



KUBERNETES ROADMAP

Kubernetes Administrator



by TechWorld with Nana

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KUBERNETES ROADMAP BY
TECHWORLD WITH NANA

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Start Here



Why Learning Kubernetes is a Good Idea

Kubernetes (K8s) is being adopted at companies at a high pace and anyone with knowledge in it has a career advantage.

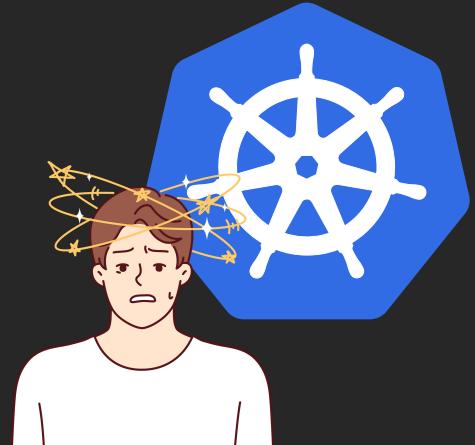
You can even become a full-time K8s engineer at your job.

Kubernetes job searches grew by 2125% in 4 years

Kubernetes is powerful, but complex

K8s is a powerful platform, but a very complex one. Which means you have a steep learning curve.

So even though many people want to learn Kubernetes, often they don't know where to start. So it certainly helps to have a guidance and sort of a roadmap of how to approach learning K8s efficiently.



That's why I want to give you this step by step roadmap of what to learn and in which order to structure your learning of K8s.

You can also find corresponding learning resources, where to learn from at the end.

Pre-Requisite - Containers

Kubernetes is built on containers, so before learning Kubernetes you should be able to run and build containers.



Administrator vs User

Most important point to consider, when you start learning Kubernetes

Kubernetes platform - as any other platform - has two sides or aspects:

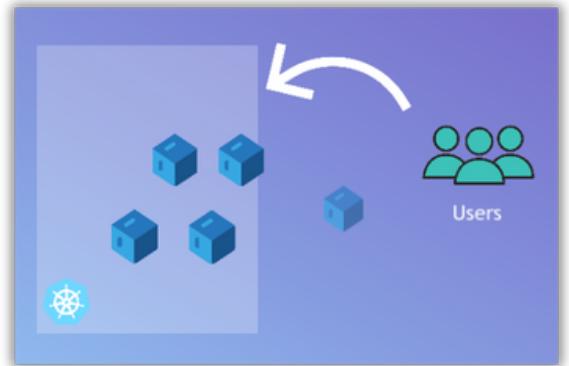
Administration -

Set Up and Maintenance of K8s cluster



Set up, initialize and configure the K8s cluster for its actual usage.

Usage of K8s cluster



Deploying applications and services into the K8s cluster

There are even different certifications for these 2:

CKA



CKAD



Administrator vs User

Decide based on your role

So these are 2 different roles and you need to understand, which aspect of the technology you want to learn?



Are you working in Operations?

You need to learn K8s Administration and Operations side and follow this roadmap



Are you an Application Developer?

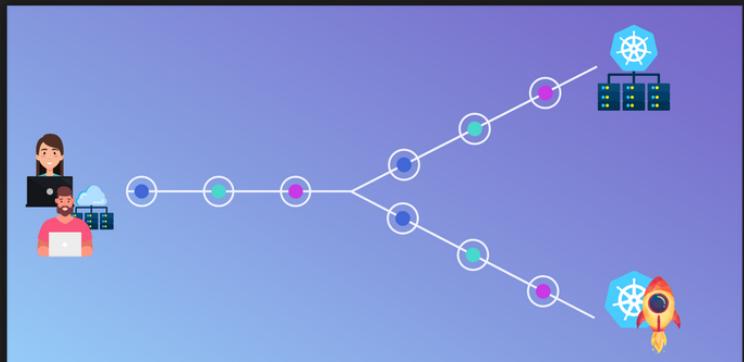
You need a roadmap of how to use K8s to deploy and run apps inside the cluster



Administrator vs User

Learning both sides

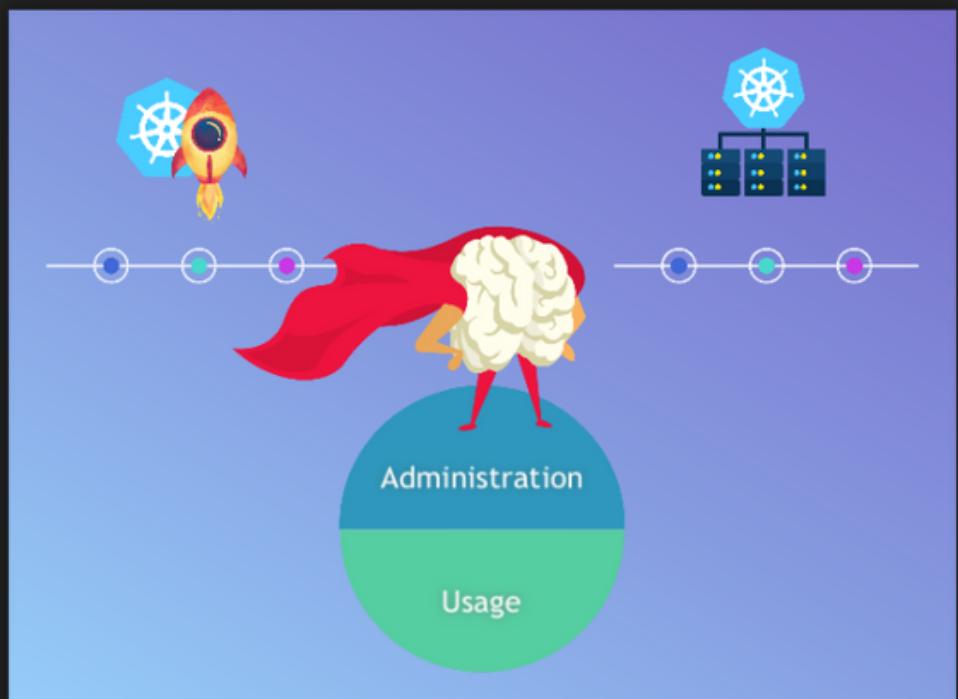
Note however, there are fundamental concepts that apply to both...



And you can eventually learn both, but you should divide it and learn one part first and then build the other on top!



This will make your learning process much easier and more structured :)



Fundamental Concepts



First, you need to learn fundamental concepts. These are the building blocks of Kubernetes knowledge, laying a solid foundation for your Kubernetes journey!



Learning the "Why"

Most important entry point to learning any new technology is, learn the WHY behind the technology first.

- What problem does it solve, that made K8s so popular and widely used?
- The whys of how K8s helps solve issues of operating large containerized apps

01

Architecture

As part of K8s architecture, you need to learn about the **control plane and worker nodes**.



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- What is the role of each?
- How are they connected?
- What processes are running on them?
- Etc

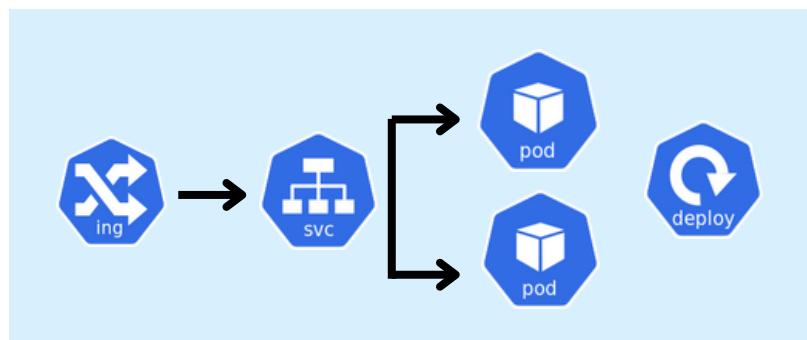
Fundamental Concepts

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Core K8s Objects

You need to understand what are:

- Pods
- Services
- ConfigMaps
- Secrets
- Ingress
- Deployment
- StatefulSet
- Namespaces
- Volumes



These are the main K8s components. Understand why each one exists and what are their relation and connection to each other

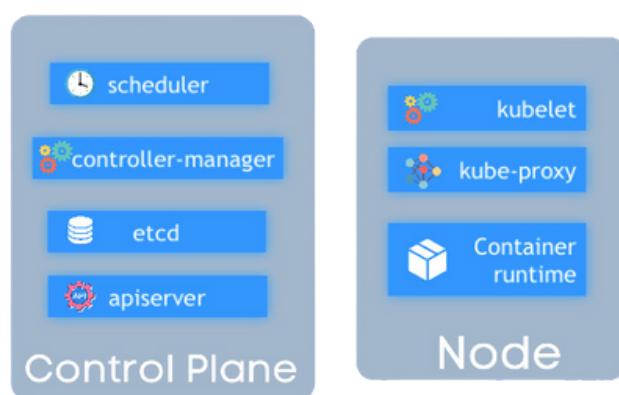
You **work with these K8s objects directly**: You create Deployments, Services etc, you join Worker Nodes to the cluster and so on.

K8s Components - How K8s works behind the scenes

But there are components of K8s, that work behind the scenes and doing its magic in the cluster:

04

Understanding what each component does, will help you **understand the mechanisms behind the cluster**, the self-healing functionality, the way K8s manages desired vs actual state etc.



Work with Kubernetes



While understanding the concepts behind a tool is essential, after that you should get hands-on!

This gives a different level of confidence with the tool and **breaks the fear of working with it.**

Access and Interacting with K8s

Next step is to actually access and work with a Kubernetes cluster. As part of this, you need to learn **kubectl command-line interface** and its main commands, which is essential for interacting with your Kubernetes cluster effectively.

KUBECTL



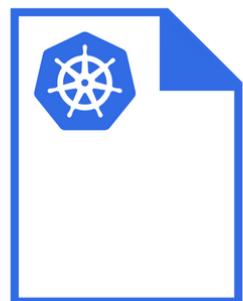
K8s cluster



kubectl Cheat Sheet: <https://kubernetes.io/docs/reference/kubectl/cheatsheet/>

K8s Manifest Files

These are K8s YAML configuration files, which **describe the desired state of your applications** within the cluster. These are used to define what K8s components, like deployments, services etc, you want to create in the cluster.



Learn syntax and understand **how to create and manage these manifest files**, which will be crucial for successful Kubernetes deployments.

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Work with Kubernetes

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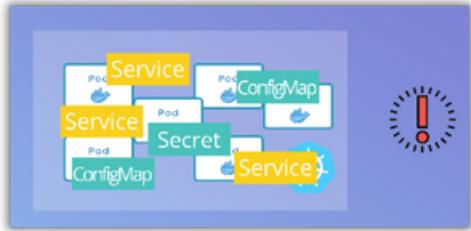
Troubleshooting

As you progress in your K8s journey and start deploying applications inside and creating various K8s resources, **you'll encounter challenges and issues** that require troubleshooting skills.



So you also need to **learn kubectl commands for troubleshooting** as well as other ways of getting insights into the cluster networking, components, applications etc:

- Check container logs
- Check cluster status
- Check Node and Pod Status
- Verify Networking
- ...



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Common K8s misconfigurations & Bad Practices (advanced)

DON'TS

DO'S

K8s is not opinionated and you can do a lot in the cluster, but this also means **you can do a lot wrong**, like configuring things with bad practices and misconfiguring things. That's where details of common misconfigurations will help a lot, knowing from the start what are some things that people without experience in K8s may misconfigure.

I find it easier to start with bad practices and what not to do, before learning about best practices. Because you learn exactly **what to avoid and importantly why**. This will also teach you more about how K8s works and why are things a certain way.



Work with Kubernetes

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Helm Charts (advanced)

Another advanced topic you can learn at this point is Helm charts, especially as you start deploying third-party services in your cluster next to your own apps.

Learn:

- What is Helm
- What are Helm charts
- What are they used for etc.



Again **first why we need them and then how to use them**. This will further enhance your deployment capabilities.

On this foundation, you can now build the knowledge you need to administer and operate a k8s cluster.





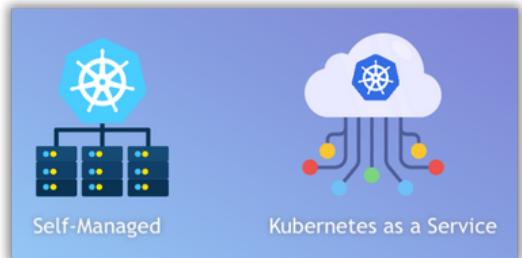
Admin Roadmap



Self-managed, Managed-service

Understand **different ways of operating K8s cluster:**

- Self-managed
- Managed K8s services offered by cloud providers, such as AWS EKS or Azure AKS



- Be able to set up and operate both
- Understand the pros and cons of each and the differences between them

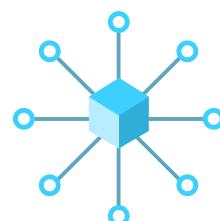


This will help make informed decisions about how to operate K8s cluster for your specific organization.

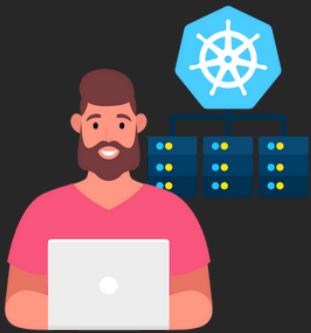
Kubernetes Networking

Networking plays a vital role in how various components communicate within a cluster. You should learn concepts, such as:

- Ingress
- Network policies
- Pod-to-pod and Pod-to-service communication
- K8s network interface and network plugins
- Cluster DNS service
- Soft network isolation with namespaces
- Hard network isolation between cluster components and why it's important



Understanding these concepts is absolutely essential, especially when administering a self-managed K8s cluster. Troubleshooting and fixing networking issues is very difficult, if you don't understand properly how K8s networking works.

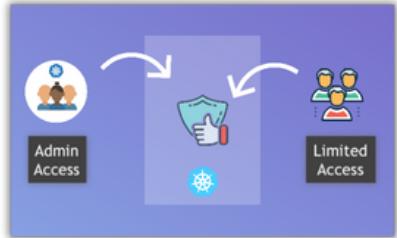


Admin Roadmap

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Access Management - RBAC

An essential responsibility of a K8s admin is cluster access management. Basically **who can do what in the cluster**. K8s is complex and powerful, so you don't want unauthorized people with little knowledge of K8s to have admin permissions to mess everything up.



So understanding K8s RBAC or **role-based access management** is important to make sure everyone has correct access permissions to cluster resources and everyone can do their job without messing things up.

For this you need to learn K8s components like:

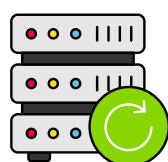
- Roles, ClusterRoles, Role & ClusterRole Bindings, ServiceAccounts

As well as kubeconfig, creating client certificates in K8s for human users and how to integrate various authentication services in K8s cluster.

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Backup & Secure Data - Volumes, Etcd

You will need to take care of data backups in K8s. You need to make sure to have a proper mechanism in place to **easily recover your cluster** in case of a disaster.

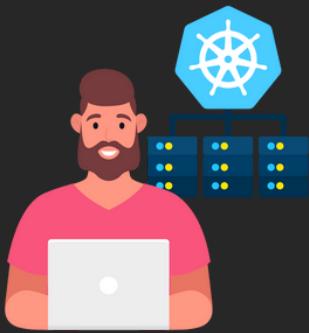


For this you need to understand generally **how data is managed in K8s**. That, by default, you have no data persistence in K8s!



- Application Data: Understand the concept of Volumes and how data is plugged into the cluster services through Volumes
- K8s Cluster Configuration Data: Learn Etcd - what's stored, how to backup and secure etcd store with all its sensitive cluster data
- Securing secret data for various cluster applications





Admin Roadmap

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Kubernetes Operators

Essential for managing stateful applications, like databases, message brokers etc.

Operator is basically the service itself bundled with the **intelligent logic of operating that service automatically** within the cluster

- Understand the operator concept
- Learn how to deploy and use Operators



Monitoring

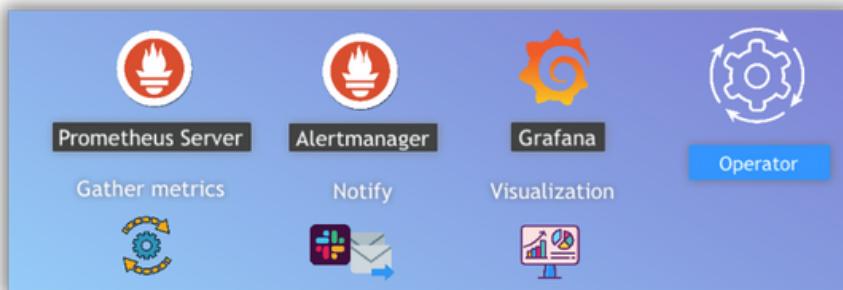
To have insights into what's going on in your cluster, you need monitoring.



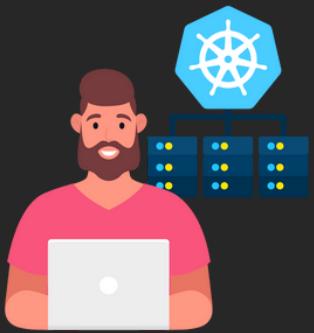
It's your job as a K8s administrator to take care of **configuring and setting up monitoring on a cluster level**.

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One of the most popular tool for monitoring in Kubernetes and containerized apps is Prometheus. And when you deploy a monitoring stack including Prometheus, Alertmanager and all the components that come with it, you will be able to deploy it with an K8s operator.



So all the skills stack up on top of each other and each one kinda helps in doing the other task better.



Admin Roadmap

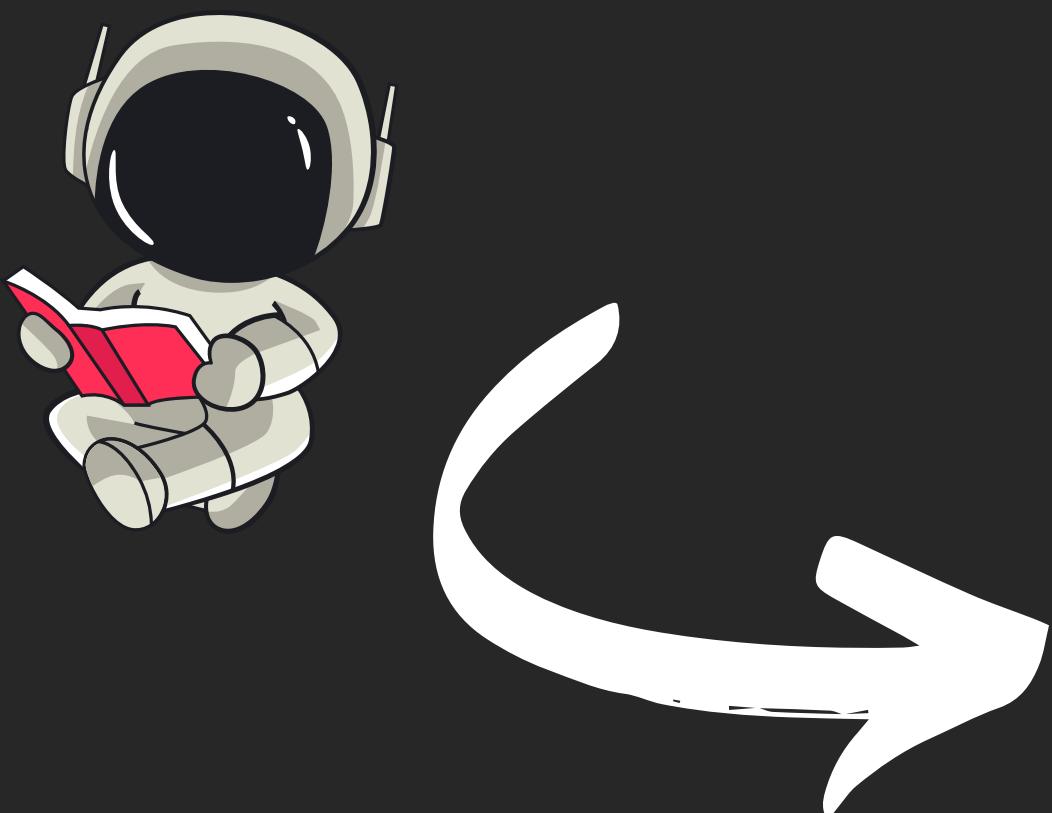


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Best practices

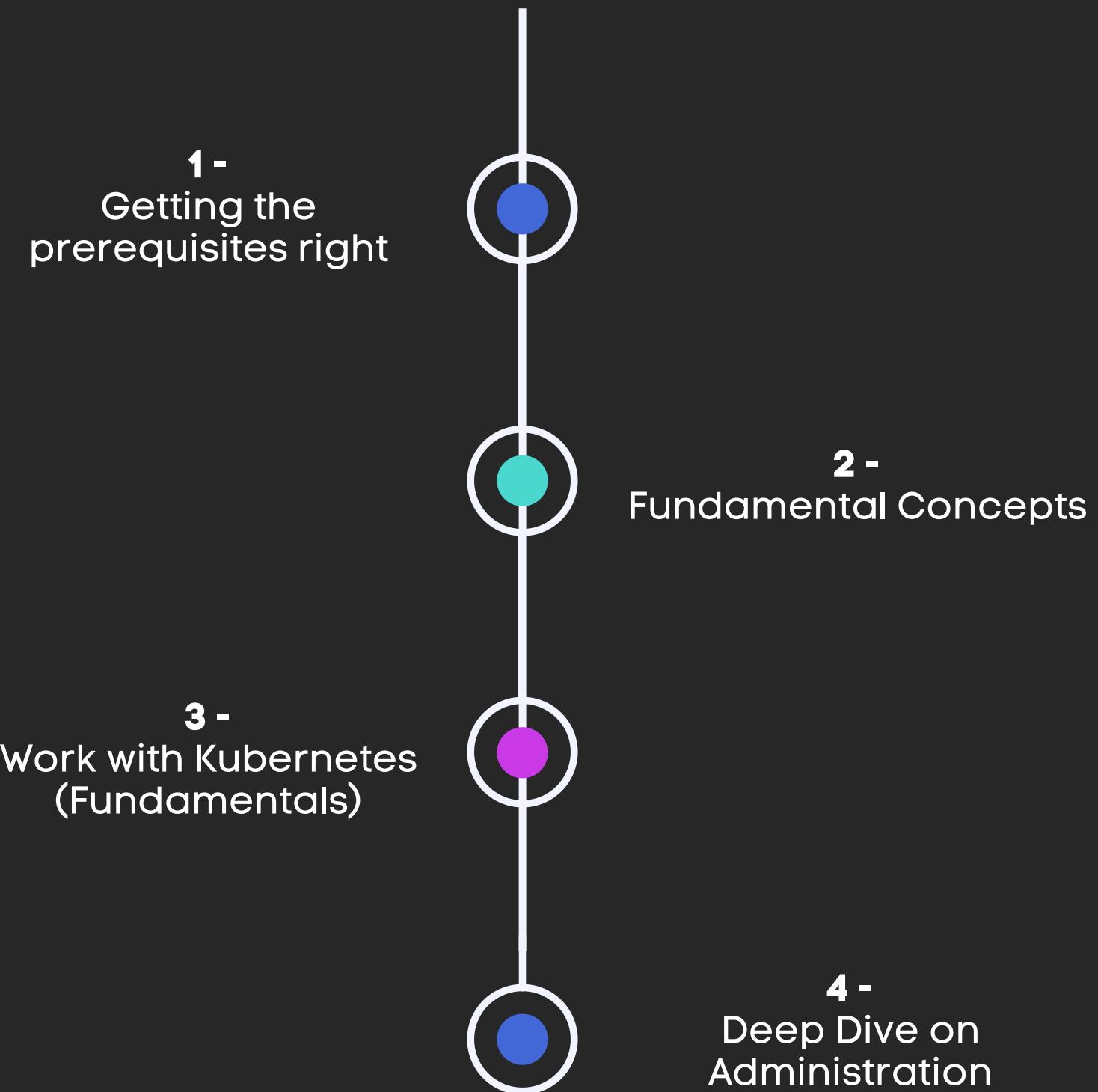
Generally, for all the above administrative tasks, you need to learn the best practices.

Not just any way of doing it, but the **best way of operations & security in K8s!**



Summary

Kubernetes Roadmap

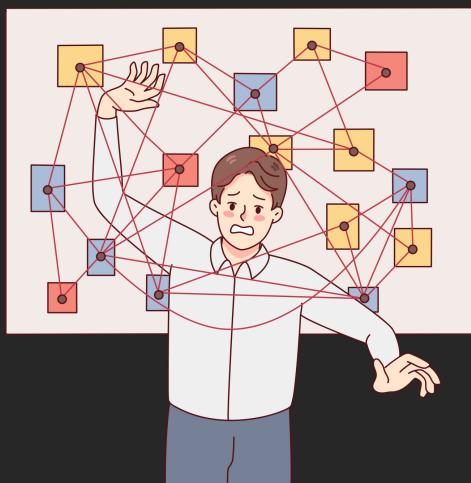


Where to learn

Official
Docs?

Blog
Articles?

Individual
Videos?



Having a roadmap like this is great for structuring your learning, but you **still need to find the right resources** that explain these concepts properly, put them in the right order, don't miss important topics etc

You can do that, but requires a lot of time and effort.

So instead, as a simpler alternative, we have created pre-structured courses, where I already did all the heavy lifting of creating the perfect curriculum, with the right hands-on projects and practical examples for this specific learning path.

So definitely check out our TWN learning resources to **make your life easier**.



TWN Learning Resources



FREE - K8s Crash Course

For Absolute Beginners

Best way to get started. You will learn everything to get started with K8s, learning all the core concepts, set up K8s cluster locally & get your first hands-on experience!

Who is this course for?

For Kubernetes beginners to learn the basics



<https://www.youtube.com/@TechWorldwithNana>

TWN Learning Resources



Kubernetes Administrator Course

Everything you need to master the Certified Kubernetes Administrator (CKA) exam in one comprehensive and practical course!

Who is this course for?

For people:

- who want to become a Kubernetes Administrator
- who want to pass the CKA exam successfully
- who need to set up and maintain a K8s cluster at work



**TECHWORLD
WITH NANA**

<https://www.techworld-with-nana.com/kubernetes-administrator-cka>



DevOps Bootcamp

A 6-month program to kickstart your career as a DevOps engineer. The whole bootcamp was created with the focus of making you job-ready and able to do the DevOps tasks at work

Kubernetes is just one part of it.

You will learn:

- How to USE K8s to advanced level & operational parts
- Kubernetes in combination with various other DevOps technologies
- Managed Kubernetes Service: AWS EKS
- Automating K8s cluster provisioning with Terraform
- Deploying from Jenkins CI/CD pipeline to K8s cluster
- Monitoring and Alerting in K8s
- And more

Everything based on actual real-life use cases to be able to apply it at work immediately.



<https://www.techworld-with-nana.com/devops-bootcamp>



DEVSECOPS BOOTCAMP

by TWN

DevSecOps Bootcamp

Integrate Security in every part of the DevOps process and advanced Kubernetes security

Security is a high priority at companies, so knowledge in this field makes you even more valuable on the job market

Again Kubernetes Security is just one part of it.

WILL BE RELEASED IN 2023
You can sign up for the waitlist



TECHWORLD WITH NANA

<https://www.techworld-with-nana.com/devsecops-bootcamp>

Last Learning Tip :)

Regardless of which resources you use to learn, be sure to follow this roadmap step by step

And for each concept:



1st:

Understand the WHY



2nd:

Immediately put it into practice

Good luck on your
Kubernetes journey!

