

Task : Kubernetes Deployment Using Pre-built Docker Images for Student Application

Prerequisites:

- Minikube or EKS Cluster or Kubeadm should be installed on your local system.

Note: This Guide is for deploying the application using minikube.

So for the EKS cluster and Kubeadm there might be changes for the Step 6.

Step 1: Start the minikube by running following command.

minikube start --driver=docker

Also set alias for minikube by →alias kubectl="minikube kubectl --"

```
seytan@seytan-Inspiron-3501:~$ minikube start --driver=docker
🐸 minikube v1.34.0 on Ubuntu 24.04
🌟 Using the docker driver based on user configuration
🔧 Using Docker driver with root privileges
👍 Starting "minikube" primary control-plane node in "minikube" cluster
🚚 Pulling base image v0.0.45 ...
🔥 Creating docker container (CPUs=2, Memory=3900MB) ...- _
```

Step 2: Clone the given repository as we need 2 files context.xml and index.html for making some changes after deployment .

```
seytan@seytan-Inspiron-3501:~$ git clone https://github.com/Gaurav1251/Devops_Tasks.git
Cloning into 'Devops_Tasks'...
remote: Enumerating objects: 283, done.
remote: Counting objects: 100% (124/124), done.
remote: Compressing objects: 100% (88/88), done.
remote: Total 283 (delta 76), reused 31 (delta 31), pack-reused 159 (from 1)
Receiving objects: 100% (283/283), 10.59 MiB | 13.20 MiB/s, done.
Resolving deltas: 100% (98/98), done.
seytan@seytan-Inspiron-3501:~$ _
```

OR

(if repo is private)

You can manually create the 2 files.

For context.xml →

<!--

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-->

<!-- The contents of this file will be loaded for each web
application -->

<Context>

<!-- Default set of monitored resources. If one of these
changes, the -->

<!-- web application will be reloaded. -->

<WatchedResource>WEB-INF/web.xml</WatchedResource>

<WatchedResource>\${catalina.base}/conf/web.xml</Watched
Resource>

<Resource name="jdbc/TestDB" auth="Container"
type="javax.sql.DataSource" maxTotal="100" maxIdle="30"
maxWaitMillis="10000" username="root" password="1234"
driverClassName="com.mysql.jdbc.Driver"
url="jdbc:mysql://172.17.0.2:3306/studentapp"/>

<!-- Uncomment this to disable session persistence across
Tomcat restarts -->

<!--

<Manager pathname="" />

-->

</Context>

For index.html →

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width,
initial-scale=1.0">
  <title>Student Application on AWS</title>
  <style>
    body {
      font-family: 'Arial', sans-serif;
      background-color: #f4f4f9;
      margin: 0;
      padding: 0;
      display: flex;
      flex-direction: column;
      justify-content: center;
      align-items: center;
      height: 100vh;
    }

    h1 {
      text-align: center;
      color: #ff4757;
      font-size: 3em;
```

```
margin: 20px 0;  
}
```

```
h2 a {  
text-decoration: none;  
color: #fff;  
background-color: #1e90ff;  
padding: 15px 30px;  
border-radius: 8px;  
font-size: 1.5em;  
transition: background-color 0.3s ease;  
}
```

```
h2 a:hover {  
background-color: #3742fa;  
}
```

```
img {  
display: block;  
margin: 20px auto;  
max-width: 80%;  
height: auto;  
border-radius: 10px;  
box-shadow: 0 4px 8px rgba(0, 0, 0, 0.2);  
}
```

```
p {  
text-align: center;  
font-size: 1.1em;  
color: #2f3542;
```

```
}

    footer {
      margin-top: 50px;
      text-align: center;
      color: #57606f;
    }
  </style>
</head>
<body>

    <h1>Welcome to Student Application on AWS</h1>

    <p></p>

    <h2><a href="http://13.232.60.154:8080/student/">Enter
to Student Application</a></h2>

    <footer>
      <p>&copy; 2024 Student Application. All Rights
Reserved.</p>
    </footer>

</body>
</html>
```

Step 3: Now deploy the Database pod.

**kubectl create deployment db
--image=gaurav1251/studentapp_db:Database --port=3306**

```
seytan@seytan-Inspiron-3501: ~/Devops_Tasks/Docker/Student-App-Containerization
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl create deployment db --image=gaurav1251/studentapp_db:Database --port=3306
deployment.apps/db created
```

Now expose this deployment .

**→ kubectl expose deployment db --name=db
--target-port=8080 --type=ClusterIP**

```
seytan@seytan-Inspiron-3501: ~/Devops_Tasks/Docker/Student-App-Containerization
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl expose deployment db --name=db --target-port=3306 ClusterIP
service/db exposed
Error from server (NotFound): deployments.apps "ClusterIP" not found
```

Step 4: Now deploy and expose the Backend pod.

**kubectl create deployment be
--image=gaurav1251/studentapp_be:Backend --port=8080**

**kubectl expose deployment be --name=be --target-port=8080
--type=NodePort**

```
seytan@seytan-Inspiron-3501: ~/Devops_Tasks/Docker/Student-App-Containerization
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl create deployment be --image=gaurav1251/studentapp_be:Backend --port=8080
deployment.apps/be created
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl expose deployment be --name=be --target-port=8080 --type=NodePort
service/be exposed
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ _
```

Step 5: Now deploy and expose the Frontend pod.

kubectl create deployment fe

–image=gaurav1251/studentapp_fe:Frontend –port=80

kubectl expose deployment fe –name=fe –target-port=80

–type=NodePort

```
seytan@seytan-Inspiron-3501: ~/Devops_Tasks/Docker/Student-App-Containerization
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl create deployment fe --image=gaurav1251/studentapp_fe:Frontend --port=80
deployment.apps/fe created
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl expose deployment fe --name=fe --target-port=80 --type=NodePort
error: unknown flag: --namefe
See 'kubectl expose --help' for usage.
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl expose deployment fe --name=fe --target-port=80 --type=NodePort
service/fe exposed
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ _
```

Step 6: Now make the necessary changes in the context.xml and index.html file.

In the context.xml file instead of the ip add the service name of database.

```
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ cd BE/
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization/BE$ nano context.xml
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization/BE$ cat context.xml
<!--
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limitations under the License.
-->
<!-- The contents of this file will be loaded for each web application -->
<Context>
<!-- Default set of monitored resources. If one of these changes, the -->
<!-- web application will be reloaded. -->
<WatchedResource>WEB-INF/web.xml</WatchedResource>
<WatchedResource>${catalina.base}/conf/web.xml</WatchedResource>
<Resource name="jdbc/TestDB" auth="Container" type="javax.sql.DataSource" maxTotal="100" maxIdle="30" maxWaitMillis="10000" username="root" password="1234" driverClassName="com.mysql.
jdbc.Driver" url="jdbc:mysql://db:3306/studentapp"/>
<!-- Uncomment this to disable session persistence across Tomcat restarts -->
<!--
<Manager pathname="" />
-->
</Context>
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization/BE$ _
```


In the index.html file add the ip of the backend and also the port.

```
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$  
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ cd FE/  
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization/FE$ nano index.html  
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization/FE$ nano index.html  
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization/FE$ cat index.html
```

```
<h1>Welcome to Student Application on AWS</h1>  
  
<p></p>  
  
<h2><a href="http://192.168.49.2:31813/student/">Enter to Student Application</a></h2>  
  
<footer>  
  <p><copy; 2024 Student Application. All Rights Reserved.</p>  
</footer>
```

Step 7: Now copy this files to there respected spots in the backend and frontend pods.

kubectl cp /path/file pod_name:/path/

For backend



```
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl get pods  
NAME                                READY   STATUS    RESTARTS   AGE  
be-5699b878d9-4gkcm                1/1     Running   0           9m57s  
db-569f4cb7b5-hj8vn                1/1     Running   0           15m  
fe-665f7cd56f-tr74t                1/1     Running   0           8m39s  
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl cp BE/context.xml be-5699b878d9-4gkcm:/opt/apache-tomcat-9.0.95/conf/  
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl exec -it be-5699b878d9-4gkcm -- cat /opt/apache-tomcat-9.0.95/conf/context.xml  
<!--  
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 WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.  
 See the License for the specific language governing permissions and  
 limitations under the License.  
 -->  
<!-- The contents of this file will be loaded for each web application -->  
<Context>  
<!-- Default set of monitored resources. If one of these changes, the -->  
<!-- web application will be reloaded. -->  
<WatchedResource>WEB-INF/web.xml</WatchedResource>  
<WatchedResource>${catalina.base}/conf/web.xml</WatchedResource>  
<Resource name="jdbc/TestDB" auth="Container" type="javax.sql.DataSource" maxTotal="100" maxIdle="30" maxWaitMillis="10000" username="root" password="1234" driverClassName="com.mysql.  
jdbc.Driver" url="jdbc:mysql://db:3306/studentapp"/>  
<!-- Uncomment this to disable session persistence across Tomcat restarts -->  
<!--  
 <Manager pathname="" />  
 -->  
</Context>
```

For Frontend



```
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl get pods  
NAME                                READY   STATUS    RESTARTS   AGE  
be-5699b878d9-4gkcm                1/1     Running   0           12m  
db-569f4cb7b5-hj8vn                1/1     Running   0           17m  
fe-665f7cd56f-tr74t                1/1     Running   0           11m  
seytan@seytan-Inspiron-3501:~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl cp FE/index.html fe-665f7cd56f-tr74t:/usr/local/apache2/htdocs/
```

Step 8: Check the pods and services are running.

```
seytan@seytan-Inspiron-3501: ~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
be-5699b878d9-4gkcm                1/1     Running   0           114s
db-569f4cb7b5-hj8vn                1/1     Running   0           6m57s
fe-665f7cd56f-tr74t                1/1     Running   0           36s
seytan@seytan-Inspiron-3501: ~/Devops_Tasks/Docker/Student-App-Containerization$ kubectl get svc
NAME         TYPE          CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
be           NodePort      10.103.133.249   <none>        8080:31813/TCP   82s
db           ClusterIP     10.98.64.30     <none>        3306/TCP         3m44s
fe           NodePort      10.111.236.40   <none>        80:31846/TCP     15s
kubernetes   ClusterIP     10.96.0.1       <none>        443/TCP          14m
seytan@seytan-Inspiron-3501: ~/Devops_Tasks/Docker/Student-App-Containerization$ _
```

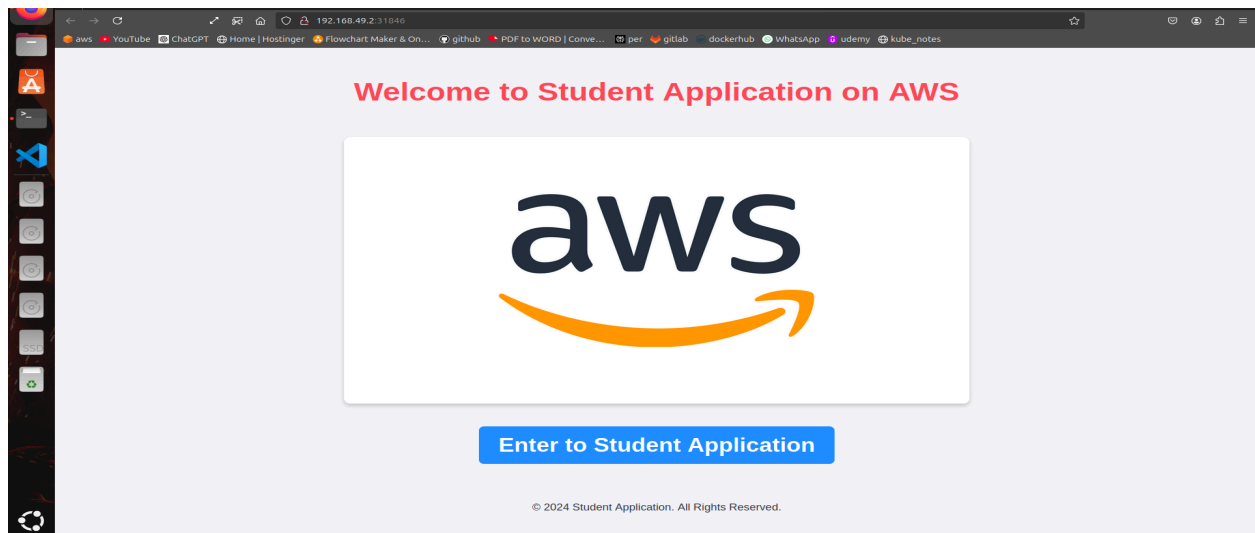
Step 9: Now to access the application using command.



minikube service fe

```
seytan@seytan-Inspiron-3501: ~/Devops_Tasks/Docker/Student-App-Containerization$ ls
be  db  Docker.sh  FE  README.md  Student-App-Containerization.pdf
seytan@seytan-Inspiron-3501: ~/Devops_Tasks/Docker/Student-App-Containerization$ minikube service fe
|-----|
| NAMESPACE | NAME | TARGET PORT | URL |
|-----|
| default | fe | 80 | http://192.168.49.2:31846 |
|-----|
Opening service default/fe in default browser...
seytan@seytan-Inspiron-3501: ~/Devops_Tasks/Docker/Student-App-Containerization$
Gtk-Message: 14:48:26.889: Not loading module "atk-bridge": The functionality is provided by GTK native
ly. Please try to not load it.
[18031: Main Thread] WARNING: GTK+ module /snap/firefox/5091/gnome-platform/usr/lib/gtk-2.0/modules/libcanberra-gtk-module.so cannot be loaded.
GTK+ 2.x symbols detected. Using GTK+ 2.x and GTK+ 3 in the same process is not supported.: 'glib warning', file /build/firefox/parts/firefox/build/toolkit/xre/nsSigHandlers.cpp:187
(firefox:18031): Gtk-WARNING **: 14:48:26.135: GTK+ module /snap/firefox/5091/gnome-platform/usr/lib/gtk-2.0/modules/libcanberra-gtk-module.so cannot be loaded.
GTK+ 2.x symbols detected. Using GTK+ 2.x and GTK+ 3 in the same process is not supported.
Gtk-Message: 14:48:26.135: Failed to load module "canberra-gtk-module"
[18031: Main Thread] WARNING: GTK+ module /snap/firefox/5091/gnome-platform/usr/lib/gtk-2.0/modules/libcanberra-gtk-module.so cannot be loaded.
GTK+ 2.x symbols detected. Using GTK+ 2.x and GTK+ 3 in the same process is not supported.: 'glib warning', file /build/firefox/parts/firefox/build/toolkit/xre/nsSigHandlers.cpp:187
(firefox:18031): Gtk-WARNING **: 14:48:26.136: GTK+ module /snap/firefox/5091/gnome-platform/usr/lib/gtk-2.0/modules/libcanberra-gtk-module.so cannot be loaded.
GTK+ 2.x symbols detected. Using GTK+ 2.x and GTK+ 3 in the same process is not supported.
Gtk-Message: 14:48:26.136: Failed to load module "canberra-gtk-module"
```

Output:



Click on the Enter to Student Application button.

Student Registration Form

Student Name

Student Address

Student Age

Student Qualification

Student Percentage

Year Passed

[register](#)

[Register Student](#)

Students List

Student ID	StudentName	Student Addr	Student Age	Student Qualification	Student Percentage	Student Year Passed	Edit	Delete
3	gaurav	kothrod	22	be	80	2024	edit	delete