VRA-LAB

LAB

Revision 0.1

Date Issued:

14/08/18

Issued By:

Bhakti Kulkarni

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3. Introduction to VMware

VMware provides cloud computing and platform virtualization software and services.VMware virtualization lets you run multiple virtual machines on a single physical machine, with each virtual machine sharing the resources of that one physical computer across multiple environments. Different virtual machines can run different operating systems and multiple applications on the same physical computer. VMware is an operating system that sits directly on the hardware and is the interface between the hardware and the various operating system. It expands the hardware, from the users point of view, to many different independent servers all with their own processors and memory. These virtual servers cannot be distinguished from physical servers by the end users.

4. vRealize Suite

VMware vRealize Suite is an enterprise-ready cloud management platform purpose-built for the hybrid cloud, delivering and managing infrastructure and applications quickly while maintaining IT control. It provides a comprehensive management stack for IT services on VMware vSphere and other hypervisors, physical infrastructure, containers, OpenStack and external clouds such as VMware vCloud Air, Azure, and Amazon Web Services, all with a unified management experience.

KEY BENEFITS

• Agility – speeds up the IT Services delivery allowing IT to fully meet the expectations of line of business partners

• Efficiency – increases the efficiency of IT staff and the utilization of data center resources; reducing both OpEx and CapEx

• Optimize - proactively identify and solve emerging issues with predictive analytics and smart alerts, ensuring optimum performance and availability

• Control – deliver the right level of control to support the needs of IT teams balancing objectives across the dimensions of agility, risk and cost

• Business/IT Alignment – provide transparency into the operations and cost characteristics of IT services which helps drive better IT and Business alignment

4.1. vRealize Automation

VMware vRealize Automation, part of VMware vRealize Suite, empowers IT to accelerate the provisioning and delivery of IT services, across infrastructure, containers, applications and custom services. Leveraging the extensible framework provided by vRealize Automation, you can streamline and automate the life-cycle management of IT resources from initial service model design, through Day One provisioning and Day Two operations. Whether your IT services are running on private cloud, public cloud or hybrid cloud, the multivendor, multi-cloud solution supported by vRealize Automation assures your services will be delivered with speed, control and performance.

4.2. vRealize Operations

VMware vRealize Operations delivers intelligent operations management across physical, virtual, and cloud infrastructures—from VMware vSphere and Hyper-V to Amazon Web Services. It correlates data from applications to storage in a unified, easy-to use management tool that provides control over performance, capacity, and configuration, with predictive analytics driving proactive action, and policy-based automation.

4.3. vRealize Log Insight

VMware vRealize Log Insight, formerly called vCenter Log Insight, is a software product with customizable dashboards that allows IT administrators to manage and analyze system log data, troubleshoot issues with vSphere, and perform security auditing and compliance testing.

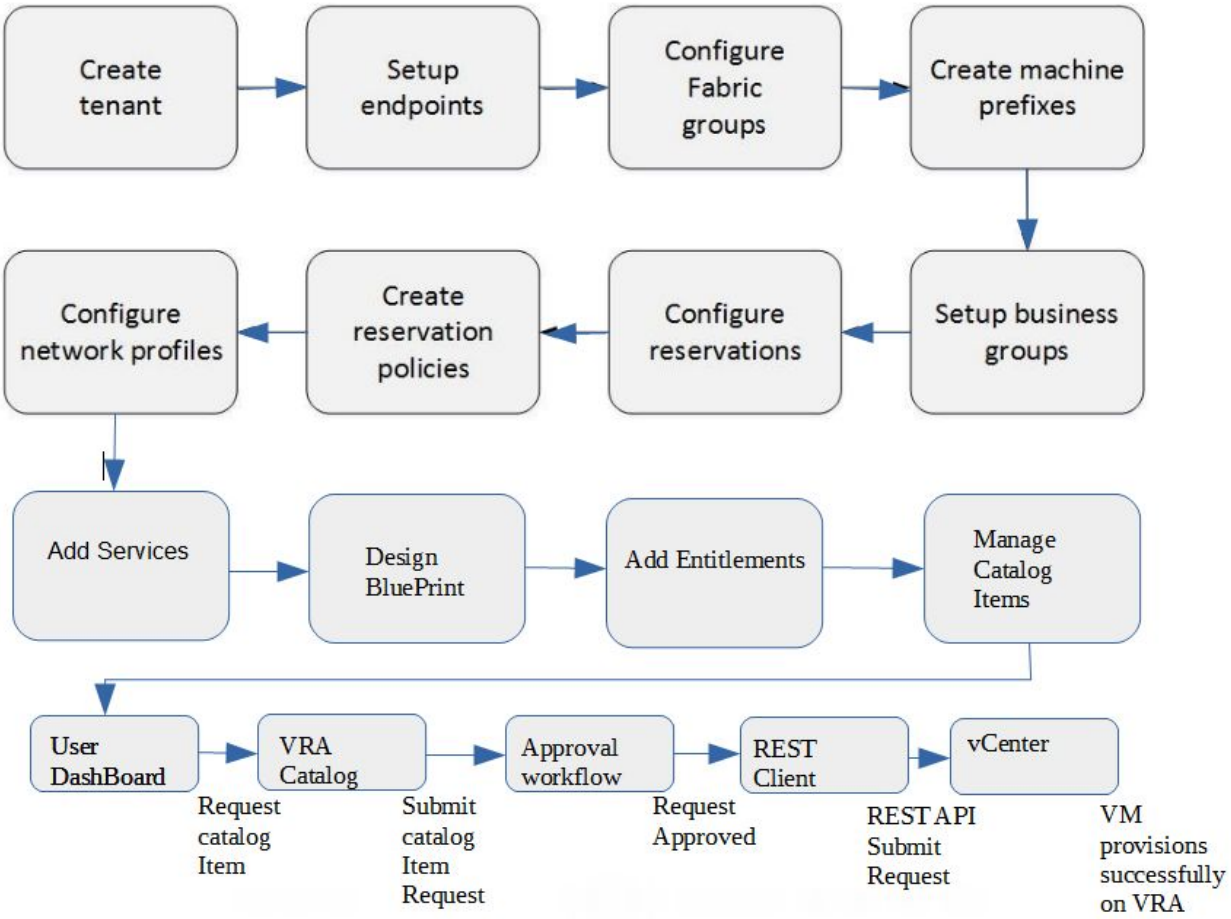
4.4. vRealize Business for Cloud

VMware vRealize Business for Cloud, formerly called IT Business Management Suite, is a software product that provides private and public cloud cost tracking; current and planned workload cost comparison; and consumption tracking and analysis across business groups, applications and services.

5. vRealize Automation

VMware vRealize Automation delivers Day One service provisioning and Day Two operational capabilities across a hybrid cloud. These capabilities help IT organizations automate core IT processes; speed up infrastructure delivery, and get the most out of both hardware and people resources.

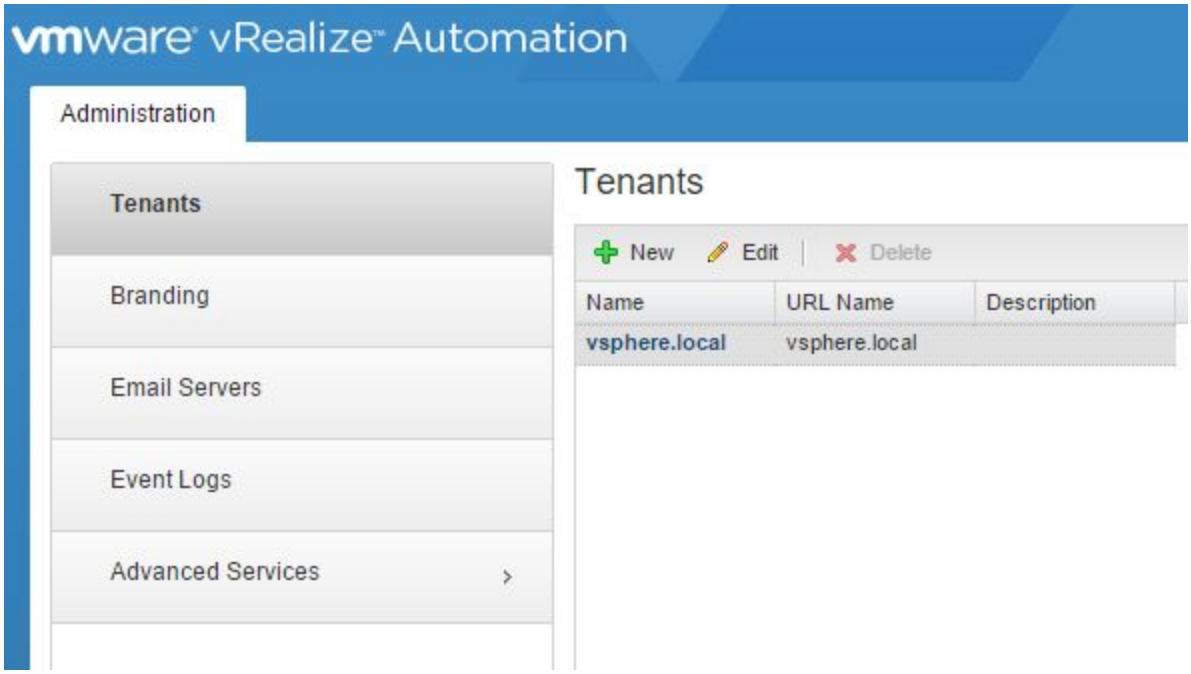
Below flowchart shows steps for requesting virtual machine provisioning.



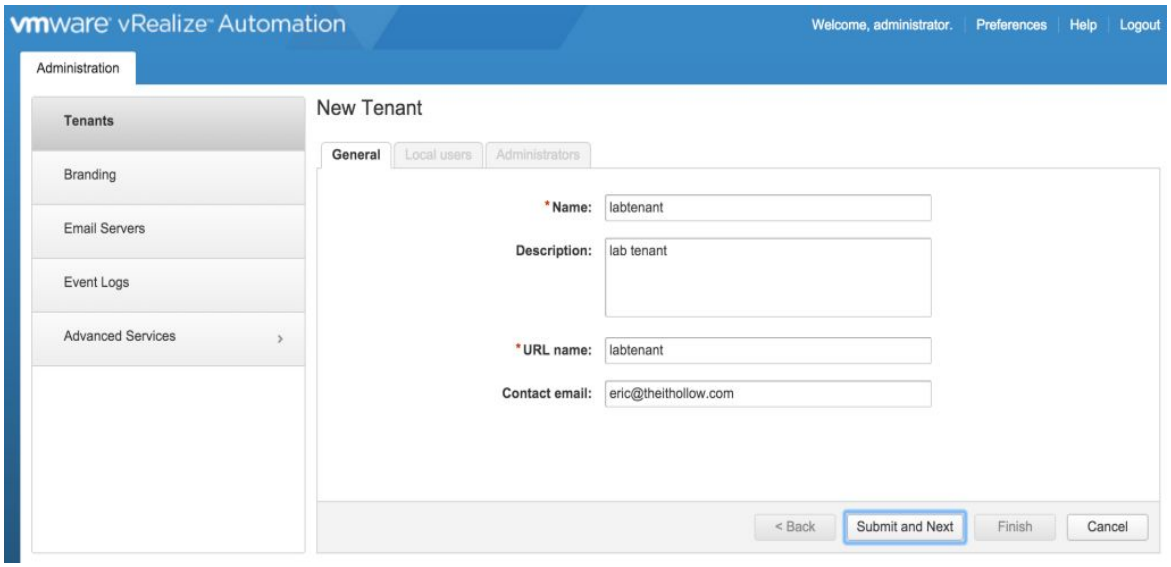
5.1. Tenants

A tenant is an organizational unit in a vRealize Automation deployment. A tenant can represent a business unit in an enterprise or a company that subscribes to cloud services from a service provider. Each tenant has its own dedicated configuration. Some system-level configuration is shared across tenants.

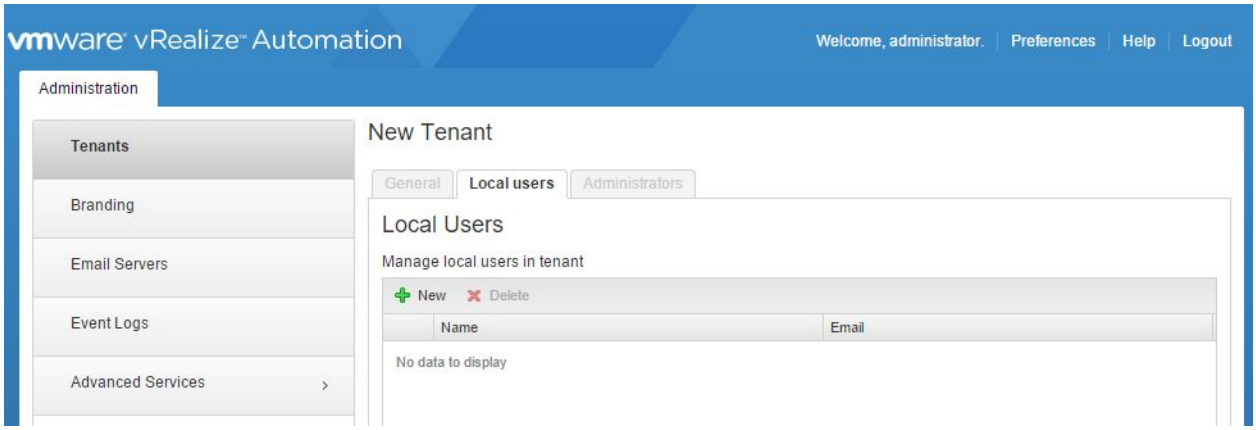
To create a new tenant, login to the portal as the system administrator. Click the Tenants tab and then click the “New” button.



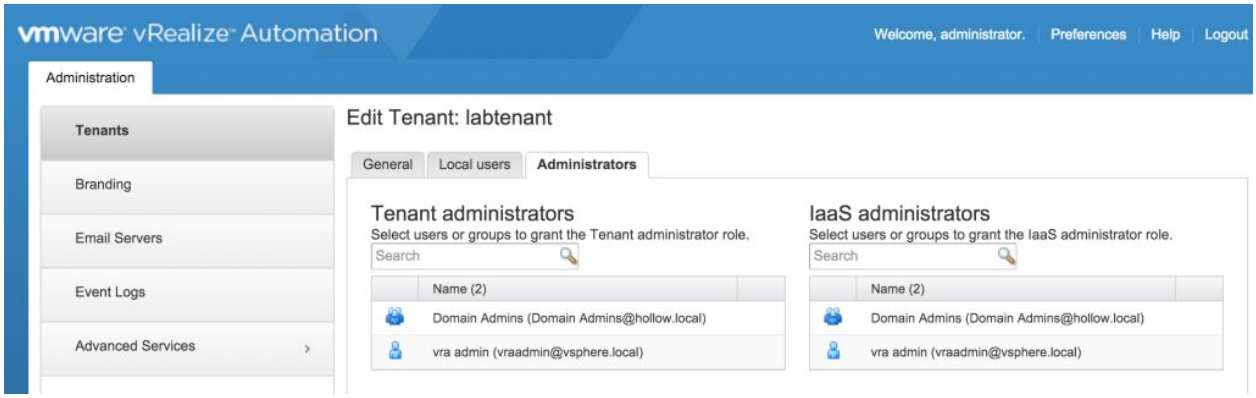
Give the new tenant a name and a description. Then enter a URL name. This name will be appended to this string: https://[vraappliance.domain.name]/vcac/org/ and will be the URL that users will login to. Click “Submit and Next”.



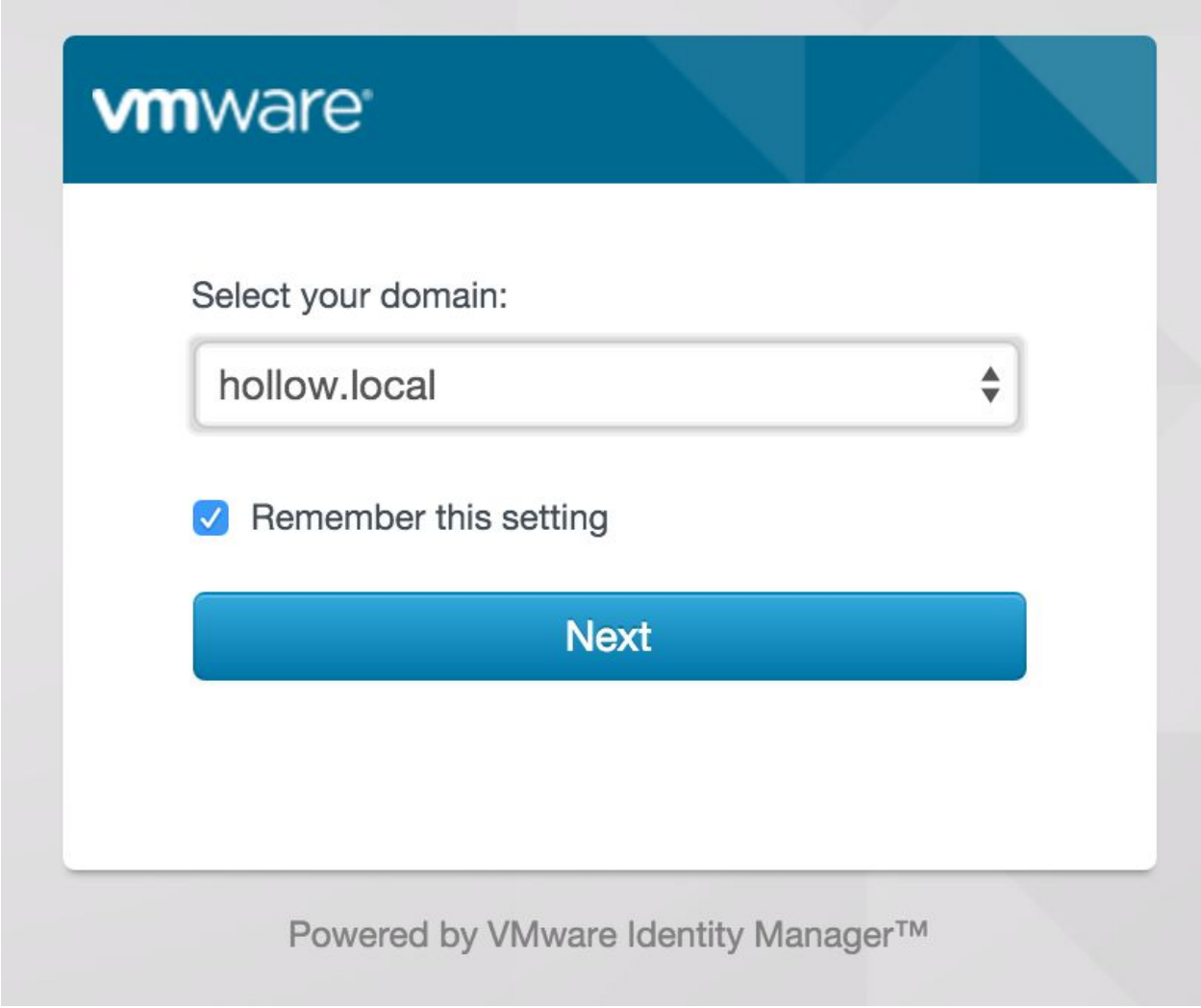
Enter a local user account. I used the vraadmin account much like I did in the previous post about setting up authentication. Click Next.



In the administrators tab, I added the vraadmin account as both a tenant administrator and an IaaS Administrator. I will admit, I'm omitting some information here. After I added the vraadmin account, I logged into the tenant as this account. I setup directory services for this account the same way I did for the default tenant. Once this was done, I added the "Domain Admins" group as a Tenant Administrator and IaaS Administrator.



Thats it for setting up a new tenant. I did want to mention that in vRA7, when you login to a tenant with a directory configured, you'll have the option to login to either the directory you setup or the default tenant domain. Be sure to select the right domain before trying to login.

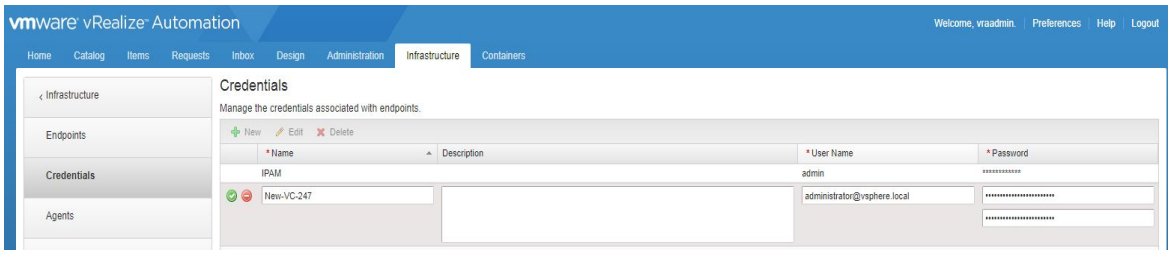


5.2. Endpoints

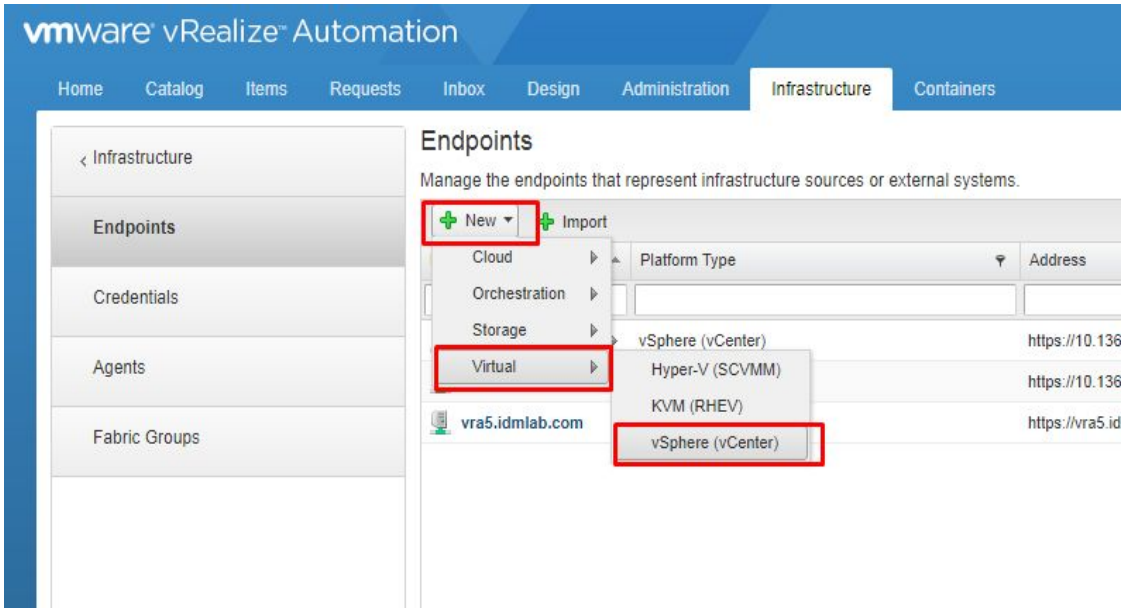
After setting up new tenant, lets login as an infrastructure admin and start assigning some resources that we can use. To do this we need to start by adding an endpoint. An endpoint is anything that vRA uses to complete it's provisioning processes. This could be a public cloud resource such as Amazon Web Services, an external orchestrator appliance, or a private cloud hosted by Hyper-V or vSphere.

In the example below, we'll add a vSphere endpoint. Go to the Infrastructure Tab –> Credentials and then click the "New" button to add a login. Give it a name and description that will help you remember what the credentials are used for. Enter a User Name and a password, which will be encrypted. When done, click the green check mark to save the

credentials. DON'T FORGET TO DO THIS OR IT WON'T BE SAVED!



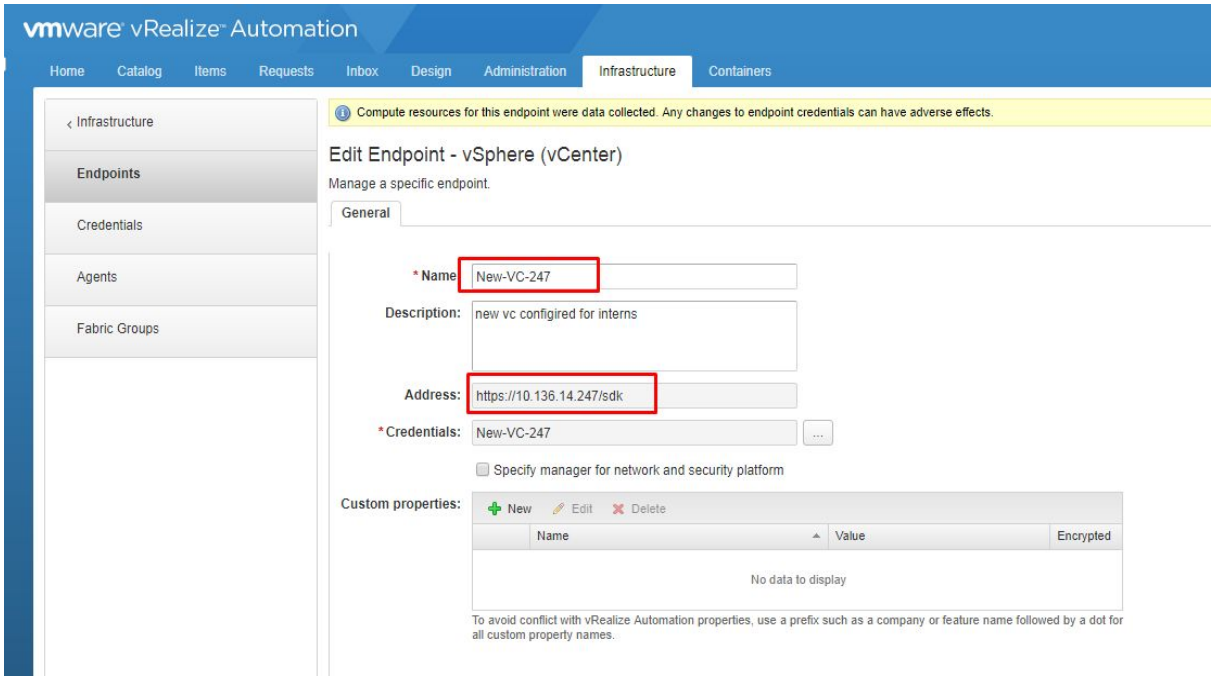
Now that we've got some credentials to use, go to Infrastructure Tab –> Endpoints and then click the "New" button again. Here I'm selecting Virtual –> vSphere (vCenter) because thats the type of endpoint I'm connecting to.



Fill out the name which should match the agents that were created during the installation. If you kept all of the defaults during the install, the first vCenter agent is named "vCenter" spelled exactly like this with the capital "C". Give it a description and then enter the address. The address for a vCenter should be https://vcenterFQDN/sdk. Now click the ellipsis next to credentials and select the username/password combination that we created earlier.

Optional: If you're using a product like VMware NSX or the older vCNS product, click the "Specify manager for network and security platform" and then enter an address and new

set of credentials for this login.



When you're done click save.

5.3. Fabric Groups

Fabric Groups are a way of segmenting our endpoints into different types of resources or to separate them by intent. These groups are mandatory before you can build anything.

To add a Fabric Group, login to your vRealize Automation tenant as a IaaS Administrator account

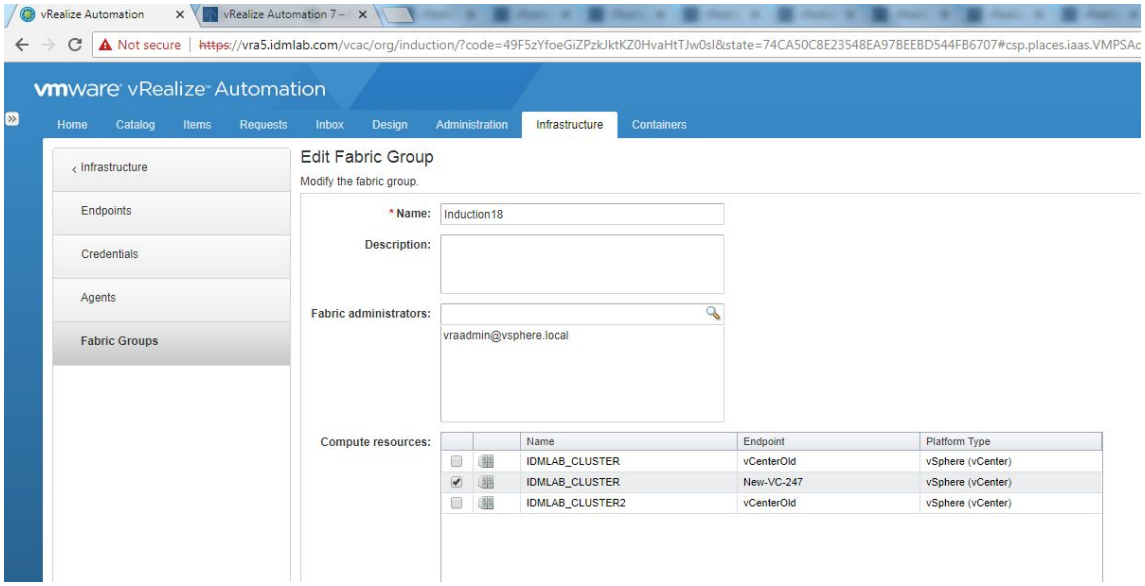
Now go to the Infrastructure Tab –> Endpoints –> Fabric Groups.

Click the "New Fabric Group" button to create a new group.

Once the "New Fabric Group" screen opens, you should first check to see if there are any resources in the "Compute resources:" section. If there are no resources, check to make sure that all of your endpoint connections are correct and the credentials are working. If you need to dig into this more deeply, you can check the vRealize Automation logs to make sure the endpoints are being discovered properly.

Once your compute resources have been discovered, enter a name for the fabric group, a description and some fabric administrators who will be able to modify the resources and reservations.

Select the compute resources (Clusters in a vCenter) that will be used to deploy vRealize Automation workloads.



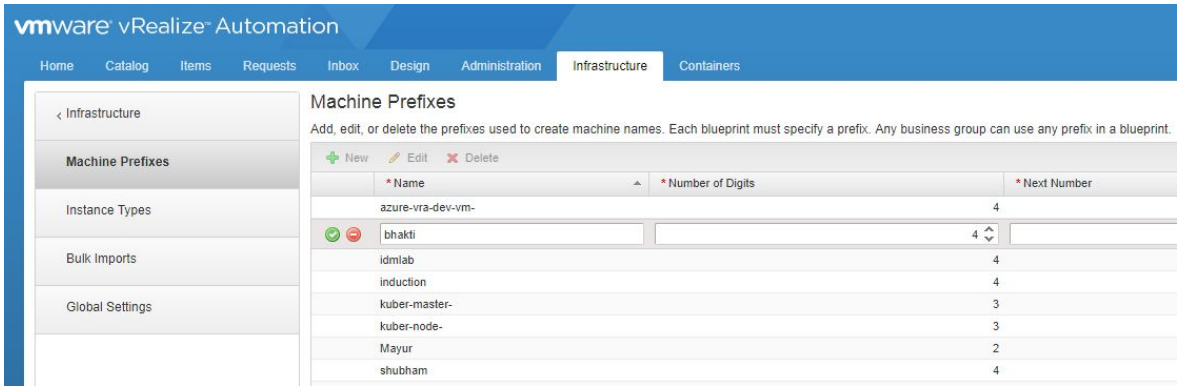
Fabric Groups are a necessary piece of a vRA7 installation and can be used to separate fabric administrators or simply to limit which compute resources in your endpoint can be used

5.4. *Business Groups*

The job of a business group is to associate a set of resources with a set of users. Think of it this way, your development team and your production managers likely need to deploy machines to different sets of servers. A business group doesn't do this by itself. Instead it is combined with a reservation. But before we can build those out, need to setup our business groups as well as machine prefixes.

A machine prefix lets us take some sort of string and prepend it to some set of numbers to give us a new machine name. We want to make sure that our machines don't have the same names so we'll need a scheme to set them up in some sort of pool like we do with IP addresses.

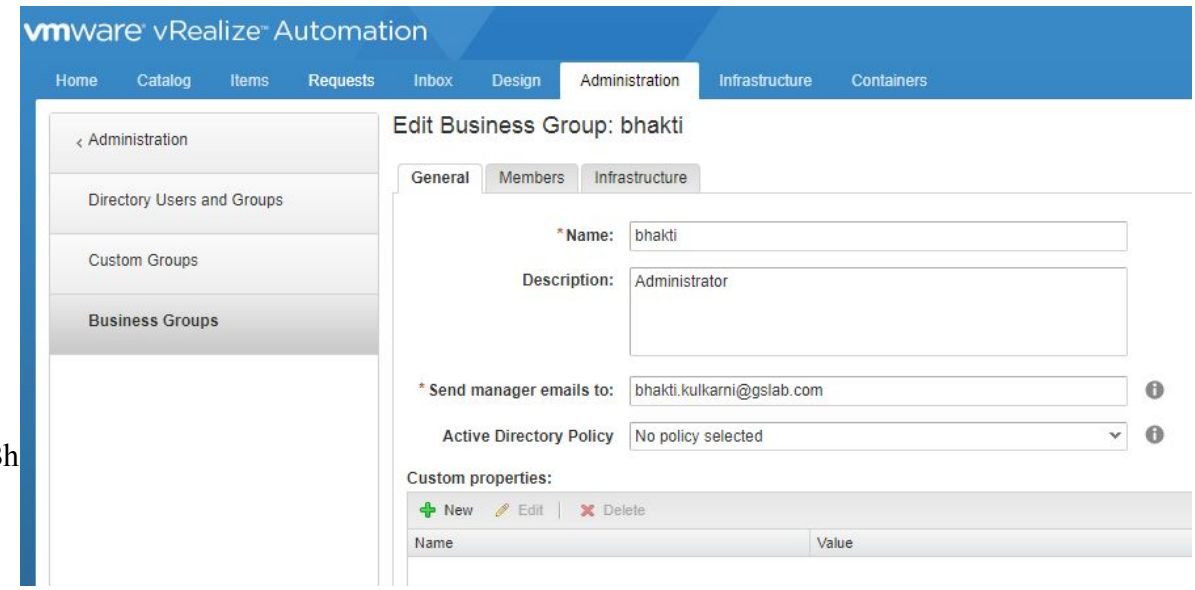
To setup a machine prefix go to Infrastructure –> Administration –> Machine Prefixes. Click the "New" button with the plus sign on it to add a new prefix. Enter a string to be used in the name that will always be added to a new machine name. Next add a number of digits to append to the end of that string, and lastly enter a number for the next machine to start with.



Be sure to click the green check mark after adding this information.

Now that we created the machine prefix, we can add our business group.

Go to Administration –> Users and Groups –> Business Groups. Click the "New" button again to add a new group. When the first screen opens, Give the group a name, description and an email address in which to send business group activities. Click "Next".



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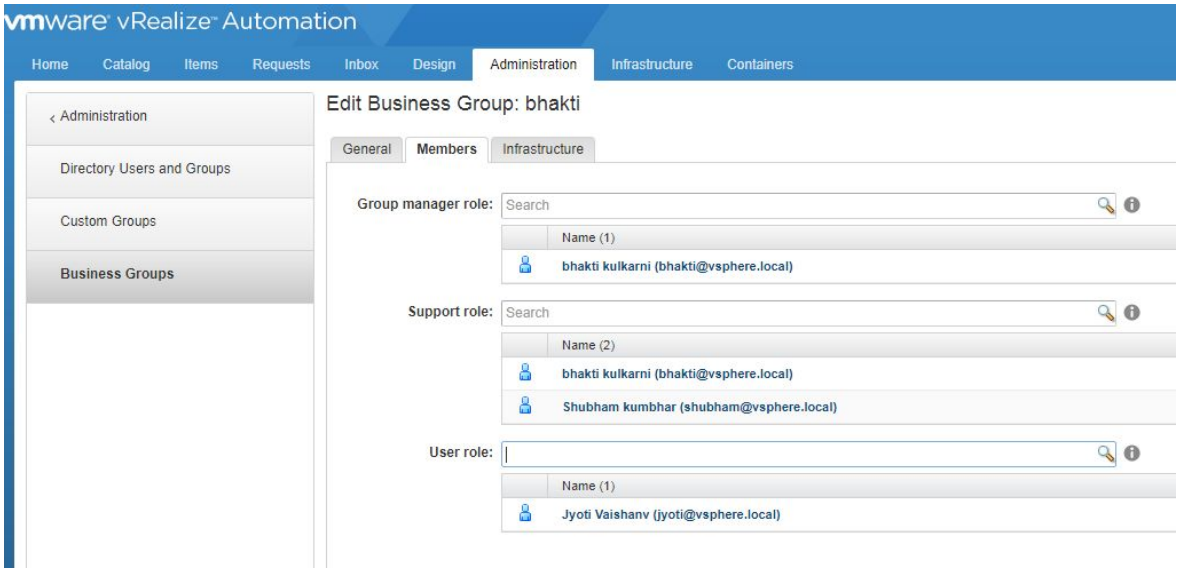
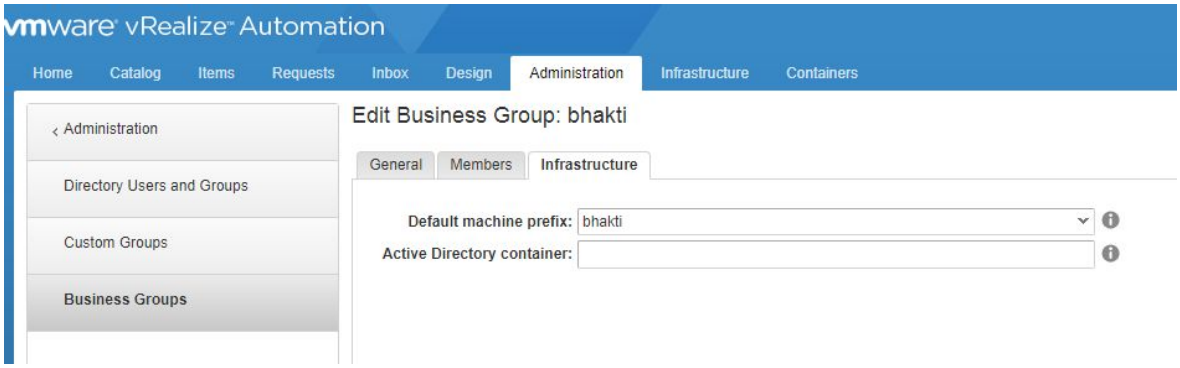
Next, we're presented with a screen to add users to three different roles. The group manager role will entitle the users to blueprints and will manage approval policies. The support role will be users that can provision resources on behalf of the users, and the users role will be a list of users who can request catalog items. Click "Next".



On the Infrastructure screen, select a machine prefix from the drop down. You don't have to have a prefix for the group but this is a best practice in case so that each of your blueprints don't have to have their own assigned. The default prefix can be overridden by the blueprint.

Optionally you can enter an Active Directory container which will house the computer objects if you're using WIM provisioning. Left this blank if you are using VMware templates to deploy Vms.



The business groups are an important piece to deploying blueprints because if a user isn't in a group, it can't be entitled to a catalog item. These business groups will likely be your corporate teams that need to self-provision resources and their manager or team leads.

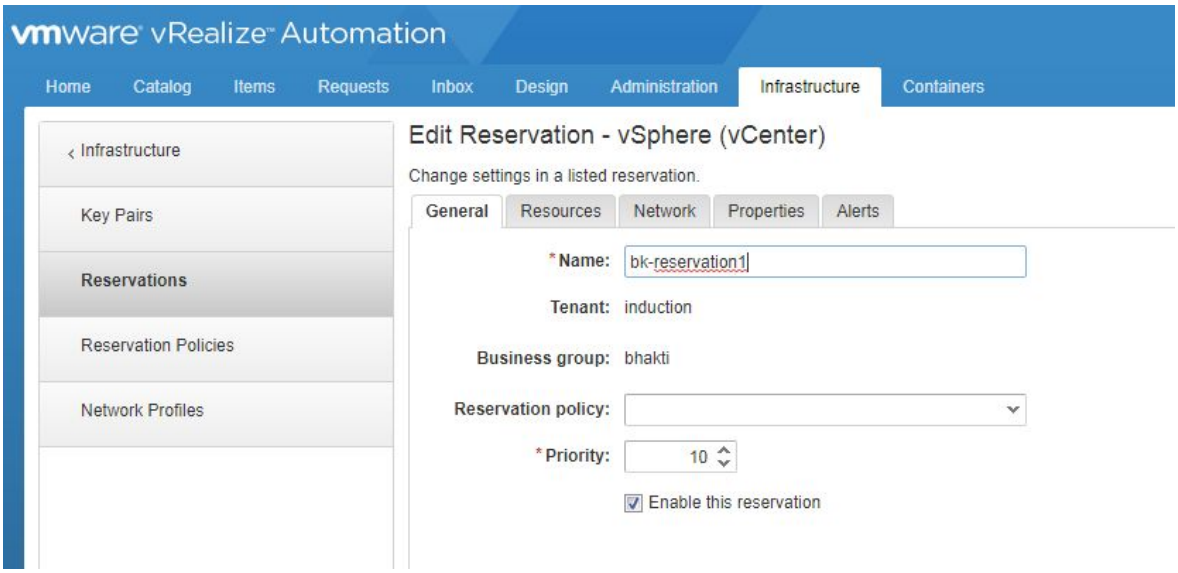
5.5. *Reservations*

vRealize Automation uses the concept of reservations to grant a percentage of fabric group resources to a business group.

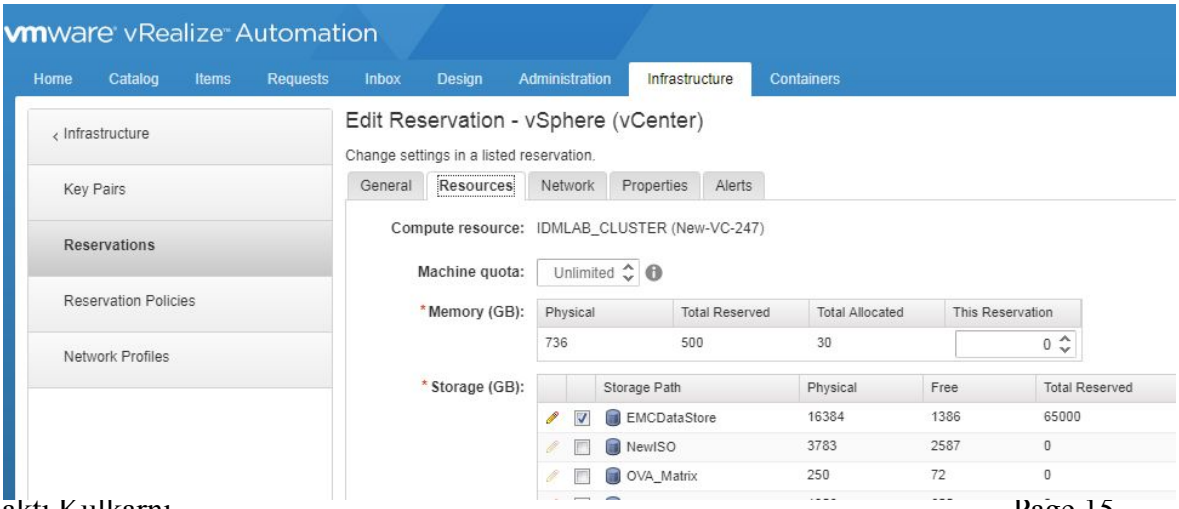
To add a reservation go to Infrastructure –> Reservations. Click the “New” button to add a reservation and then select the type of reservation to be added.

If you are using a vSphere Cluster, select Virtual –> vCenter.

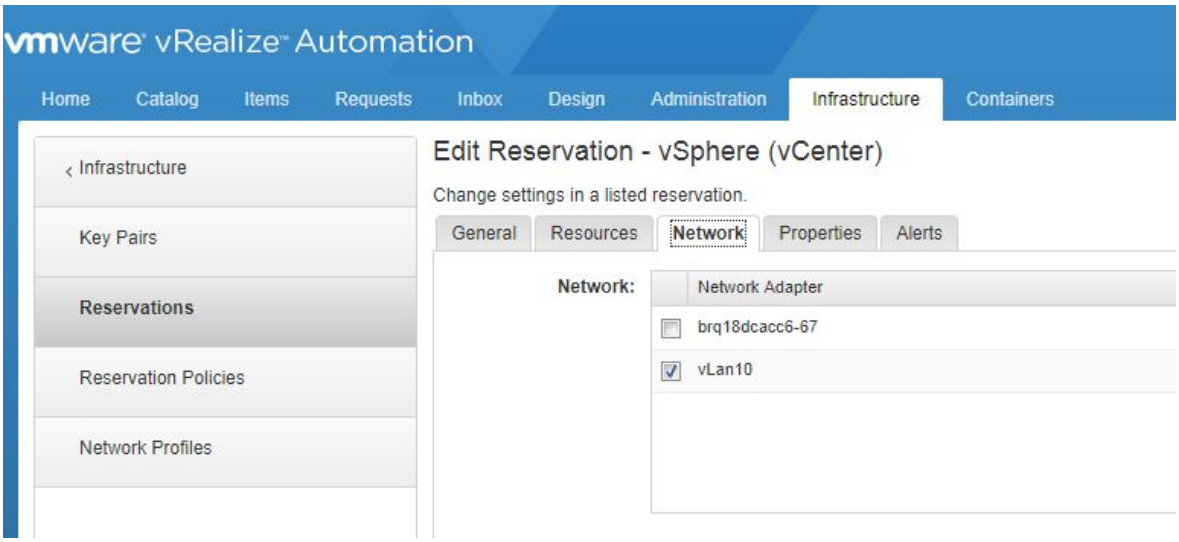
Enter a Name for the reservation and the tenant (which should already be selected). Next, in the dropdown select your business group that will have access to the reservation. Leave reservation policy empty for now but enter a priority. If a business group has access to more than one reservation, the priority is used to determine which to use up first. Lastly, select “Enable this reservation”. Click “Next”.



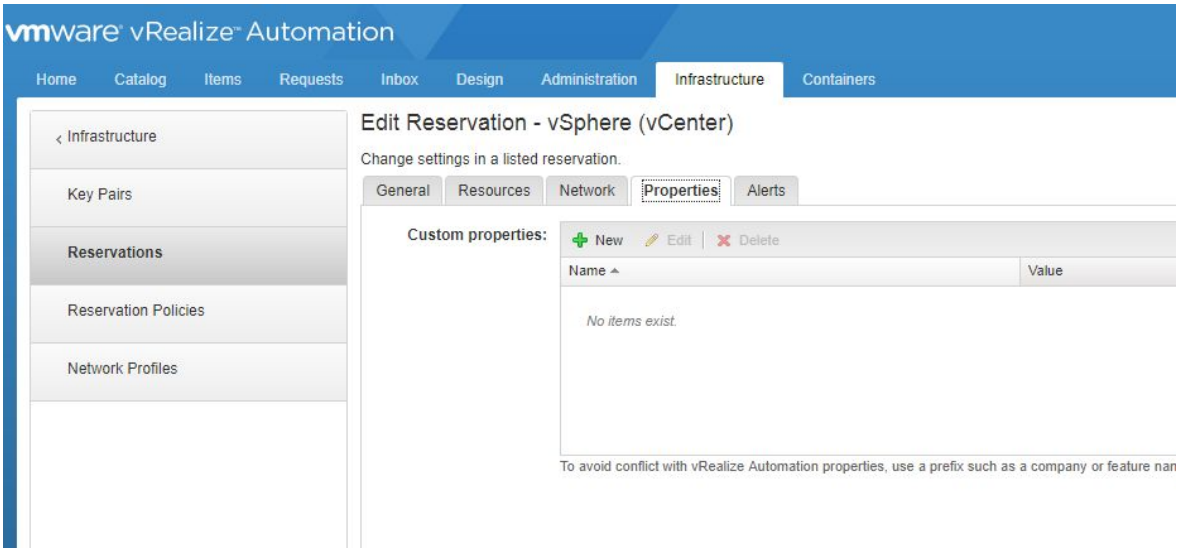
On the resources tab, select the compute resource and then we need to add some quotas. Quotas limit how large the reservation will be, so we can limit it by a number of machines, the amount of memory or how much storage is being used. Be sure to enter a memory amount and at least one datastore to be used for deploying cloud resources. Click “Next”.



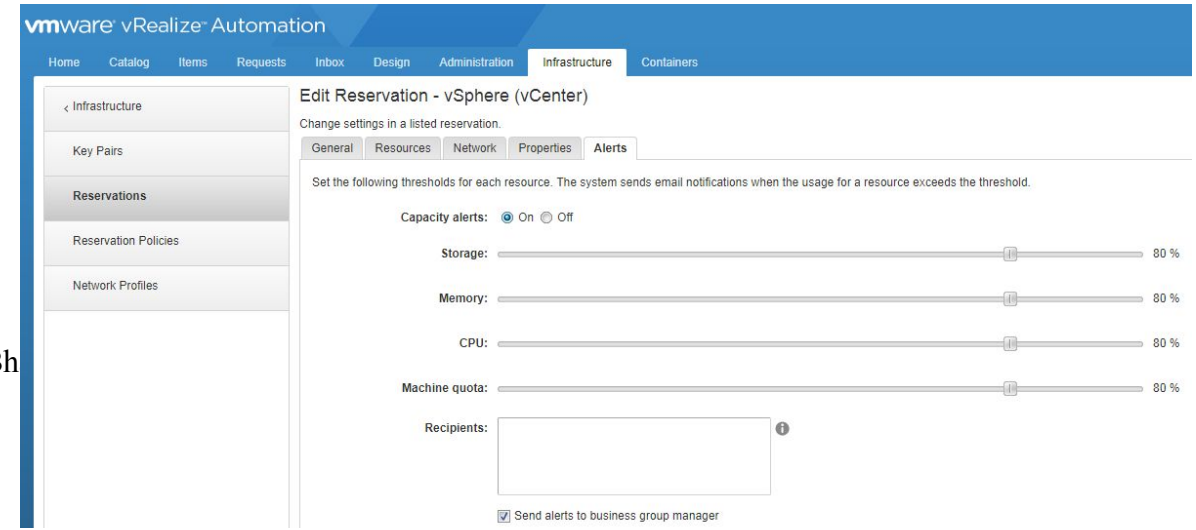
On the network tab, select the networks that can be used to deploy resources and for now leave the “Network Profile” blank.



On the properties tab, you can add custom properties that will be associated with all catalog items deployed through this reservation. For now we’ll leave this empty. Click “Next”.



Lastly, the alerts page we can set the thresholds on when to alert our administrators about resource usage.



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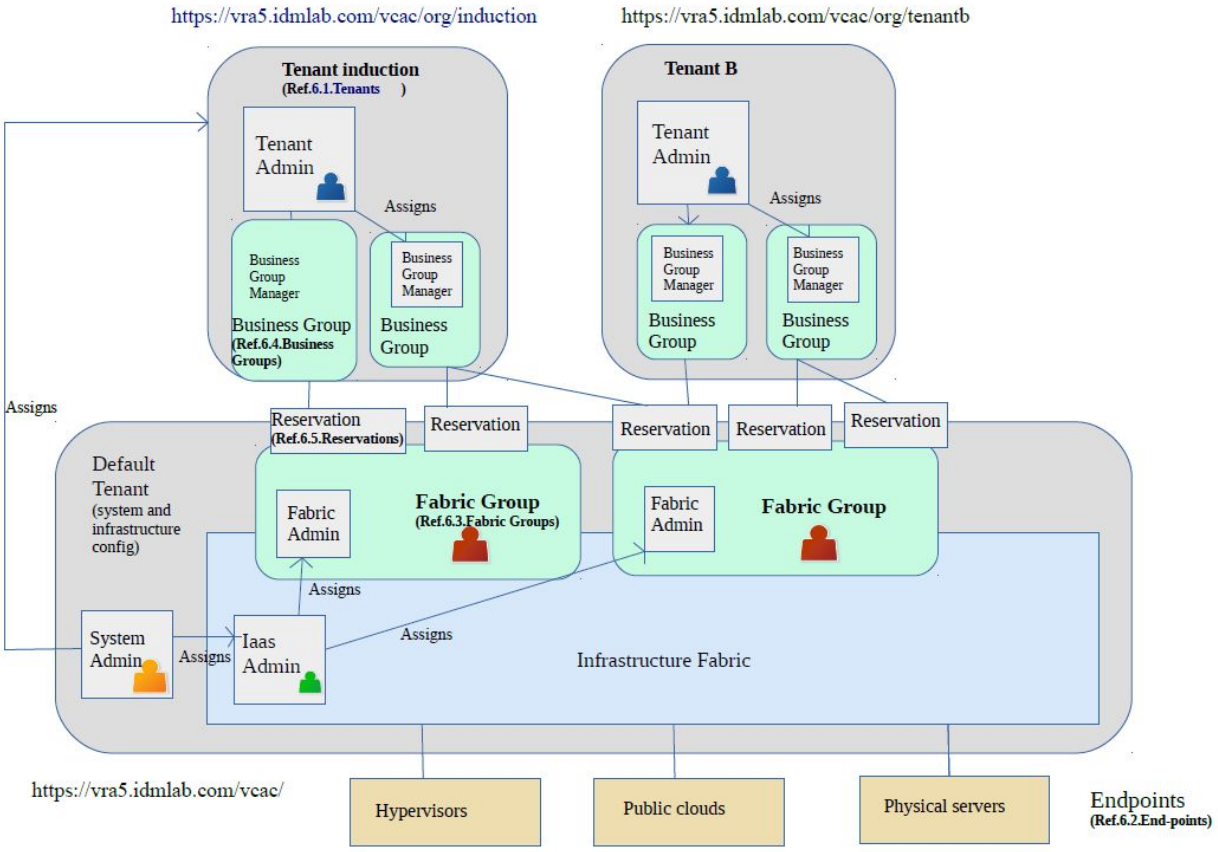
Reservations are how we limit our business groups to a certain amount of resources in our cloud. They are necessary to prevent our vSphere environment from being over provisioned with virtual machines and can empower business group managers to handle their own resources instead of the IT Administrators.

Below Diagram shows Architecture and Assignments of Roles



5.6. Services

Services are just a grouping for blueprints and not something more complex. We'll add our blueprints to a service so that we can group them better later on.

Below you can see the services in a catalog. If you highlight the "All Services" service, it will show you all blueprints regardless of their service category. Otherwise, selecting a specific service will show you only the blueprints in that category.

NOTE: if you only create a single service, the tab that is highlighted on the left side does not appear. Creating a second service forces this panel to be displayed.

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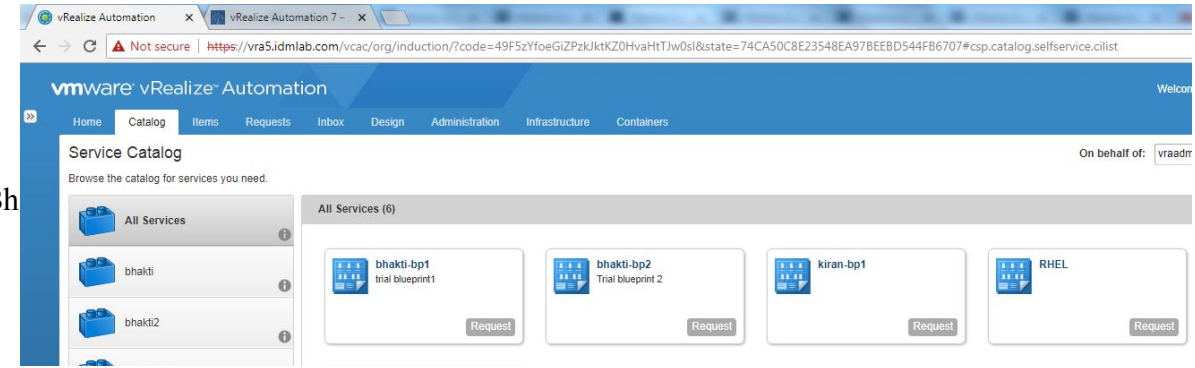
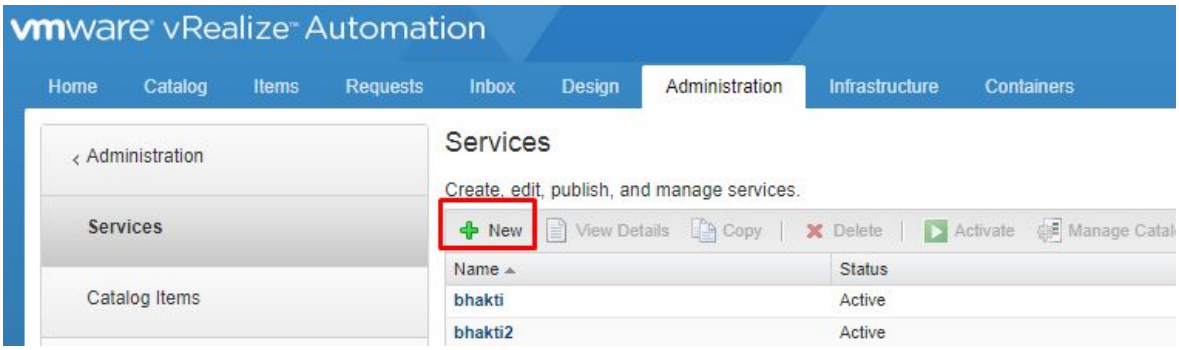
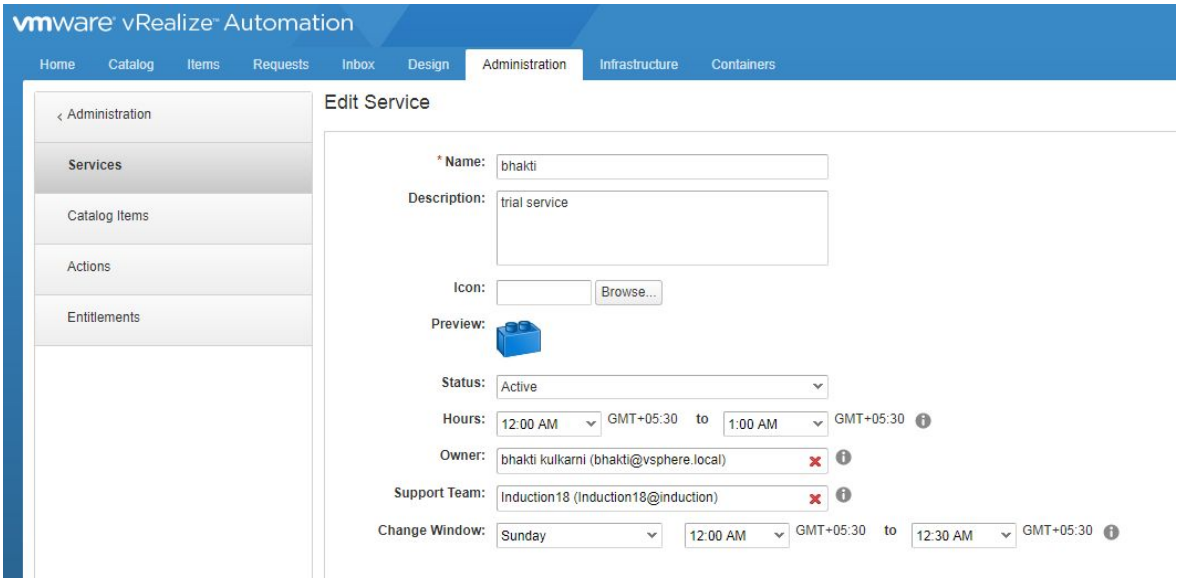


All blueprints must be part of a service for it to be provisioned. To create a service go to Administration tab –> Catalog Management –> Services. Click the “New” button to add a new service.



Give the service a name and description. Then click the browse button to add an icon for your service.

Change the status to Active and then give it an owner. You can also set which hours the service is available to your users and the default change window for the service if you’d like. Again, I’m in a small lab so I’m not messing with this much. Click “OK”



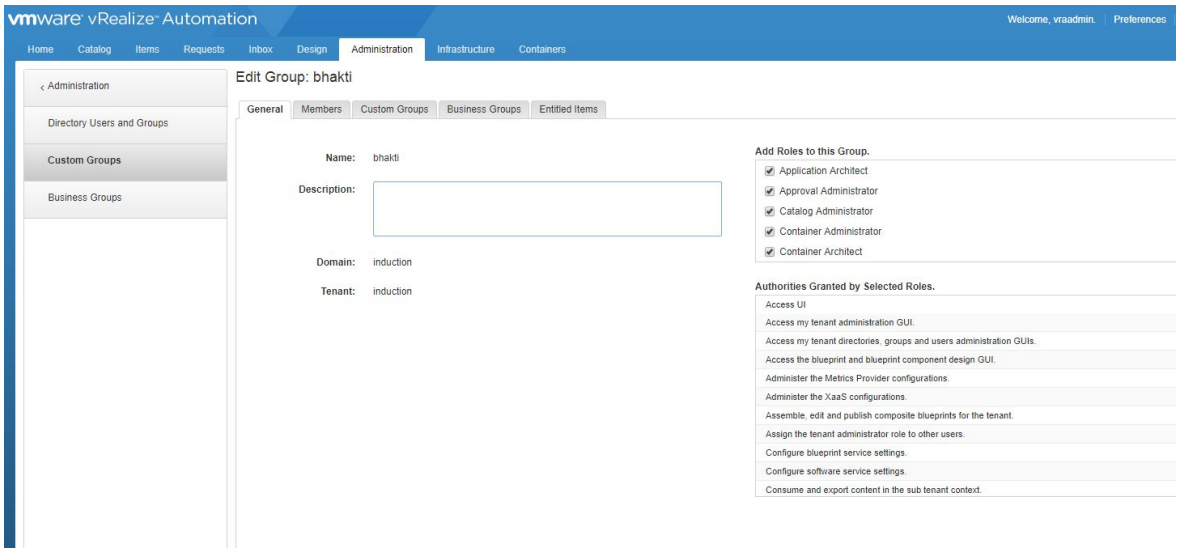
5.7. Custom Groups

If you need any permissions besides just requesting a blueprint, you’ll need to be added to a custom group first.

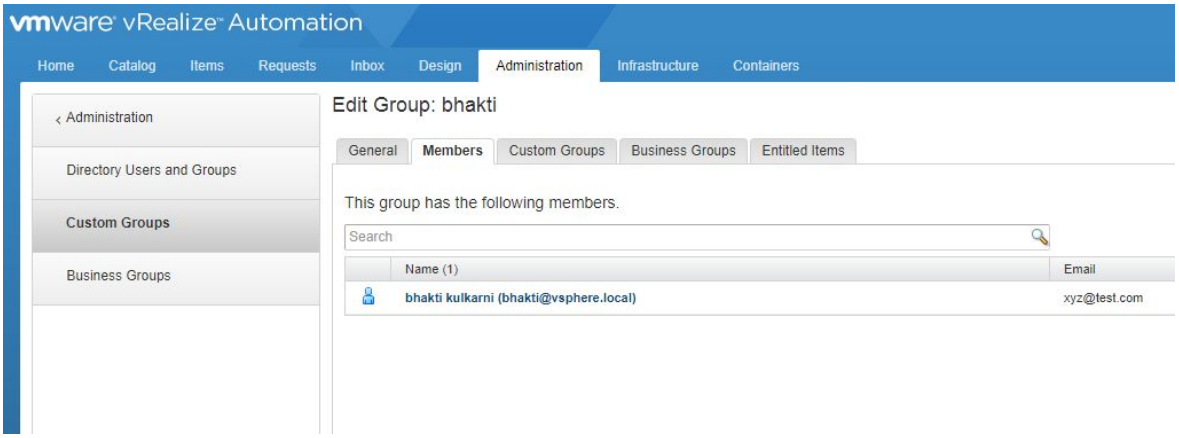
To create a custom group, login as a tenant administrator and go to the Administration Tab –> Users and Groups –> Custom Groups. From there click the “New” button to add a new custom group.

Once the “New Group” screen appears give it a name and description. On the right hand side, select the built in roles that you’d like to assign to this group.

To find out what each of the roles do, take a look in the bottom right hand corner of the "New Group" screen. The permissions will be listed as you click on each role. When you're done, click "Next".



On the following screen select your users. Again this is my home lab and all of my Domain Admins will manage this vRA7 portal.



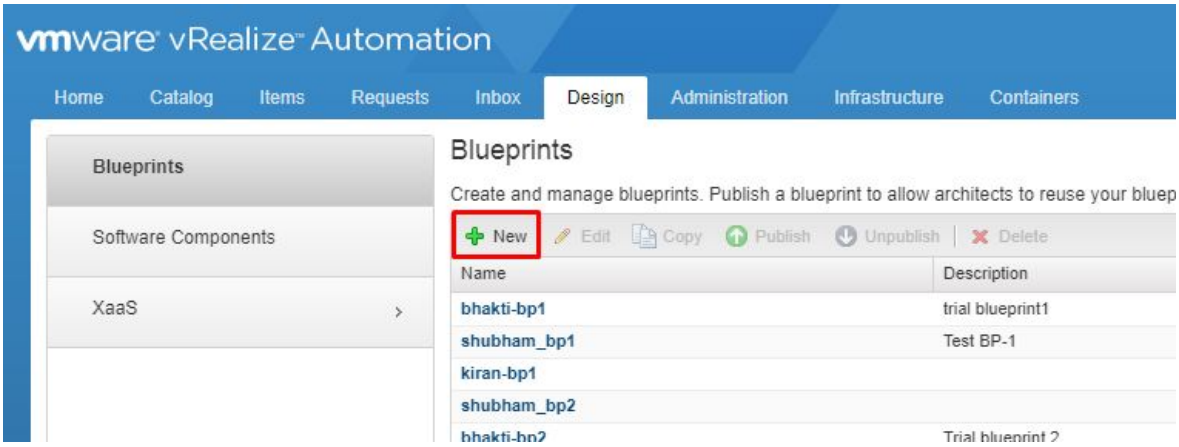
custom groups are important for us to build blueprints and manage catalogs

5.8. Blueprints

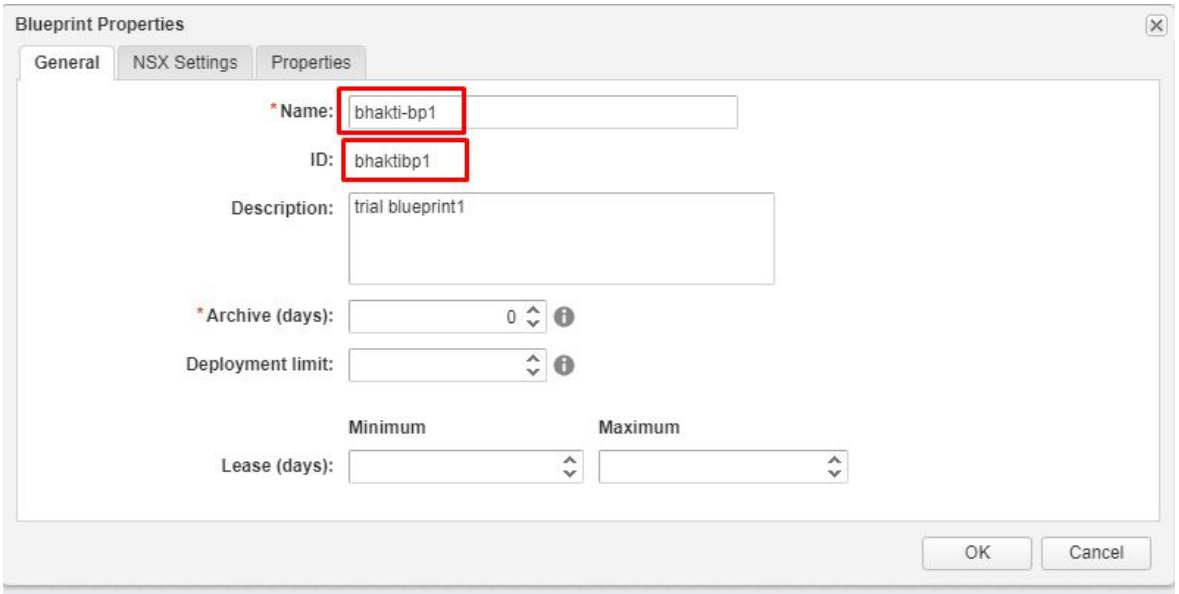
Now we can publish our vSphere templates in vRA.

To create a blueprint in vRealize Automation go to the "Design" tab.

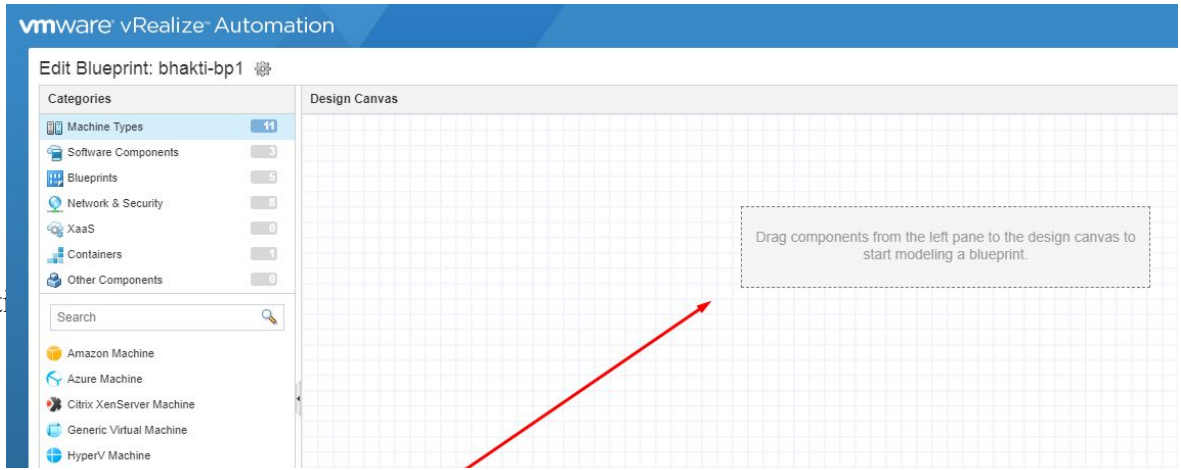
Click the “New” button to add a new blueprint.



Give the new blueprint a name and a Unique ID. The ID can’t be changed later so be sure to make it a good one. Next, enter a description as well as the lifecycle information. Archive (days) determines how long an item will be kept after a lease expires. The lease is how long an item can be provisioned before it’s automatically removed. Click OK.



The next step is to put all of our “stuff” into the blueprint. To add a vCenter template into our blueprint, drag the “vSphere Machine” object onto our design canvas. This As you can see we have a lot of options to be added to our blueprint, such as multiple machine types, networks, software and other services.



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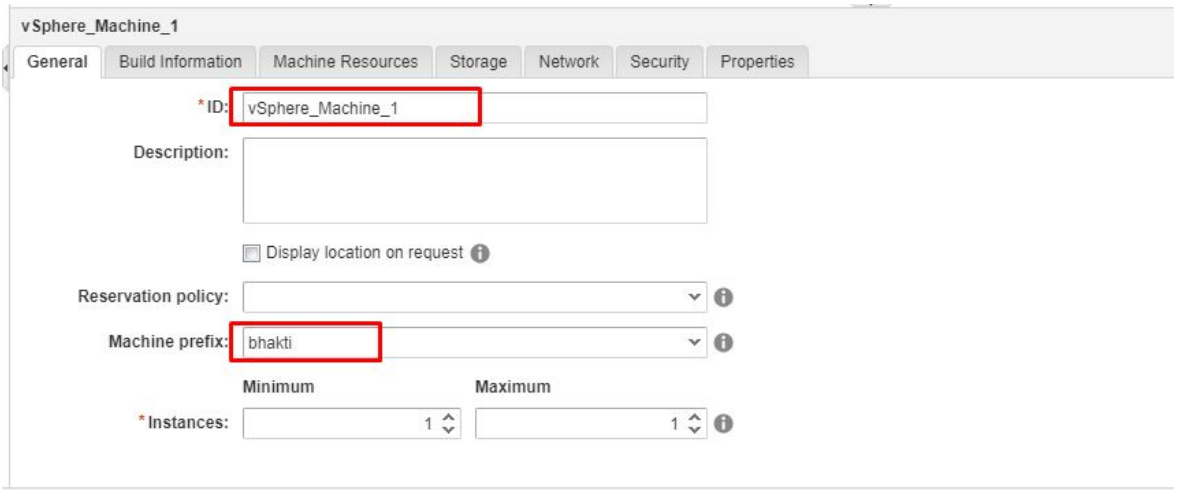
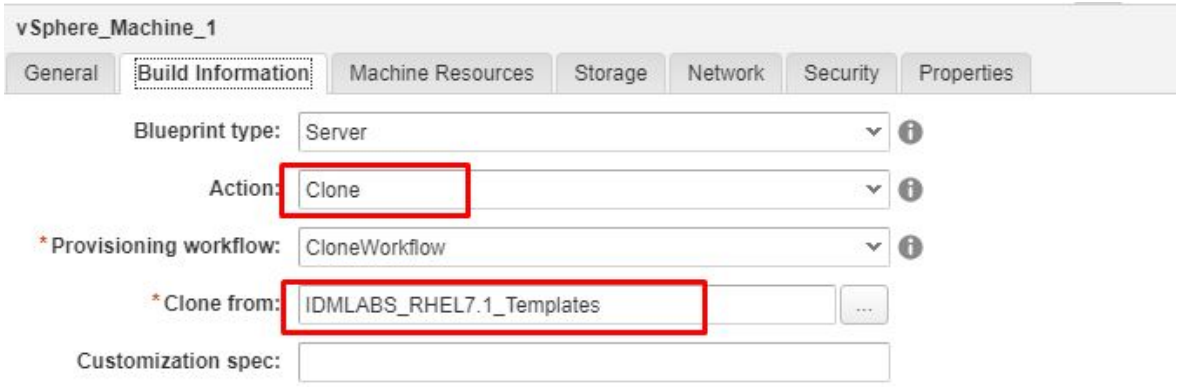
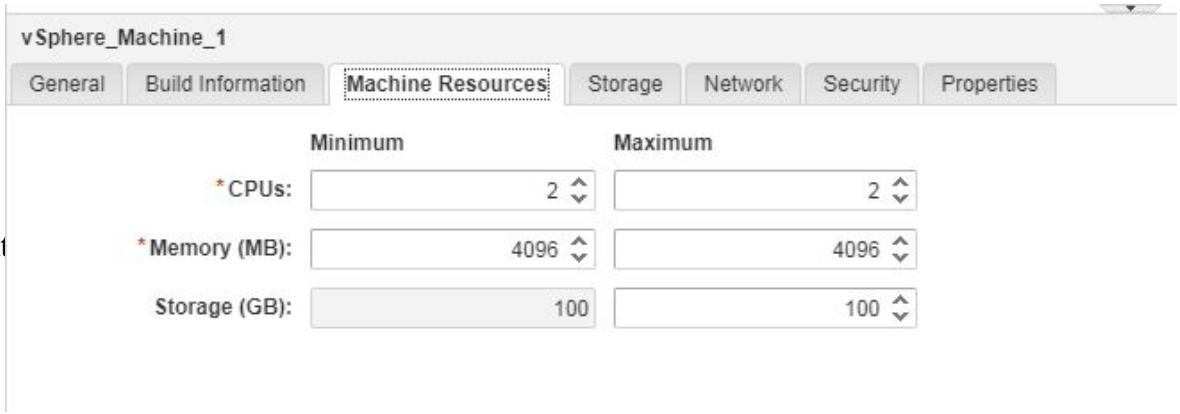
Once we've added our components into the blueprint, we need to give each of them some characteristics. To start, we're going to give the component an ID and description.



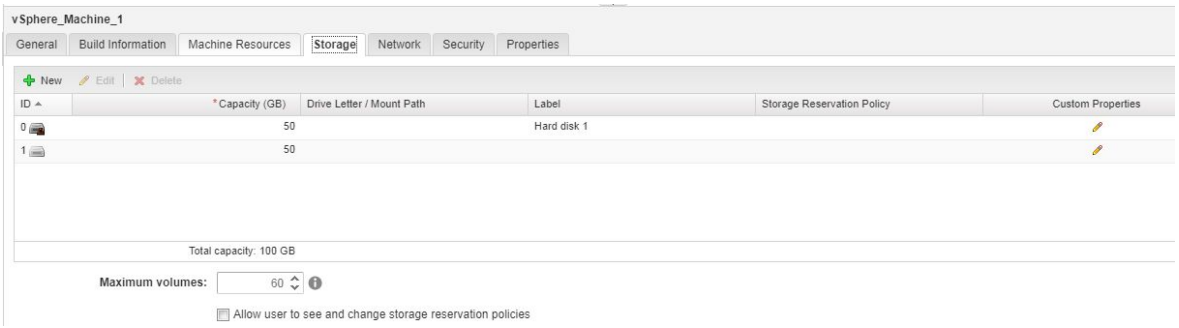
On the Build Information tab, make sure the blueprint type is "Server" and change the Action to "Clone". Click the ellipsis and select one of your vSphere templates. And lastly on this tab enter a customization spec exactly how it is named in vSphere, including case sensitivity.



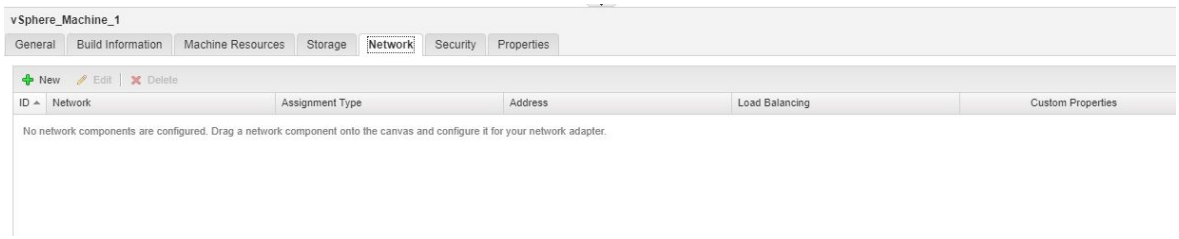
The next tab is the "Machine Resources" tab. Here we need to enter in the size of this virtual machine, or the max sizes that a user could request. Fill out your values and go to the next tab.



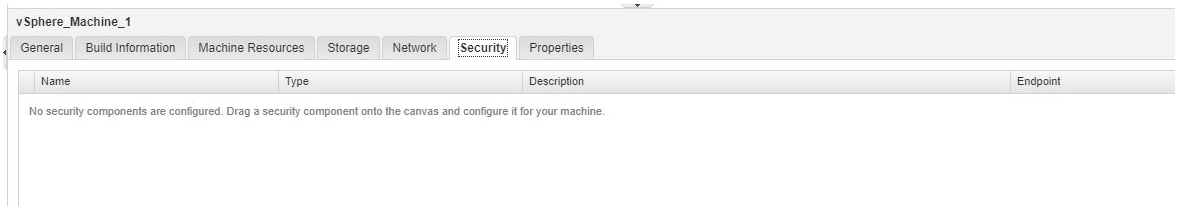
The storage tab will let us customize the sizes of our disks. I've left my disk sizes the same as my vSphere template, but you can change them if needed.



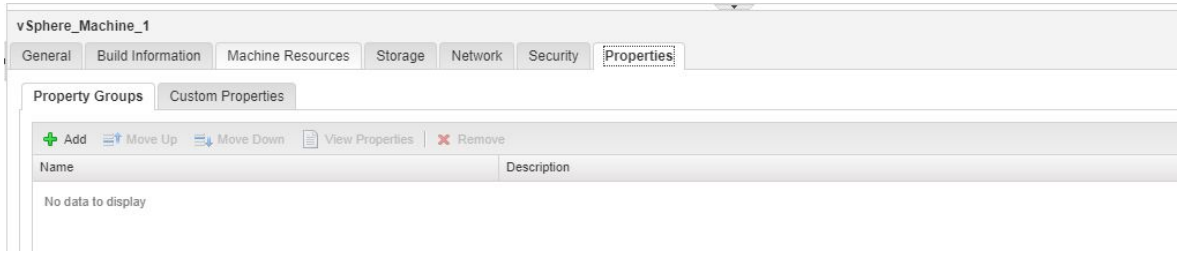
The network tab, I've also left blank. I'm letting the network in my vSphere template dictate what networks I'll be deployed on. For a larger corporate installation, you'll want to specify some network info here



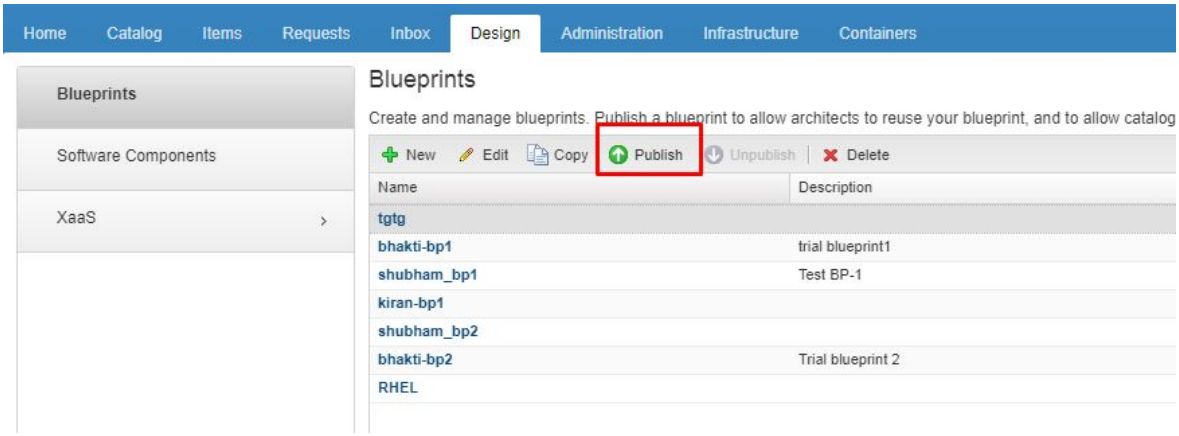
The security tab is to be used specifically with NSX or vCNS. So fare we're not using this so we'll leave it blank for now.



Custom properties deserve their own blog post or series of blog posts. They will allow us to do lots of cool things during provisioning, but they are not required to deploy a machine from blueprint. If you understand them, you can enter them here for the blueprint.



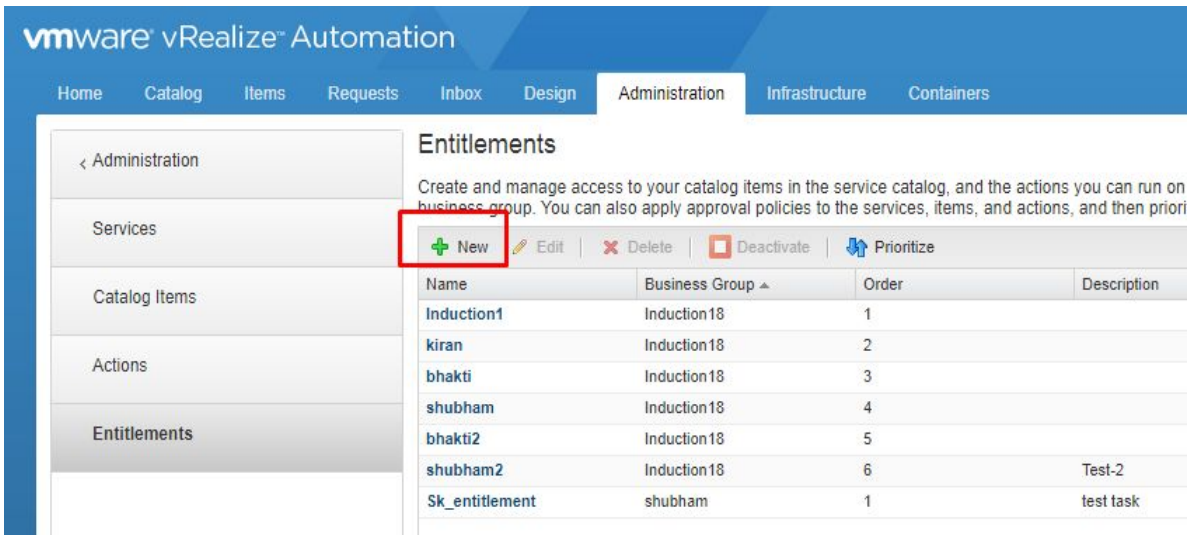
When you're all done fiddling with your settings click "Finish". When you're done, you'll see your blueprint listed in the grid. Before it can be assigned to people though, it must be published. Click the blueprint in the grid and then select the "Publish" button.



5.9. Entitlements

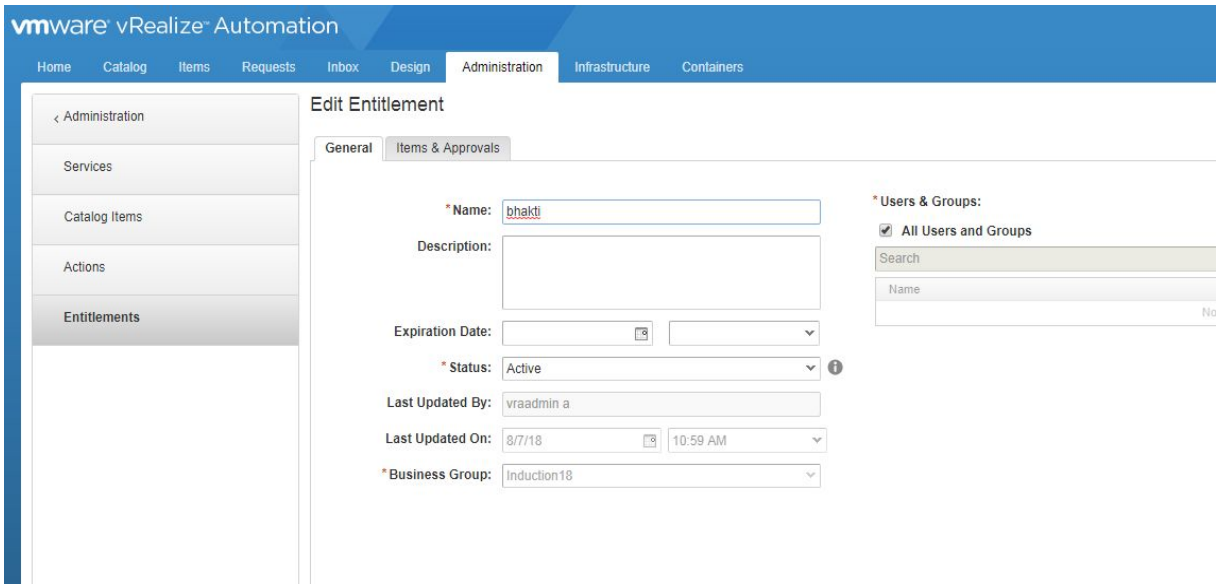
An entitlement is how we assign users a set of catalog items. Each of these entitlements can be managed by the business group manager or a tenant administrator can manage entitlements for all business groups in their tenant.

To create a new entitlement go to Administration tab –> Catalog Management –> Entitlements. Click the "New" button to add a new entitlement.

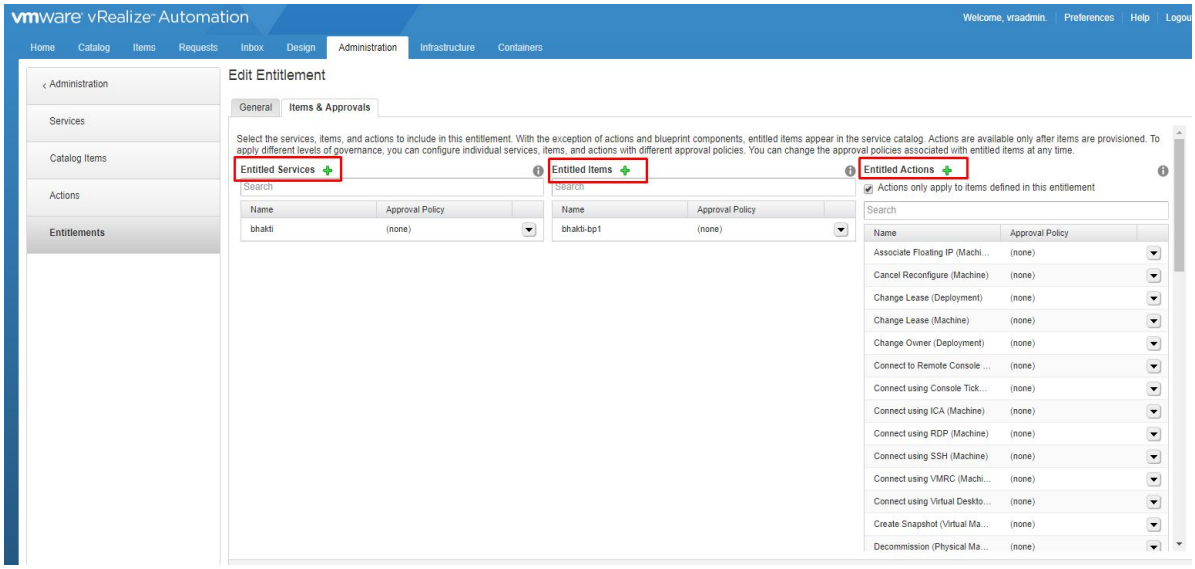


Under the General tab, enter a name for the entitlement and a description. Change the status to "Active" and select a Business Group.Then select the users who will be part of this entitlement.

Next, under the "Items & Approvals" tab, we get to pick which things this user(s) will have access to. We do not need to fill out all of these types, but we can if we choose to do so.



We can entitle users to Services, Items, and/or Actions.

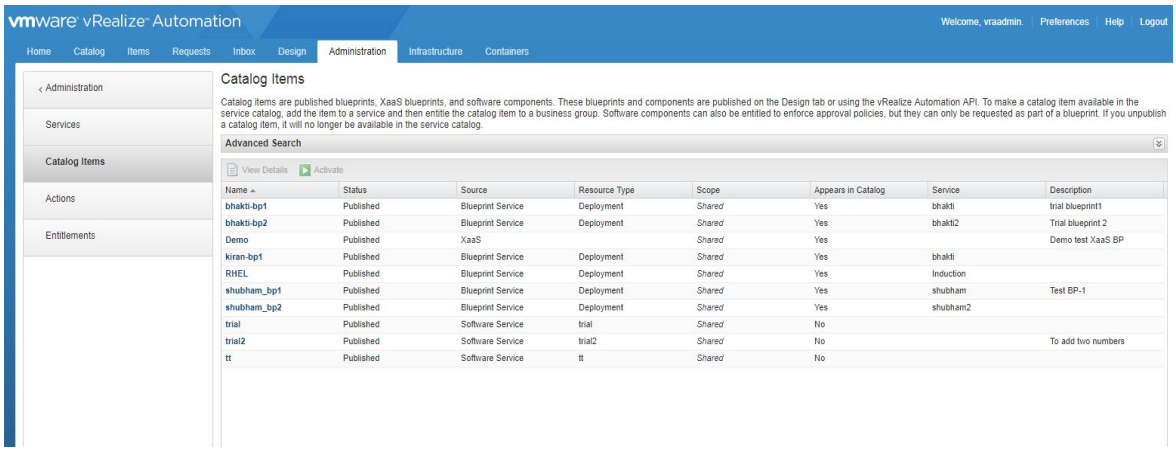


Now we've setup our cloud management portal to assign our users catalog items and actions that they can execute on those items. Entitlements are a key piece to making sure that your users have access to the stuff they need.

5.10. Manage Catalog Items

Managing catalog items are used to show up blueprints in our service catalog so that it can look pretty and organized.

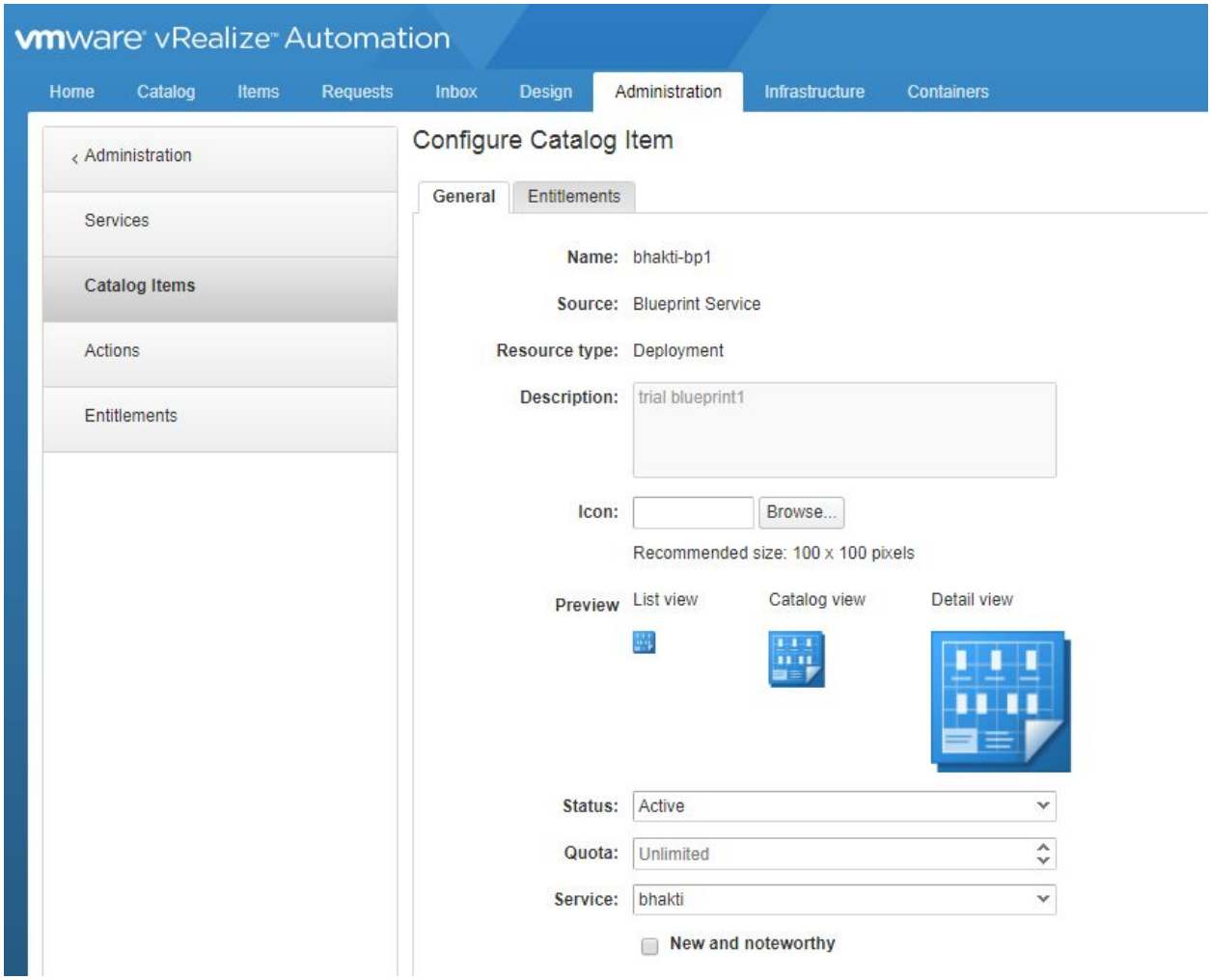
Log in as a tenant administrator and go to the Administration Tab –> Catalog Management –> Catalog Items. From here, we'll need to look for the blueprint that we've previously published. Click on the blueprint.



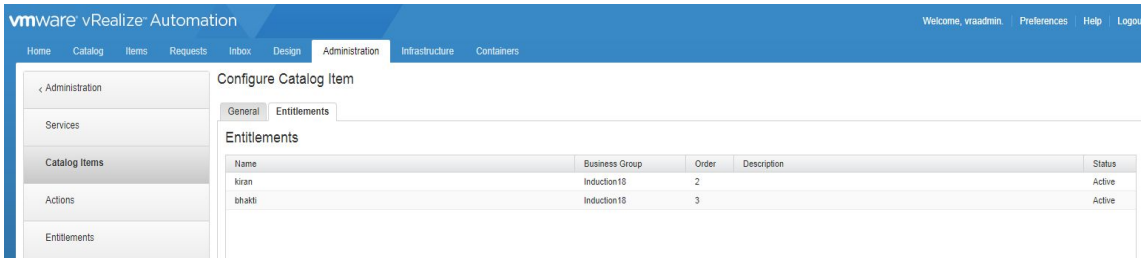
The configure catalog item screen will appear. Here, we can assign this catalog item an icon. Next, change the status to Active so that it will show up in the catalog, and lastly, select which service this catalog item should be listed under.

Remember that a service is like a group of catalog items. Also, if you want, there is a check box to show the item as "New and Noteworthy." This just highlights the catalog

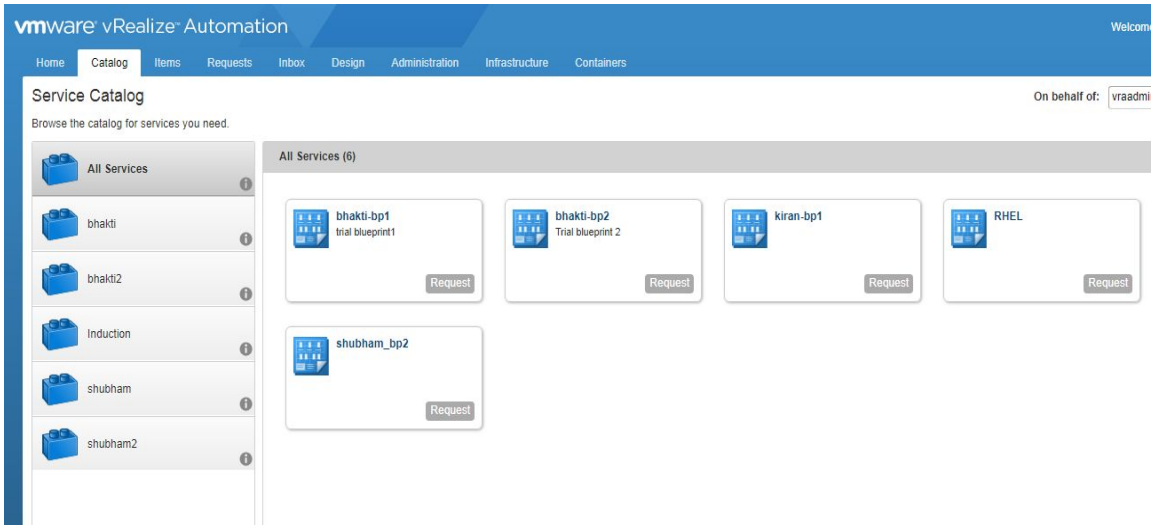
item in the service catalog.



If we click the entitlements tab, we'll see who has been entitled to the item. Click Finish.



When we go to the service catalog, we should see some nicely laid out items, with icons and grouped together by services. If you don't see the correct things, check to make sure the user logged in has the correct entitlements.

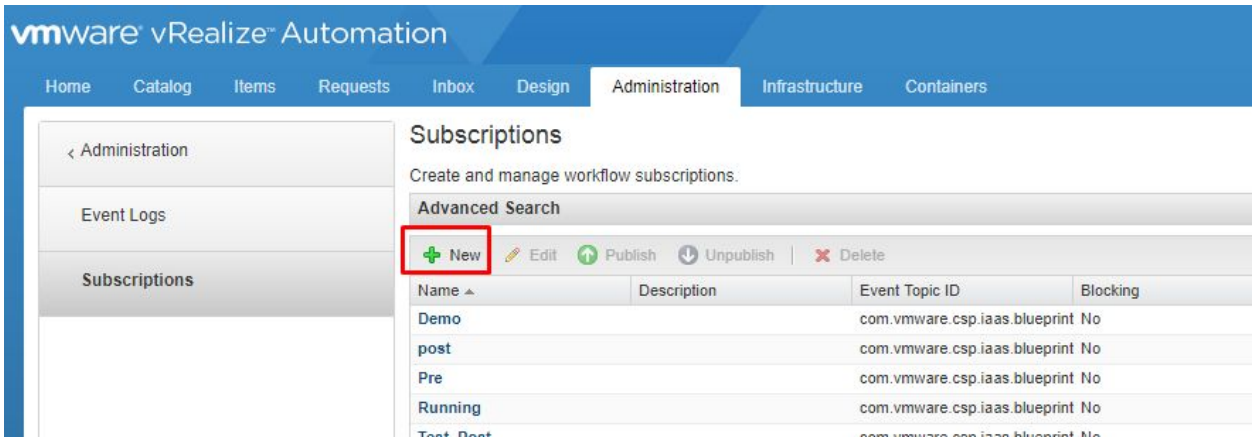


A blueprint that is published has to get configured so that it shows up all nice and neat in the service catalog. Managing catalog items is the way to do this.

5.11. Event Subscriptions

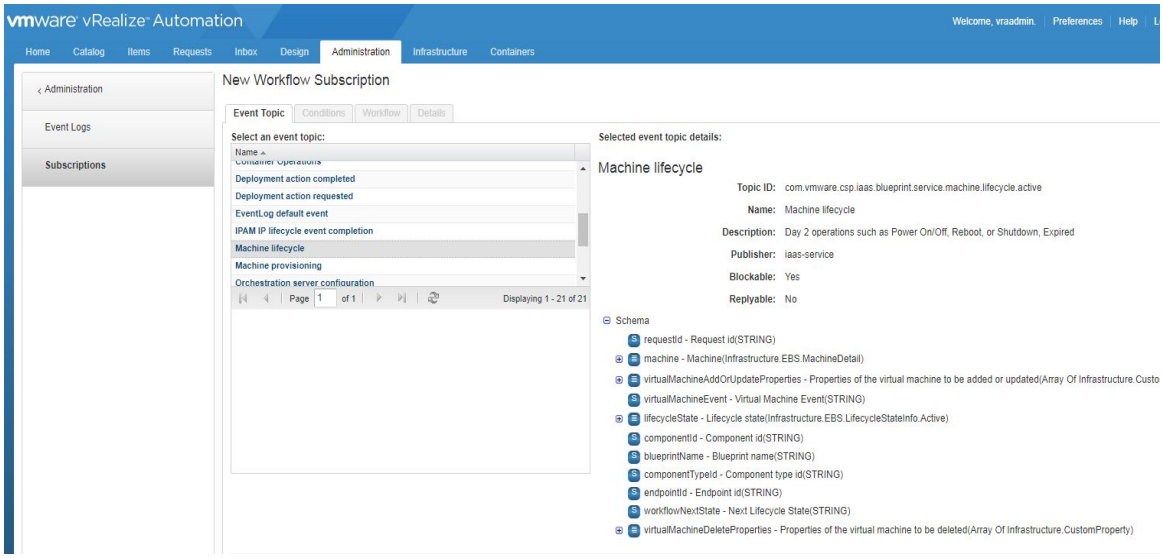
In vRealize Automation 7 a new concept was introduced called a "Subscription." A subscription is a way to allow you to execute a vRealize Orchestrator workflow based on some sort of event that has taken place in vRA.

To being we will go to the Administration Tab –> Events –> Subscriptions. Here we can add a new subscription by click the "New" button with the plus sign.



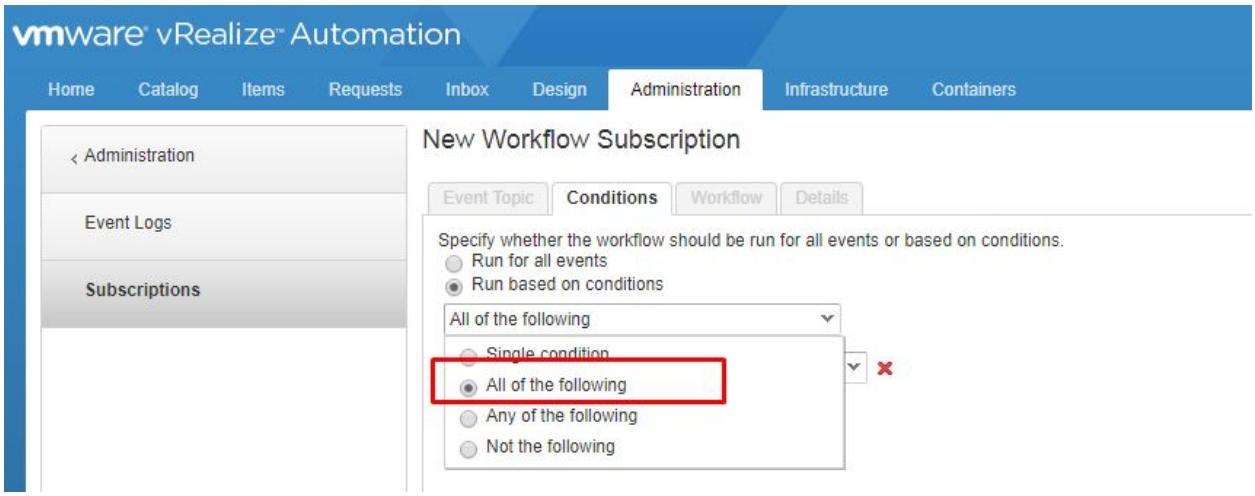
The first screen that shows up is the “Event Topic” screen. An event topic describes the type of event that we’re going to watch for. For now we are using the “Machine Provisioning” event.

Once you’ve selected an Event Topic, you’ll notice that the schema will be displayed on the right hand side of the screen. This explains the data that will be passed to vRealize Orchestrator during the event. Once you’ve selected an Event Topic, click Next.

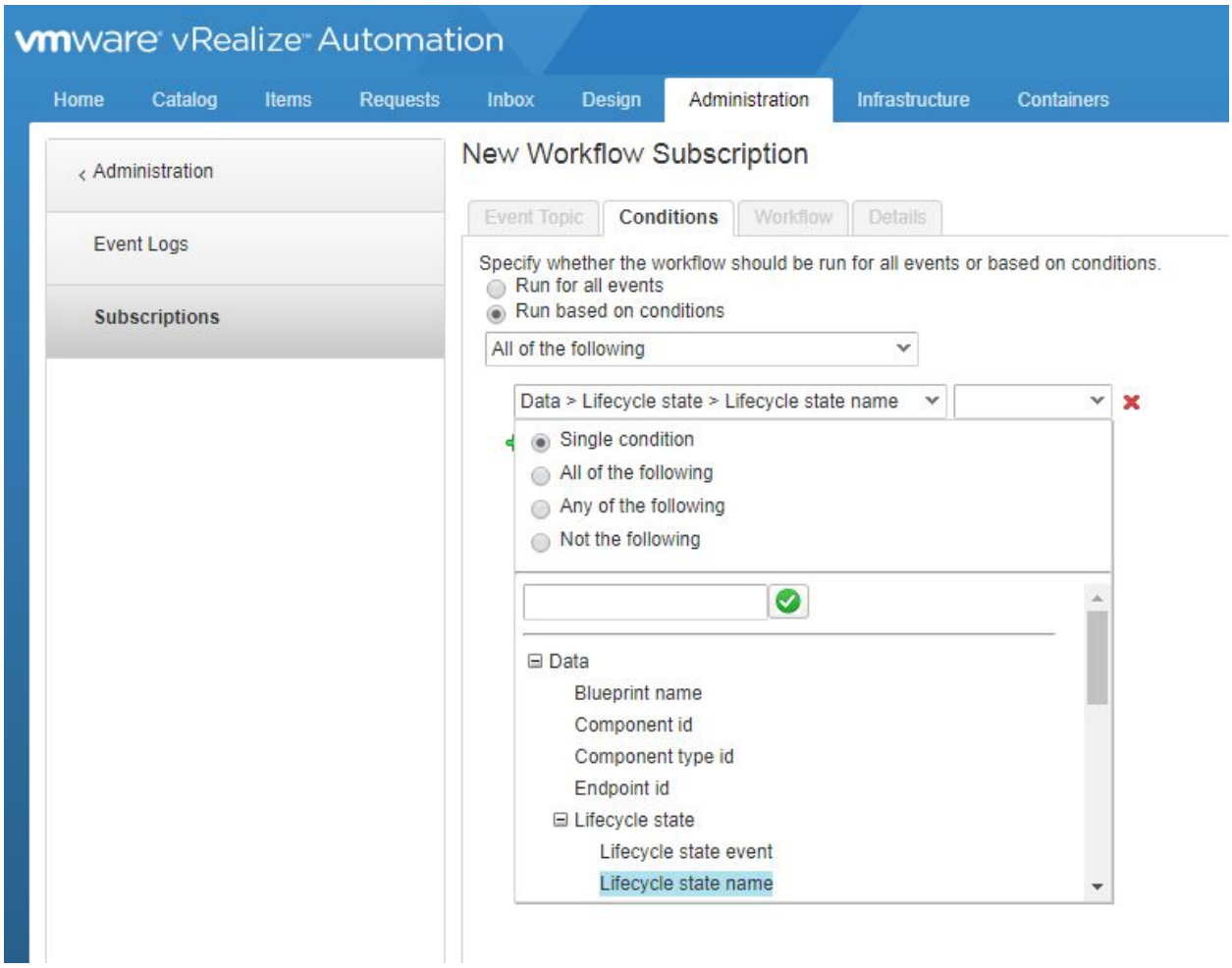


Now we get to the conditions tab. By default, the “Run for all events” option is selected. I encourage you to leave this alone and run it one time with some really basic “Hello World” type workflow just to see what it does but in the rest of this post we’re going to set some specific conditions.

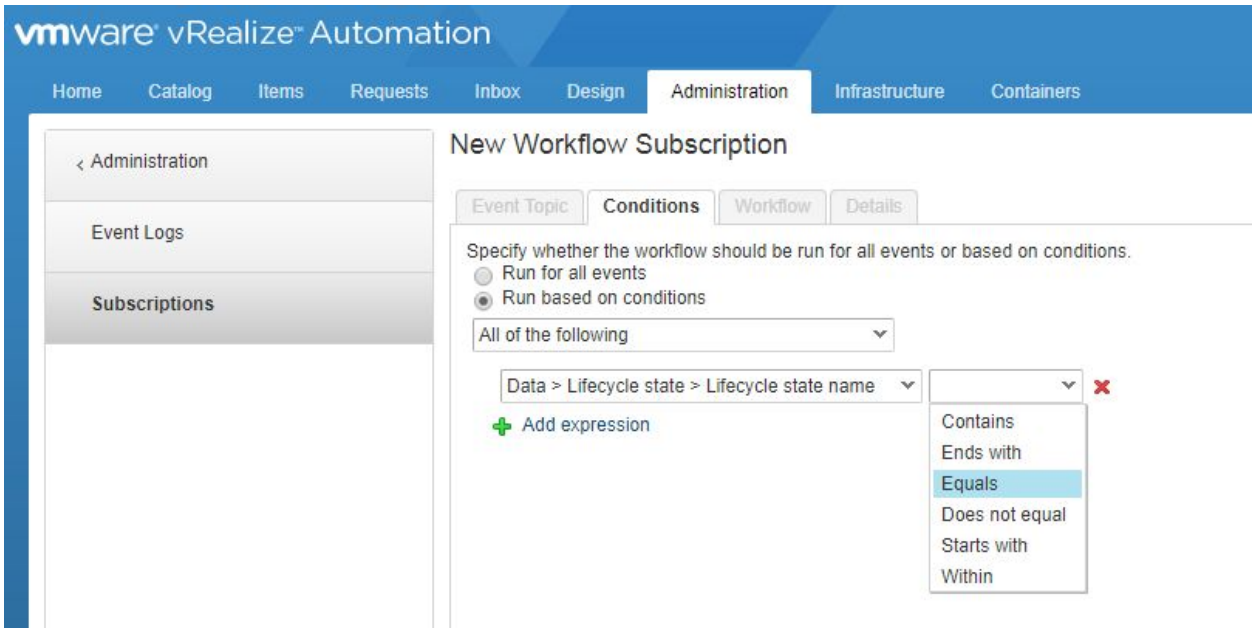
Change the radio option to “Run based on conditions” and then choose “All of the following.” This will allow us to enter a list of conditions and every one of them must be met before the action is triggered.



Next click the drop down and select “Lifecycle state name”.

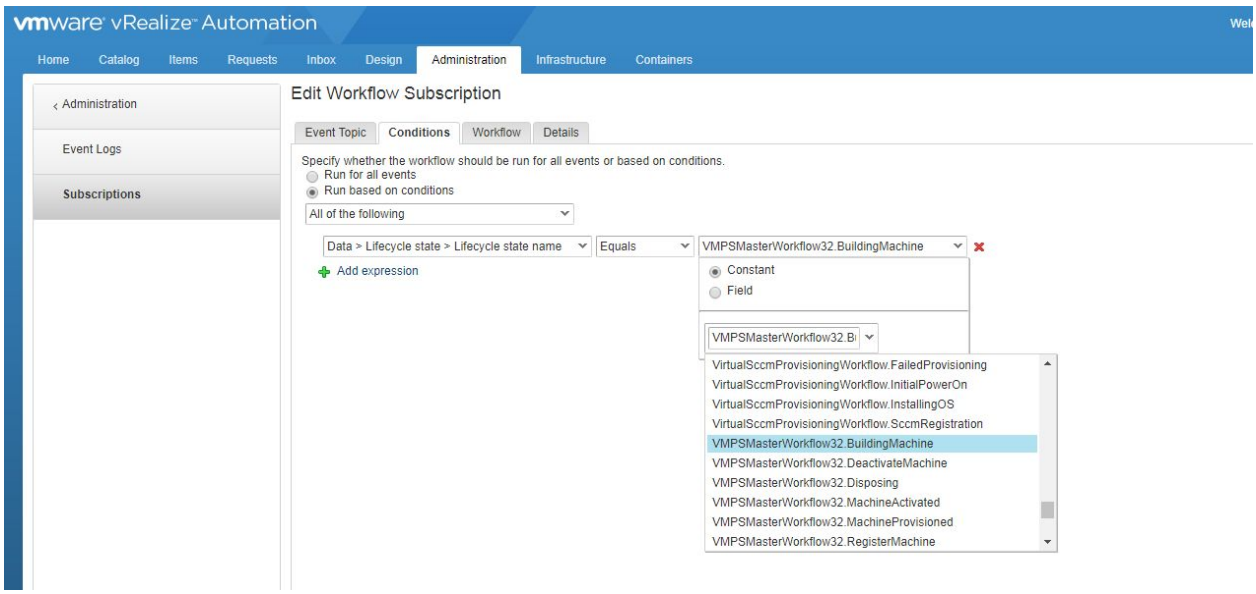


In the next box choose “Equals”.



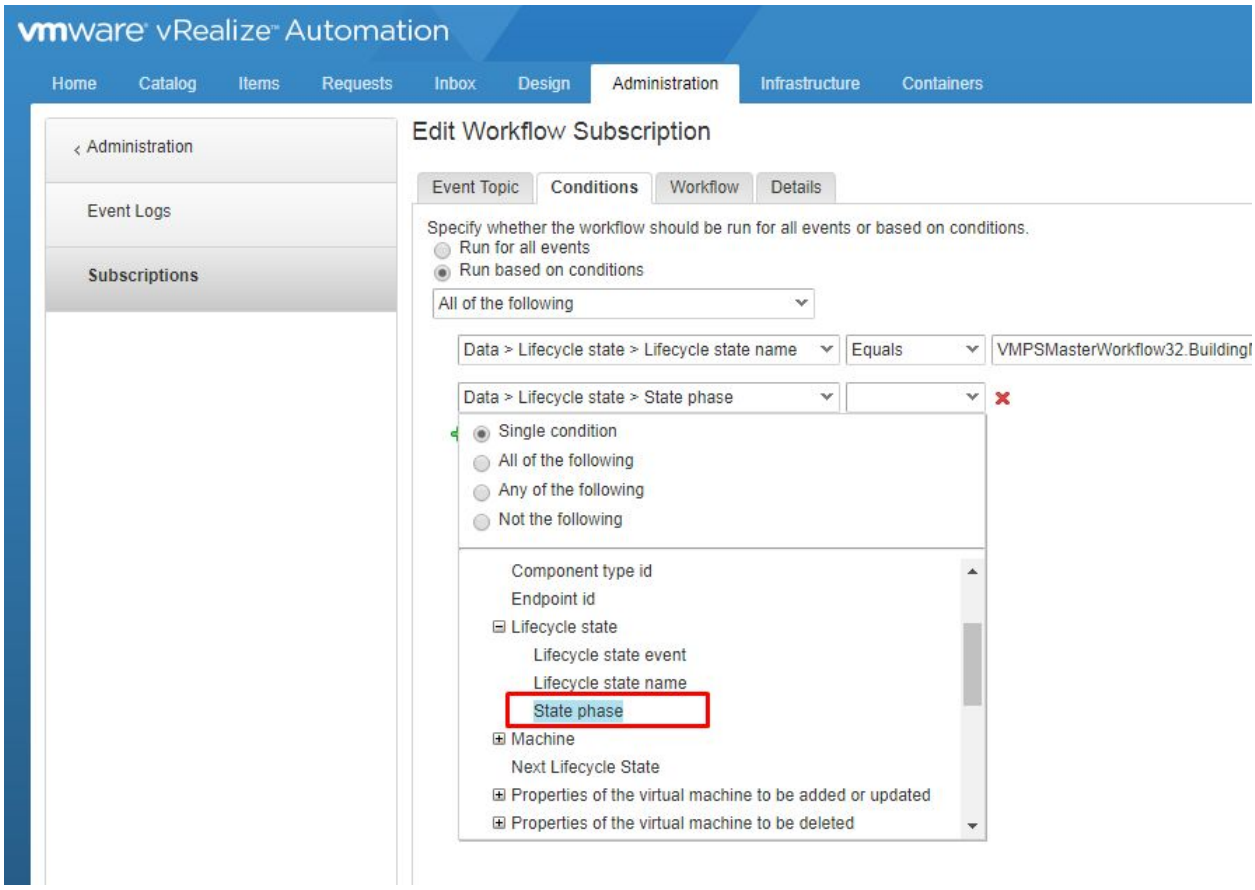
And in the last box leave the radio button on “Constant” and the select the “VMPSMasterWorkflow32.BuildingMachine.” This building machine lifecycle state should be familiar because its the same name as a stub in vRealize Automation 6 but if you’re new to this, it just means that this is the stage of the provisioning lifecycle where the machine is actually being built.

To recap what we’ve done in the past few steps, we said we only want our workflow to trigger when the lifecycle state = WMPSMasterWorkflow32.BuildingMachine.

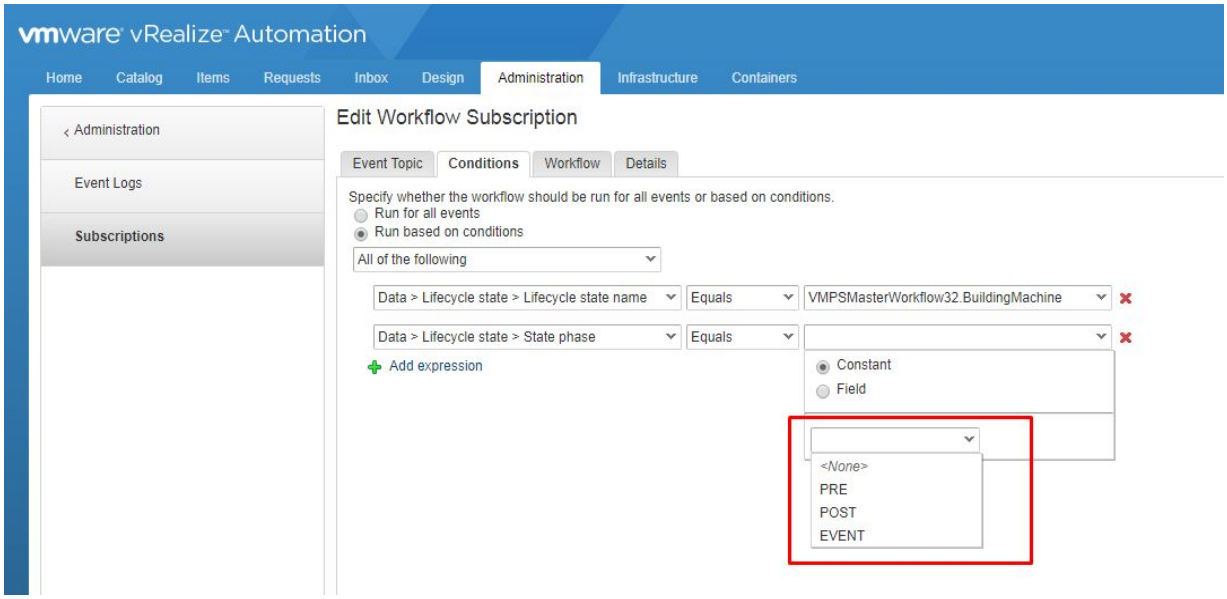


We're not finished yet, we're going to add one more condition here. Click the "Add expression" link to add another condition.

This time select "state phase" and then "equals".

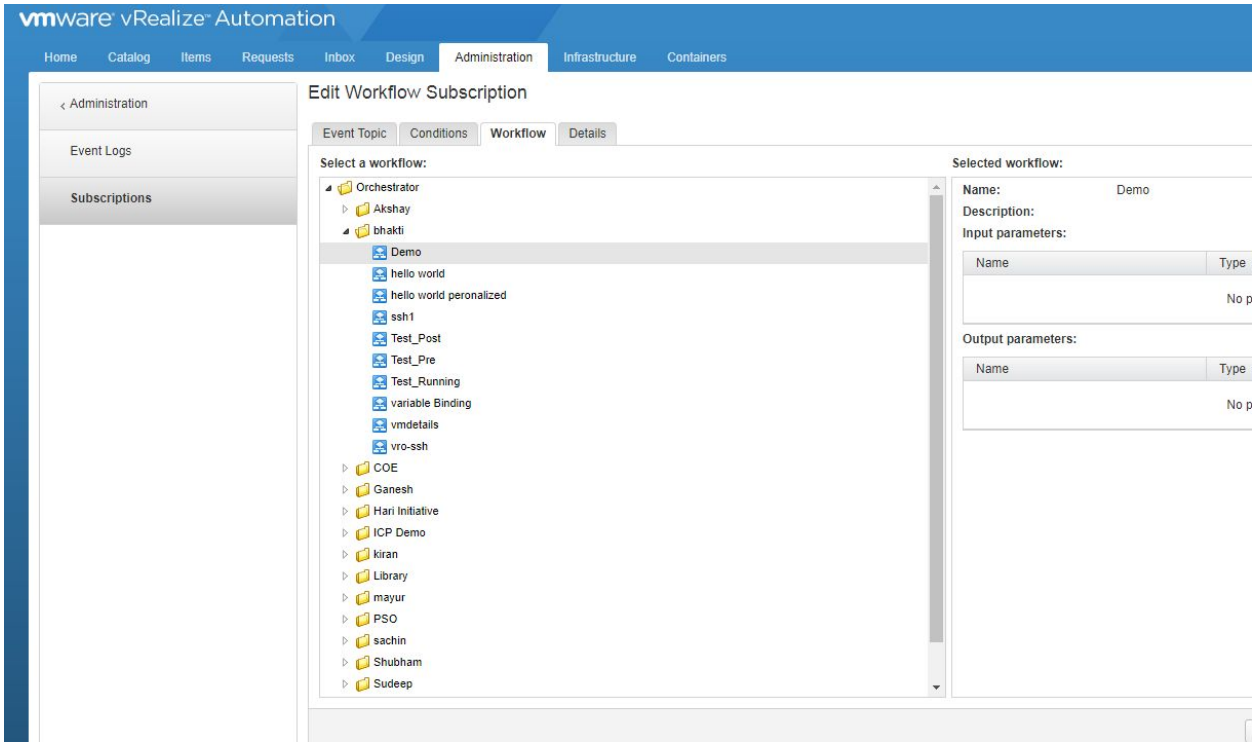


Then in the last dropdown leave the radio button on "Constant" and select "Event".



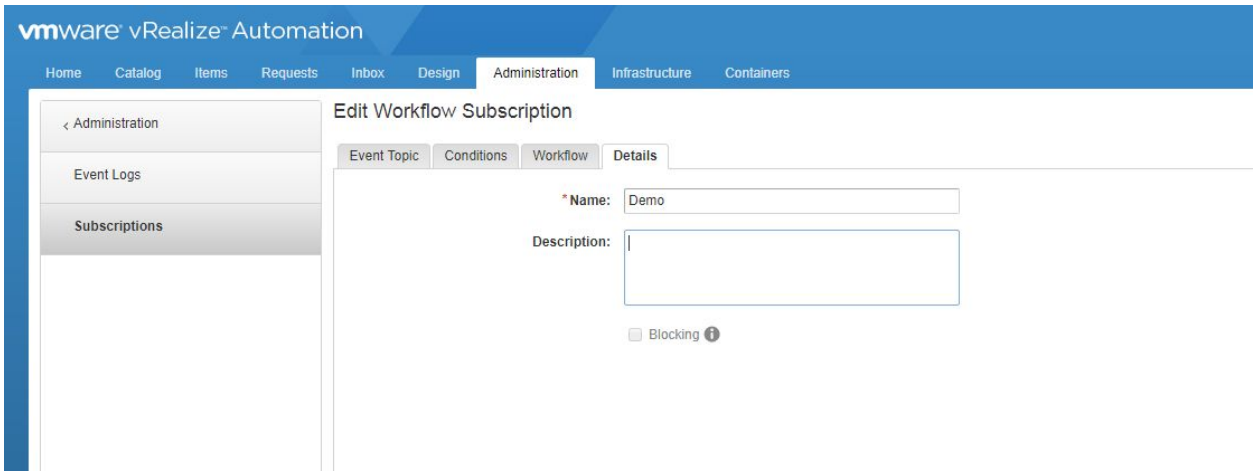
Ok, so what is a state phase? Well, in version 7 of vRealize Automation, we don't have just one "Building Machine" option, but rather three! A pre-building machine, a post-building machine and the actual building machine event. If you didn't specify the state phase and you build a new virtual machine from a blueprint, the "Building Machine" event subscription would trigger 3 times! One for each phase.

Once we've added all of our conditions, click next to go to the "Workflow" tab. Select the vRealize Orchestrator workflow that you want to run when the event occurs. Then click Next.

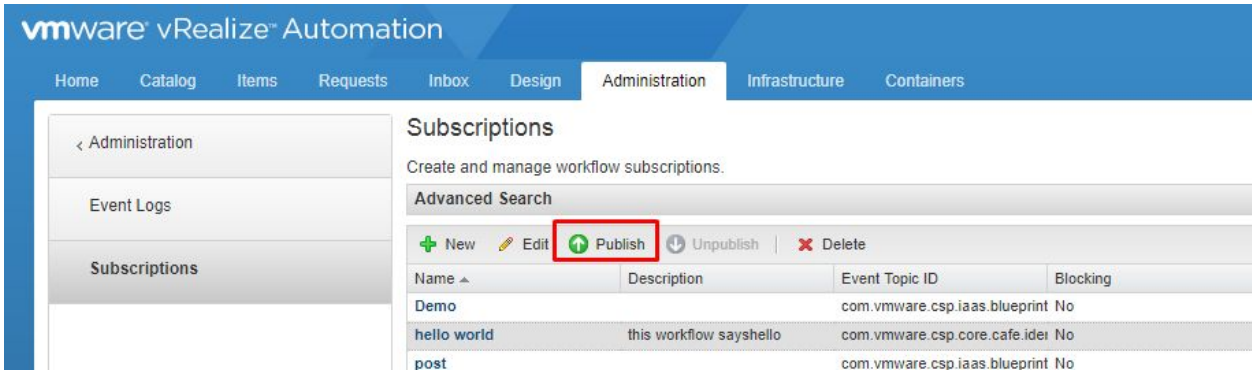


On the details tab, enter a name for the subscription, and a description.

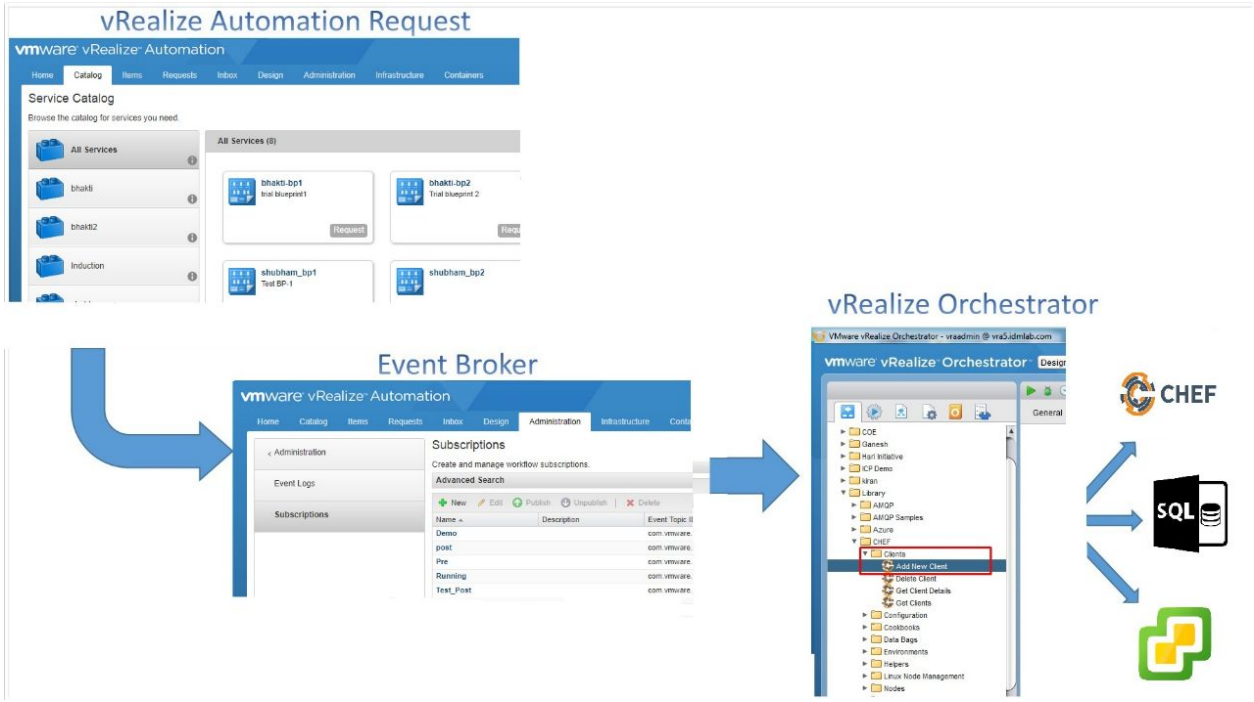
There is also an option for blocking, which means that workflows have to wait on this workflow to finish before running. If you don't click the "blocking" checkbox then any other subscriptions may run simultaneously. To determine what order blocking tasks run in, you will then have to enter a priority. You'll also be able to put in a timeout period to move on to the next workflow if your first one seems to have taken too long to execute.



Once you've finished setting up your event, be sure to click on the subscription in the list and then click "Publish."



Subscription events should be a pretty quick concept to grasp if you're familiar with stub workflows in previous versions. They can be very powerful and there are many more opportunities to jump out of vRA and execute a task via Orchestrator

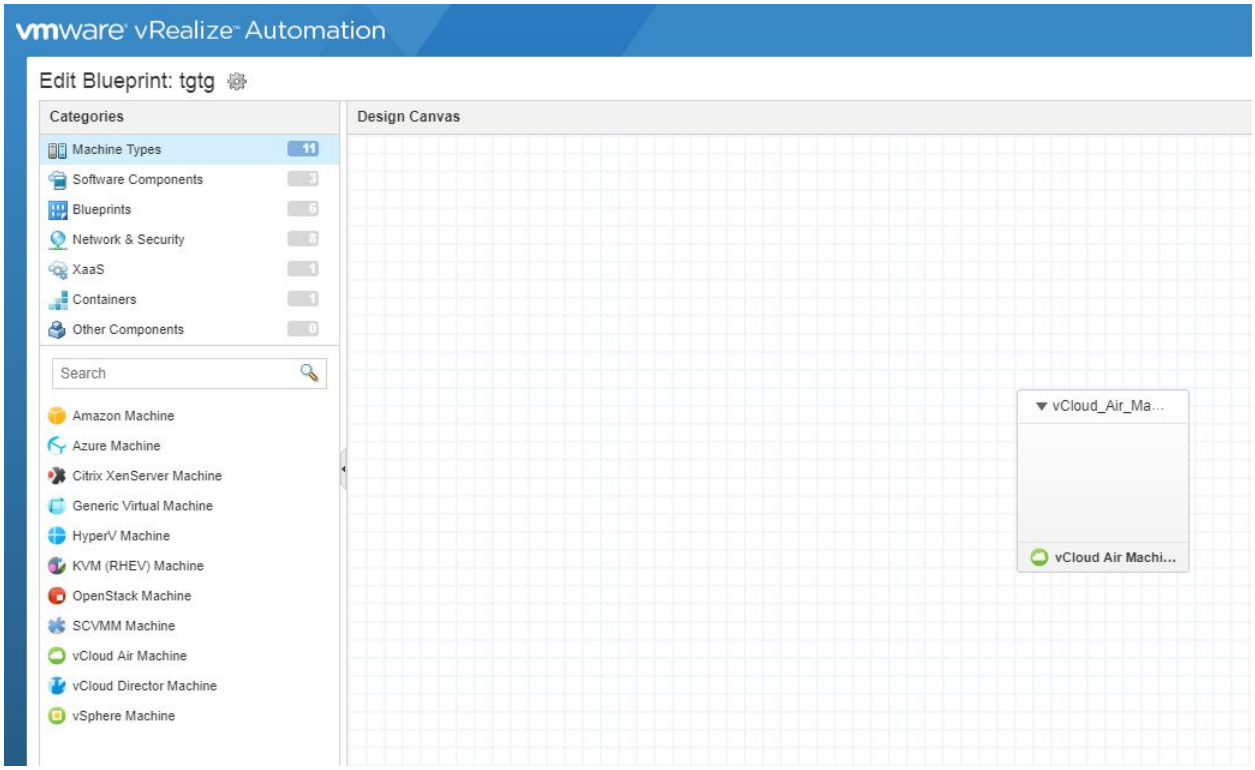


5.12. Custom Properties

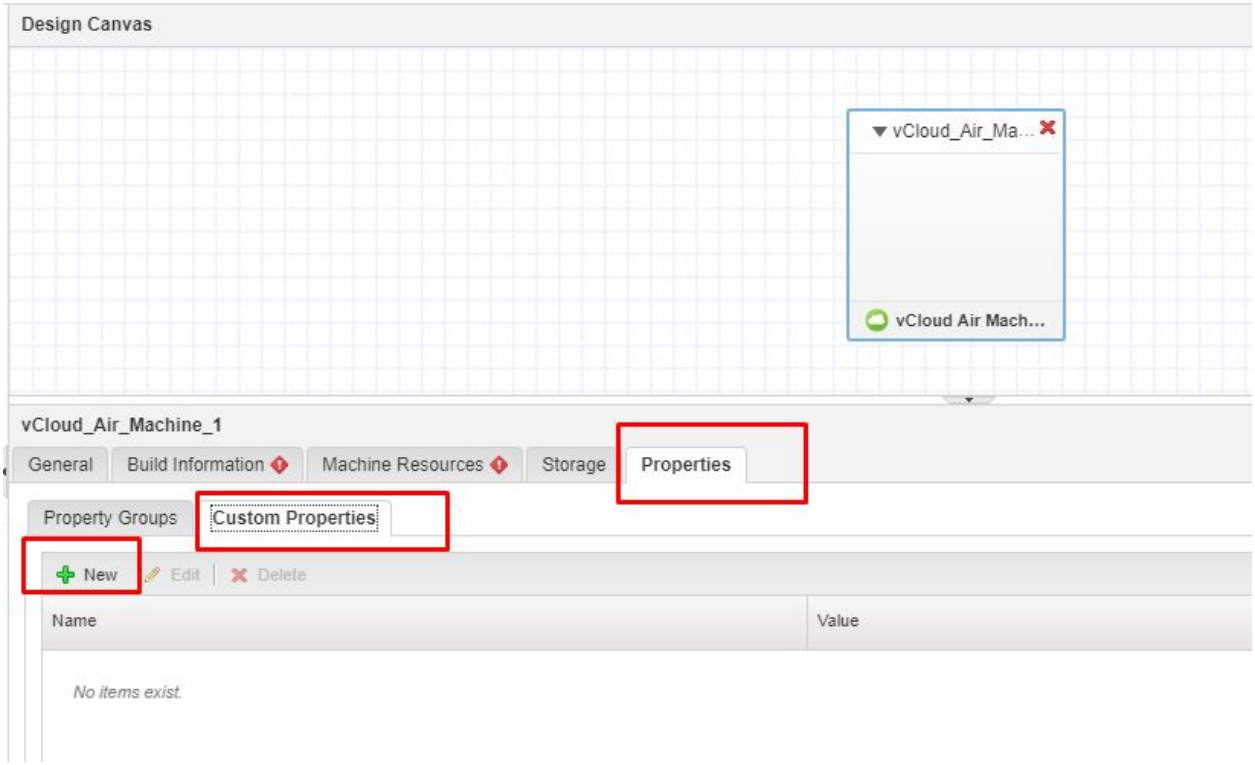
Custom Properties are used to control aspects of machines that users are able to provision. For example, memory and CPU are required information that are necessary for users to deploy a VM from a blueprint. Custom properties can be assigned to a blueprint or reservation to control how memory and CPU should be configured.

Custom properties are really powerful attributes that can vastly change how a machine behaves. I like to think of custom properties as the “Windows Registry” of vRealize Automation. Changing one property can have a huge effect on deployments.

To add a custom property to a blueprint, open the blueprint in the “Design” tab. Select the blueprint we’re working with and then click the vSphere Machine that is on the “Design Canvas”.



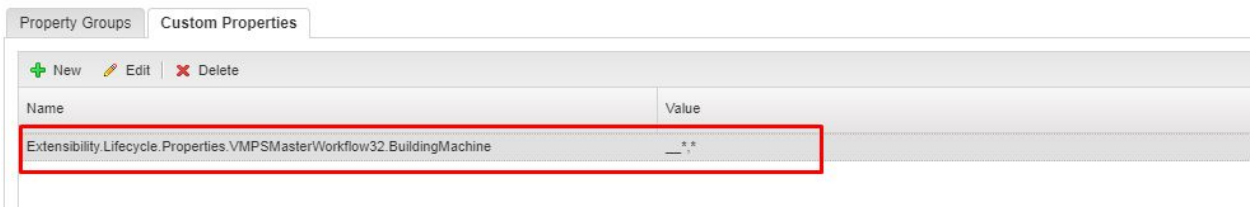
Now click on the properties tab of the machine object and click the “Custom Properties” tab. Here we can click the “New” button to add a new property.



From here, we need to enter a name and a value.

Not all of the virtual machine properties are passed to vRealize Orchestrator in vRA7 unless you add the following custom property to the blueprint. Extensibility.Lifecycle.Properties.VMPSMasterWorkflow32.[LIFECYCLESTATE]. Where Lifecycle state is the name of the lifecycle that the machine would be in.

For instance Extensibility.Lifecycle.Properties.VMPSMasterWorkflow32.BuildingMachine with a Value of __*,* will pass all hidden properties as well as all of the normal properties. If you didn't figure it out, the __* (Double underscore, asterisk) denotes a hidden property. You can see the actual property that I've added to my blueprint in the screenshot below. Notice that I've added two custom properties so that all the attributes are passed during both the BuildingMachine and Requested Lifecycle states.



When the custom properties below are passed over to vRealize Orchestrator we can list all the properties of the machine to do custom workflows. The screenshot below shows a list of properties that are passed over by default.

```
[2016-01-05 11:42:40.016] [I] BlueprintName: CentOS
[2016-01-05 11:42:40.021] [I] ComponentId: CentOS
[2016-01-05 11:42:40.022] [I] ComponentTypeId: Infrastructure.CatalogItem.Machine.Virtual.vSphere
[2016-01-05 11:42:40.022] [I] EndpointId: 12250e26-da94-4c0a-b19d-5c5d7c73ebcb
[2016-01-05 11:42:40.023] [I] RequestId: 16d179cc-a1ce-4261-831e-cd54ed009c3f
[2016-01-05 11:42:40.024] [I] VirtualMachineEvent: null
[2016-01-05 11:42:40.025] [I] WorkflowNextState: null
[2016-01-05 11:42:40.028] [I] State: VMPSMasterWorkflow32.Requested
[2016-01-05 11:42:40.029] [I] Phase: PRE
[2016-01-05 11:42:40.030] [I] Event: null
[2016-01-05 11:42:40.030] [I] ID: 4e87d827-50b4-407a-b9b7-955db9d644af
[2016-01-05 11:42:40.033] [I] Name: HollowAdmin0003
[2016-01-05 11:42:40.034] [I] ExternalReference: null
[2016-01-05 11:42:40.034] [I] Owner: user@domain.local
[2016-01-05 11:42:40.035] [I] Type: 0
[2016-01-05 11:42:40.036] [I] Properties: HashMap:1409151584
[2016-01-05 11:42:40.040] [I] vRA VM Properties :
Cafe.Shim.VirtualMachine.TotalStorageSize : 16
Extensibility.Lifecycle.Properties.VMPSMasterWorkflow32.BuildingMachine : __*,*
Extensibility.Lifecycle.Properties.VMPSMasterWorkflow32.Requested : __*,*
VirtualMachine.Admin.TotalDiskUsage : 16384
VirtualMachine.CPU.Count : 1
VirtualMachine.Cafe.Blueprint.Component.Cluster.Index : 0
VirtualMachine.Cafe.Blueprint.Component.Id : CentOS
VirtualMachine.Cafe.Blueprint.Component.TypeId : Infrastructure.CatalogItem.Machine.Virtual.vSphere
VirtualMachine.Cafe.Blueprint.Id : CentOS
VirtualMachine.Cafe.Blueprint.Name : CentOS
```

VirtualMachine.Cafe.Blueprint.Component.TypeId : Infrastructure.CatalogItem.Machine.Virtual.vSphere
VirtualMachine.Cafe.Blueprint.Id : CentOS
VirtualMachine.Cafe.Blueprint.Name : CentOS
VirtualMachine.Disk0.IsClone : true
VirtualMachine.Disk0.Label : Hard disk 1
VirtualMachine.Disk0.Size : 16
VirtualMachine.Disk0.Storage : Synology02
VirtualMachine.Memory.Size : 2048
VirtualMachine.Network0.Name : VMs-VLAN
VirtualMachine.Storage.Name : Synology02
__Cafe.Request.BlueprintType : 1
__Cafe.Request.VM.HostnamePrefix : Use group default
__Cafe.Root.Request.Id : 276b4854-db3b-4cca-9a06-fc070c1081d1
__Clone_Type : CloneWorkflow
__InterfaceType : vSphere
__Legacy.Workflow.ImpersonatingUser :
__Legacy.Workflow.User : user@domain.local
__VirtualMachine.Allocation.InitialMachineState : SubmittingRequest
__VirtualMachine.ProvisioningWorkflowName : CloneWorkflow
__api.request.callback.service.id : 6da9b261-33ce-495e-b91a-4f50c202635d
__api.request.id : 16d179cc-a1ce-4261-831e-cd54ed009c3f
__clonefrom : CentOS-Template
__clonefromid : 18ff68d0-5190-4b42-99b3-641145378a3a
__clonespec : CentOS
__request_reason :
__trace_id : FhP8UgRD
_number_of_instances : 1

You can see from that list, there are a bunch of properties assigned to a VM by default and you can makeup your own properties if you'd like. Maybe you want a variable passed named "DR Server" and the value is either Yes or No. vRealize Orchestrator could read that property, if you add it to your blueprint, and you can make a decision based on that. In another case, maybe you want to make a decision about what datastore in which the vm should be placed, and you use vRO to update that property so the machine is deployed in a different datastore.

There are three more things you need to add to a custom property besides "Name" and "Value." These are Encrypted, Overridable and Show in Request. Lets take a look at these.

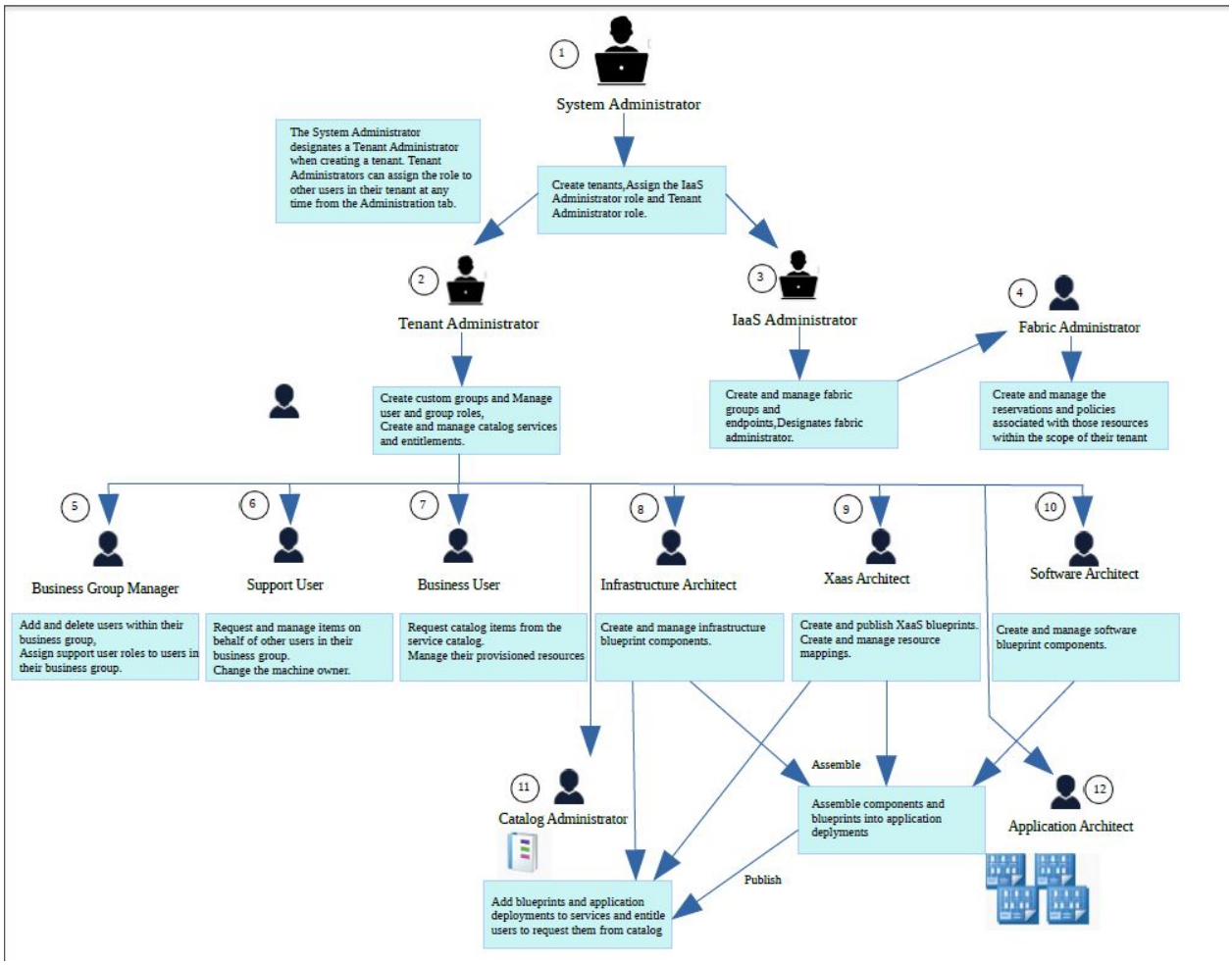
Encrypted – Removes clear text from the vRealize Automation GUI. Hint: use this for passwords.

Overridable – Allows the user to change the property during provisioning.

Show in Request – Prompts the user to enter this property during provisioning.

Custom Properties are a must have piece of your vRealize Automation instance if you plan to do any serious customization or decision making. These properties allow you to add variables and make the solution fit within your organizational structure

5.13. vRA Roles and Permissions

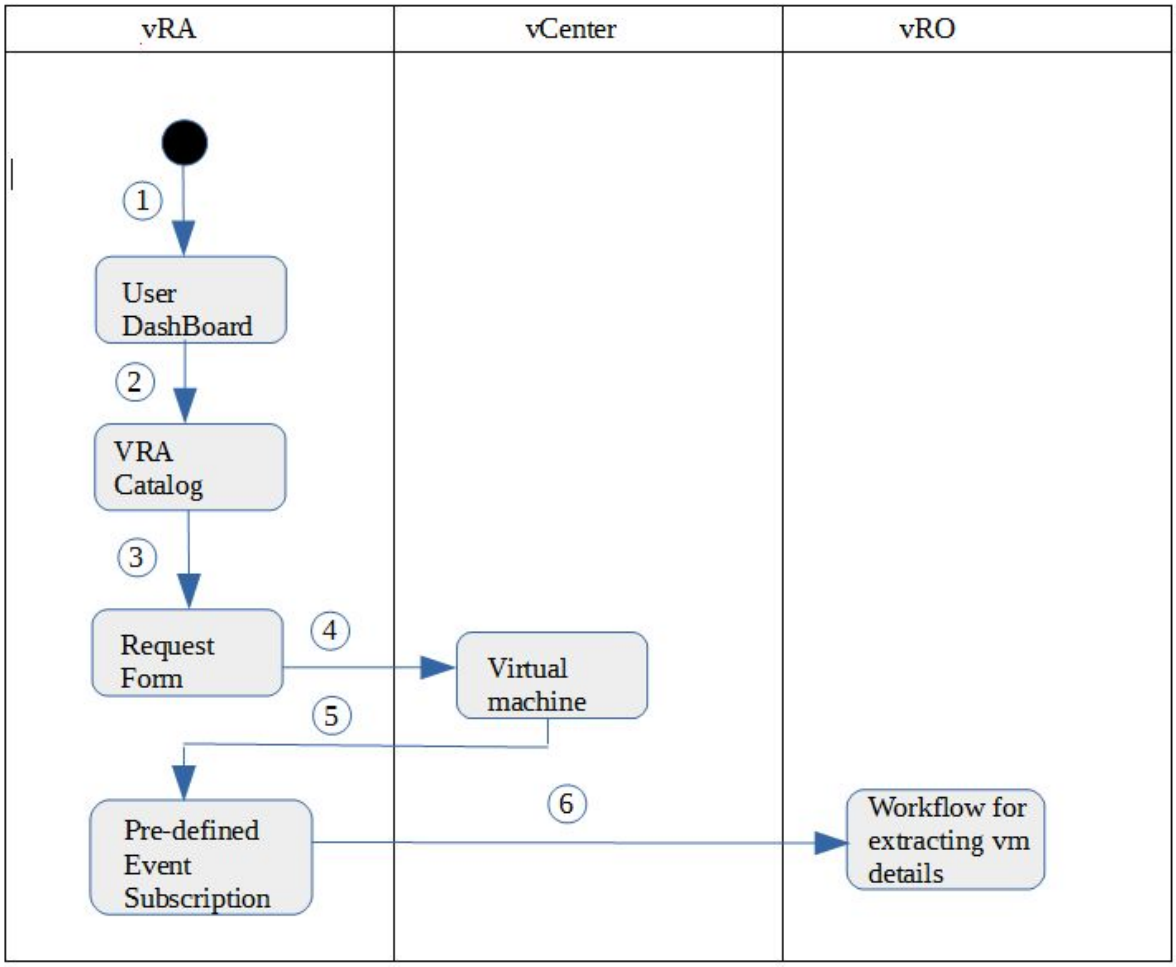


Index	Role	Permissions
1	System Administrator	● Create tenants. ● Configure tenant identity stores. ● Assign the IaaS Administrator role. ● Assign the Tenant Administrator role. ● Configure system default branding. ● Configure system default notification providers. ● Monitor system event logs, not including IaaS logs. ● Configure the vRealize Orchestrator server for use with XaaS. ● Create and manage (view, edit, and delete) reservations across tenants if also a Fabric Administrator.
2	Tenant Administrator	● Customize tenant branding. ● Manage tenant identity stores. ● Manage user and group roles. ● Create custom groups. ● Manage notification providers. ● Enable notification scenarios for tenant users. ● Configure vRealize Orchestrator servers, plug-ins and workflows for XaaS. ● Create and manage catalog services. ● Manage catalog items. ● Manage actions. ● Create and manage entitlements. ● Create and manage approval policies. ● Monitor tenant machines and send reclamation requests.
3	IaaS Administrator	● Configure IaaS features and global properties.

		● Create and manage fabric groups. ● Create and manage endpoints. ● Manage endpoint credentials. ● Configure proxy agents. ● Manage Amazon AWS instance types. ● Monitor IaaS-specific logs. ● Create and manage (view, edit, and delete) reservations across tenants if also a fabric administrator.
4	Fabric Administrator	●Manage property groups. ●Manage compute resources. ●Manage network profiles. ●Manage Amazon EBS volumes and key pairs. ●Manage machine prefixes. ●Manage property dictionary. ●Create and manage reservations and reservation policies in their own tenant. ●If this role is added to a user with IaaS Administrator or System Administrator privileges, the user can create and manage reservations and reservation policies in any tenant.
5	Business Group Manager	●Add and delete users within their business group. ●Assign support user roles to users in their business group. ●Assign support user roles to users in their business group. ●Request and manage items on behalf of a user in their business group. ●Monitor resource usage in a business group. ●Change the machine owner.
6	Support User	●Request and manage items on behalf of other users in their business group. ●Change the machine owner.

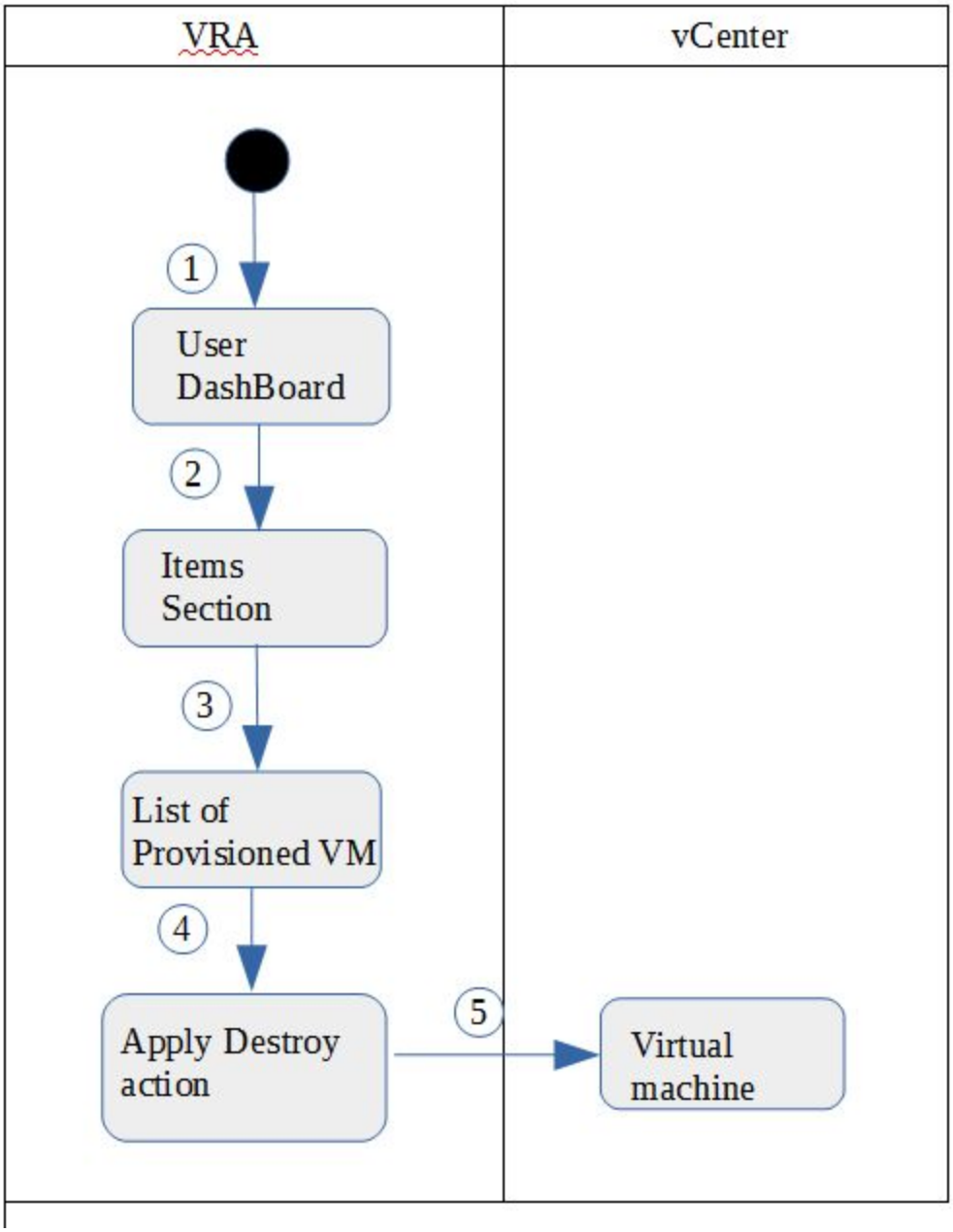
7	Business User	●Request catalog items from the service catalog. ●Manage their provisioned resources.
8	Infrastructure Architect	●Create and manage infrastructure blueprint components. ●Assemble and manage composite blueprints.
9	Xaas Architect	●Define custom resource types. ●Create and publish XaaS blueprints. ●Create and manage resource mappings. ●Create and publish resource actions.
10	Software Architect	●Create and manage software blueprint components. ●Assemble and manage composite blueprints.
11	Catalog Administrator	●Create and manage catalog services. ●Manage catalog items. ●Assign icons to actions.
12	Application Architect	●Assemble and manage composite blueprints.

5.14. vRA Provisioning Process



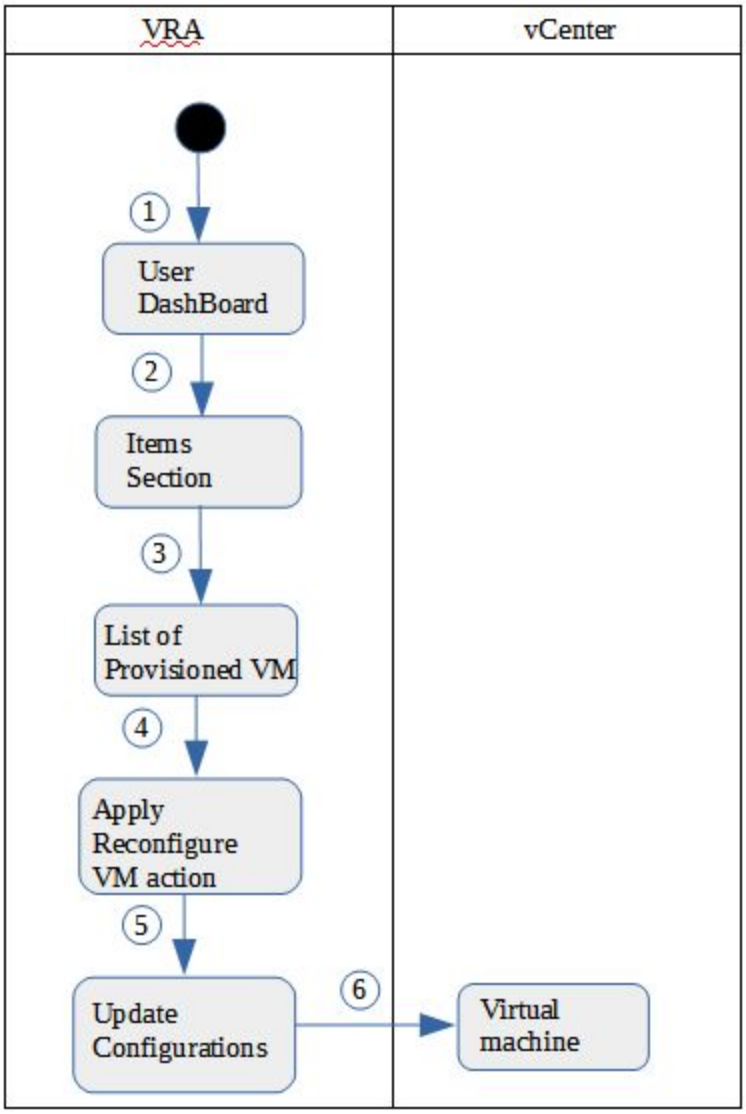
1. User needs to login to VRA portal by entering valid Credentials.
2. User can request for vm blueprint from catalog items.
3. Enter Required Details for VM.
4. Submit Catalog Item request.
5. Vm Provisioning completed.
6. Event subscription triggers post provisioning workflow in VRO and Workflow extracts details about provisioned vm by using payload.

5.15. vRA De-Provisioning Process



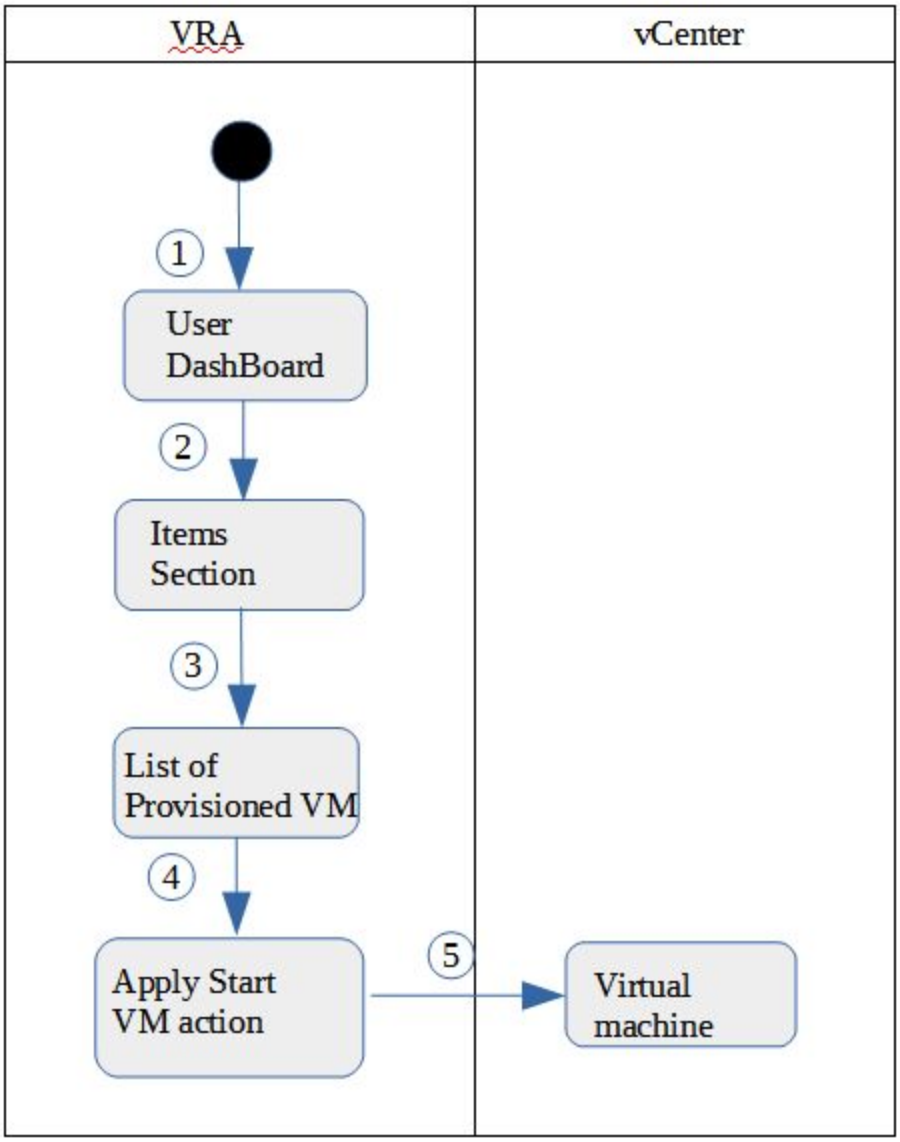
1. User needs to login to VRA portal by entering valid Credentials.
2. User needs to navigate to items tab.
3. Choose vm which needs to be destroyed.
4. Choose destroy action from actions tab and Submit the request .
5. Vm De-Provisioning completed.

Reconfigure VM workflow



1. User needs to login to VRA portal by entering valid Credentials.
2. User needs to navigate to items tab.
3. Choose vm want to Re-configure.
4. Choose Reconfigure action action from actions tab and Submit the request .
5. Update CPU/Memory /Storage and submit the request
6. Vm gets Re-configured.

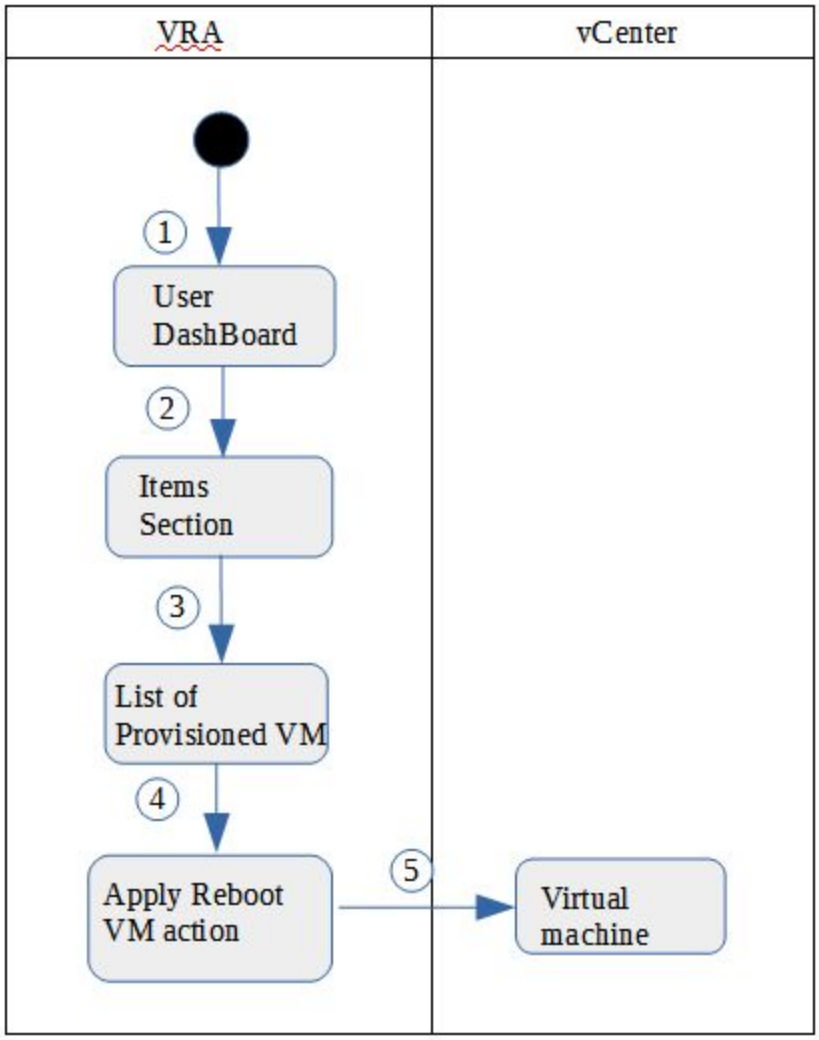
Start VM workflow



1. User needs to login to VRA portal by entering valid Credentials.
2. User needs to navigate to items tab.
3. Choose vm want to start.

4. Choose Start VM action from actions tab and Submit the request .
5. Vm Started.

Restart VM Workflow



1. User needs to login to VRA portal by entering valid Credentials.
2. User needs to navigate to items tab.
3. Choose vm want to restart.
4. Choose Reboot VM action from actions tab and Submit the request .
5. Vm restarted.

6. Terminologies

Terminology	Explanation
VM	Virtual Machine
vRA	vRealize Automation
vRO	vRealize Orchestrator
Iaas	Infrastructure as a service
AWS	Amazon Web Services

7. References

vRA Guide	https://theithollow.com/2016/01/11/vrealize-automation-7-guide/