Deploy a stateful app on Kubernetes Student Guide for Windows

This workshop will make use of the VMware Cloud PKS. This provides Kubernetes clusters as a managed cloud hosted service. For the workshop, you will have access to a Kubernetes cluster running in the AWS public cloud.

This version of the instructions assumes you will utilize your own Windows laptop.

If you have not responded to your Invitation to VMware Cloud Services email, open it now. Find the link labeled JOIN VMWARE CLOUD SERVICES in the email and open it.

Fill in your name and Whitney High School as the organization. Address is 16800 Shoemaker Ave Cerritos 90703 Unites States California. Put in a phone number. Agree to terms and conditions and do NOT check box for email communications.

You will get a second email with a link to set a password. Set the password to codeOPEN123! Then log in to your account.

Pre-conditions for remainder of this workshop:

1. You have a VMware ID and login credentials.
2. A VKE Kubernetes Cluster has been pre-deployed and your account has been authorized to use it. Your cluster id is used to replace <myclustername> in the instructions below.

It is recommended that you open the built-in Windows “Notepad app” to save some items as we go along. You can paste them in in later steps to save typing and potential errors. If you are unfamiliar with Windows, Ctrl-C copies on Windows and Ctrl-V pastes. Typing Notepad in the search box on lower left will find the app. You can cut and paste the content of the box below into a savedsecrets.txt file.

```
My Student number: __
My VMware Cloud AcountId (email): _____________
My VMware Cloud Password: _____________
My Smart Cluster Name: cluster__

My VMware Cloud full org ID:
My VMware Cloud refresh token:
My cluster name (URL):
```

At a Windows command prompt:

Create Directory

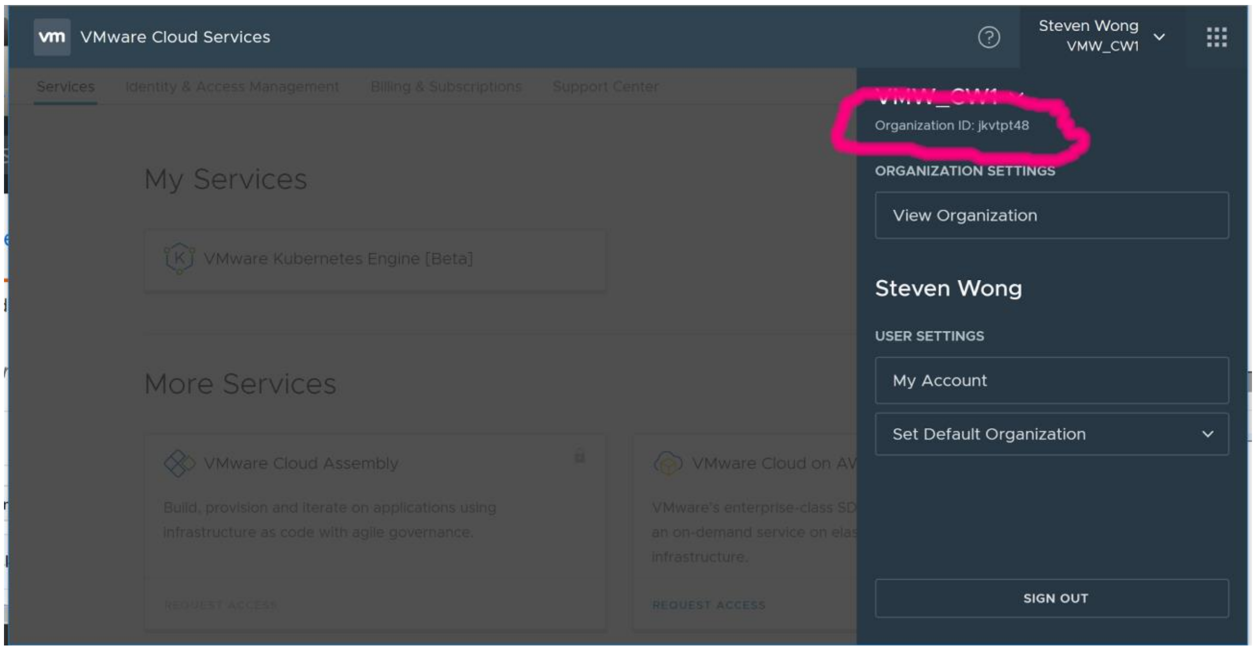
```
$ mkdir %UserProfile%\bin
```

```
$ set PATH=%PATH%;%UserProfile%\bin
```

add this permanently to your path if desired. On Windows 10, `%UserProfile%` is normally `C:\Users\yourname`

In a browser (leave command prompt open for use again later):

1. Launch the VMware Cloud Services console (https://console.cloud.vmware.com/) and **log in** to your organization.
2. Click your user name in the toolbar. The drop-down menu displays an abbreviated organization ID below your organization name.

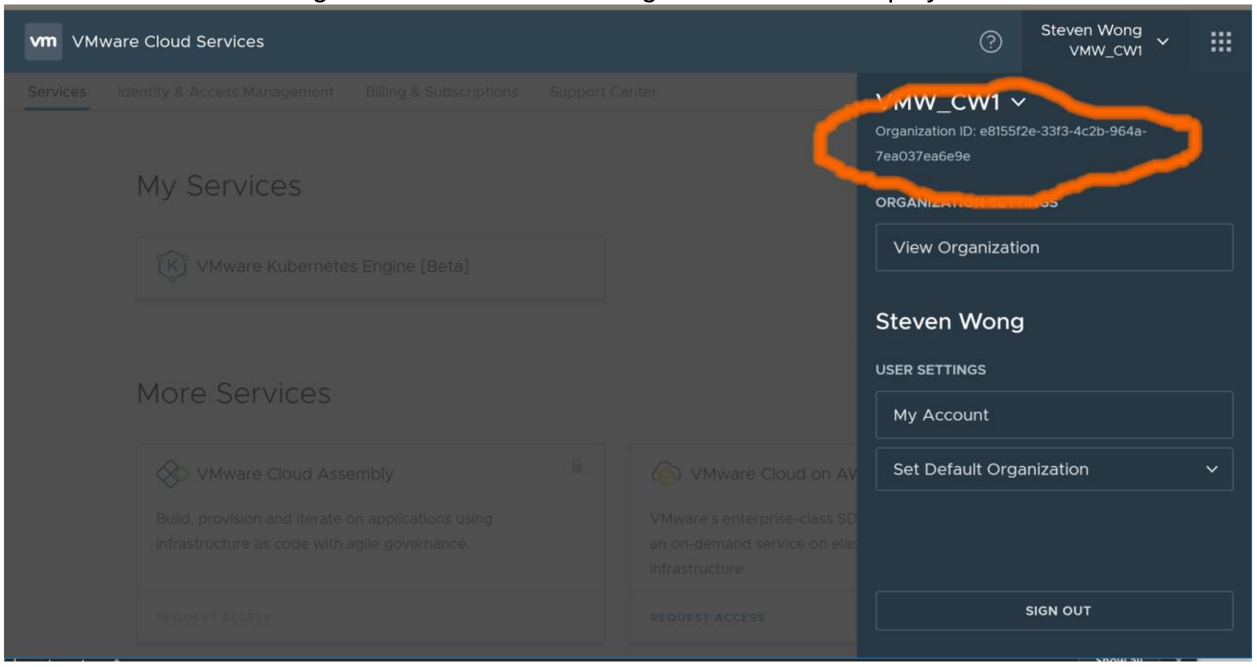


Organization ID: jkvtpt48

Build, provision and iterate on applications using infrastructure as code with agile governance.

VMware's enterprise-class SD an on-demand service on elas infrastructure.

3. Click the abbreviated organization ID. Your full organization ID is displayed.

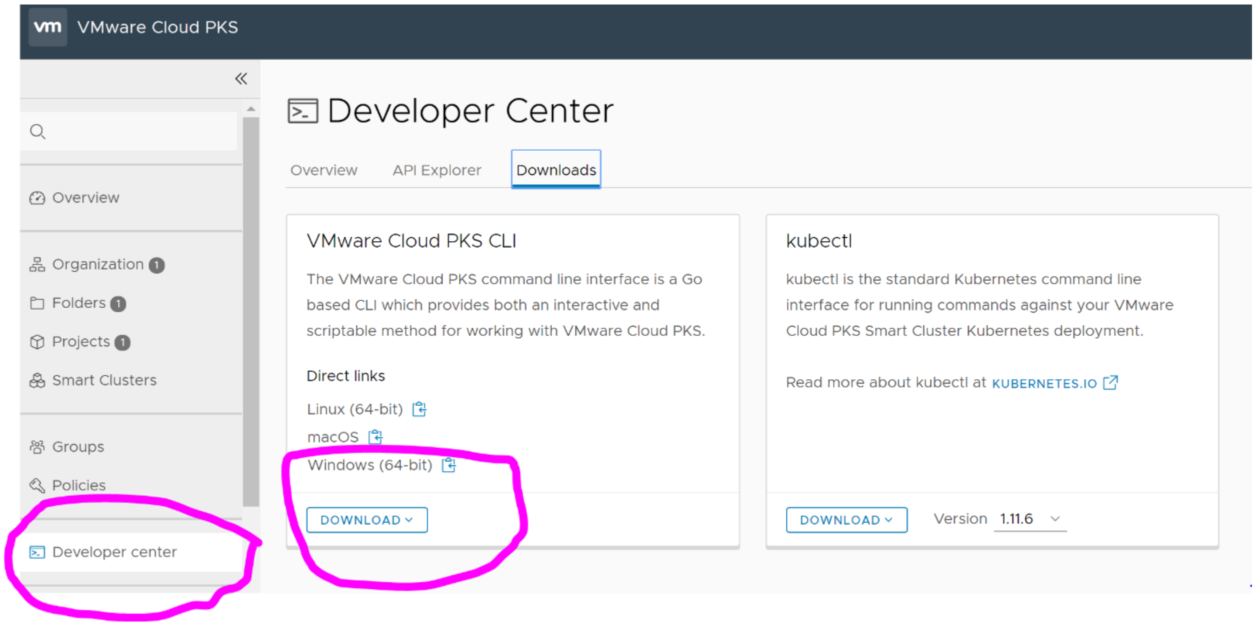


Save the organization ID to a “clipboard” file (you can use the notepad app for this) for cut and paste later.
<my full org id>=___________________

4. To see your access key, click My Account in the drop-down menu. Your profile information is displayed.

5. Still on the My Account page, select the API Tokens tab. From here, you can regenerate, revoke, and copy your token. **Save the Refresh Token** to a “clipboard file for cut and paste. You should treat this refresh token like a personal password.
<my refresh token>=_____________________

6. From 3x3 “grid” menu at upper right select VMware Cloud PKS tile. Choose Developer Center tab on left side, then the Downloads tab.
Download Cloud PKS CLI using DOWNLOAD button - saving the Windows version to %UserProfile%\bin.



VMware Cloud PKS CLI

The VMware Cloud PKS command line interface is a Go based CLI which provides both an interactive and scriptable method for working with VMware Cloud PKS.

Direct links

Linux (64-bit)

macOS

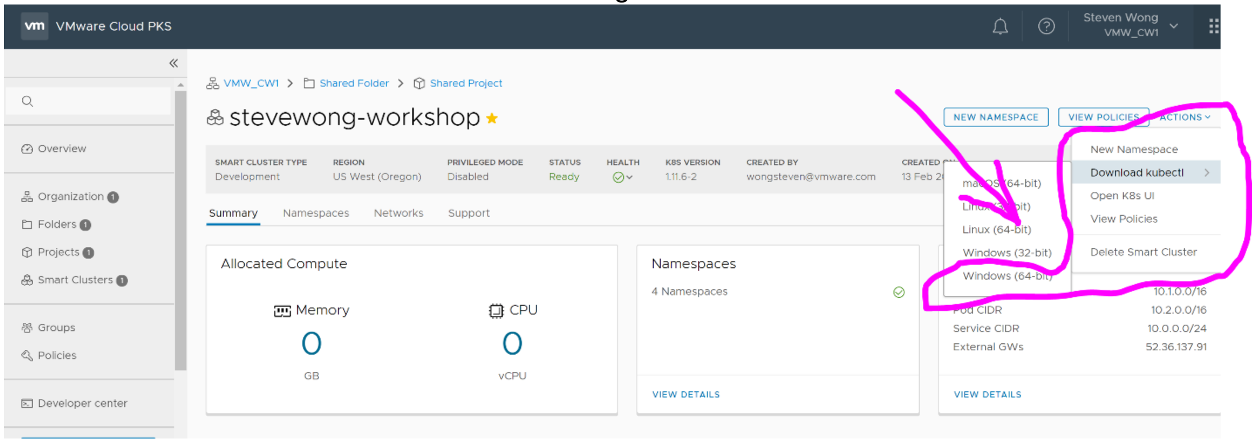
Windows (64-bit)

kubectl

kubectl is the standard Kubernetes command line interface for running commands against your VMware Cloud PKS Smart Cluster Kubernetes deployment.

Read more about kubectl at KUBERNETES.IO

7. From “Smart Clusters” Tab at left, find your Kubernetes Cluster and “star” it (on right) to make it a favorite. Go to Overview (Upper left) and Favorites tab, and click on your cluster. Under “ACTIONS” tab in center screen, choose “**Download kubectl”** to get the Windows version of the Kubernetes CLI - saving to %UserProfile%\bin.



SMART CLUSTER TYPE	REGION	PRIVILEGED MODE	STATUS	HEALTH	K8S VERSION	CREATED BY	CREATED
Development	US West (Oregon)	Disabled	Ready	✓	1.11.6-2	wongsteven@vmware.com	13 Feb 2

	10.1.0.0/16
Pod CIDR	10.2.0.0/16
Service CIDR	10.0.0.0/24
External GWs	52.36.137.91

Return to command prompt (leave browser open):

(assuming %UserProfile%\bin is in path, and vke and kubectl have been downloaded there)

Verify vke the VMware Cloud PKS CLI is present and working:

$ **vke –version**

```
vke version 0.9.4 (Build: ci-a7653d8)
```

Verify kubectl Kubernetes CLI is present and operational

$ **kubectl version**

```
Client Version: version.Info{Major:"1", Minor:"11", GitVersion:"v1.11.6",
GitCommit:"fc32d2f3698e36b93322a3465f63a14e9f0eaead", GitTreeState:"clean",
BuildDate:"2018-03-26T16:55:54Z", GoVersion:"go1.9.3", Compiler:"gc",
Platform:"windows/amd64"}
Unable to connect to the server: No valid id-token, and cannot refresh without refresh-token
```

Log in and verify operation, using the credentials you save to a clipboard file.:

```
$ vke account login -t <my full org id> -r <my refresh token>
Login successful
$ vke cluster list
NAME …
<myclustername> ...
$ vke cluster show <myclustername>
Name:       <myclustername>
. . . . . . . . . . . . . .
```

The Kubernetes CLI has a mechanism to use configuration files to identify and authenticate to the API server of a cluster so that credentials and other parameters don't have to be entered on the command line each time you use it. The vke CLI will set up this configuration file for you.

Have vke set your kubectl configuration, and verify operation:

```
$ vke cluster auth setup <myclustername>
$ kubectl get node
```

NOTE – A login is only good for a limited amount of time. If your connection is lost or times out during this workshop, repeat these to resume:

```
$ vke account login -t <my full org id> -r <my refresh token>
$ vke cluster auth setup <myclustername>
```

NOTE – If kubectl prompts for a user name, you likely have another version of kubectl previously installed and in your path. These links may be helpful to resolve the situation:
https://kubernetes.io/docs/tasks/access-application-cluster/configure-access-multiple-clusters/
https://vsupalov.com/multiple-kubectl-versions/

Close your command prompt because we now have to run some commands as a Windows administrator.

Open a cmd.exe shell as administrator (search for cmd, right mouse click on it and choose run as administrator)

```
$ @"%SystemRoot%\System32\WindowsPowerShell\v1.0\powershell.exe" -NoProfile -InputFormat None -ExecutionPolicy Bypass -Command "iex ((New-Object System.Net.WebClient).DownloadString('https://chocolatey.org/install.ps1'))" && SET "PATH=%PATH%;%ALLUSERSPROFILE%\chocolatey\bin"
```

Close the command prompt window and start a new one, running as administrator again.

$ **choco install kubernetes-helm**

Return to a new non administrator command prompt

Close the administrator prompt and open a new regular cmd prompt. Change to the %UserProfile%\bin directory

Install the Tiller server side component in your Kubernetes cluster
$ **helm init**

Verify tiller is deployed (may take a minute until AVAILABLE count shows 1) The web UI can also be used for monitoring.

$ **kubectl get deploy --namespace kube-system**
$ **helm version**

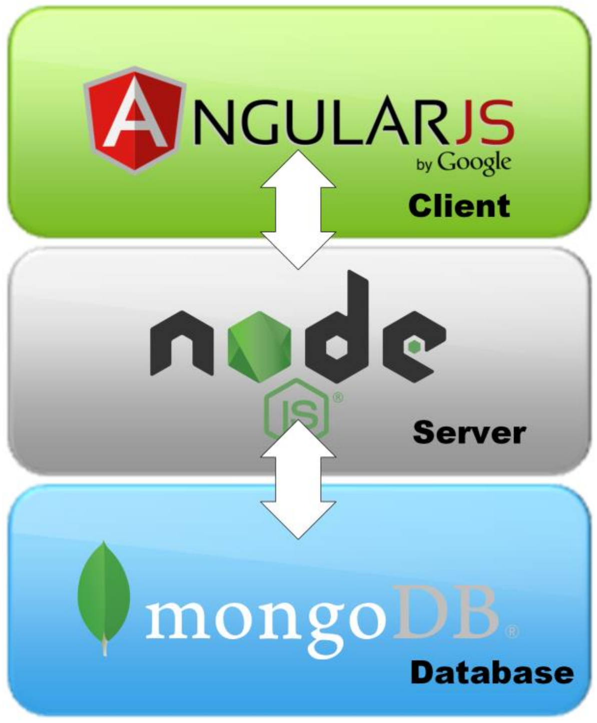
```
Client: &version.Version{SemVer:"v2.9.1",
GitCommit:"20adb27c7c5868466912eebdf6664e7390ebe710", GitTreeState:"clean"}
Server: &version.Version{SemVer:"v2.9.1",
GitCommit:"20adb27c7c5868466912eebdf6664e7390ebe710", GitTreeState:"clean"}
```

Update Helm charts:

$ **helm repo update**

```
Hang tight while we grab the latest from your chart repositories...
...Skip local chart repository
...Successfully got an update from the "stable" chart repository
Update Complete. ☐ Happy Helming!☐
```

RocketChat is an open source multi-user messaging system that has many of the features of Slack. It is built using the Node.js based Meteor web app framework. Meteor uses a MongoDB NoSQL database as its backend to hold state.



Confirm that a RocketChat application helm chart is available in the repository you are using. The one at https://kubernetes-charts.storage.googleapis.com/ is installed by default and is called stable:

```
$ helm search rocketchat
NAME                  CHART VERSION   APP VERSION     DESCRIPTION
stable/rocketchat       0.1.3           0.56          Prepare to take off with the ultimate chat plat...
```

The helm chart will deploy all the components of RocketChat on Kubernetes, front-end and back-end. It supports easy deployments by making a lot of configuration choices automatically for you – but it does leave you with a small group of mandatory and optional settings. Using Helm to deploy an application is basically a tradeoff of giving you simpler deployment in exchange for loss of full control of settings. Anything Helm does, you could also do without using it, but for this workshop we are electing to use the "easy way".

Display configurable values for the RocketChat Helm chart:

```
$ helm inspect values stable/rocketchat
## Rocket Chat image version
## ref: https://hub.docker.com/r/library/rocket.chat/tags/
##
image: rocket.chat:0.56

## Specify a imagePullPolicy
## Defaults to 'Always' if image tag is 'latest', else set to 'IfNotPresent'
## ref: http://kubernetes.io/docs/user-guide/images/#pre-pulling-images
##
# imagePullPolicy:

## Host for the application
##
# host:
…
```

Kubernetes cluster installations will generally have a default storage class configured. Confirm there is a default storage class present in your cluster

```
$ kubectl get storageclass
NAME              PROVISIONER            AGE
default (default)   kubernetes.io/vke-disk   1d
```

Helm charts typically define default values for deployments, but allow you to override these on the command line, or in a file. We will use the default storage class, and make the volumes larger than the default. We are also going to create a Kubernetes Ingress object to expose the RocketChat application for public access on the Internet.

Compose a myvals.yaml file, in your home directory, using editor of your choice, with this content:

```
mongodb:
  mongodbUsername: myname
  mongodbPassword: mypw123!
  mongodbDatabase: mydbname
  persistence:
    storageClass: default
    size: 16Gi
persistence:
  storageClass: default
  size: 16Gi
ingress:
  enabled: true
```

Get the public hostname to be used for your Ingress hostname. It will look like your clustername concatenated with a GUID and .vke-user.com

$ **vke cluster show** <myclustername> **| `findstr` Address**

The address shown will be used as <hostname> in the next command. This will be a URL that is resolved to your service, publicly exposed and running in the AWS cloud.

Deploy a release using the rocketchat chart (note there is a space between `set` and `host` below)

$ **helm install -f myvals.yaml --name student**<mystudentnumber> **--set host=**<hostname> **--set ingress.enabled=true stable/rocketchat**

The output will indicate the public URL for your deployment of RocketChat. This will take several minutes to become available because storage and pods will get deployed.

You can open the Kubernetes UI using the “Open K8s UI” selection on your VKE cluster dashboard. Examine the various Kubernetes objects (deployments, pods, etc.) that it deployed in the default namespace. The UI will show the detailed configuration. You could have used the kubectl CLI to do this too but it would have taken much more effort. When a helm chart is available, it can improve your efficiency. Even if ultimately you choose to use kubectl with yaml to gain more control, a helm deployment can be used to show you a sample deployment as an example.

Deployment status can be monitored using the Kubernetes web UI for your cluster. You may wish to refresh it periodically.

Open the RocketChat URL in a browser tab. Create a new RocketChat account specifying a username and password. Post a message in a channel such as the precreated #general channel.

Send the URL to your cell phone and open RocketChat there. Create a second account using your phone and verify that *you have successfully created an n-tier stateful app exposed on the Internet*.

If you like you can delete the rocketchat front end pod and verify that Kubernetes will detect this as a failure and redeploy the pod. (You can use the UI or kubectl delete pod <podname>) And since we used an external volume mount for the stateful backend you can even delete the MongoDB pod and watch the recovery.

Post workshop Cleanup, using command line

List releases

```
$ helm list
```

Delete your release

```
$ helm delete --purge <myrelease>
```