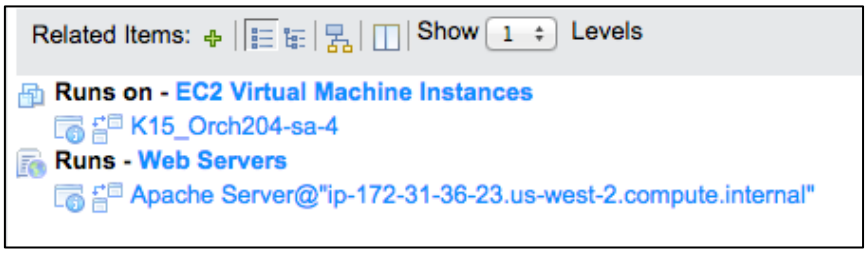
1. You are redirected to see a new **Discovery Status** record with a state of **Active**.



2. Once discovery completes, click into the **CMDB CI** name (e.g. **ec2-52-10-101-11**).



3. Click the **Configuration** tab to show **Related Items**. You should see a new related item: a Runs – Web Servers relationship showing (e.g.) **Apache Server@ip-172-31-36-23.us-west-2.compute.internal**.



4. Copy the **IP Address** value from the **Configuration** tab and paste it into the location of a new web browser window or tab. You should move to the newly loaded website that is running on your VM!

©2015 ServiceNow, Inc. All rights reserved.

Congratulations!!

You just used ServiceNow to spin up two virtual machines, deploy one of them as a puppet master, deploy the other as a puppet node managed by that master, and use this relationship to provision it as a web server. All of this was accomplished without ever having to leave the ServiceNow instance.

©2015 ServiceNow, Inc. All rights reserved.