



# SRE Bootcamp

## 90 days Goal

- Prerequisites [2 days]
  - General Awareness

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    - Linux Foundation and CNCF
    - Landscape -  [CNCF Landscape](#)
  - Linux fundamentals
    - Create an Ubuntu VM with multipass or Vagrant
    - Linux commands - navigation, troubleshooting (top, ps, lsof, mpstat, iostat, nicstat, stacktrace, ptrace, strace, ebpf tooling), performance, data collection, system management (user, sudo permissions, log management, understand bash profile)
    - Brendan Gregg - performance evaluation, flamegraph, bpf (high level), ebpf
      - <https://www.brendangregg.com/>
        - <https://netflixtechblog.com/linux-performance-analysis-in-60-000-milliseconds-accc10403c55>
    - Julia Evans [Optional resource]
      -  [Julia Evans](#)
      - Look at Zines
    - Basic Tech [Read the basic concept]
      - DNS
      - BGP
      - OSI Layer 7 model
      - IP
      - SSL
      - VI Editor / Nano / nvim
      - Tmux
      - Git
      - Yaml, JSON parsing (YQ, JQ etc)
- Containerization and Virtualization [3 days]
  - Virtualization - KVM, Qemu, Hypervisors **[SKIP and do it at the end]**
  - Learn about Docker
    - Container basics, [container runtime](#), see [this talk](#), [demo](#),
    - Install docker-engine
    - Docker - multi-stage builds, buildx, building images for multi-architecture systems,
    - How to authenticate with Docker Hub?
    - How to change the logging driver in Docker?
    - How to change [the storage driver](#) in Docker?
    - Docker-compose
    - How to reduce the storage used by Docker. Learn about how to see storage used and how to clean up.
    - **Security**
      - Docker hardening
      - [Docker security best practices](#)
      - **Linters** like Hadolint

- **Scanner** - Docker scout, Trivy, [docker-bench](#)
- CIS Benchmark
- Docker alternatives - [containerd](#)
- Overview of MicroVMs, ~~NanoVMs~~, and Unikernels [Reading]
  - MicroVM - [Firecracker](#)
  - ~~NanoVM~~ - [Nanovms](#)
  - [Unikernel](#)
- Resources
  - [IX Ivan on Containers, Kubernetes, and Server-Side](#)
  - [Learnk8s — the Kubernetes training company](#)
  - [Kubernetes architect](#)
  - [AI-Powered Recipe Generator: Cook Delicious Dishes with What You Have! - cloudyuga.guru](#)
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- **Kubernetes**
  - Basics - Cover the Mumshad's CKA course.
  - [Kubectl Reference Docs](#)
  - **Hand-on Assignment [2 weeks]**
    - Create a Kind cluster and do the rest of the activities.
    - Install metrics server (prerequisite for HPA)
    - Create a Kubernetes user called `demo`
    - **See the Kubernetes tasks** - [Tasks](#) and try in the sequence given.
    - Setup a git repo with KV API
    - Setup Docker Credentials in the new cluster pointing to your user (Docker hub)
    - Use Kustomize to write the manifest file and use Kustomize patch to change the replica from 1 to 2. Namespace should be demo.
    - Ensure your deployment has a health check and readiness check configured.
    - Define the resource requests and limits on the deployment
    - Define HPA on the deployment
    - Generate load using curl or postman or use a load generator like k6 [skips]
    - Observe the scaling happening because of HPA
    - Learn other autoscaling techniques here - [VPA](#) and KEDA
    - Put resource quotas on the `demo` namespace.
    - Taints & Toleration, advanced scheduling mechanism
    - Install Nginx Ingress Controller and Create an Ingress for the API in the demo namespace
      - learn path-based and rule-based routing
    - Network policies
      - block all egress traffic
      - create another namespace demo2 and block traffic from demo2 to demo.
      - Test it with any container
    - **Kustomize [see Examples] \*\* Important\*\***
    - **Helm \*\* Important\*\***
    - Create an **RBAC role** called Reader role which gives read-only access (**Role Binding**) to a demo user. This role will allow you to list down the pods, and see the logs but not the configmap or secrets.

## Observability

- Reading: [🔗 Observability in 2024: Understanding the State of Play and Future Trends](#)
- Prometheus **\*\* Important\*\***, Grafana and Loki
  - Opentelemetry
  - Cardinality
  - Observability pipelines - Vector, Fluent, etc
  - Alerting basics
  - Incident Management Systems
  - Current trends - Signoz, KloudMate, Axiom, etc.
  - Kubernetes Certified (CKA) - [learning path](#), [syllabus](#)
    - **Kubernetes Cluster Build [Skip this section and do at the end]**
      - Create an ETCD cluster with 3 nodes
      - Take the ETCD backup in the local disk
      - Wait for 5 minutes and restore from the backup taken in the previous step
      - Spin up Kubernetes cluster (version 1.27) with Kubeadm
        - Specification: 2 node cluster (1 is master and 1 is client)
        - Untaint the master node to schedule workload.
      - Install Calico (if you want to use network policies) or Flannel CNI
      - Change ndots configuration in coredns
    - **Kubernetes Upgrade from 1.27 to 1.28**
      - What are the key things to check before upgrading Kubernetes? **Read this.**
      - [🔗 Upgrading kubeadm clusters](#)
    - Kubernetes the hard way - [🔗 GitHub - kelseyhightower/kubernetes-the-hard-way: Bootstrap Kubernetes the hard way. No scripts.](#)
    - [🔗 Killer Shell - Exam Simulators](#)
- Cloud Native Core Products
  - GitOps **\*\* Important\*\***
    - **ArgoCD**
    - **setup ArgoCD**
    - Create an ArgoCD app for the KV API
    - Test sync is happening for the new commits, eg. adding a new label in the deployment.
    - Set up the Image updater to fetch the latest image from the Docker hub based on the regex demo-\*
    - Set up the ArgoCD notification to send notifications in Slack. [If you face an issue, engage Anjul]
    - Additional course recommendation - [🔗 Introduction to GitOps and Argo CD - Online Course by Akuity](#)
  - Running VMs on Kubernetes - KubeVirt project
  - Cert Manager and Let's Encrypt
  - Ingress controllers (Nginx Ingress Controller, Traefik)
  - Storage (OpenEBS, Ceph..)
  - Backup and Recovery (Velero, Kasten..) [low priority]
  - Network (CNIs - Calico, Cilium) [low priority]
  - Service Mesh - Istio, Linkerd [low priority]
    - <https://events19.linuxfoundation.org/wp-content/uploads/2018/07/Running-Legacy-VMs-with-Kubernetes.pdf>
  - Crossplane (only basic understanding, just read about what it is and its use cases) [low priority]
- SRE
  - IaC - Terraform, OpenTofu, Pulumi, AWS CDK

- SLI, SLA, SLOs Concepts (Google SRE Book, Last9 has some talks, Liz Fong, Charity Majors..)
- Databases
  - PostgreSQL (go advance)
    - Official Documentation
    - [postgres.ai](https://postgres.ai) - blog
    - Art of Tuning PostgreSQL
  - Redis (basic)
- Hashicorp Stack
  - Packer
  - Vault (also look into infisical)
  - Vagrant
- Security
  - Scan the workload with `kube-bench` or `kubescape` or `popeye`
  - Fix the issues identified by Kubescape for the demo namespace workload. [Read this article for more information.](#)
- Cloud Cost Optimization
- FinOps Practices - [FinOps Framework Overview](#)
- CICD
  - GitHub Actions (mandatory)
  - Cloud Native CI tools
    - Tekton (Optional)
  - Jenkins Pipelines (Groovy scripting)
  - Release Engineering
  - Advanced CD
    - Blue-green, Canary, etc.
    - Argo Rollout, or Flux...,