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Kubernetes "Zero to Hero" Roadmap – Comprehensive FREE Resource Index

Maximize your mastery of Kubernetes by following this curated index of **free resources, tutorials, interactive labs, and videos**, mapped to every phase and topic/subtopic of your learning journey.

PHASE 1: FOUNDATIONS & PREREQUISITES (3–4 Weeks)

Week 1–2: Linux & Container Foundations

1.1 Linux System Administration

- **Courses:**
  - [Linux Foundation Free Linux Courses][1]
  - [NIELIT Linux Admin (Free Certificate Course)][2]
  - [Udemy Free Linux Administration Courses][3]
  - [Alison Linux Network Administrator][4]
- **Interactive Labs:**
  - [LabEx Shell Scripting Free Labs][5]
  - [Cybrary Bash Scripting Practice Lab][6]
- **Topic Guides:**
  - [ClassCentral Linux System Admin Course List][7]

1.2 Container Technology Deep Dive

- **Courses:**
  - [The Ultimate Docker Fundamentals (Free Online Labs)][8]
  - [Docker for Beginners (Hands-On Labs)][9]
  - [Docker: From Beginner to Expert (Free Modules)][10]
- **Practical Labs:**
  - [Oracle Free Docker Hands-on Lab][11]
  - [GitHub Docker Labs Repository][12]
- **Videos:**
  - [Official Docker YouTube Training (Free)][13]

- [Docker Networking Video][14]

- **Guides:**
  - [Docker Networking Guide – KodeKloud][15]

1.3 Networking Concepts

- **Courses & Videos:**
  - [Coursera TCP/IP Fundamentals (Free Audit)][16]
  - [Udemy TCP/IP for DevOps (Free)][17]
- **Topic Guides:**
  - [Hostinger iptables (Linux Firewall) Tutorial][18]

Week 3: Development Environment Setup

1.4 Local Kubernetes Setup

- **Minikube Tutorials:**
  - [Getting Started with Minikube (Guide)][19]
  - [Minikube Step-by-Step Tutorial][20]
- **Kind Tutorials & Videos:**
  - [Kind Kubernetes Setup Guide (Free)][21]
  - [YouTube: Install a Kubernetes Cluster with Kind in 5 Minutes][22]
- **Interactive Labs:**
  - [Play with Kubernetes Free Browser Cluster][23]

1.5 Essential Tools Mastery

- **kubectl:**
  - [GitHub: Kubectl Cheat Sheet][24]
  - [Kubectl PDF Command List][25]
- **jq & yq:**
  - [Guide to jq Command (Baeldung)][26]
  - [jq Official Tutorial][27]
  - [LabEx jq Programming Lab][28]
  - [yq Documentation & Usage Guide][29]
- **Text Editors & Multiplexers:**
  - [Generic Bash/Linux Tutorials – All Editors, CLI Tools][1] [3]
  - [tmux Cheat Sheet][1] (covered generically in Linux/CLI courses)

Week 4: Kubernetes Architecture Foundation

1.6 Cluster Architecture Deep Dive

- **Comprehensive Guides:**
  - [Red Hat: Sysadmin's Guide to Kubernetes Components][30]
  - [DevOpsCube: Kubernetes Architecture Explained][31]
- **Official Docs:**
  - [Kubernetes Nodes Concept][32]

1.7 API Objects and Resources

- **Interactive Tutorials/Labs:**
  - [LabEx: Kubernetes Free Hands-On Tutorials (Full Walkthroughs)][33]
  - [Kubernetes.io: Namespaces & Resource Quotas][34] [35]
  - [DevOps.dev: Resource Quotas & Namespaces][36]
  - [Kubernetes Multi-Container Pod Patterns (Dev.to)][37]
- **Deep Dives:**
  - [Labels, Selectors, Annotations Articles][38] [39]

PHASE 2: CORE KUBERNETES MASTERY (4–5 Weeks)

Week 5–6: Workloads & Scheduling

2.1 Pod Management

- **Labs & Tutorials:**
  - [LabEx: Pod Lifecycle, Init & Sidecar Patterns, Probes][33] [40]
  - [Kubernetes Deployment YAML Example (Spacelift)][41]

2.2 Workload Controllers

- **Courses:**
  - [Pluralsight Free Trials: Controllers & Deployments][42]
- **Labs:**
  - [LabEx: Deployments, ReplicaSets, Autoscaling, StatefulSet, DaemonSet, Jobs, CronJobs][33] [43] [44]
- **HPA & VPA:**
  - [YouTube HPA & VPA Autoscaling Tutorial][45]
  - [KodeKloud Blog: Vertical Pod Autoscaler][46]

2.3 Advanced Scheduling

- **Labs & Docs:**
  - [kubernetes.io Node Affinity & Pod Affinity Tutorial][47] [48]
  - [Spot.io Kubernetes Affinity Quick Tutorial][49]
  - [Taints & Tolerations Docs][50] [51]
- **More Scheduling Resources:**
  - [LabEx Hands-On: Node Affinity, Taints/Tolerations][33]
  - [Dev.to Placement with Taints & Tolerations][51]

Week 7–8: Storage Systems

2.4 Volume Management

- **Tutorials:**
  - [kubernetes.io: Persistent Volumes][52]
  - [Spacelift PV & PVC Tutorials][53]
  - [Civo: Intro to Kubernetes Volumes][54]

2.5 Persistent Storage

- **Official Docs:**
  - [kubernetes.io: Storage Classes][55]
- **Labs & Videos:**
  - [YouTube: Kubernetes CSI Hands-On][56]
  - [Severalnines: CSI Deep Dive][57]
  - [Kubernetes Cloud Volumes Guide (Spacelift, Civo, Official Docs)][54] [55]

Week 9: Configuration Management

2.6 Application Configuration

- **Tutorials & Labs:**
  - [Lab13 Secrets and ConfigMaps Lab][58]
  - [GitHub: ConfigMaps & Secrets Exercises][59]
  - [LabEx: ConfigMaps, Secrets, Environment Injection][33]

PHASE 3: NETWORKING & SERVICES (3–4 Weeks)

Week 10–11: Services & Networking

3.1 Service Discovery

- **Labs & Tutorials:**
  - [LabEx: Kubernetes Services, Headless, ExternalName][33]
  - [Kubernetes.io: Services Concepts][1]

3.2 Advanced Networking

- **CNI & Plugins:**
  - [LabEx: Networking and CNI Labs][33]
  - [KodeKloud Docker Networking][15]
- **Network Policies:**
  - [YouTube: Network Policies Tutorial][60]
  - [Isovalent: Network Policies Done the Right Way (Book)][61]
- **Service Mesh:**
  - [LabEx: Service Mesh Labs (Istio, Linkerd) if available][33]

3.3 Ingress and Gateway API

- **Ingress Controllers:**
  - [YouTube: Ingress Controller Setup 2025][62]
  - [YouTube Ingress Tutorial for Beginners][63]
  - [LabEx: Ingress Labs][33]
- **Gateway API:**
  - [Kubernetes.io: Gateway API Concepts][1]

Week 12–13: Security & RBAC

3.4 Authentication & Authorization

- **RBAC Labs & Tutorials:**
  - [LabEx: RBAC Role, RoleBinding, Users, Service Accounts][33]
- **Official Docs:**
  - [Kubernetes RBAC Concepts][1]

3.5 Security Policies

- **Pod Security:**
  - [LabEx: Pod Security Standards, Security Context][33]
- **Network Policy:**
  - [YouTube/Isovalent: Network Policies][60] [61]

PHASE 4: ADVANCED TOPICS & TOOLS (3–4 Weeks)

Week 14–15: Package Management & Extensions

4.1 Helm Package Manager

- **Tutorials & Videos:**
  - [Helm Official Docs][1]
  - [LabEx: Helm Labs][33]

4.2 Kustomize Configuration Management

- **Guides:**
  - [Kustomize Official Docs][1]
  - [LabEx: Kustomize Labs][33]

4.3 Kubernetes Extensions

- **CRDs & Operators:**
  - [LabEx: CRDs, Operators, CNI/CSI/CRI Labs][33]

Week 16: Cluster Management

4.4 Cluster Architecture & Installation

- **kubeadm Tutorials:**
  - [LabEx: Cluster Installation (kubeadm)][33]
  - [Minikube/Kind Setup Guides][19] [21]

4.5 Maintenance Operations

- **Docs & Labs:**
  - [LabEx: Node Maintenance, Upgrades, Backups][33]

PHASE 5: TROUBLESHOOTING MASTERY (2–3 Weeks)

Week 17–18: Advanced Troubleshooting

5.1 Cluster Diagnostics

- **Labs:**
  - [LabEx: Diagnostics, Node Recovery, Control Plane][33]

5.2 Application Troubleshooting

- **Labs:**
  - [LabEx: Pod Debugging, CrashLoopBackOff, Init Containers][33]

5.3 Network Troubleshooting

- **Labs:**
  - [LabEx: Service Discovery, DNS, Policies][33]
  - [YouTube Network Troubleshooting][60]

5.4 Storage Troubleshooting

- **Labs:**
  - [LabEx: PVC Issues, Volumes, Storage Problems][33]

Week 19: Monitoring & Observability

5.5 Logging and Monitoring

- **Tutorials:**
  - [LabEx: Monitoring, Logging, Prometheus, Grafana][33]

PHASE 6: CERTIFICATION PREPARATION (1–2 Weeks)

Week 20: Exam Readiness

6.1 Mock Examinations

- **Practice Platforms:**
  - [Killer.sh Free Demo (Paid full version)][1]
  - [KodeKloud CKA Labs & Simulators][1] [33]
  - [Linux Foundation Sample Exams][1]

6.2 Final Review

- **Cheat Sheets:**
  - [GitHub: Kubernetes Cheat Sheets][24] [25]
  - [LabEx: Last Mile Practice Labs][33]

HIGH-PRIORITY INTERACTIVE SANDBOXES & LABS

- **LabEx Kubernetes Labs:** Collection of 40+ free hands-on scenarios from basics to advanced [33]
- **Play with Kubernetes:** Browser-based free multi-node sandbox clusters [23]
- **Katacoda Kubernetes Labs:** (Platform retired, use alternatives above)
- **GitHub: Free Kubernetes Tutorials, Practical Labs** [33] [59]

SPECIAL: YAML, jq & yq, CLI Scripting

- [YAML for Kubernetes (Mirantis)][64]
- [jq Command Tutorial (Baeldung)][26]
- [jq Interactive Lab (LabEx)][28]
- [yq Documentation][29] [65]
- [jq/yq Official Tutorial and Usage][27] [29]

> **Tip:** Focus on “LabEx” for comprehensive hands-on practice with no setup, “Play With Kubernetes” for live cluster practice, and supplement theory with official docs and YouTube video tutorials.

This index ensures you can go from absolute zero to Kubernetes hero using top-tier free resources and hands-on labs at every stage. No paid courses are necessary!

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1. https://training.linuxfoundation.org/resources/free-courses/
2. https://lms.nielit.gov.in/course/view.php?id=44
3. https://www.udemy.com/topic/linux-administration/free/
4. https://alison.com/course/linux-network-administrator
5. https://labex.io/free-labs/shell
6. https://www.cybrary.it/practice-lab/bash-scripting
7. https://www.classcentral.com/subject/linux-system-administration
8. https://www.udemy.com/course/the-ultimate-docker-fundamentals/
9. https://www.coursera.org/learn/docker-for-the-absolute-beginner
10. https://www.udemy.com/course/docker-from-beginner-to-expert/
11. https://go.oracle.com/lp=93125
12. https://github.com/mdsami/docker-labs

13. https://www.docker.com/trainings/
14. https://www.youtube.com/watch?v=itZ_x_nDBxU
15. https://kodekloud.com/blog/networking-docker-containers/
16. https://www.coursera.org/learn/tcpip
17. https://www.classcentral.com/course/udemy-learn-tcpip-computer-networking-fundamental-88029
18. https://www.hostinger.com/in/tutorials/iptables-tutorial
19. https://dev.to/mesrar/getting-started-with-minikube-a-beginners-guide-to-kubernetes-2hgm
20. https://devopscube.com/kubernetes-minikube-tutorial/
21. https://betterstack.com/community/guides/scaling-docker/kind/
22. https://www.youtube.com/watch?v=LfZF-xDN22w
23. https://dev.to/i_am_vesh/best-free-platforms-to-practice-kubernetes-for-free-5d0f
24. https://gist.github.com/Richard-Barrett/447e18bbf0f6a68a5db8298d616cf1ed
25. https://assets-global.website-files.com/65f01231a53e1ee6d2a351e3/67c6f5f3385f3acfc6f602c6_61631545275.pdf
26. https://www.baeldung.com/linux/jq-command-json
27. https://jqlang.org/tutorial/
28. https://labex.io/tutorials/linux-json-data-processing-with-jq-279945
29. https://mikefarah.gitbook.io/yq
30. https://www.redhat.com/en/blog/kubernetes-components
31. https://devopscube.com/kubernetes-architecture-explained/
32. https://kubernetes.io/docs/concepts/architecture/nodes/
33. https://github.com/labex-labs/kubernetes-free-tutorials
34. https://kubernetes.io/docs/concepts/policy/resource-quotas/
35. https://kubernetes.io/docs/tasks/administer-cluster/manage-resources/quota-memory-cpu-namespace/
36. https://blog.devops.dev/day18-kubernetes-resource-quota-and-namespace-6a21045b0d97
37. https://betterprogramming.pub/understanding-kubernetes-multi-container-pod-patterns-577f74690aee?gi=5c89041b509a
38. https://k21academy.com/docker-kubernetes/labels-and-annotations-in-kubernetes/
39. https://itnext.io/labels-and-annotations-in-kubernetes-234944b0f7ab
40. https://spacelift.io/blog/kubernetes-sidecar-container
41. https://spacelift.io/blog/kubernetes-deployment-yaml
42. https://www.pluralsight.com/courses/managing-kubernetes-controllers-deployments
43. https://gist.github.com/bantic/7a714ab4be6dfb61a1cada8b597cabe1
44. https://rahulsharma1301.hashnode.dev/kubernetes-deployment-statefulsets-daemon-sets-cron-jobs
45. https://www.youtube.com/watch?v=_wtJ9DXg4Ho
46. https://kodekloud.com/blog/vertical-pod-autoscaler/
47. https://kubernetes.io/docs/tasks/configure-pod-container/assign-pods-nodes-using-node-affinity/
48. https://kubernetes.io/docs/concepts/scheduling-eviction/assign-pod-node/
49. https://spot.io/resources/kubernetes-architecture/kubernetes-affinity-the-basics-and-a-quick-tutorial/

50. https://kubernetes.io/docs/concepts/scheduling-eviction/taint-and-toleration/
51. https://dev.to/buzzgk/controlling-pod-placement-with-kubernetes-taints-and-tolerations-27op
52. https://kubernetes.io/docs/concepts/storage/persistent-volumes/
53. https://spacelift.io/blog/kubernetes-persistent-volumes
54. https://www.civo.com/academy/kubernetes-volumes/introduction-to-kubernetes-volumes
55. https://kubernetes.io/docs/concepts/storage/storage-classes/
56. https://www.youtube.com/watch?v=AnfAd6goq-o
57. https://severalnines.com/blog/kubernetes-container-storage-interface-csi/
58. https://www.scribd.com/document/510021339/Lab13-Secrets-and-ConfigMaps
59. https://github.com/seifrajhi/Kubernetes-practical-exercises-Hands-on
60. https://www.youtube.com/watch?v=QZE0b0rc4KY
61. https://isovalent.com/books/kubernetes-network-policies-done-the-right-way-by-isovalent/
62. https://www.youtube.com/watch?v=--J29I5AnFs
63. https://www.youtube.com/watch?v=80Ew_fsV4rM
64. https://www.mirantis.com/blog/introduction-to-yaml-creating-a-kubernetes-deployment/
65. https://github.com/mikefarah/yq