

EXPERIMENT-6 KUBERNETES

● MINIKUBE INSTALLATION

```
Last login: Fri Sep 26 20:26:59 on ttys000
[dhyepatel@Dhyeys-MacBook-Air ~ % brew install minikube
=> Auto-updating Homebrew...
Adjust $HOMEBREW_NO_AUTO_UPDATE=1 run with '$HOMEBREW_AUTO_UPDATE_SECS' or disable with
'$HOMEBREW_NO_AUTO_UPDATES=1'. Hide these hints with '$HOMEBREW_NO_ENV_HINTS=1' (see 'man brew').
=> Auto-updated Homebrew!
Updated 2 taps (homebrew/core and homebrew/cask).
=> New Formulae
mcp-atlassian: MCP server for Atlassian tools (Confluence, Jira)
php-pint: PHP interactor and extension
slack-history: Powerful MCP Slack Script with multiple transports and smart history fetch logic
swag: Automatically generate RESTful API documentation with Swagger 2.0 for Go
terminfo: Record, share and export your terminal as a animated SVG image
tfstate-lookup: Lookup resource attributes in tfstate
=> New Casks
aionui: GUI for Gemini CLI
droide: AI-powered software engineering agent by Factory
font-bbh-sans-barlow
font-bbh-sans-bogle
font-bbh-sans-hegarty
handy: Speech to text application
helium-browser: Chromium-based web browser
rewriter-plipixol: Rewrite URLs within assistant
topaz-imagecoder
topaz-photo: AI image enhancer
topaz-video: Video upscaler and quality enhancer
You have 37 outdated formulae installed.

=> Fetching downloads for: minikube
=> Downloading https://ghcr.io/v2/homebrew/core/minikube/manifests/1.37.0
#####
##### 100.0%
=> Fetching dependencies for minikube: kubernetes-cli
#####
##### 100.0%
=> Downloading https://ghcr.io/v2/homebrew/core/kubernetes-cli/manifests/1.34.1
#####
##### 100.0%
=> Fetching kubernetes-client
#####
##### 100.0%
=> Downloading https://ghcr.io/v2/homebrew/core/kubernetes-client/blobs/sha256:54ac86e62a8394fb843394f748a76f83b6f0c03e73c381683b3c6341b3d00
#####
##### 100.0%
=> Fetching minikube
=> Downloading https://ghcr.io/v2/homebrew/core/minikube/blobs/sha256:1de992e28c94637e9bf7291e2c658a4b6f896a19fbc8194b56944247b649c
#####
##### 100.0%
=> Installing minikube dependency:
=> Downloading https://ghcr.io/v2/homebrew/core/kubernetes-client/manifests/1.34.1
Already downloaded: /Users/dhyepatel/Library/Caches/Homebrew/downloads/f631b27c571877ca4c6334f227c8940304647b04a5d87e66a848f272d26dd027--kubernetes-client-1.34.1.bottle_manifest.json
=> Pouring kubernetes-client-1.34.1.arm64_tahoe.bottle.tar.gz
↳ /opt/homebrew/Cellar/kubernetes-client/1.34.1: 256 files, 61.2MB
=> Pouring minikube-1.37.0.arm64_tahoe.bottle.tar.gz
↳ /opt/homebrew/Cellar/minikube/1.37.0: 18 files, 131.0MB
=> Cleaning up...
Disable this behaviour by setting '$HOMEBREW_NO_INSTALL_CLEANUP=1'.
Hide these hints with '$HOMEBREW_NO_ENV_HINTS=1' (see 'man brew').
=> Caveats
zsh completions have been installed to:
  /opt/homebrew/share/zsh/site-functions
dhyepatel@Dhyeys-MacBook-Air ~ %
```

● KUBECTL INSTALLATION

```
[dhyepatel@Dhyeys-MacBook-Air ~ % brew install kubectl
Warning: kubernetes-client-1.34.1 is already installed and up-to-date.
To reinstall 1.34.1, run:
  brew reinstall kubernetes-client
[dhyepatel@Dhyeys-MacBook-Air ~ % brew reinstall kubernetes-client
=> Fetching downloads for: kubernetes-client
=> Downloading https://ghcr.io/v2/homebrew/core/kubernetes-client/manifests/1.34.1
Already downloaded: /Users/dhyepatel/Library/Caches/Homebrew/downloads/f631b27c571877ca4c6334f227c8940304647b04a5d87e66a848f272d26dd027--kubernetes-client-1.34.1.bottle_manifest.json
=> Fetching kubernetes-client
=> Downloading https://ghcr.io/v2/homebrew/core/kubernetes-client/blobs/sha256:54ac86e62a8394fb843394f748a76f83b6f0c03e73c381683b3c6341b3d00
Already downloaded: /Users/dhyepatel/Library/Caches/Homebrew/downloads/b77b869d57d116db2cbda95112cabef128bfe19fca4daec7cd8f7af551e25ac7--kubernetes-client-1.34.1.arm64_tahoe.bottle.tar.gz
=> Reinstalling kubernetes-client
=> Pouring kubernetes-client-1.34.1.arm64_tahoe.bottle.tar.gz
↳ /opt/homebrew/Cellar/kubernetes-client/1.34.1: 256 files, 61.2MB
=> Running 'brew cleanup kubernetes-client'
Disable this behaviour by setting '$HOMEBREW_NO_INSTALL_CLEANUP=1'.
Hide these hints with '$HOMEBREW_NO_ENV_HINTS=1' (see 'man brew').
=> No outdated dependents to upgrade!
dhyepatel@Dhyeys-MacBook-Air ~ %
```

- JAVA APPLICATION & DOCKERFILE

The screenshot shows a code editor with two files open:

- Jenkinsfile:**

```
package com.example.dockerjenkinsjava;
import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.RestController;

@RestController
public class HelloController {
    @GetMapping("/")
    public String hello() {
        return "Hello from DHYEY and K8S";
    }
}
```
- Dockerfile:**

```
# Stage 1: Build the application with Maven
FROM eclipse-temurin:21-jdk-jammy as builder
WORKDIR /app
COPY mvn/ .mvn
COPY mvnw pom.xml .
RUN ./mvnw dependency:go-offline
COPY src ./src
RUN ./mvnw clean package -DskipTests

# DHYEY'S K8S

# Stage 2: Create the final, smaller image
FROM eclipse-temurin:21-jre-jammy
WORKDIR /app
# Copy the built JAR from the 'builder' stage
COPY --from=builder /app/target/*.jar app.jar
# Expose the port the app runs on
EXPOSE 8090
# Command to run the application
ENTRYPOINT ["java", "-jar", "app.jar"]
```

- IMAGE CREATED & PUSHED TO DOCKERHUB

```
dhyepatel@Dheyes-MacBook-Air dockerjenkinsjava % docker build -t dhyey2907/k8s_demo .
[+] Building 69.5s (16/16) FINISHED
 => [internal] load build definition from Dockerfile
... => [internal] transfer Dockerfile: 615B
 => WARN: FromAsCasing: 'as' and 'FROM' keywords' casing do not match (line 2)
 => [internal] load metadata for docker.io/library/eclipse-temurin:21-jre-jammy
 => [internal] load metadata for docker.io/library/eclipse-temurin:21-jdk-jammy
 => [internal] load .dockerignore
 => [internal] transfer context: 95B
 => [builder 1/7] FROM docker.io/library/eclipse-temurin:21-jdk-jammy@sha256:70da94ce05ebfd18d78b57d8ccdc90ec5886730e256e486f4bbb07de336bd3e
 => [builder 1/7] resolve docker.io/library/eclipse-temurin:21-jdk-jammy@sha256:70da94ce05ebfd18d78b57d8ccdc90ec5886730e256e486f4bbb07de336bd3e
 => [stage-1 1/3] FROM docker.io/library/eclipse-temurin:21-jre-jammy@sha256:c179170cc5e8e1195a815558ecf956daf965a131cb1cc832579877ad2c7850ce
 => [stage-1 1/3] resolve docker.io/library/eclipse-temurin:21-jre-jammy@sha256:c179170cc5e8e1195a815558ecf956daf965a131cb1cc832579877ad2c7850ce
 => [internal] load build context
 => [internal] transfer context: 16.59kB
 => CACHED [builder 2/7] WORKDIR /app
 => [builder 3/7] COPY mvn/ .mvn
 => [builder 4/7] COPY mvnw pom.xml .
 => [builder 5/7] RUN ./mvnw dependency:go-offline
 => [builder 6/7] COPY src ./src
 => [builder 7/7] RUN ./mvnw clean package -DskipTests
 => CACHED [stage-1 2/3] WORKDIR /app
 => [stage-1 3/3] COPY --from=builder /app/target/*.jar app.jar
 => exporting to image
 => [internal] export layers
 => [internal] export manifest sha256:96047013068f5f32dc567c1839248b395a4a30ad6e8d60939e599a21d2c7600f
 => [internal] export config sha256:c88c98966df5c9852e5a896b4e39892a1ffee7d41d7966548decf6cf4f1e6e3a
 => [internal] export attestation manifest sha256:d8fa94e087f7b22dd9fc7623f61ff8c08d60f5d4759ade5328e926e7b580f
 => [internal] export manifest list sha256:b97444fd7d9218189a13bb76910b714194984ab43ac4b1df7723ac31473a7fff45
 => [internal] naming to docker.io/dhyey2907/k8s_demo:latest
 => [internal] unpacking to docker.io/dhyey2907/k8s_demo:latest

```

View build details: docker-desktop://dashboard/build/desktop-linux/desktop-linux/7h3qym3jlynuhrb8b89fss

1 warning found (use docker --debug to expand):

```
dhyepatel@Dheyes-MacBook-Air dockerjenkinsjava % docker login -u dhyey2907
Password:
Error response from daemon: Get "https://registry-1.docker.io/v2/": unauthorized: incorrect username or password
dhyepatel@Dheyes-MacBook-Air dockerjenkinsjava % docker login

USING WEB-BASED LOGIN
To sign in with credentials on the command line, use 'docker login -u <username>'

Your one-time device confirmation code is: PPMT-DWQS
Press ENTER to open your browser or submit your device code here: https://login.docker.com/activate

Waiting for authentication in the browser...

Login Succeeded
```

```
dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % docker push dhyey2907/k8s_demo
Using default tag: latest
The push refers to repository [docker.io/dhyey2907/k8s_demo]
fdf67ba0bcd: Mounted from dhyey2907/docker-jenkins-java
20a16ee379c8: Mounted from dhyey2907/docker-jenkins-java
4511ef1f8818: Mounted from dhyey2907/docker-jenkins-java
3cf4079b30f6: Pushed
② a17a85ee02b: Pushed
[?] cee350bb550c: Mounted from dhyey2907/docker-jenkins-java
[?] bad5339f3cac: Mounted from dhyey2907/docker-jenkins-java
① 85ed767c847d: Mounted from dhyey2907/docker-jenkins-java
latest: digest: sha256:b974f4f7d9218189a13bb76910b714194984ab43ac4b1df7723ac31473a7ff45 size: 856
dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava %
[?] dockerjenkinsjava > Dockerfile
20:39 LF UTF-8 4 spaces
```

- MINIKUBE START

```
[dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % minikube start
🌟 minikube v1.37.0 on Darwin 26.0 (arm64)
✨ Automatically selected the docker driver
🚀 Using Docker Desktop driver with root privileges
👍 Starting "minikube" primary control-plane node in "minikube" cluster
🌟 Pulling base image v0.0.48 ...
⬇️ Downloading Kubernetes v1.34.0 preloaded...
  ⬇️ Kubernetes v1.34.0-0-g0e0339 / 329.39 MiB / 329.38 MiB 100.00% 3.84 Mi
> gcr.io/k8s-minikube/kicbase...: 458.86 MiB / 458.86 MiB 100.00% 4.78 Mi
Creating docker container (CPU=2, Memory=3072MiB) ...
🔥 Preparing Kubernetes v1.34.0 on Docker 25.4.0 ...
🌐 Configuring bridge CNI (Container Networking Interface) ...
🌐 Verifying Kubernetes components...
⚠️ Warning: go version: go1.18.10 darwin/arm64
  Enabling add-on storage-provisioner, default-storageclass
🌟 Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % ]
```

- KUBERNETES DEPLOYMENT CREATION

```
[dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % kubectl create deployment k8s-demo-depl --image=dhyey2907/k8s_demo
deployment.apps/k8s-demo-depl created
dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % ]
```

- GET PODS

```
[dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % kubectl get pods
NAME          READY   STATUS    RESTARTS   AGE
k8s-demo-depl 777498b74-0r646  1/1     Running   0          103s
dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % ]
```

- EXPOSING THE DEPLOYMENT

```
[dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % kubectl expose deployment k8s-demo-depl --type=NodePort --port=8080
service/k8s-demo-depl exposed
dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % ]
```

- GET URL TO ACCESS EXPOSED SERVICE

```
[dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % minikube service k8s-demo-depl --url
http://127.0.0.1:58252
Because you are using a Docker driver on darwin, the terminal needs to be open to run it.
dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % ]
```

- VISIT THE URL

```
[dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % curl http://127.0.0.1:58252
Hello from DHYEY and K8S
dhyepatel@Dhyey-MacBook-Air dockerjenkinsjava % ]
```



- SEE ALL RESOURCES

```
dhyepatel@Dhyeys-MacBook-Air dockerjenkinsjava % kubectl get all
NAME           READY   STATUS    RESTARTS   AGE
pod/k8s-demo-depl-777498b744-6r646   1/1     Running   0          24m
NAME          TYPE    CLUSTER-IP      EXTERNAL-IP   PORT(S)        AGE
service/k8s-demo-depl   NodePort   10.119.128.107 <none>        8080:31282/TCP   18m
service/kubernetes   ClusterIP  10.96.0.1       <none>        443/TCP        32m
NAME          READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/k8s-demo-depl   1/1     1           1           24m
NAME          DESIRED  CURRENT   READY   AGE
replicaset.apps/k8s-demo-depl-777498b744  1         1     1   24m
dhyepatel@Dhyeys-MacBook-Air dockerjenkinsjava %
```

- GET PODS

```
[dhyepatel@Dhyeys-MacBook-Air dockerjenkinsjava % kubectl get pods
NAME           READY   STATUS    RESTARTS   AGE
k8s-demo-depl-777498b744-6r646   1/1     Running   0          25m
dhyepatel@Dhyeys-MacBook-Air dockerjenkinsjava %
```

- INTERACTIVE SHELL INSIDE RUNNING CONTAINER

```
[dhyepatel@Dhyeys-MacBook-Air dockerjenkinsjava % kubectl exec -it k8s-demo-depl-777498b744-6r646 -- /bin/sh
# ls -l
total 20804
-rwxr-xr-- 1 root root 28994083 Sep 28 14:49 app.jar
# java -version
openjdk version "21.0.8" 2025-07-15 LTS
OpenJDK Runtime Environment Temurin-21.0.8+9 (build 21.0.8+9-LTS)
OpenJDK 64-Bit Server VM Temurin-21.0.8+9 (build 21.0.8+9-LTS, mixed mode, sharing)
# if
KUBERNETES_SERVICE_PORT=443
KUBERNETES_PORT=tcp://10.96.0.1:443
LANGUAGE=en_US:en
HOSTNAME=k8s-demo-depl-777498b744-6r646
HOME=/root
JAVA_VERSION=jdk-21.0.8+9
TERMINAL=xterm
KUBERNETES_PORT_443_TCP_ADDR=10.96.0.1
PATH=/opt/java/openjdk/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin
KUBERNETES_PORT_443_TCP_PORT=443
KUBERNETES_PORT_443_TCP_PROTO=tcp
LANGUAGE=en_US.UTF-8
KUBERNETES_SERVICE_PORT_HTTPS=443
KUBERNETES_PORT_443_TCP=tcp://10.96.0.1:443
KUBERNETES_SERVICE_HOST=10.96.0.1
JAVA_HOME=/opt/java/openjdk
LC_ALL=en_US.UTF-8
PWD=/app
# exit
dhyepatel@Dhyeys-MacBook-Air dockerjenkinsjava %
```

● EDIT THE DEPLOYMENT

```
|dhyepatel@Dhyeys-MacBook-Air dockerjenkinsjava % kubectl edit deployment k8s-demo-depl|  
  
#  
apiVersion: apps/v1  
kind: Deployment  
metadata:  
  annotations:  
    deployment.kubernetes.io/revision: "1"  
  creationTimestamp: "2025-09-28T15:29:43Z"  
  generation: 1  
  labels:  
    app: k8s-demo-depl  
  name: k8s-demo-depl  
  namespace: default  
  resourceVersion: "876"  
  uid: 1774eb64-2711-4345-a654-fedd1d9f1b1f  
spec:  
  progressDeadlineSeconds: 600  
  replicas: 1  
  revisionHistoryLimit: 10  
  selector:  
    matchLabels:  
      app: k8s-demo-depl  
  strategy:  
    rollingUpdate:  
      maxSurge: 25%  
      maxUnavailable: 25%  
    type: RollingUpdate  
  template:  
    metadata:  
      labels:  
        app: k8s-demo-depl  
    spec:  
      containers:  
        - image: dhyepatel/k8s_demo  
          imagePullPolicy: Always  
          name: k8s-demo-vxgg  
          resources: {}  
          terminationMessagePath: /dev/termination-log  
          terminationMessagePolicy: File  
      dnsPolicy: ClusterFirst  
      restartPolicy: Always  
      schedulerName: default-scheduler  
      securityContext: {}  
      terminationGracePeriodSeconds: 30  
status:  
  availableReplicas: 1  
  conditions:  
    - lastTransitionTime: "2025-09-28T15:31:25Z"  
      lastUpdateTime: "2025-09-28T15:31:25Z"  
      message: Deployment has minimum availability.  
      reason: MinimumReplicasAvailable  
      status: True  
      type: Available  
    - lastTransitionTime: "2025-09-28T15:29:43Z"  
      lastUpdateTime: "2025-09-28T15:31:25Z"  
      message: ReplicaSet "k8s-demo-depl-777498b744" has successfully progressed.  
      reason: NewReplicaSetAvailable  
      status: True  
      type: Progressing  
  observedGeneration: 1  
  readyReplicas: 1  
  replicas: 1
```