



Kubernetes Workshops - Weekly

Concepts with hands-on exercises

Sessions Part 1

Week 1
**Getting Started with
Kubernetes**

Week 2
Containers and Microservices

Week 3
Applications and Patterns

Session Part 2

Week 4
Meshing and Observability

Week 5
Operators and Serverless

Week 6
**CI/CD Pipelines and Lifecycle
Tools**

Sessions in 2020

Part 1
June 3, 11, 24

Part 1
August 10, 17, 24

Part 2
Sept 3, 10, 17

Part 1
Oct 8, 15, 22

Part 2
Nov 5, 19, 24



INTERACTIVE

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Katacoda Scenarios

Kubernetes Fundamentals

- First Kubernetes Application
- ConfigMaps & Secrets
- Kubernetes API
- Define and Query Labels & Annotations
- Run Stateful Services on Kubernetes (& Volumes)
- Jobs
- Minikube
- Pods to Services Communication
- Sidecar Containers
- Create Kubernetes Ingress Routing

Kubernetes Applications

- Nginx
- RabbitMQ
- Shiny R

Containers for Kubernetes

- [Decomposing Container Images](#)
- Spring Boot to Kubernetes
- Kaniko with Python (drafting)
- [Go Apps to Kubernetes](#)
- Multi-stage with Rust (drafting)
- Buildah/Podman with Kotlin (drafting)
- Img with Node.js (drafting)
- Distilled JRE Apps in Containers

Kubernetes Serverless

- Kubeless

- Nuclio
- OpenFaaS

Kubernetes Pipelines

- Helm
- Registries
- SonarQube
- Tekton Pipelines

Kubernetes Observability

- Basics
- [Kubernetes Logging](#)
- Logging with EFK
- [Kubernetes Probes with Spring Boot](#)
- Liveness & Readiness Healthchecks in Kubernetes
- Scaling Your Applications, Automatically

Kubernetes Extensibility

- [Custom Resource Definitions](#)
- [KubectI CLI Plugins](#)
- [KubectI CLI Plugin Development](#)
- [Develop an Operator with Kubebuilder](#)
- [Develop an Operator with KUDO](#)

Kubernetes Chaos

- KubelInvaders
- Kube Monkey
- Chaoskube



kubernetes

You may want to add to bash profile: **alias kc='kubectl'** Use "kubectl options" for a list of global command-line options (applies to all commands).

Basic	Beginner
create	Create a resource from a file or from stdin.
expose	Take a replication controller, service, deployment or pod and expose it as a new Kubernetes Service
run	Run a particular image on the cluster
set	Set specific features on objects

Basic	Intermediate
explain	Documentation of resources
get	Display one or many resources
edit	Edit a resource on the server
delete	Delete resources by filenames, by resources and label selector stdin, resources and names, or

Deploy	
rollout	Manage the rollout of a resource
scale	Set a new size for a Deployment, ReplicaSet, Replication Controller, or Job
autoscale	Auto-scale a Deployment, ReplicaSet, or ReplicationController resources.

Cluster Management	
certificate	Modify certificate resources.
cluster-info	Display cluster info
top	Display Resource (CPU/Memory/Storage) usage.
cordon	Mark node as unschedulable
uncordon	Mark node as schedulable
drain	Drain node in preparation for maintenance
taint	Update the taints on one or more nodes

Troubleshooting and Debugging	
describe	Show details of a resource or group of resources
logs	Print the logs for a container in a pod
attach	Attach to a running container
exec	Execute a command in a container
port-forward	Forward one or more local ports to a pod
proxy	Run a proxy to the Kubernetes API server
cp	Copy files and directories to and from containers.
auth	Inspect authorization

Advanced	
diff	Diff live version against would-be applied version
apply	Apply a configuration to a resource by filename or stdin
patch	Update field(s) of a resource using strategic merge patch
replace	Replace a resource by filename or stdin
wait	Experimental: Wait for a specific condition on one or many
convert	Convert config files between different API versions
kustomize	Build a kustomization target from a directory or remote url.

Setting	
label	Update the labels on a resource
annotate	Update the annotations on a resource
completion	Output shell completion code for a shell (bash or zsh)

Other	
api-resources	Print the supported API resources on the server
api-versions	Print the supported API versions on the server, in the form of "group/version"
config	Modify kubeconfig files
plugin	Provides utilities for interacting with plugins.
version	Print the client and server version information
debug	kubect1 run curl-test -- image=radial/busyboxplus:curl -- generator=run-pod/v1 -i --tty --rm

Helm

Version 3 preferred. (Avoid Version 2 with insecure server-side Tiller.)



Install	
Target	HELM_INSTALL_DIR=['desired path'] USE_SUDO=['true' 'false']
Linux OS Windows	curl https://raw.githubusercontent.com/helm/helm/master/scripts/get-helm-3 bash

Setup	
helm version	Print the client/server version information
helm completion	Generate autocompletions script for the specified shell (bash or zsh)
helm plugin	Add, list, or remove Helm plugins
helm repo	Add, list, remove, update, and index chart repositories

Create	
helm create	Create a new chart with the given name
helm dependency	Manage a chart's dependencies
helm lint	Examines a chart for possible issues
helm package	Package a chart directory into a chart archive
helm template	Locally render templates

Deployment	
helm install	Install a chart archive
helm upgrade	Upgrade a release
helm test	Test a release

Inspect	
helm list	List releases
helm fetch	Download a chart from a repository and (optionally) unpack it in local directory
helm get	Download a named release
helm history	Fetch release history
helm home	Displays the location of HELM-HOME
helm inspect	Inspect a chart
helm status	Displays the status of the named release
helm verify	Verify that a chart at the given path has been signed and is valid

Cleanup	
helm delete	Given a release name, delete the release from Kubernetes
helm rollback	Rollback a release to a previous revision
helm search	Search for a keyword in charts
helm serve	Start a local http web server

Minikube



CLI tool that provisions and manages single-node Kubernetes clusters optimized for development workflows.

Use "minikube <command> --help" for more information about a given command. You may want to add to bash profile: **alias mk='minikube'**

Basics	
mk start	Starts a local kubernetes cluster
mk status	Gets the status of a local kubernetes cluster
mk stop	Stops a running local kubernetes cluster
mk delete	Deletes a local kubernetes cluster
mk dashboard	Access the kubernetes dashboard running within the Minikube cluster

Images	
mk docker-env	Sets up docker env variables; similar to '\$(docker-machine env)'
mk cache	Add or delete an image from the local cache.

Configuration	
mk addons	Modify minikube's kubernetes addons
mk config	Modify minikube config
mk profile	Profile gets or sets the current minikube profile
mk update-context	Verify the IP address of the running cluster in kubeconfig.
mk completion	Outputs minikube shell completion for the given shell (bash or zsh)

Networking	
mk service	Gets the kubernetes URL(s) for the specified service in your local cluster
mk tunnel	Makes services of type LoadBalancer accessible on localhost

Advanced

mk mount	Mounts the specified directory into minikube
mk ssh	Log into or run a command on a machine with SSH; similar to 'docker-machine ssh'
mk kubectl	Run kubectl

Troubleshooting

mk ssh-key	Retrieve the ssh identity key path of the specified cluster
mk ip	Retrieves the IP address of the running cluster
mk logs	Gets the logs of the running instance, used for debugging minikube, not user code.
mk update-check	Print current and latest version number
mk version	Print the version of minikube



Bash Shell

Keyboard Shortcuts

Ctrl + A and E	Move to beginning and end of line
Ctrl + S and Q	Scroll and typing pause and resume
Ctrl + L	'Clear's text in shell, except current line
Ctrl + U	Clears line before cursor
Ctrl + H	Backspace
Ctrl + R	Search through previously used commands
Ctrl + C	Kill current foreground process
Ctrl + D	'Exit' current shell
Ctrl + Z	Puts running process into suspended background process. 'fg' restores to foreground, 'bg' to back
Ctrl + W	Delete word before cursor
Ctrl + K	Clear line after cursor
Ctrl + T	Swap last two characters before cursor
Esc + T	Swap last two words before cursor
Alt + F	Move cursor forward one word
Alt + B	Move cursor backward one word
Tab	Auto complete commands, folder and file names

Docker

Basic Docker Commands	
docker ps	List of live containers
docker ps -a	List all containers
docker info	Retrieves docker configuration
docker version	Retrieves docker versioning
docker build -t <image>:<tag> .	Builds docker Image from Dockerfile or container
docker push <image_name>:<tag>	Pushes image to repo
docker pull <image_name>:<tag>	Pulls image from repo

Container Commands	Where <container> is ID or NAME
docker inspect <container>	Inspect a container
docker stats <container>	Live data stream from container
docker logs <container>	Retrieves the containers logs
docker run <container>	Run container
docker kill <container>	Kill a running container
docker start <container>	Start container
docker stop <container>	Stop a running container
docker restart <container>	Restarts container
docker rm <container>	Remove container
docker port <container>	Lists port mapping of container
docker pause <container>	Suspends all processes in container
docker unpause <container>	Unsuspects all processes in container

Miscellaneous Commands	
docker cp <container>:<source_path> <dest_path>	Copy from container to host
docker cp <source_path> <container>:<dest_path>	Copy from host to container
docker exec -it <container> <entry point>	Executes terminal of live container

Keywords and Switches	On most commands
-p, --publish	Host to container port mapping
--publish-all	Publish all ports
--expose	Expose container port
-d, --detach	Run in background
-e, --env	Set env vars
-v, --volume	Mount files or directories
-i, --interactive	
-t, --tty	
exec	Run a new command in a container
cp	Copy path

Volume Commands	Where <volume> is ID or NAME
docker volume ls	List volumes
docker volume inspect <volume>	Inspect volume
docker volume create <volume>	Create volume
docker volume rm <volume>	Removes a volume


Image Commands	Where <network> is ID or NAME
docker images	List images
docker run <image>	Runs the image
docker create <image>:<-Tag>	Create image
docker rmi <image>	Remove image
docker save <image>	Saves images to tar archive

Network Commands	
docker network ls	List networks
docker network inspect <network>	Inspect a network
docker network create <network>	Create a network
docker network rm <network>	Removes a network
docker network connect <network> <container>	Connect container to network
docker network connect --ip <IP> <network> <container>	Specify IP address of container interface
docker network disconnect <network_name> <container>	Disconnect container from network



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Description	Link
Kubernetes documentation	kubernetes.io
Cloud Native Computing Foundation	landscape.cncf.io
Continuous Delivery Foundation	cd.foundation
Helm documentation	helm.sh
Helm Hub	hub.helm.sh
Operator Hub	operatorhub.io
Kubernetes on Katacoda	katacoda.com/learn katacoda.com/courses/kubernetes
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