
Table of Contents

Preface	ix
1. Getting Started With Kubernetes	15
1.1 Using Kubernetes Without Installation	15
1.2 Installing the Kubernetes CLI <code>kubectl</code>	16
1.3 Installing Minikube To Run A Local Kubernetes Instance	17
1.4 Using Minikube Locally for Development	19
1.5 Starting your First Application on Minikube	20
1.6 Accessing the Dashboard in Minikube	20
2. Creating a Kubernetes Cluster	25
2.1 Installing <code>kubeadm</code> To Create A Kubernetes Cluster	25
2.2 Bootstrapping A Kubernetes Cluster Using <code>kubeadm</code>	26
2.3 Downloading A Kubernetes Release From GitHub	27
2.4 Downloading Client And Server Binaries	28
2.5 Using Hyperkube Image To Run A Kubernetes Master Node With Docker	29
2.6 Writing A Systemd Unit File To Run Kubernetes Components	31
2.7 Creating A Kubernetes Cluster On Google Kubernetes Engine (GKE)	34
2.8 Creating A Kubernetes Cluster On Azure Container Service (ACS)	35
3. Learning to Use the Kubernetes Client	39
3.1 Listing Resources	39
3.2 Deleting Resources	40
3.3 Watching Resource Changes With <code>kubectl</code>	41
3.4 Editing Resources With <code>kubectl</code>	42
3.5 Letting <code>kubectl</code> Explain Resources And Fields	42

4. Creating and Modifying Fundamental Workloads.....	45
4.1 Creating A Deployment Using <code>kubectl run</code>	45
4.2 Creating Objects From File Manifests	46
4.3 Writing A Pod Manifest From Scratch	47
4.4 Launching Deployment Using A Manifest	48
4.5 Updating A Deployment	52
5. Working With Services.....	55
5.1 Creating A Service To Expose Your Application	56
5.2 Verifying the DNS Entry of a Service	58
5.3 Changing The Type of a Service	58
5.4 Deploy An Ingress Controller on Minikube	60
5.5 Making Services Accessible From Outside The Cluster	61
6. Exploring the Kubernetes API and Key Metadata.....	65
6.1 Discovering API Endpoints Of The Kubernetes API Server	65
6.2 Understanding The Structure Of A Kubernetes Manifest	67
6.3 Creating Namespaces To Avoid Name Collisions	68
6.4 Setting Quotas Within A Namespace	69
6.5 Labeling An Object	70
6.6 Using Labels For Queries	71
6.7 Annotating a Resource With One Command	73
7. Managing Specialized Workloads.....	75
7.1 Running A Batch Job	75
7.2 Running a Task on a Schedule Within a Pod	77
7.3 Running Infrastructure Daemons Per Node	78
7.4 Managing Stateful and Leader-Follower Apps	79
7.5 Influencing Pods Startup Behavior	83
8. Volumes and Configuration Data.....	85
8.1 Exchanging Data Between Containers Via A Local Volume	85
8.2 Passing An API Access Key To A Pod Using A Secret	87
8.3 Providing Configuration Data To An Application	91
8.4 Using A Persistent Volume With Minikube	93
8.5 Understanding Data Persistency on Minikube	96
8.6 Dynamically Provision Persistent Storage On GKE	99
9. Scaling.....	101
9.1 Scaling A Deployment	102
9.2 Automatically Resizing a Cluster in GKE	102
9.3 Automatically Resizing a Cluster in AWS	105

9.4 Using Horizontal Pod Autoscaling on GKE	106
10. Security	109
10.1 Providing A Unique Identity For An Application	109
10.2 Listing And Viewing Access Control Information	111
10.3 Controlling Access To Resources	116
10.4 Securing Pods	118
11. Monitoring and Logging	121
11.1 Accessing The Logs of a Container	121
11.2 Recover From a Broken State With a Liveness Probe	122
11.3 Control Traffic Flow to a Pod Using a Readiness Probe	123
11.4 Adding Liveness and Readiness Probes To Your Deployments	124
11.5 Enabling Heapster on Minikube To Monitor Resources	126
11.6 Using Prometheus On Minikube	128
11.7 Using Elasticsearch-Fluentd-Kibana (EFK) On Minikube	133
12. Maintenance And Troubleshooting	137
12.1 Enabling Autocomplete For kubectl	137
12.2 Removing a Pod From a Service	138
12.3 Access a ClusterIP Service Outside the Cluster	139
12.4 Understanding And Parsing Resource Statuses	140
12.5 Debugging Pods	142
12.6 Getting A Detailed Snapshot Of The Cluster State	146
12.7 Adding Kubernetes Worker Nodes	147
12.8 Draining Kubernetes Nodes For Maintenance	149
12.9 Managing etcd	151
13. Developing Kubernetes	153
13.1 Compiling From Source	153
13.2 Compiling A Specific Component	154
13.3 Using A Python Client To Interact With The Kubernetes API	155
13.4 Extending The API Using Custom Resource Definitions (CRD)	156
14. Ecosystem	161
14.1 Installing Helm, The Kubernetes Package Manager	161
14.2 Using Helm to Install Applications	162
14.3 Creating Your Own Chart To Package Your Application with Helm	163
14.4 Converting Your Docker Compose Files To Kubernetes Manifests	165
14.5 Creating A Kubernetes Cluster With kubicorn	166
14.6 Storing Encrypted Secrets in Version Control	171
14.7 Deploying Functions with kubeless	173