knowledge14

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Lab Guide

Orchestration 204: Configuration Automation with Puppet

Jimmy Yuan

Ben Yukich

Lab instance: https://**<<name>>**.lab.service-now.com

Login / Password:

admin / Knowledge14

Lab Goal

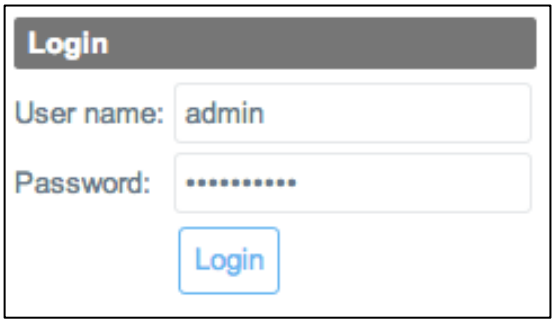
Core to ServiceNow's integration with Puppet is a Configuration Item (CI) representation of nodes that Puppet is managing. The CI is ultimately where Puppet obtains information about what configuration to apply to the node. In an Enterprise, the CMDB is updated through tools such as ServiceNow Discovery. In this lab, Discovery will find a new node that will be configured by Puppet using your lab ServiceNow instance as Puppet's External Node Classifier.

Lab 1
Managed Nodes

Log on to Your Lab Instance

Your lab manual should supply you with your own personal ServiceNow instance to complete the following lab. The instance has some pre-configurations and update sets applied to make the steps in this lab work.

1. Log into your instance, using the username **admin** and the password **Knowledge14**.



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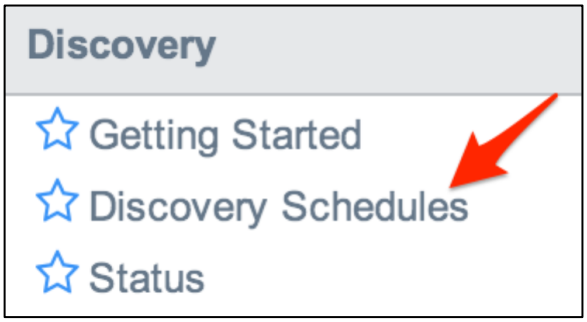
Discover the Node

In a normal environment, Discovery would periodically run, creating new CIs it finds and updating existing CIs.

1. In the **Left Navigation Pane**, click **Discovery** to expand the Discovery application.

2. Click the **Discovery Schedules** module to display this application in the main pane of the browser.

   NOTE: In subsequent labs, these steps are abbreviated to **Application Name > Module Name** (**Discovery > Discovery Schedules** in this example).

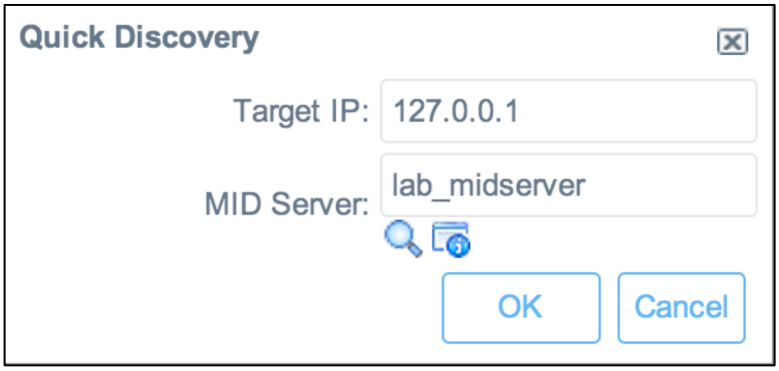


3. Click on **Quick discovery**.



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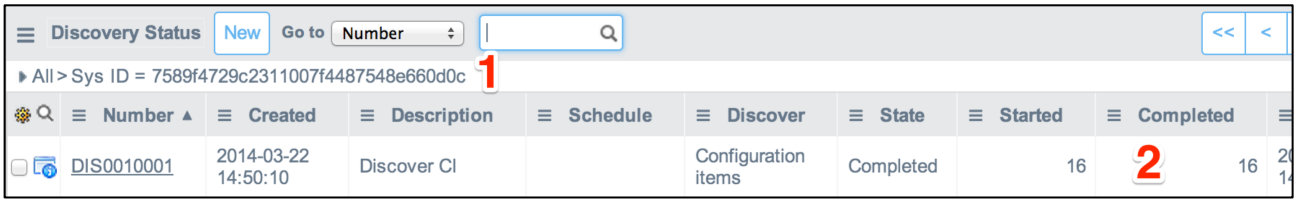
4. Enter the Target IP as **127.0.0.1** and the MID Server as **lab_midserver**.



5. Click **OK**.

6. Refresh the resulting list until Discovery is complete.

   Step 1. Click the **breadcrumb** to refresh the list – repeat until
   Step 2. **Started** and **Completed** are equal

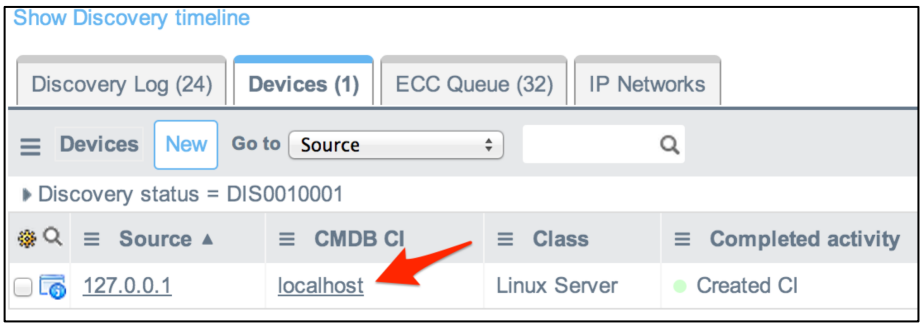


Lab Success Verification

1. Click on **DIS0010001**.

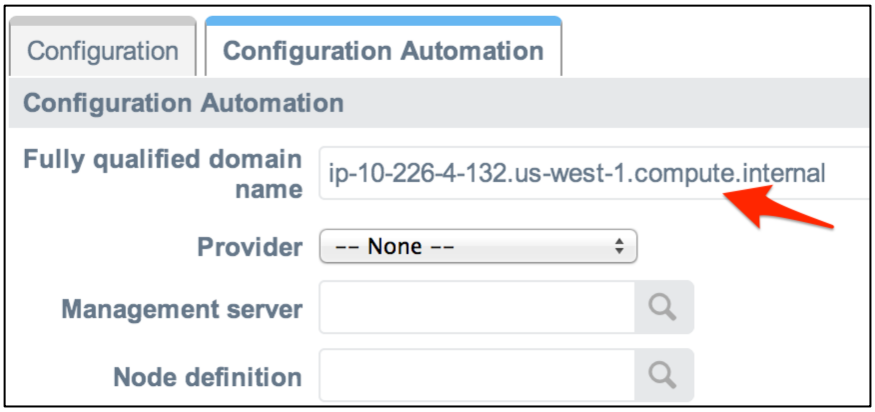
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2. Click on the **CMDB CI** entry **localhost** on the **Devices** related list. Throughout this lab, related lists are referenced in tabbed view. Change to tabbed view by clicking the  icon on the upper right side of the header bar.



3. Click on the **Configuration Automation** tab. Configuration Automation is added to computer based CIs with the activation of the Configuration Automation plugin.

4. **Fully qualified domain name** is the identifier Puppet sends to ServiceNow to identify the node it is managing. This value has to match the result of the command **hostname –f** when typed into the console of the *nix managed node.



The **Provider** field identifies what Configuration Management tool manages this node. It is currently **– None --** because the node is newly discovered and has not yet been identified as a managed node. In a later lab, this will be populated with **Puppet.**

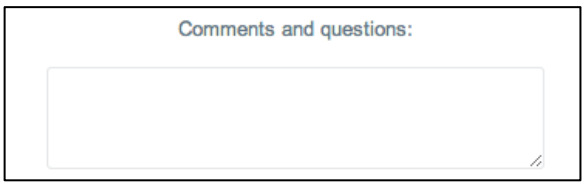
The **Management server** and **Node definition** fields will be discussed at length coming up.

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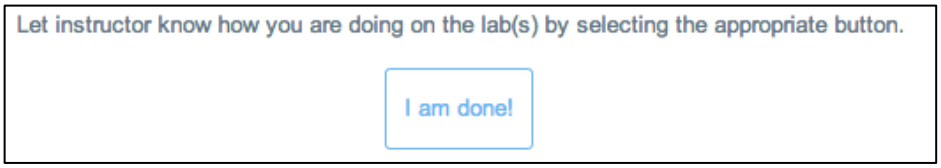
Report Lab Progress

1. Click **Lab Management > Report Lab Progress**.

2. Enter any comments regarding this lab.



3. In the main window, click **I am done!**



NOTE: In subsequent labs, use Report Lab Progress to inform the instructors when you need assistance or when you have completed a lab. Feedback is encouraged and appreciated!

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Lab Goal

You are Mike Hopkins, a ServiceNow user that is a member of the Puppet Administrators group. Today you are going to use ServiceNow to install Puppet Forge's Apache module to your Puppet Master. The Apache module is the basis for later web node configuration.

Lab 2
Installing a Module on Your Puppet Master

Impersonate User

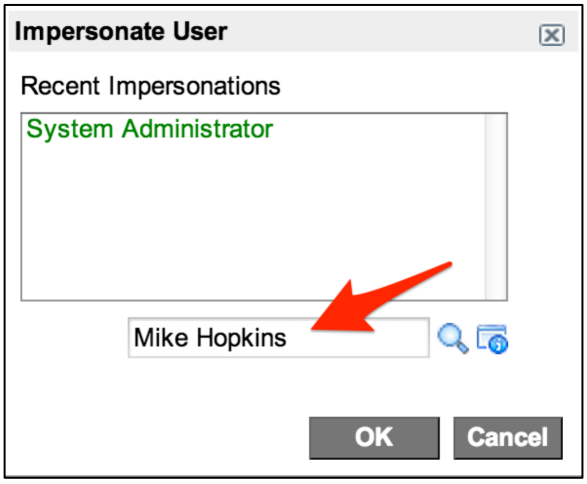
Throughout this lab, you will role-play scenarios as users with different roles, or simulate background tasks by forcing them to start as the System Administrator. You will impersonate users to avoid having to log in and out and enter credentials every time.

1. Click the  icon next to the System Administrator name on the banner.



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2. Enter **Mike Hopkins** in the text box.



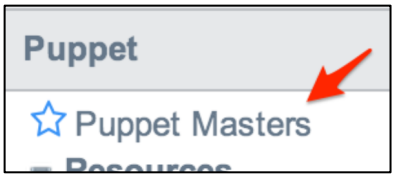
3. Click **OK**. You should now be impersonating Mike Hopkins.

   Note: In subsequent labs, these steps will be simplified to **Impersonate: <User>** where <User> is the user to impersonate.

Create Puppet Master Record

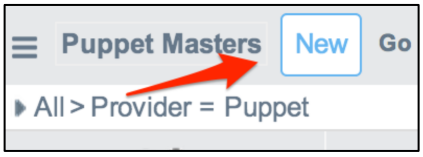
A Puppet Master record in ServiceNow is the link between ServiceNow and your Puppet Master. Prior to requesting installation of a module to the Puppet Master, we need one of these records so we'll know what Puppet Master to install to.

1. Click **Puppet > Puppet Masters**.



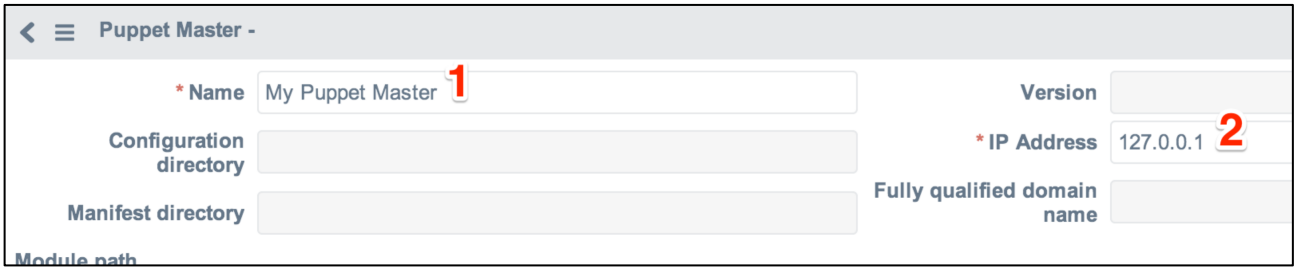
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2. Click **New**.



3. Provide information about the Puppet Master.

   Step 1. Name: **My Puppet Master**
   Step 2. IP Address: **127.0.0.1**

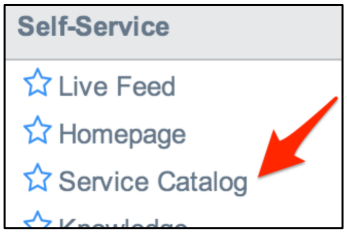


4. Click **Submit**.

Request Installation of Module

Next, you will request the installation of Puppet Forge's Apache module to the Puppet Master.

1. Click **Self-Service > Service Catalog**.

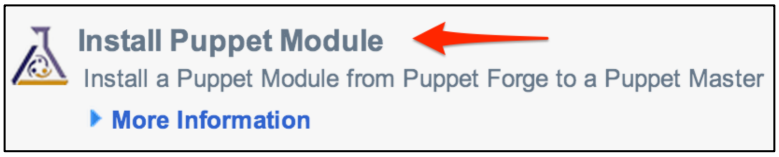


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2. Click Software.

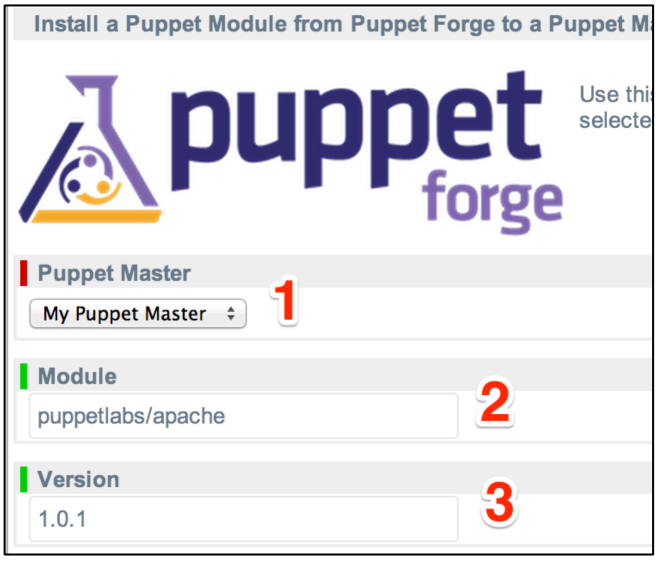


3. Scroll down and click on Install Puppet Module.



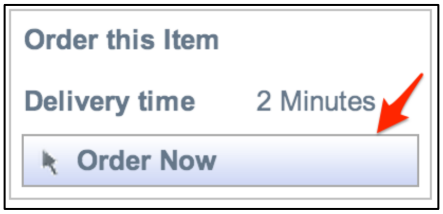
4. Provide information about the request.

   Step 1. Select **My Puppet Master**
   Step 2. Module: **puppetlabs/apache**
   Step 3. Version: **1.0.1**



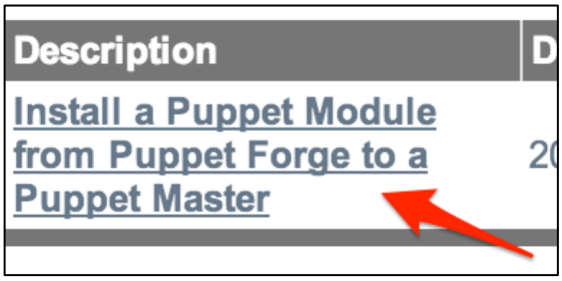
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5. Click **Order Now**.



Lab Success Verification

1. On the Order Status, click on the **Description** link.

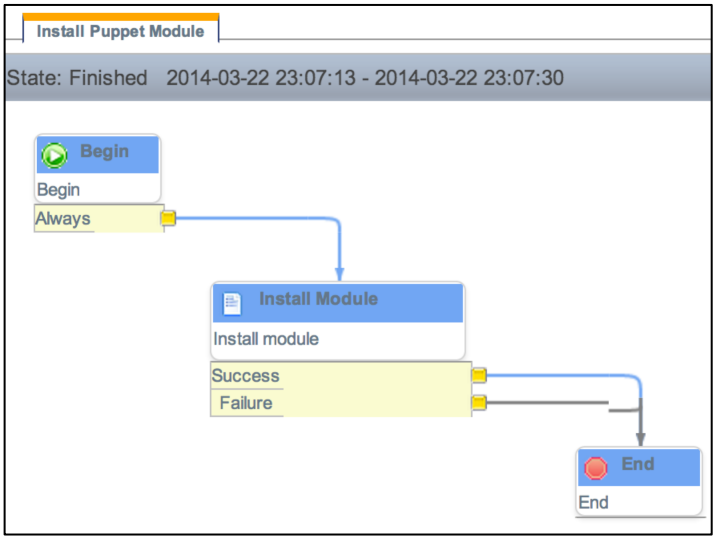


2. On the Requested Item, click **Show Workflow**.



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3. The Install Module activity should show **Success**.



4. If the Install Module activity is still running (green), click the refresh  button in the upper right corner of the workflow canvas and repeat until the workflow completes.

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

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Lab Goal

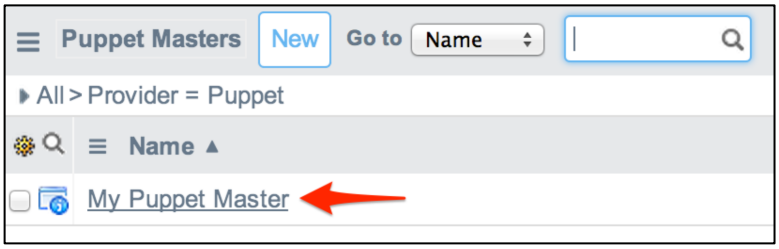
For ServiceNow to help Puppet manage your infrastructure's nodes, applying change governance prior to making any changes, ServiceNow needs to know about your Puppet Environment. The goal of this lab is to discover information about the Puppet Master.

Lab 3
Discovering the Puppet Master

Discover the Puppet Master

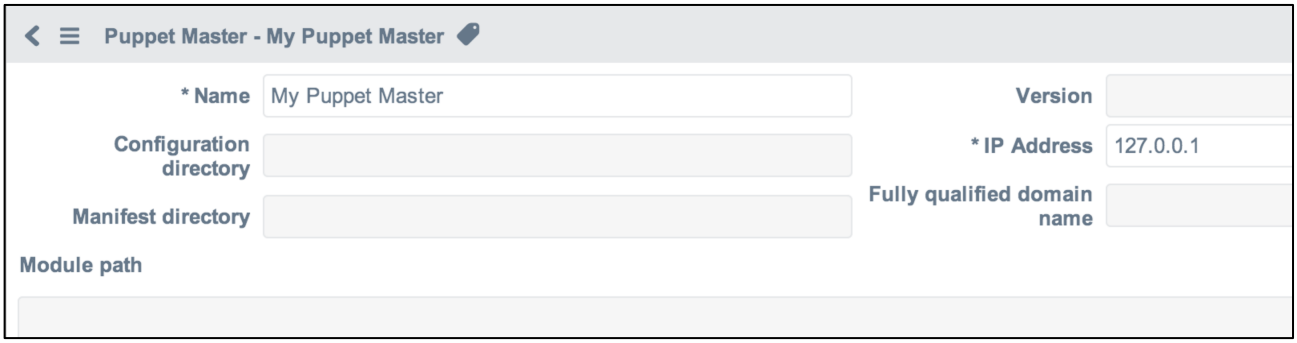
1. Navigate to **Puppet > Puppet Masters**

2. Click **My Puppet Master**

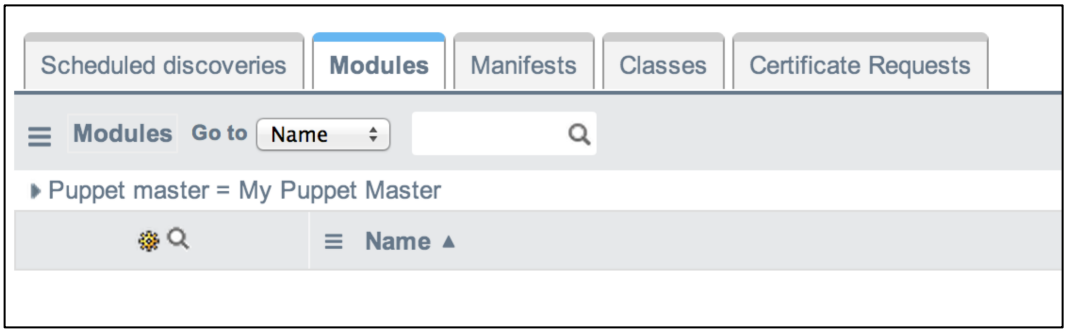


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3. The Puppet Master record should look like:



4. The related lists are empty:



5. Click **Discover Puppet Details**



6. Discovery of the Puppet Master starts. You're told you'll get an email when it completes. However, in the lab instance, email is not configured, and if it were, it would go to mike.hopkins@k14lab.com.

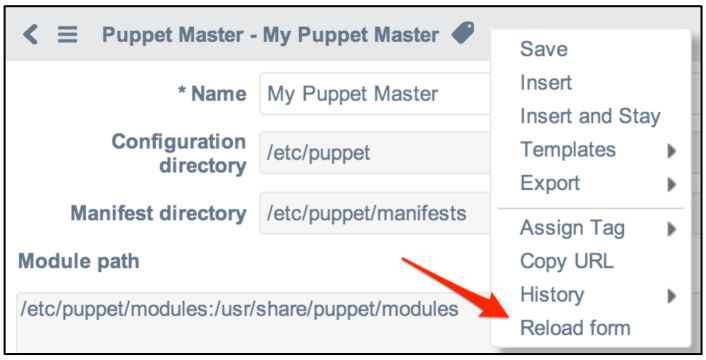
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Lab Success Verification

Since this is the initial discovery, to verify the discovery completed successfully, look at the records.

1. Open **My Puppet Master**.

2. Right-click on the header and click **Reload form** over the next couple minutes.



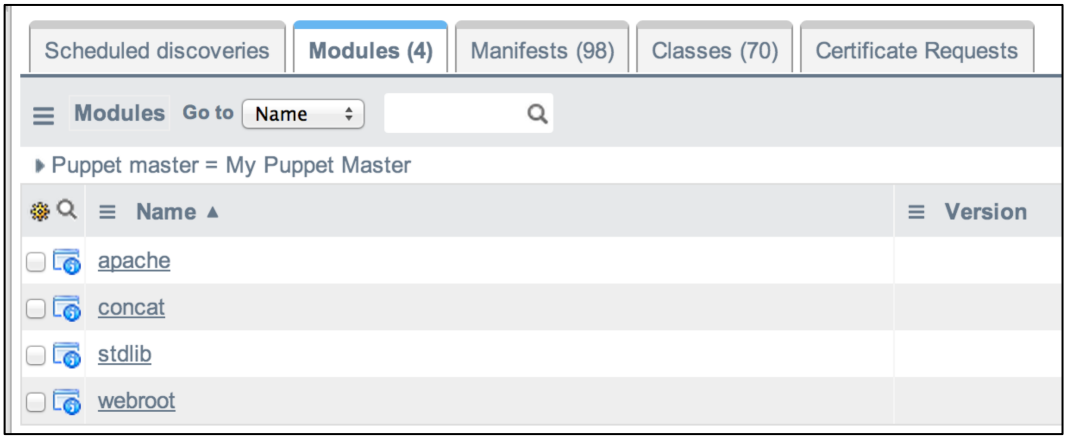
3. Your Puppet Master record should look like:



4. The **Fully qualified domain name** is unique to your particular lab instance.

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5. The related lists should look like:



6. Verify there is a number next to **Modules**, **Manifests**, and **Classes**. These are the modules, manifests, and classes currently installed on the Puppet Master.

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

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Lab Goal

Before a configuration can be assigned to a node, ServiceNow needs to know what Puppet Master is managing the node. This way, only artifacts installed on the Puppet Master managing the node can get assigned to the node. The goal of this lab is to show how the mapping between the CI discovered earlier is automatically mapped to the Puppet Master that was just discovered.

Lab 4
Lightweight Onboarding

Lightweight Onboarding: Overview

The Puppet Master is configured to use the ServiceNow instance as its External Node Classifier (ENC). When a node requests its configuration from the Puppet Master, the Puppet Master in turn calls the ServiceNow instance with the fully qualified domain name (FQDN) of the requesting node and the FQDN of the Puppet Master itself. The ServiceNow instance looks in the CMDB for a CI that has a matching FQDN. If found, and a configuration is assigned, the configuration is returned. If there is a CI without a configuration, Provider and Management Server, ServiceNow sets the Provider to Puppet. Then it attempts to make the mapping to a Puppet Master automatically. It does this by:

- Looking in the Puppet Master records to find one with a FQDN matching the one in the request
- If found, the Puppet Master is known, so it makes the mapping automatically

Lightweight onboarding is the process of automatically setting any known information on the CI.

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Force Node to Update

In most cases, the Puppet agent on a node would likely be configured to check in with the Puppet Master on a scheduled, periodic basis. In your lab instance, the Puppet agent is not configured to do so. Instead, we will use a UI action built for this lab to force the node to update.

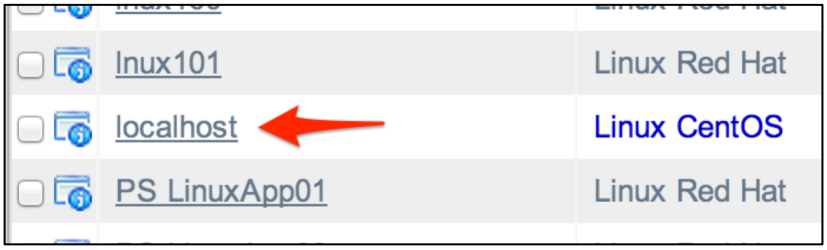
1. Impersonate: **System Administrator**.

2. Type **Linux** in the filter box

3. Click **Configuration > Linux**.

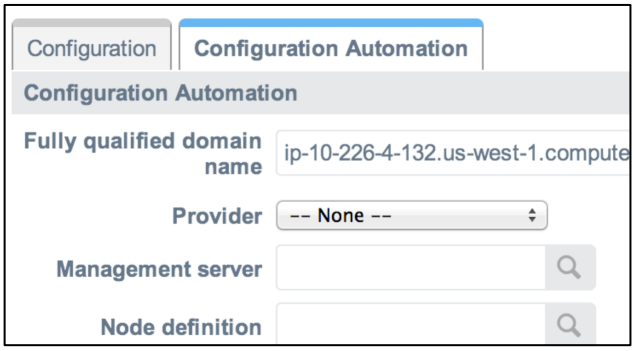


4. Click **localhost**.

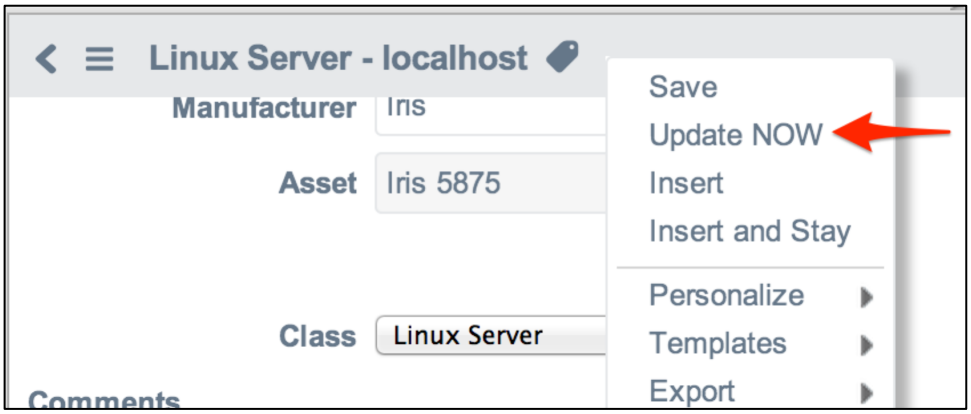


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5. Verify **Provider** and **Management server** are still empty under **Configuration Automation**.



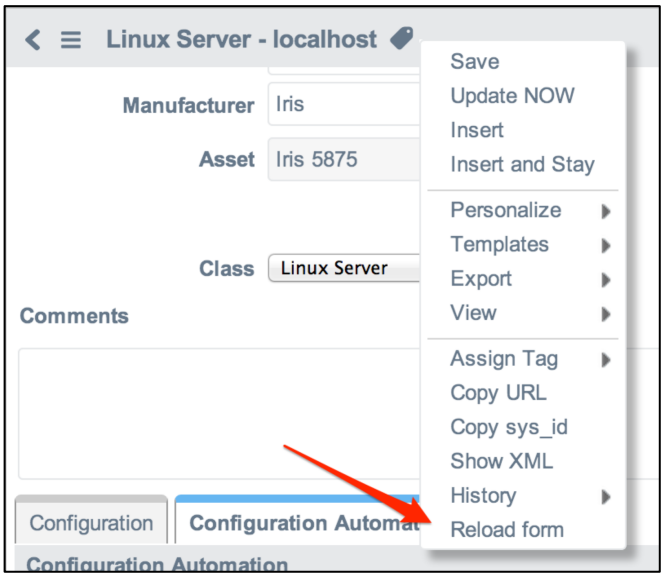
6. Right-click on the header and click **Update NOW**.



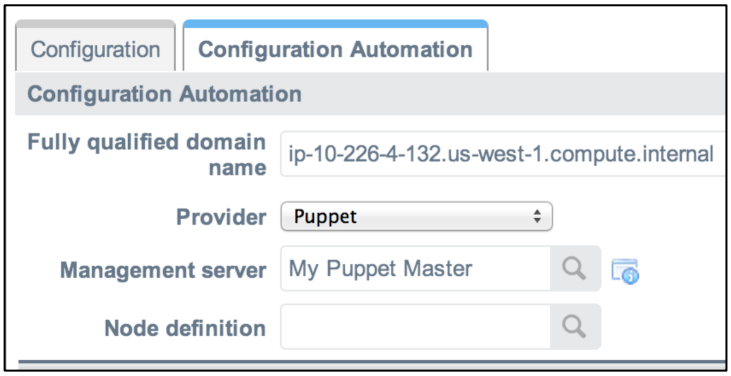
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Lab Success Verification

1. Right-click on the header and click **Reload form** over the next 15-30 seconds. The **Provider** becomes **Puppet** and the **Management server** becomes **My Puppet Master**.



2. **Configuration Automation** looks like:



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

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Lab Goal

Node definitions are logical, named collections of Puppet classes and parameters that make up a configuration that can be assigned to one or many nodes. Change governance is applied to the assignment of node definitions to nodes, and also to the modification of a node definition. Node definitions defined in the ServiceNow instance is a ServiceNow construct. They are not mapped directly to a Puppet construct, even though they are made up of Puppet constructs. In this lab, we will create node definitions that define our simple web application.

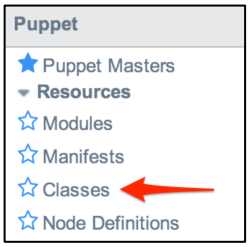
Lab 5
Create Node Definitions

Puppet Class Selectability

Of all classes discovered on the Puppet Master, by default only those defined in an init.pp file are selectable for assignment to a node.

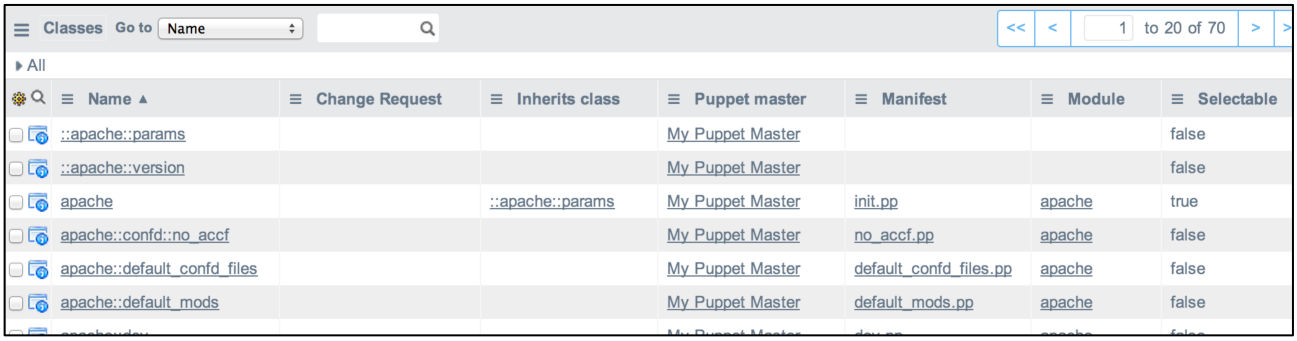
1. Impersonate: **Mike Hopkins**.

2. Click **Puppet > Classes**.



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3. The list looks like:



4. Notice the only item in the screenshot with **Selectable** being **true** is **apache**. Notice the **Manifest** for apache is **init.pp**. The rest are other manifests. On your instance, notice all Selectable being true are for classes that are in a manifest called init.pp.

Make a Class Selectable

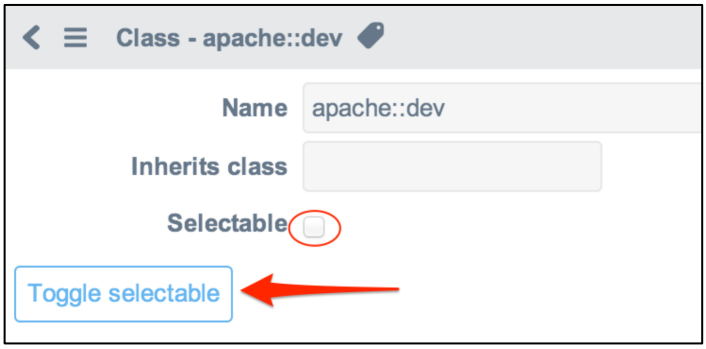
1. Click **apache::dev**.



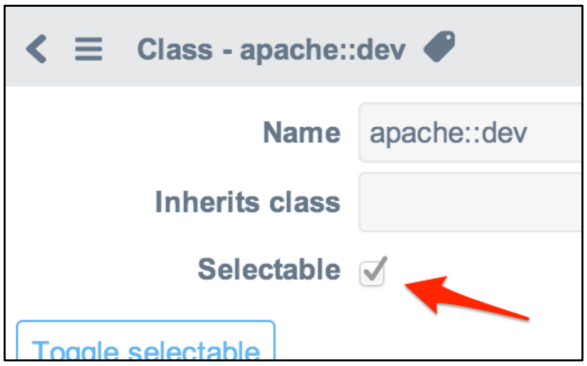
2. Notice the **Selectable** box is not checked.

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3. Click **Toggle selectable**.



4. Click **apache::dev**. Notice **Selectable** is now checked.

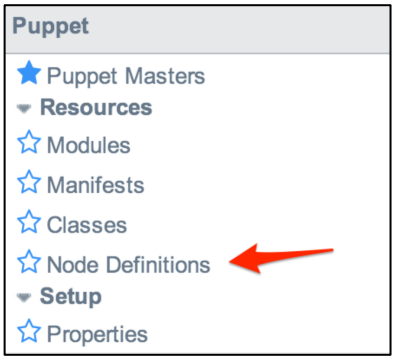


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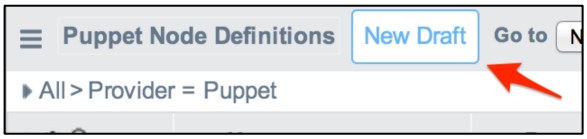
Create a Base Web Server Node Definition

Node definitions can inherit classes and parameter definitions from other node definitions. We will create a base web server node definition that all web servers in the organization would inherit.

1. Click **Puppet > Node Definitions**.



2. Click **New Draft**. Node definitions being created for the first time get created as drafts. They cannot be assigned to a node until they are published.



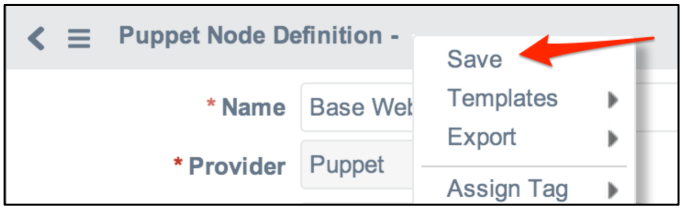
3. Enter information for the Node Definition.

   Step 1. Name: **Base Web Server**
   Step 2. Puppet master: **My Puppet Master**



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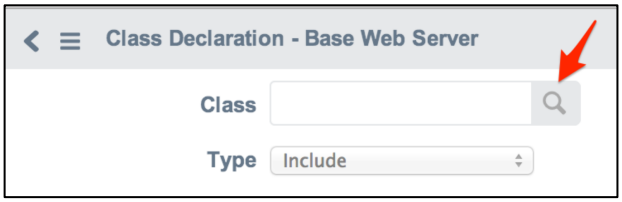
4. Right-click on the header and **Save**.



5. Add a new class. Class Declarations are Puppet classes defined on the given Puppet Master that will be assigned to any node configured with this node definition. Click **New** on **Class Declarations**.

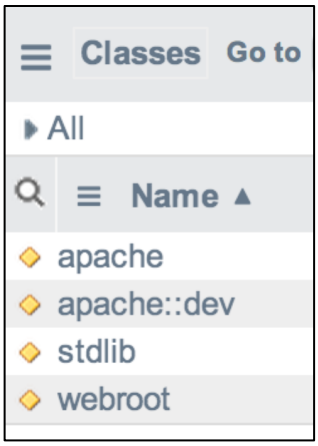


6. Click the magnifying glass next to **Class**.

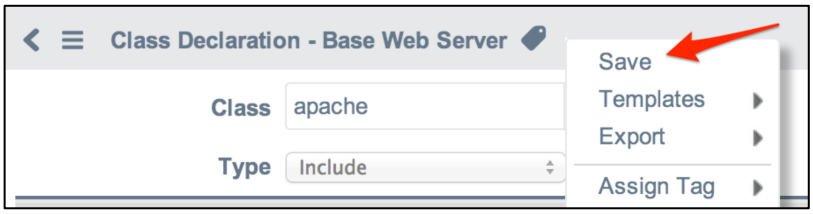


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7. Notice **apache::dev** is selectable based on previous actions. However, we are not actually going to assign it. Click **apache**.



8. The **Type** should be **Include**. Right-click on the header and **Save**.



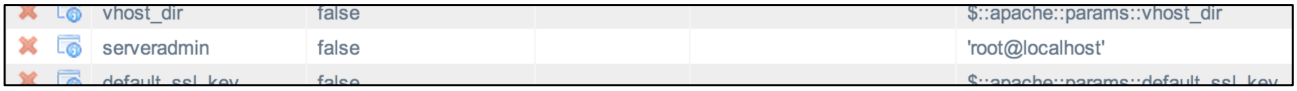
9. A list of **Parameter Values** appears. These are the parameters associated with the apache class. If no value is set, the Default value field is what ultimately gets returned to the Puppet agent on the node to use when applying the class to the node. However, a value can be specified in 2 ways:

   - Provide a value in the Value field of a particular Parameter. This value would be the same across every node that the node definition containing this class declaration is assigned to.

   - Reference a field on the node CI that will be pulled from the particular node CI at the time the configuration is done. Each node could have its own unique value based on whatever its representative CI has for that referenced field.

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10. Find the **serveradmin** parameter. It may be on the next page if you are only showing 20 items per page. This is the email address of the administrator for the apache installation. The default value is **root@localhost**.



11. For the Base Web Server node definition, we want the value to be fixed to the Web Administrator of our company, k14lab. The email address is **webadmin@k14lab.com**. Click the  icon next to the **serveradmin** parameter.



12. Enter **webadmin@k14lab.com** for **Value**.



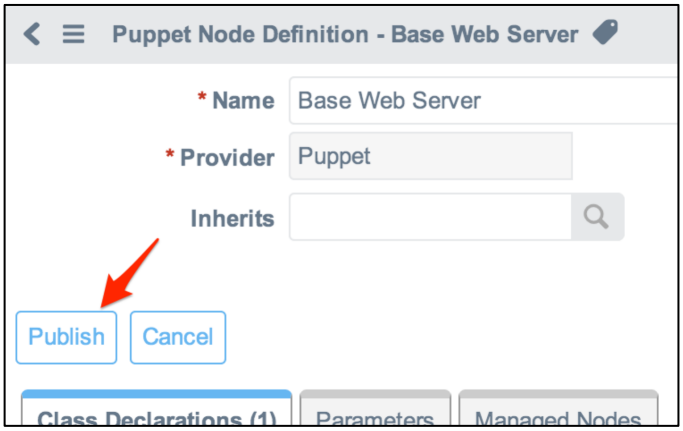
13. Click **Update**.

14. Click **Update** on the **Class Declaration**.

15. There are no other desired changes for the Base Web Server node definition. It is to be inherited by any web application managed by the Puppet Master.

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16. Click **Publish**.



17. The node definition is now read only and cannot be changed without checking it out, making the changes and publishing with approval on a change request. The initial draft node definition can be published without a change request because there are no nodes configured by it. Once it has been published any changes require change approval.

Create Node Definition for Version 1 of a Web Application

Mike Hopkins is going to build a node definition to configure a node to a web application node, hosting version 1 of a web application. He has a new module called webroot that is on the Puppet Master. It simply copies files from a file share to Apache's web root. The module has a single class (webroot) that takes a parameter with the folder to go copy from the file share.

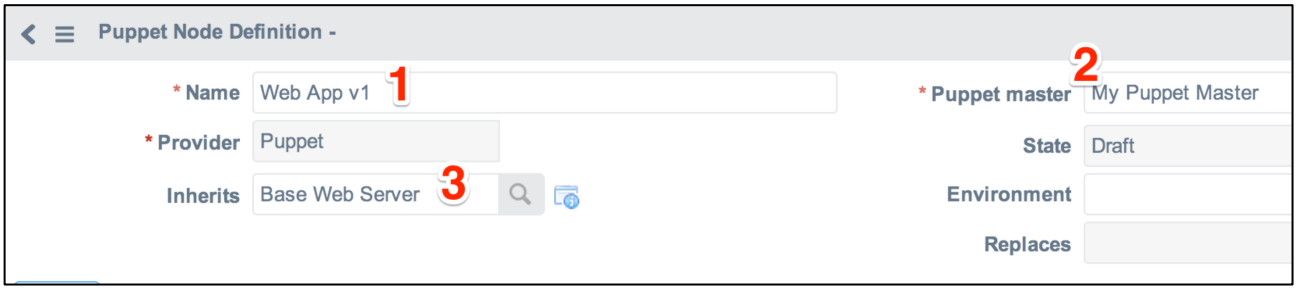
1. Click **Puppet > Node Definitions**.

2. Click **New Draft**.

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3. Enter information for the Node Definition:

   Step 1. Name: **Web App v1**
   Step 2. Puppet master: **My Puppet Master**
   Step 3. Inherits: **Base Web Server**

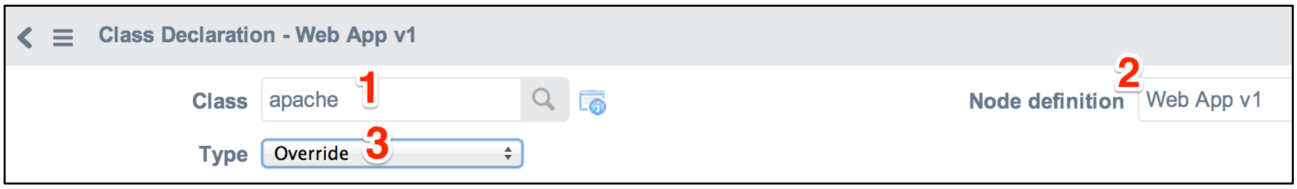


4. Right-click on the header and **Save**.

5. Click **New** on Class Declarations.

6. Enter the following for the Class Declaration:

   Step 1. Class: **apache**
   Step 2. Node definition: **Web App v1**
   Step 3. Type: **Override**



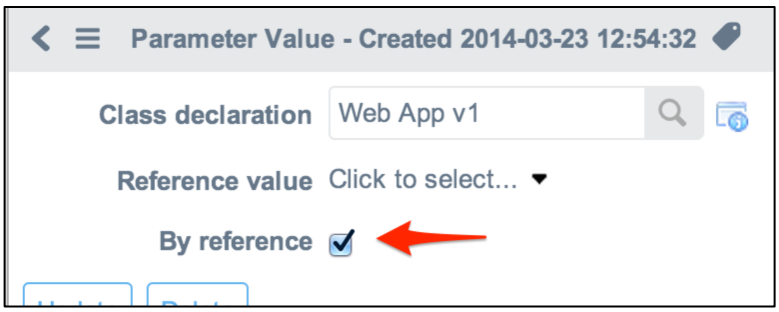
7. Right-click and **Save**.

An **override** class declaration replaces all parameter values specified in the node definition being inherited with the ones defined here. An **include** class declaration will take all parameter values specified in the node definition being inherited. An **exclude** class declaration excludes the class entirely in this node definition. In this case, Mike wants to override the serveradmin parameter as the email of the user that owns the node.

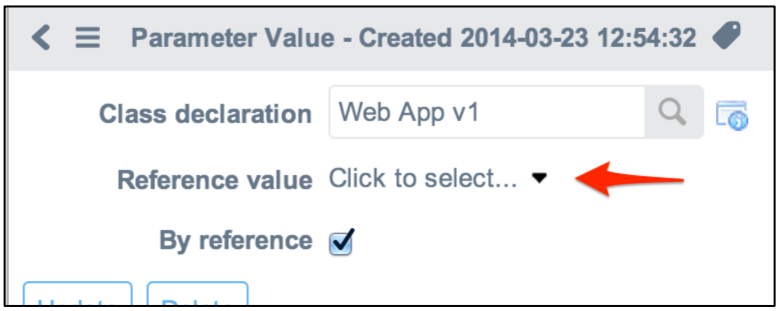
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8. Find and bring up details for the **serveradmin** parameter.

9. Click **By Reference**.

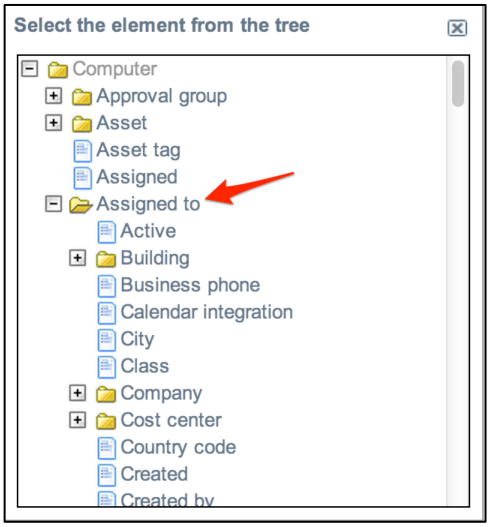


10. Click **Reference value**.

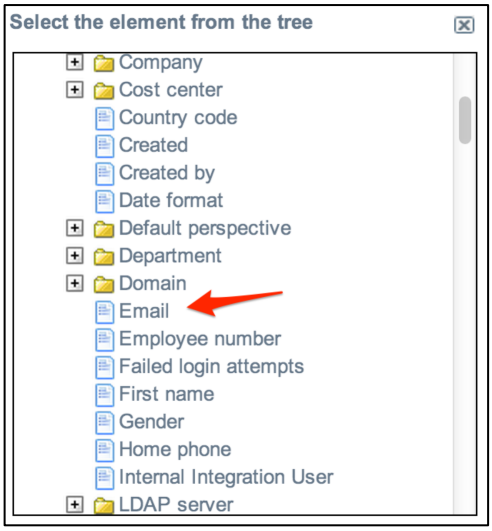


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11. Expand **Assigned to**.



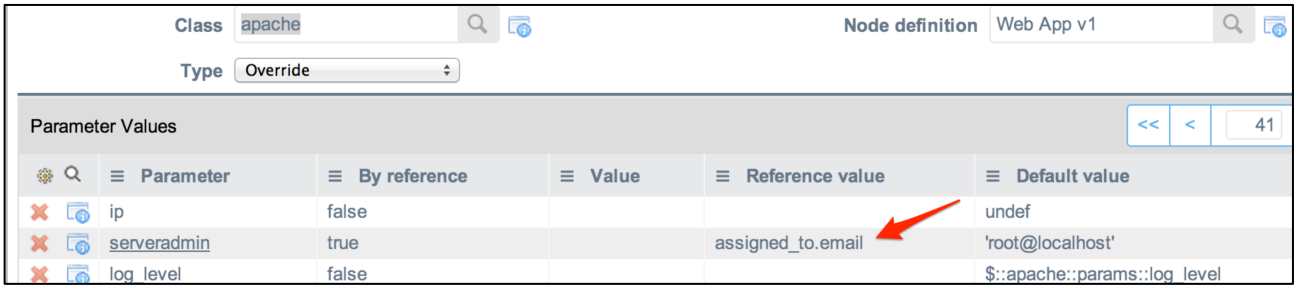
12. Select **Email**.



13. Click **Update**.

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14. **Parameter Values** looks like:



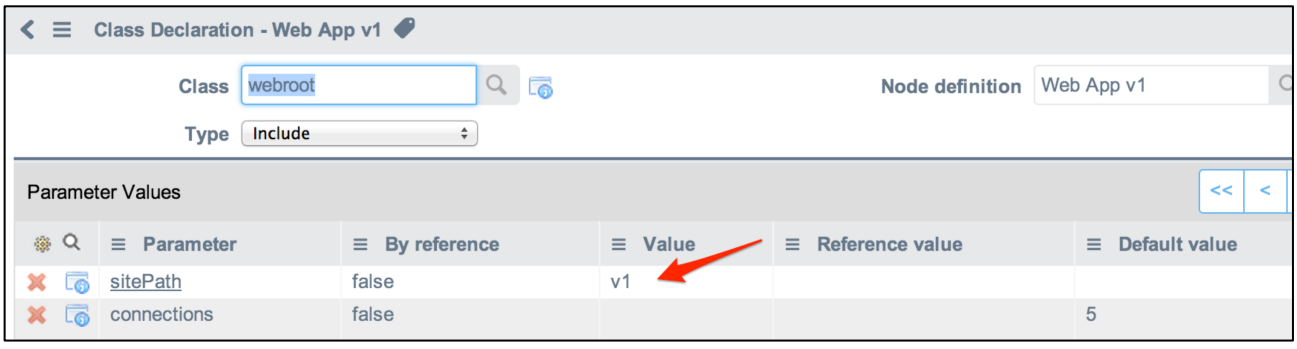
15. Click **Update**.

16. Click **New** on Class Declarations.

17. Select Class **webroot**.

18. Right-click on the header and **Save**.

19. Modify the **sitePath** parameter with Value **v1**.



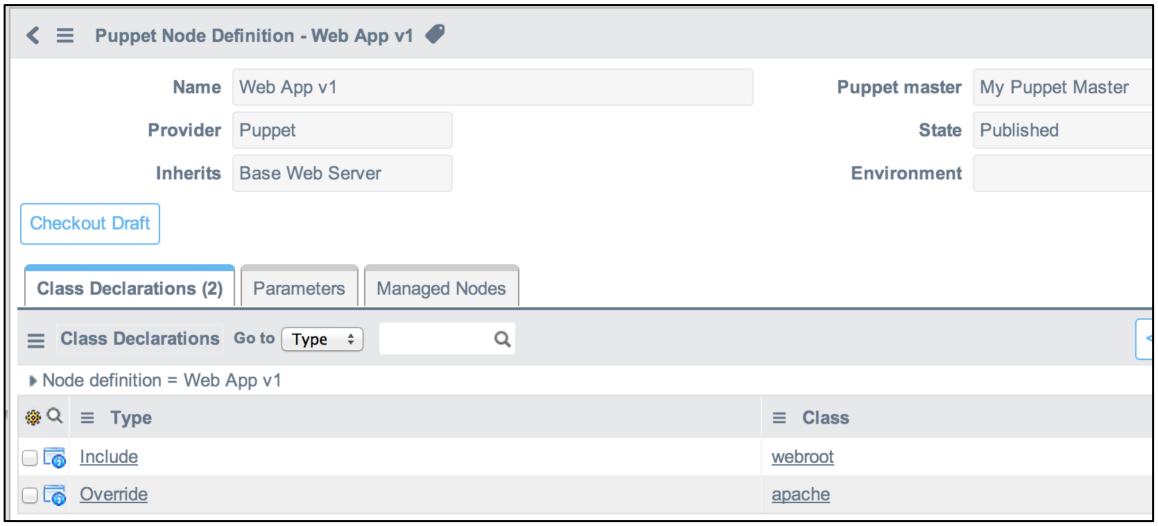
20. Click **Update**.

21. Click **Publish**.

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Lab Success Verification

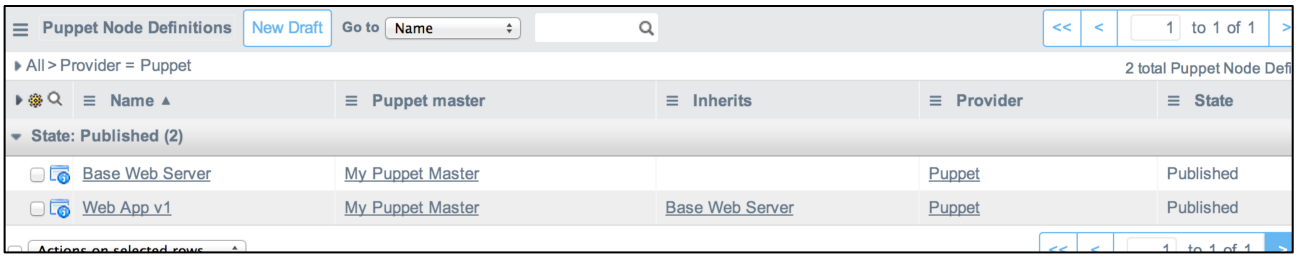
1. **Web App v1** looks like:



2. Click **Puppet > Node Definitions**.

3. Expand **Published**.

4. **Puppet Node Definitions** looks like:



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

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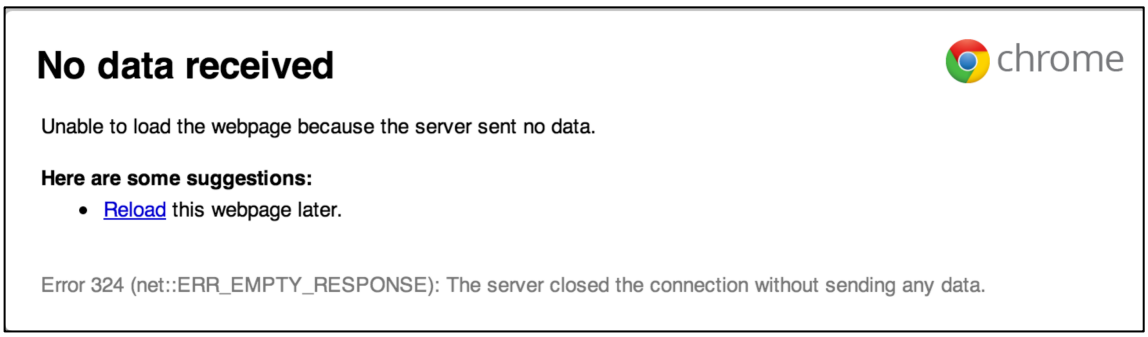
Lab Goal

Assigning a node definition to a node ultimately changes the configuration of that node. ServiceNow helps apply change governance to that process, requiring a change request to be approved before allowing the assignment. In this lab, you will go through that process. Kim Larsen is the owner of the CI discovered earlier. She wants to configure the node as a web node, running version 1 of the application.

Lab 6 Configure Node with Change Governance

Verify No Web Server on Node

1. Open a new tab on your browser.
2. Type in your instance URL, but use **http://**, not **https://**.
3. Verify no web page is displayed.



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Request Configuration Change for Node

1. Return to your ServiceNow instance. Impersonate: **Kim Larsen**.

2. Click on **Self-Service > My Assets**.

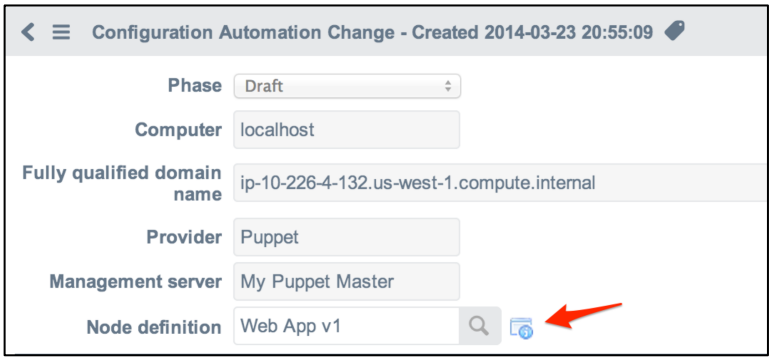
3. In **Assets Assigned to me**, click the Configuration Item **localhost**.



4. Click **Create New Configuration Change**.



5. Enter Node definition: **Web App v1**.

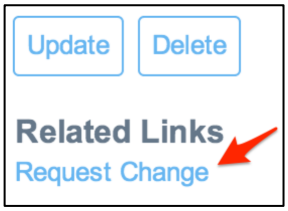


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6. **Requested CI Node Attributes** are a way of specifying parameter values specific to this node. For example, we previously assigned the serverAdmin parameter to be the CI's assigned to's email for the Web App v1 node definition. If that is not desired for any particular node, it can be overridden here. In this lab, we are not going to set any of these.

7. Right-click on the header and **Save**.

8. Click **Request Change**.



9. Click **OK** to confirm you want to make the request.

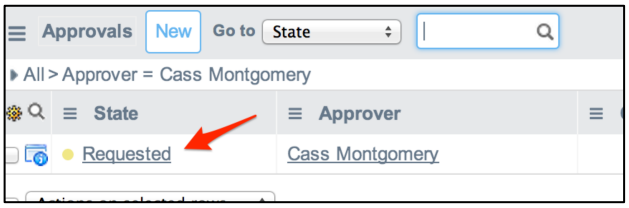
10. The change request is generated.

Approve the Change

1. Impersonate: **Cass Montgomery**. Cass is Kim's manager. She must approve the request.

2. Click **Service Desk > My Approvals**.

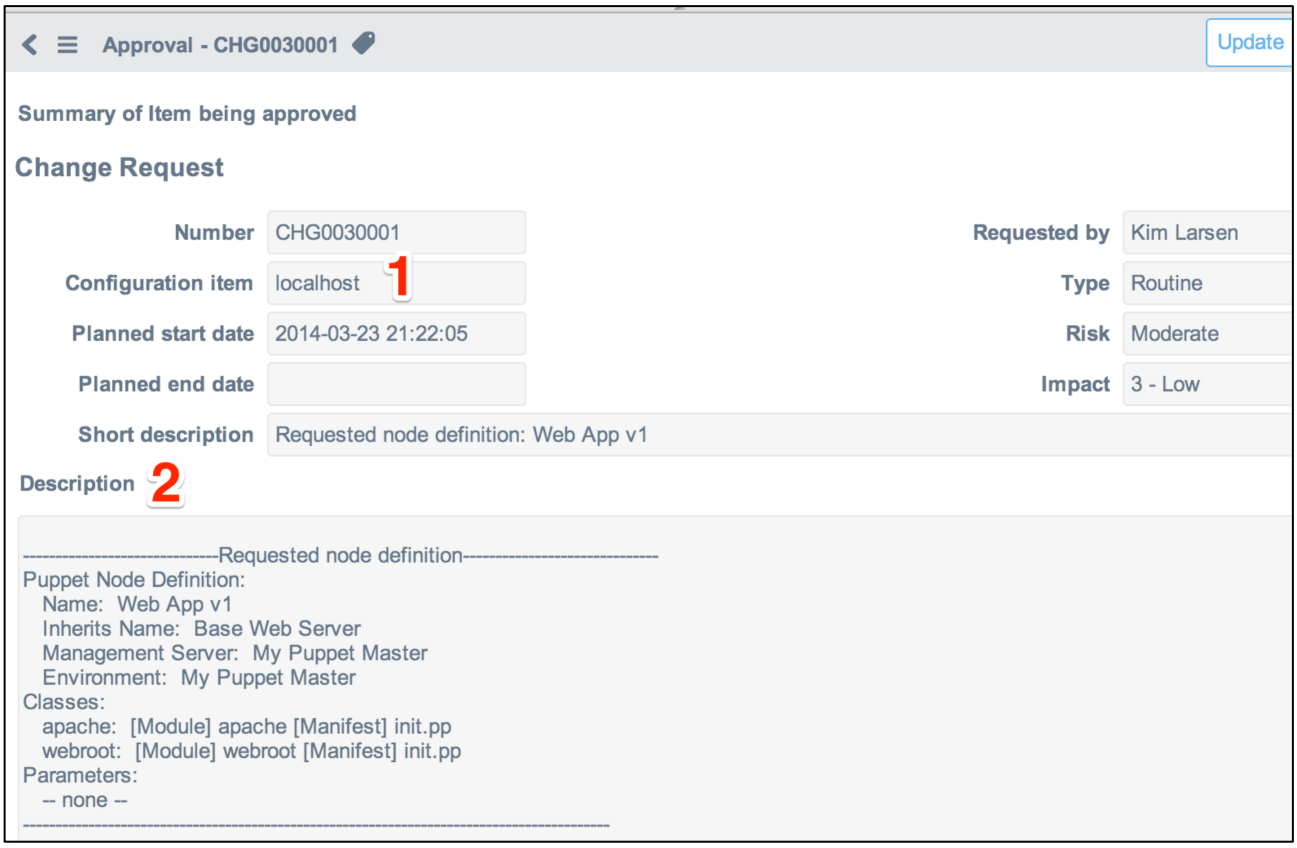
3. **Click Requested** on the open approval



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4. Cass learns information about the request.

   Step 1. **Configuration item** shows what CI the change is for
   Step 2. **Description** tells what node definition is requested.



5. Click **Approve**.

Apply the Change

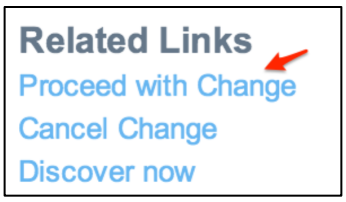
1. Impersonate: **Kim Larsen**.

2. Click Self-Service > My Assets.

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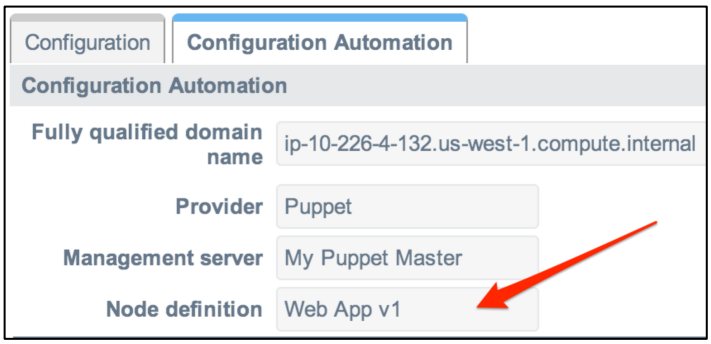
3. Click Configuration Item **localhost**.

4. Click Proceed with Change.



5. The node definition is applied to the CI. Confirm by clicking **localhost** in My Assets.

6. Node definition is **Web App v1**. The Puppet agent on the node will apply the configuration change the next time the node queries the Puppet Master for its configuration.



7. Force the update. Right-click on the header and select **Update NOW**.

Lab Success Verification

1. Refresh the browser tab that previously showed no web server was installed on the node. Within a couple of minutes, the web server should return a page.

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

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Lab Goal

One benefit of the ServiceNow Cloud Provisioning application is simple creation of virtual offerings. Using Configuration Automation integrated with Cloud Provisioning offers ease of fulfilling requests for these virtual offerings. A single template can be paired with node definitions of various configurations to provide a wide variety of offerings. In this lab, you will use Cloud Provisioning of Amazon EC2 instances paired with Puppet to quickly provision a new web node.

Lab 7 Integration with Cloud Provisioning (optional)

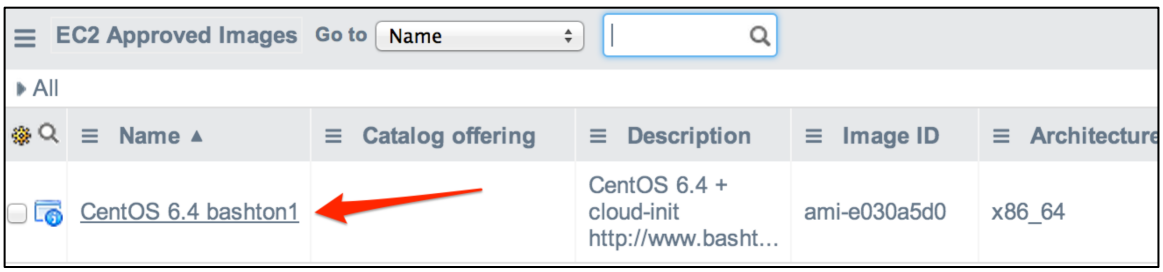
Create Catalog Item

Mike Hopkins is also a cloud administrator. He has added the company's Amazon AWS credentials to the ServiceNow instance. He wants to create a service catalog offering to allow essentially one-click ordering of a new web node.

1. Impersonate: **Mike Hopkins**.

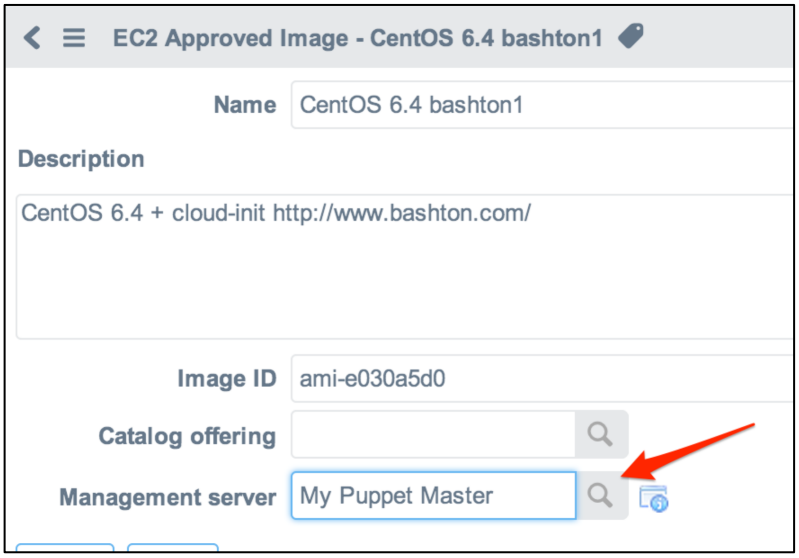
2. Click **Amazon EC2 > Approved Images**.

3. Click **CentOS 6.4 bashton1**.



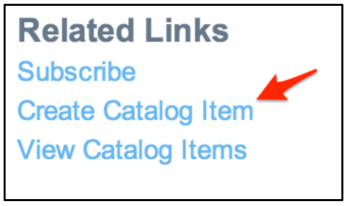
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4. Enter Management server: **My Puppet Master**.

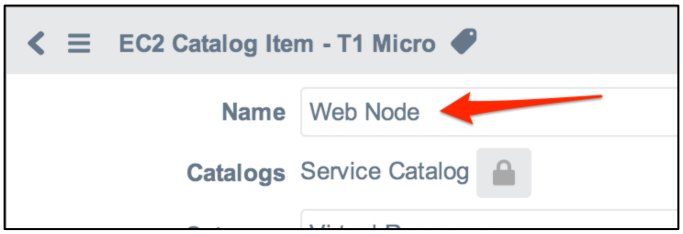


5. Right-click on the header and click **Save**.

6. Click **Create Catalog Item**.

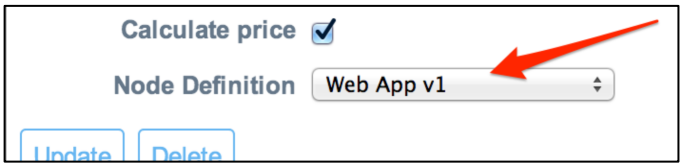


7. Change the name to **Web Node**.



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8. Change Node Definition to **Web App v1**.



9. Click **Update**.

Order a New Web Node

Kim Larsen wants to order a new web node to add to the one she already has.

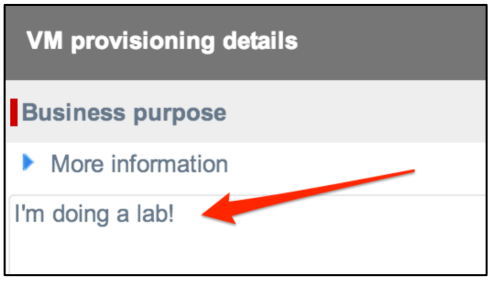
1. Impersonate: **Kim Larsen**.

2. Click **Self-Service > Service Catalog**.

3. Click **Web Node**.

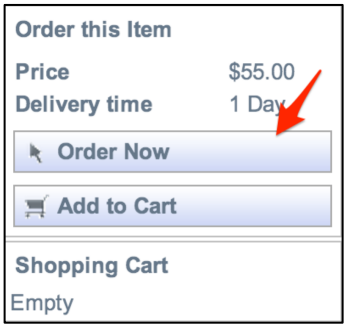


4. Type a Business purpose: **I'm doing a lab!**. The rest of the fields are ok to leave as default. If there were a CI representing the web application the node is going to be used for, the Business service and/or Application fields should be set and a relationship would be created between them and the new web node CI. The default lease period is fine. We want the node to provision immediately.



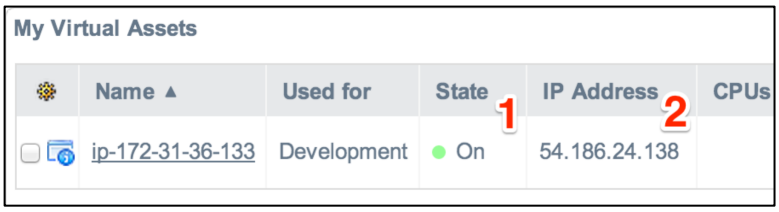
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5. Click **Order Now**.



6. You are redirected to **My Virtual Assets**. A new entry is created. Observe the following:

   Step 1. State: It starts out **Scheduled**, then becomes **Starting**, and eventually becomes **On**.
   Step 2. IP Address: Filled in once the node is on.



Lab Success Verification

1. Take the IP address from the virtual asset portal and enter it in a new browser tab. Refresh as needed. In several minutes, the web server should return a page.

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

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Lab Goal

Changing a node definition potentially impacts many nodes. ServiceNow applies change governance to this process, preventing an accidental update to a node definition from inadvertently making unplanned changes across the operational infrastructure. In this lab, a new version of the web application needs to be deployed. This update will obtain the required approval.

Lab 8 Changing a Node Definition

Modify Node Definition

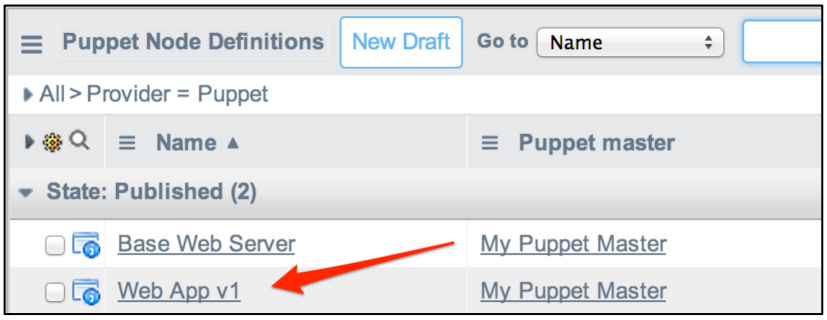
The new version of the application is ready for deployment. Mike is going to update the node definition Web App v1 to facilitate this change.

1. Impersonate: **Mike Hopkins**.

2. Click on **Puppet > Node Definitions**.

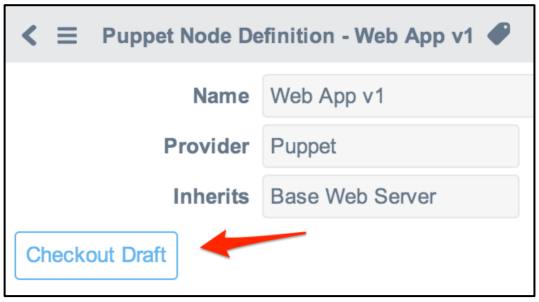
3. Expand **Published**.

4. Click on **Web App v1**.

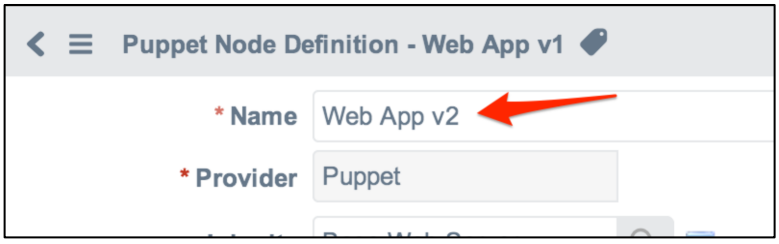


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5. Click **Checkout Draft**. Checking out a node definition makes a copy of the published version. No nodes are assigned the draft version. The draft can be modified as many times as desired and will not impact anything until published and applied. It can also be canceled and discarded at any time.

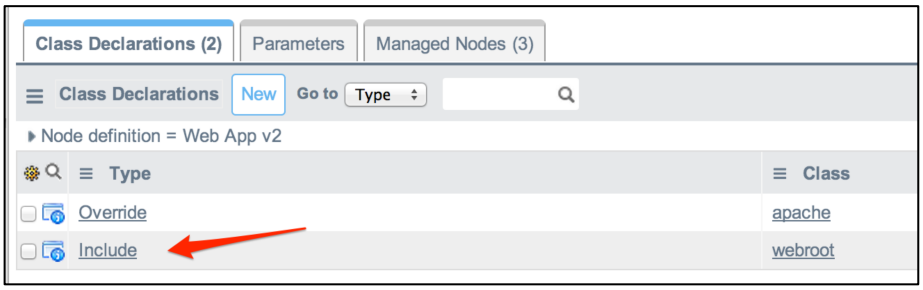


6. Change the Name to **Web App v2**.



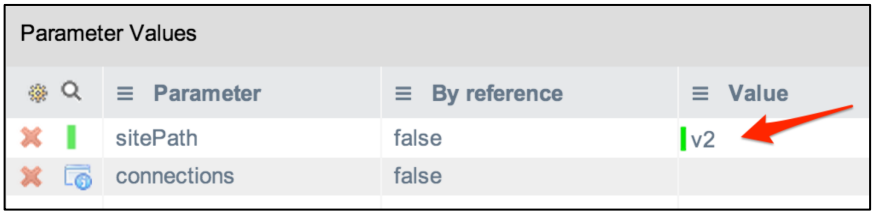
7. Right-click on the header and click **Save**.

8. In Class Declarations, click **Include** next to **webroot**.



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9. Double-click on **v1** of sitePath. Modify the Value to **v2**.



10. Click **Update**.

11. Click **Publish**. Notice you are prompted to confirm you want to proceed. This action generates a change request. The **Managed Nodes** will be updated if this change is approved and the node definition is updated.

12. Click **OK** to proceed. A Change Request is generated and sent for approval.

Approve the Change Request

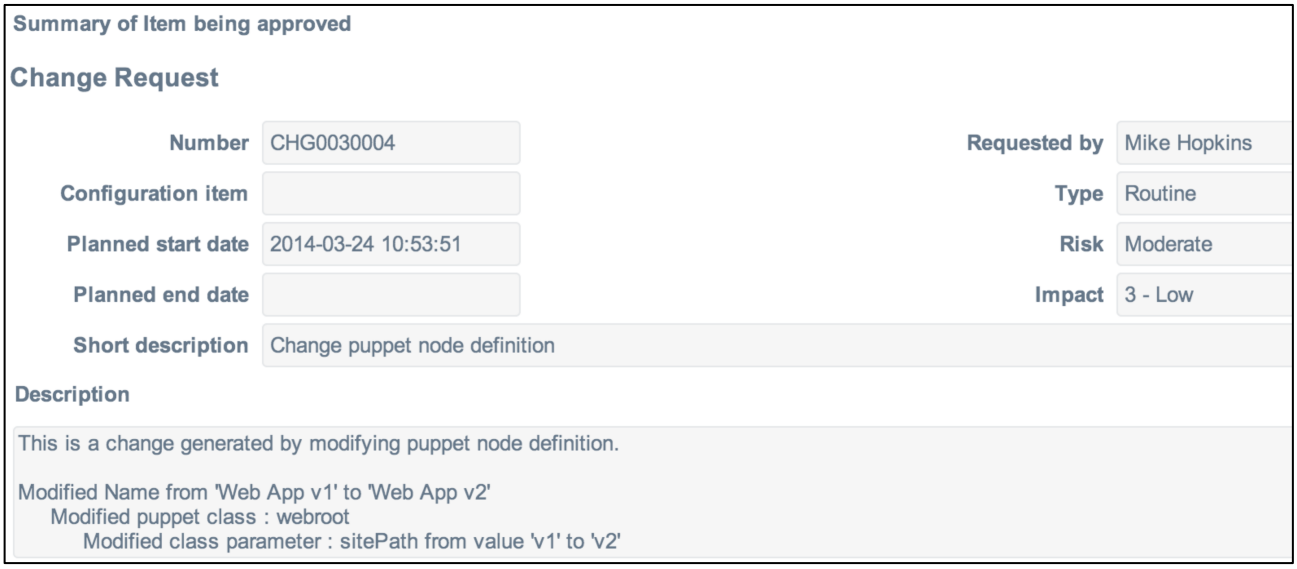
1. The Routine Change is routed to Mike's manager, Cass Montgomery. Impersonate: **Cass Montgomery**.

2. Click **Service Desk > My Approvals**.

3. Click on the **Requested** item.

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4. Observe the **Description** tells what is being changed.



5. Click **Approve**.

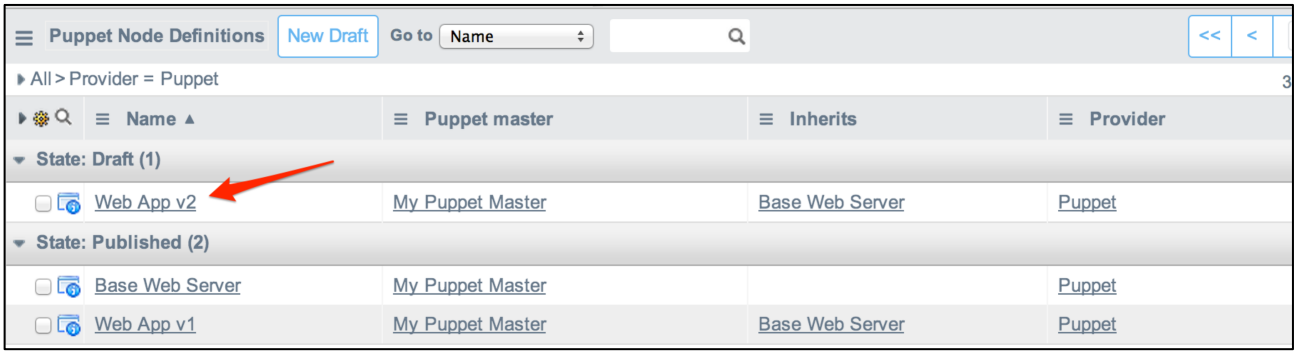
Apply the Change

1. Impersonate: **Mike Hopkins**.

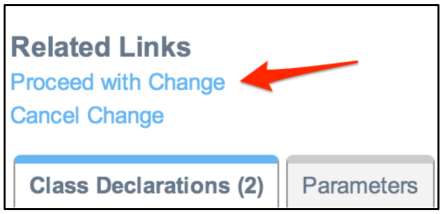
2. Click **Puppet > Node Definitions**.

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3. Click on **Web App v2** under Draft.



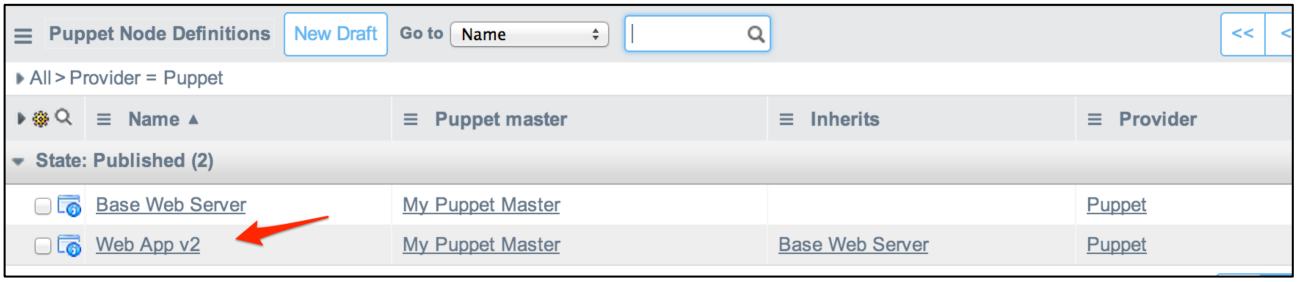
4. Click **Proceed with Change**.



Lab Success Verification

1. Click **Puppet > Node Definitions**.

2. **Web App v2** is now **Published**.



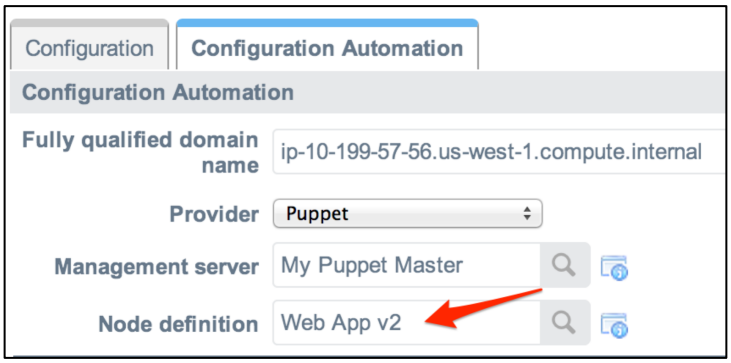
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3. Impersonate: **System Administrator**.

4. Click **Configuration > Linux**.

5. Click **localhost**.

6. Verify under **Configuration Automation**, the **Node definition** has a value of **Web App v2**.



7. Right click on the header and click **Update NOW**.

8. Return to the browser tab of your instance with http, not https. Refresh over the next couple minutes. The web page should update.

9. If you did optional lab 8, return to the browser tab that had the web page hosted on the new web node. The Puppet agent on this node is configured to check for updated configurations every minute. Refresh it over the next couple of minutes. The web page should update.

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

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