Introduction to Cloud Computing Final Project - Guess the Capital

Estimated time needed: 30 minutes

In this final project, you will be deploying "Guess the Capital" on the cloud. It is a web application that asks you to guess the capital of a country from 4 choices.

You will use the source code and the steps provided to practice hands-on how an application can be developed and deployed on the cloud.

Objectives:

1. Clone the source code
2. Build Docker image
3. Deploy on Docker
4. Tag and Push image to IBM Cloud
5. Deploy on IBM Code Engine

Background

Docker

Containers are isolated environments that package applications and their dependencies. Each container runs as an isolated process on the host operating system.

Docker is an open-source platform that enables developers to automate the deployment and management of applications inside lightweight, isolated containers.

IBM Cloud

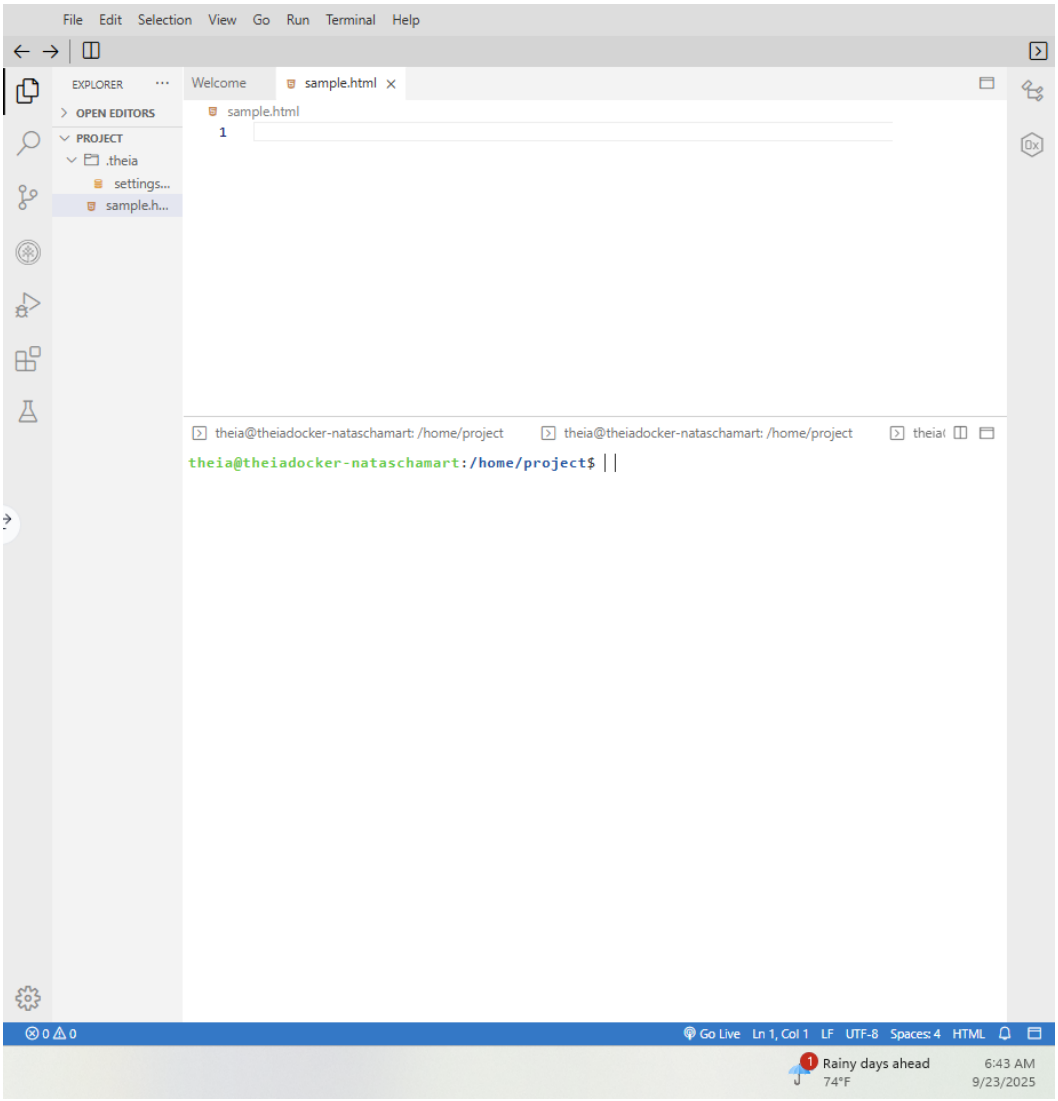
IBM Cloud is a cloud computing platform and suite of cloud-based services offered by IBM. It provides a range of infrastructure, platform, and software services to support the development, deployment, and management of various types of applications and workloads in the cloud.

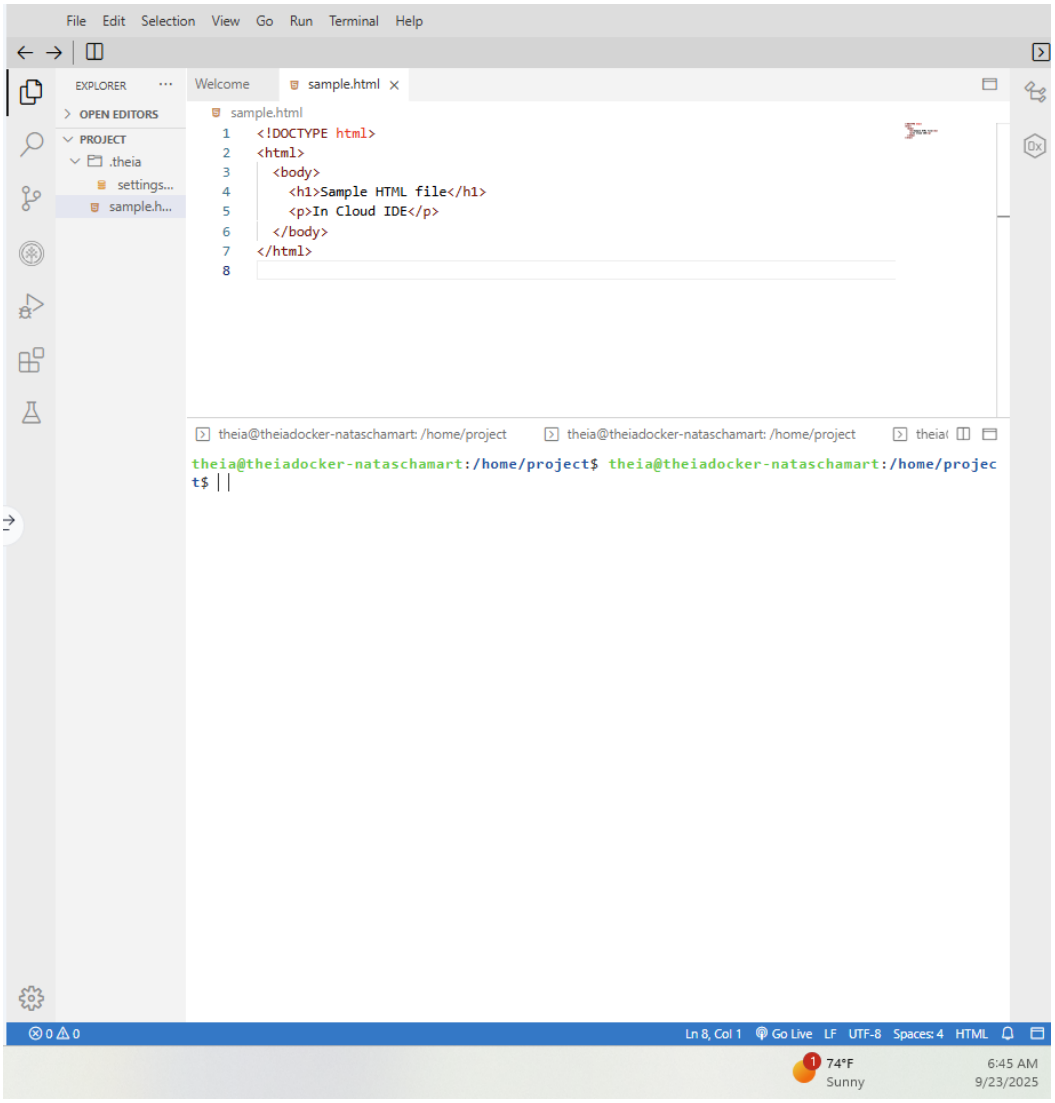
IBM Code Engine

IBM Cloud Code Engine is a serverless compute platform provided by IBM Cloud. It allows developers to deploy and run containerized applications without the need to manage the

underlying infrastructure. Abstracting away the complexities of server provisioning, scaling, and maintenance, enabling developers to focus on writing code and building applications.

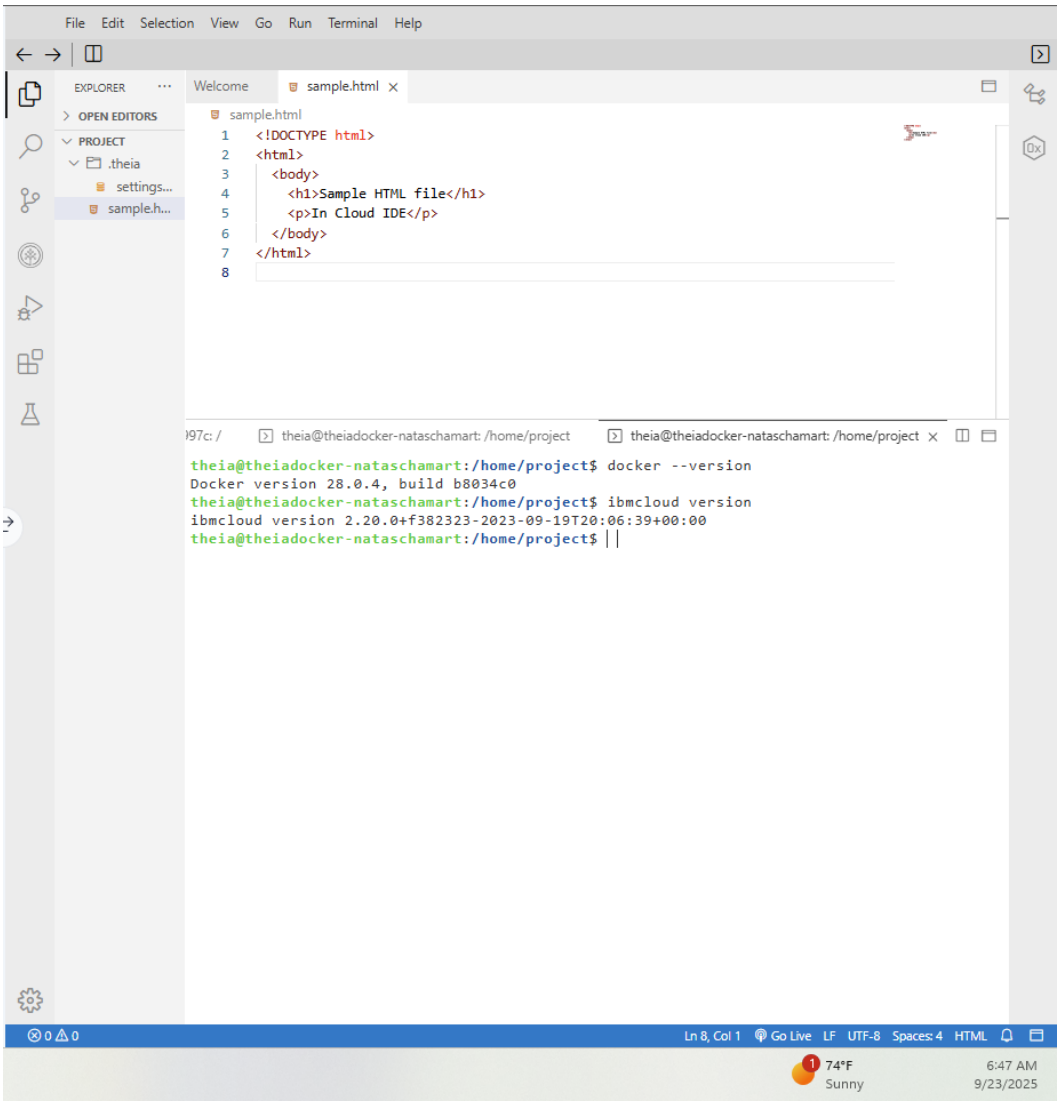
It will then prompt you to enter name of this new file. In the example below, we are creating sample.html.





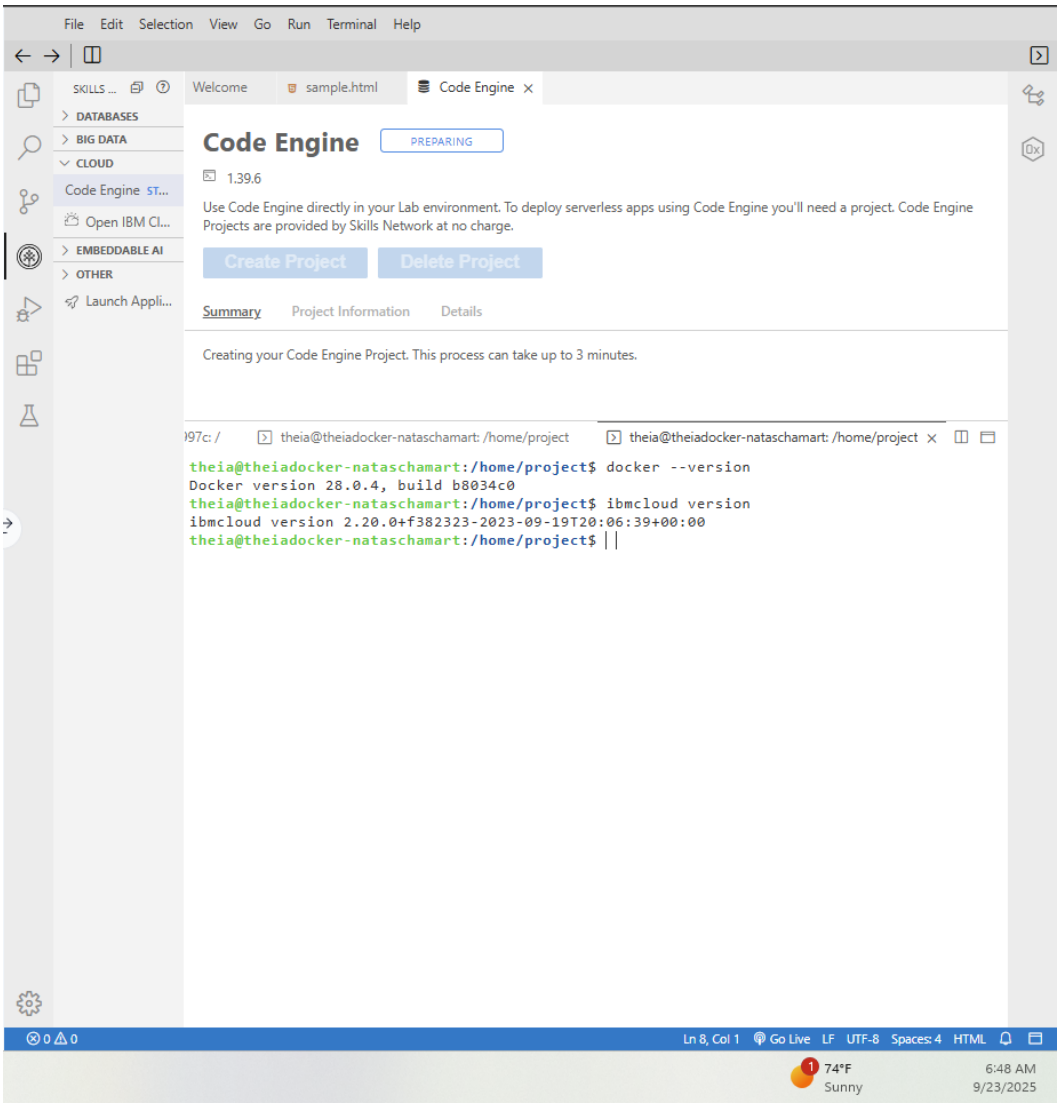
Verify the environment and command line tools

1. Open a terminal window by using the menu in the editor: Terminal > New Terminal
2. Verify that `docker` CLI is installed.
3. Verify that `ibmcloud` CLI is installed.

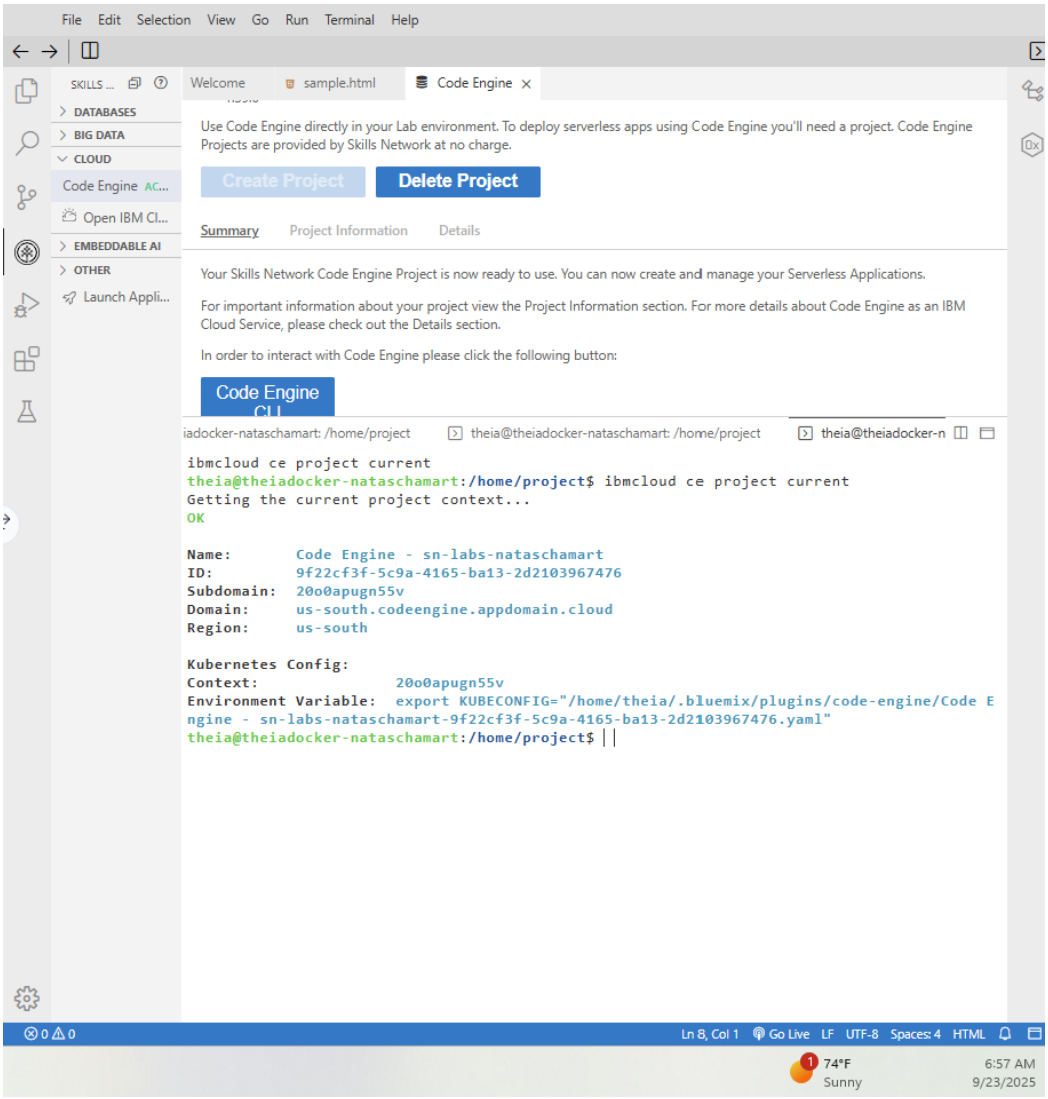


Start Code Engine

1. On the menu in your lab environment, Click on SN logo icon and then click the Cloud dropdown menu and select Code Engine. The code engine setup panel appears. Click Create Project to begin.

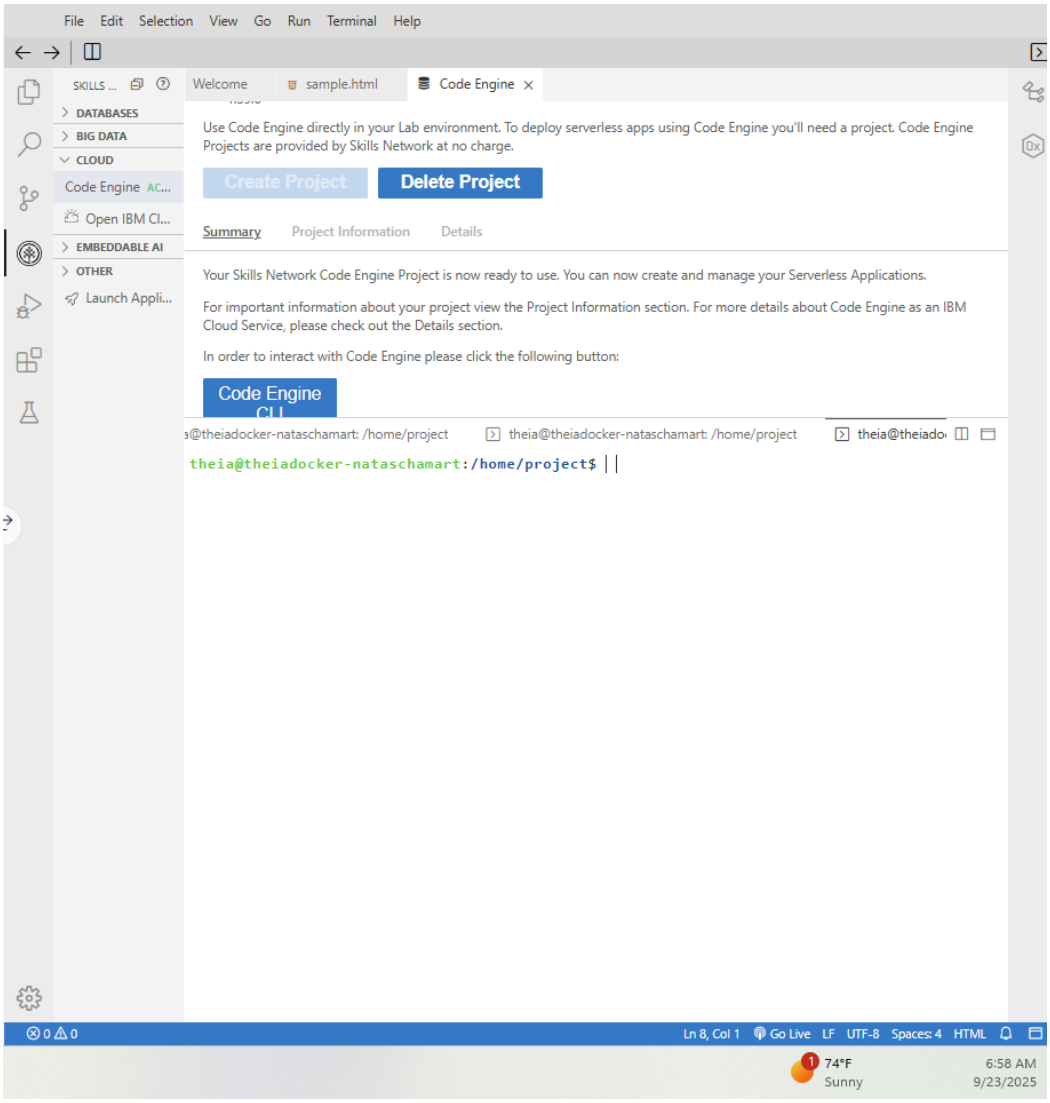


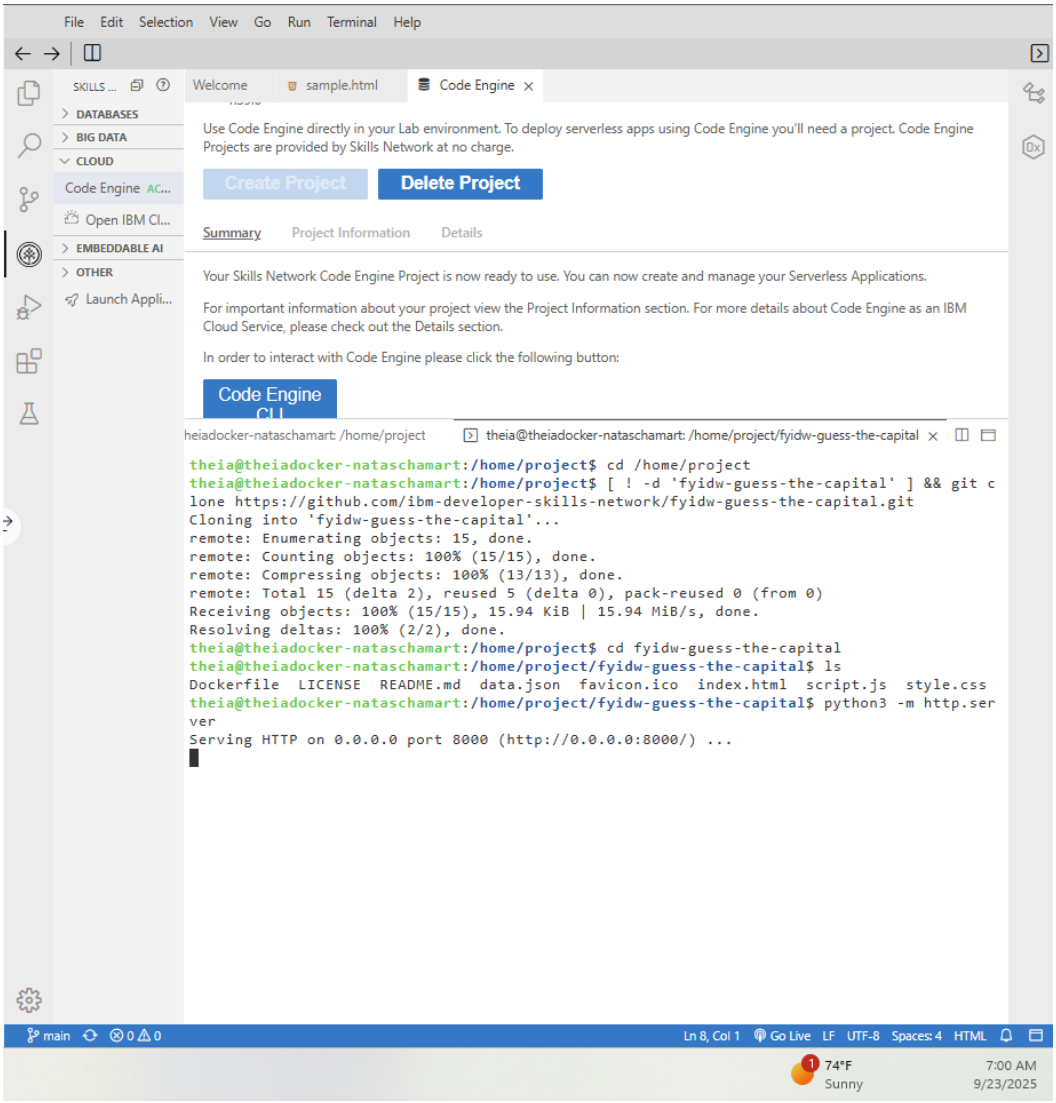
Once the code engine set up is complete, you can see that it is active. Click Code Engine CLI to begin the pre-configured CLI in the terminal as shown below.



Set-up : Create application

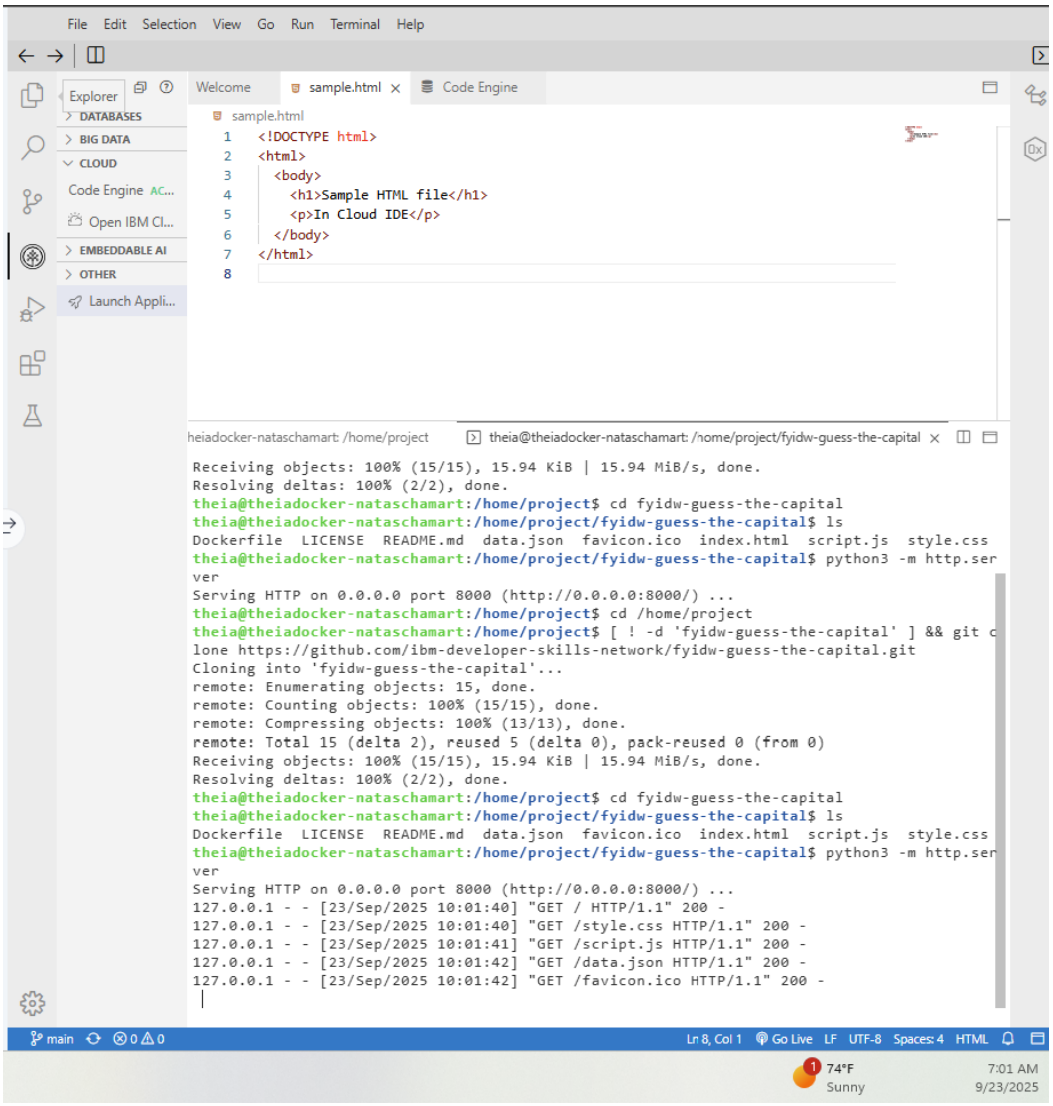
1. Open a terminal window by using the menu in the editor: **Terminal > New Terminal**.

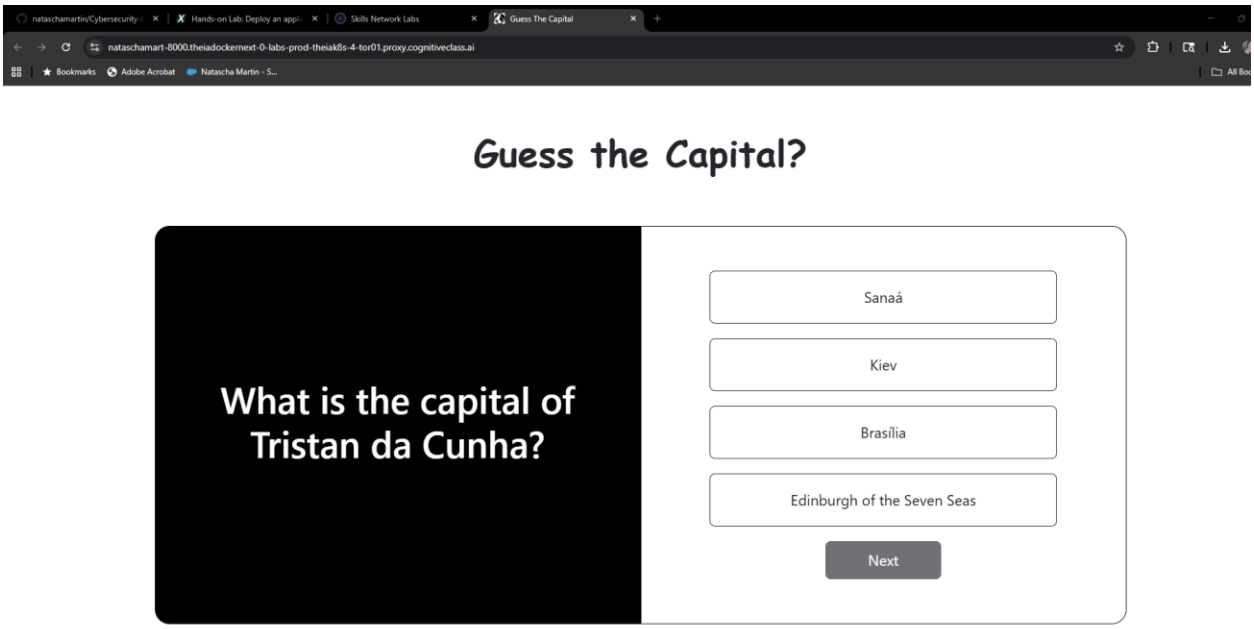

File Edit Selection View Go Run Terminal Help
SKILLS ...
DATABASES
BIG DATA
CLOUD
Code Engine AC...
Open IBM Cl...
EMBEDDABLE AI
OTHER
Launch Appli...
Welcome
sample.html
Code Engine
Use Code Engine directly in your Lab environment. To deploy serverless apps using Code Engine you'll need a project. Code Engine Projects are provided by Skills Network at no charge.
Create Project
Delete Project
Summary
Project Information
Details
Your Skills Network Code Engine Project is now ready to use. You can now create and manage your Serverless Applications.
For important information about your project view the Project Information section. For more details about Code Engine as an IBM Cloud Service, please check out the Details section.
In order to interact with Code Engine please click the following button:
Code Engine
@theiadocker-nataschamart: /home/project
theia@theiadocker-nataschamart: /home/project
theia@theiado
theia@theiadocker-nataschamart:/home/project$
Ln 8, Col 1
Go Live
LF
UTF-8
Spaces: 4
HTML
74°F
Sunny
6:58 AM
9/23/2025



To test your application in your browser, run the application first. To view your application, click the Skills Network icon on the left panel (refer to number 1). This action will open the **SKILLS NETWORK TOOLBOX**. Next, click **Launch Application** (refer to number 2).

Enter port number **8000** in **Application Port** (refer to number 3) and click  . You can also click on the button given below to launch your application.


File Edit Selection View Go Run Terminal Help
Explorer
DATABASES
BIG DATA
CLOUD
Code Engine AC...
Open IBM Cl...
EMBEDDABLE AI
OTHER
Launch Appli...
Welcome
sample.html
Code Engine
sample.html
1 <!DOCTYPE html>
2 <html>
3 <body>
4 <h1>Sample HTML file</h1>
5 In Cloud IDE
6 </body>
7 </html>
8
heiadocker-nataschamart: /home/project
theia@theiadocker-nataschamart: /home/project/fyidw-guess-the-capital
Receiving objects: 100% (15/15), 15.94 KiB | 15.94 MiB/s, done.
Resolving deltas: 100% (2/2), done.
theia@theiadocker-nataschamart:/home/project$ cd fyidw-guess-the-capital
theia@theiadocker-nataschamart:/home/project/fyidw-guess-the-capital$ ls
Dockerfile LICENSE README.md data.json favicon.ico index.html script.js style.css
theia@theiadocker-nataschamart:/home/project/fyidw-guess-the-capital$ python3 -m http.ser
ver
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
theia@theiadocker-nataschamart:/home/project$ cd /home/project
theia@theiadocker-nataschamart:/home/project$ [! -d 'fyidw-guess-the-capital'] && git c
lone https://github.com/ibm-developer-skills-network/fyidw-guess-the-capital.git
Cloning into 'fyidw-guess-the-capital'...
remote: Enumerating objects: 15, done.
remote: Counting objects: 100% (15/15), done.
remote: Compressing objects: 100% (13/13), done.
remote: Total 15 (delta 2), reused 5 (delta 0), pack-reused 0 (from 0)
Receiving objects: 100% (15/15), 15.94 KiB | 15.94 MiB/s, done.
Resolving deltas: 100% (2/2), done.
theia@theiadocker-nataschamart:/home/project$ cd fyidw-guess-the-capital
theia@theiadocker-nataschamart:/home/project/fyidw-guess-the-capital$ ls
Dockerfile LICENSE README.md data.json favicon.ico index.html script.js style.css
theia@theiadocker-nataschamart:/home/project/fyidw-guess-the-capital$ python3 -m http.ser
ver
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
127.0.0.1 - - [23/Sep/2025 10:01:40] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [23/Sep/2025 10:01:40] "GET /style.css HTTP/1.1" 200 -
127.0.0.1 - - [23/Sep/2025 10:01:41] "GET /script.js HTTP/1.1" 200 -
127.0.0.1 - - [23/Sep/2025 10:01:42] "GET /data.json HTTP/1.1" 200 -
127.0.0.1 - - [23/Sep/2025 10:01:42] "GET /favicon.ico HTTP/1.1" 200 -
main
Ln 8, Col 1
Go Live
LF
UTF-8
Spaces: 4
HTML
74°F
Sunny
7:01 AM
9/23/2025



Task 1: Containerise the application

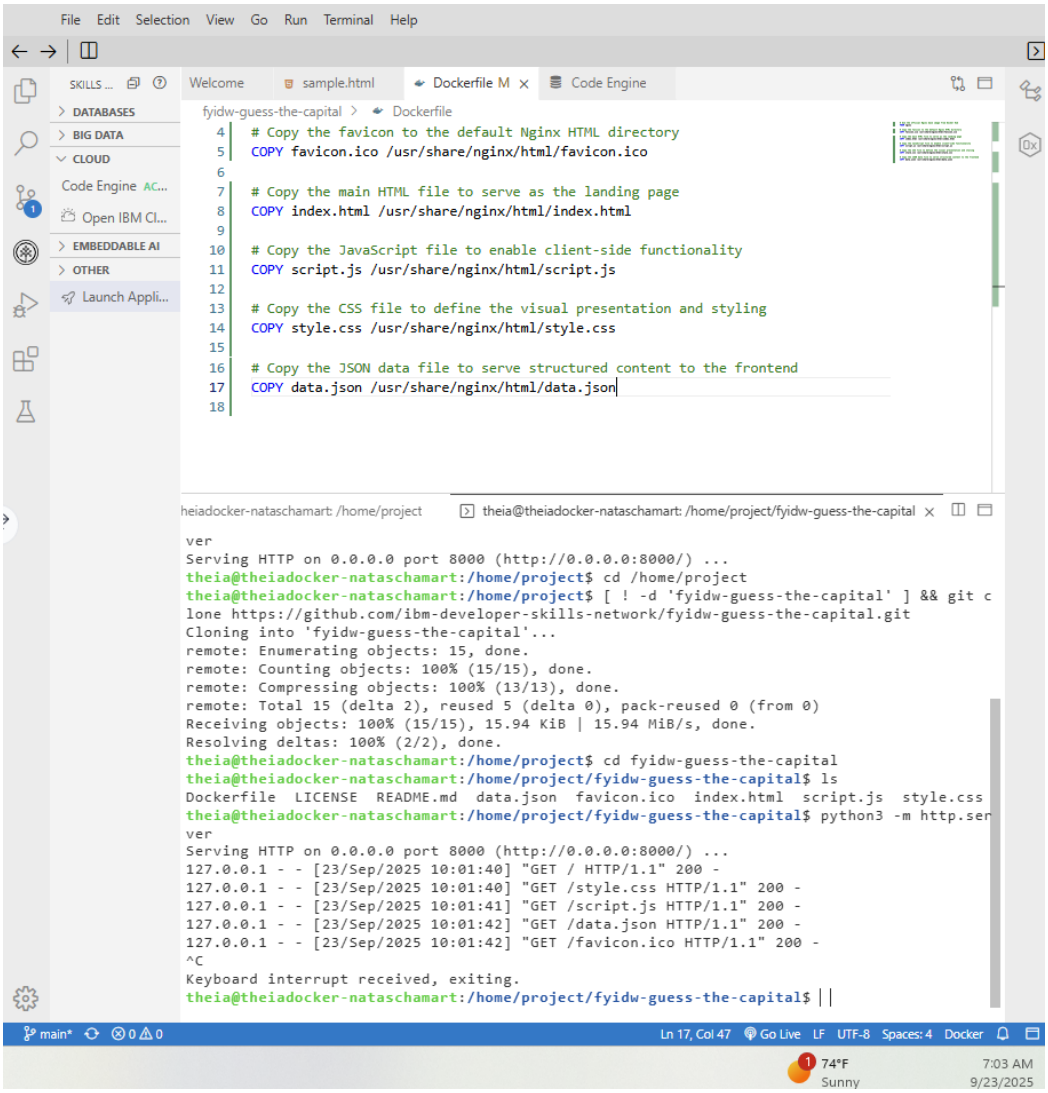
Let's start modernising our application. The first step towards it is to containerise it using Docker.

Create Dockerfile

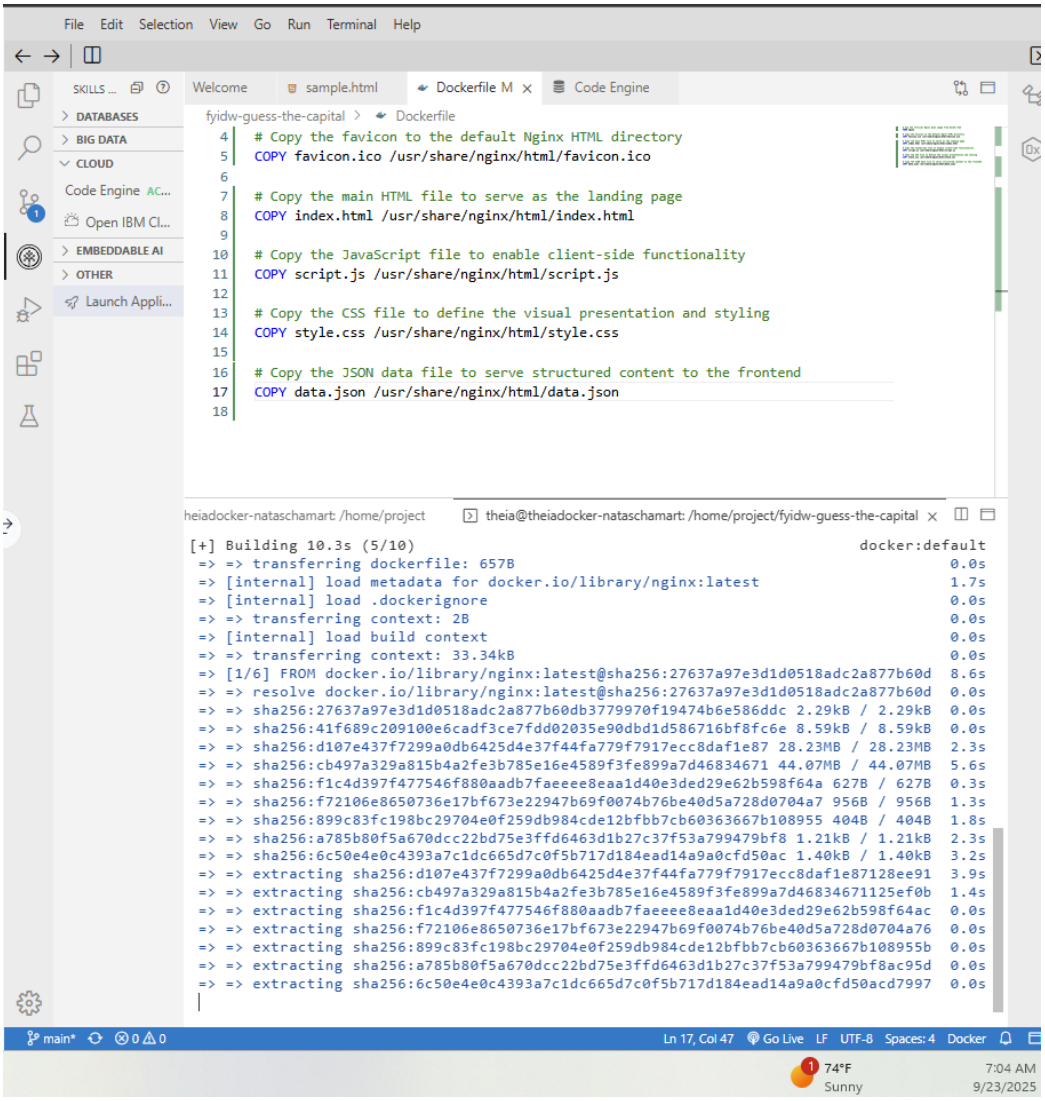
Your tasks:

1. Paste the following content in

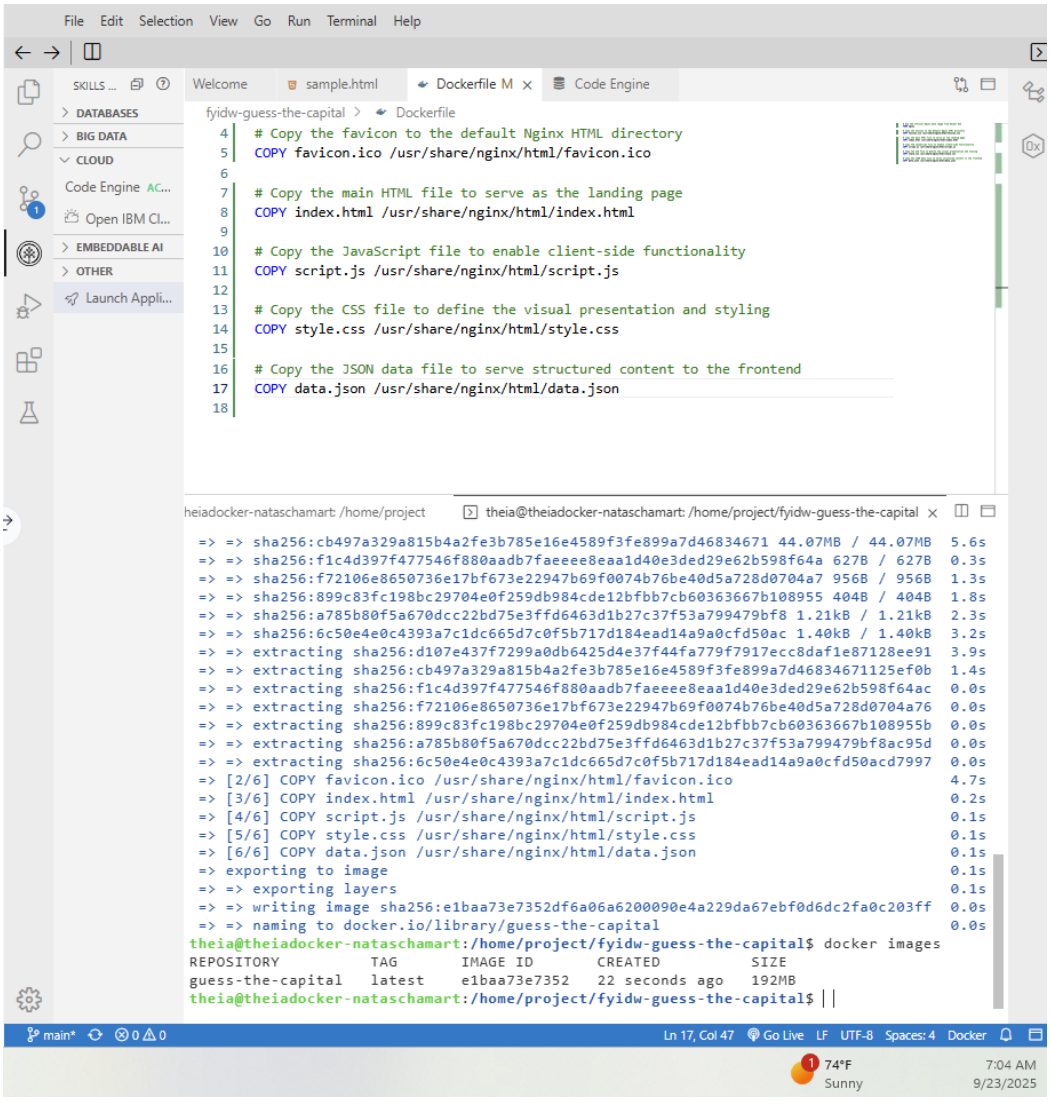
Open **Dockerfile** in IDE



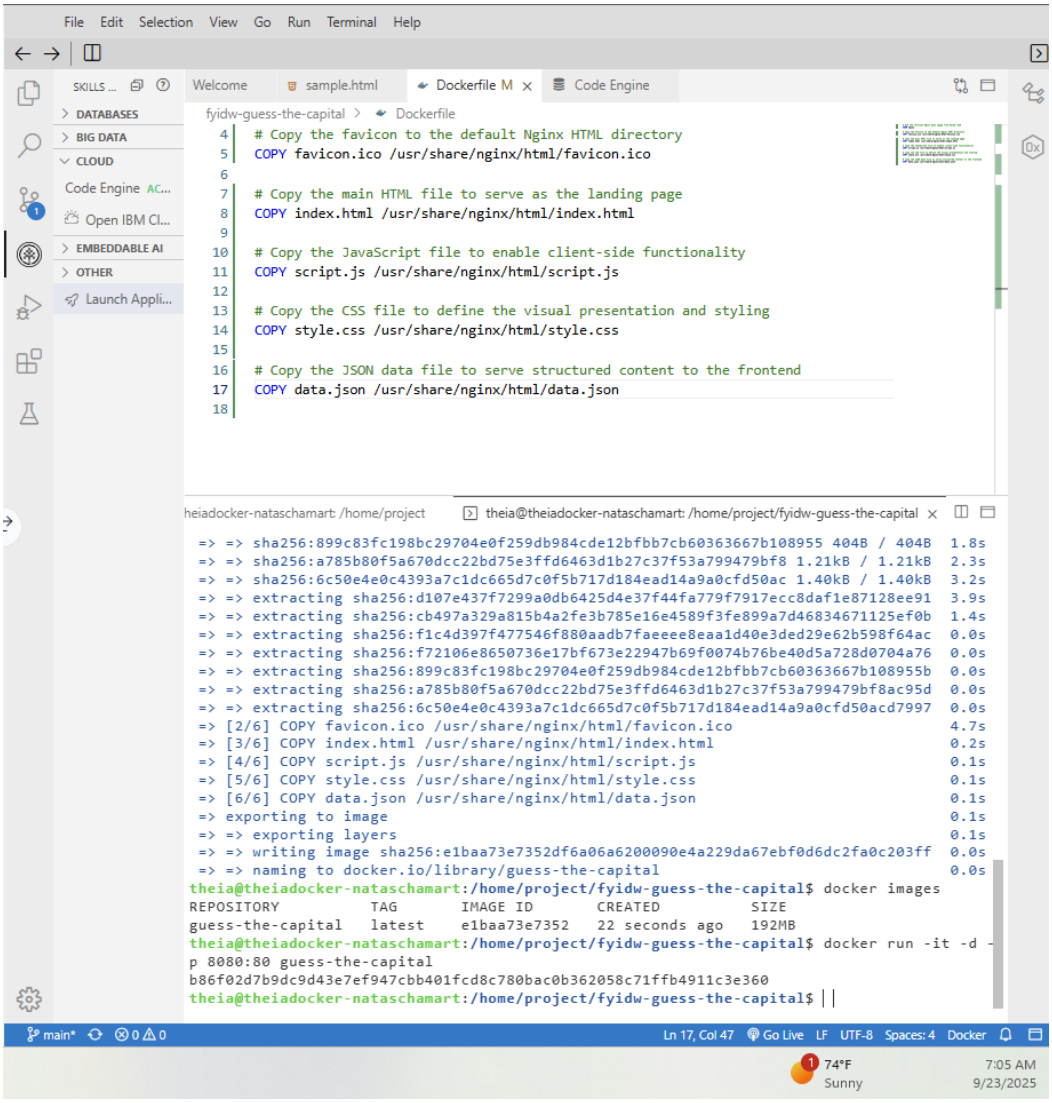
2. Build an image from a Dockerfile



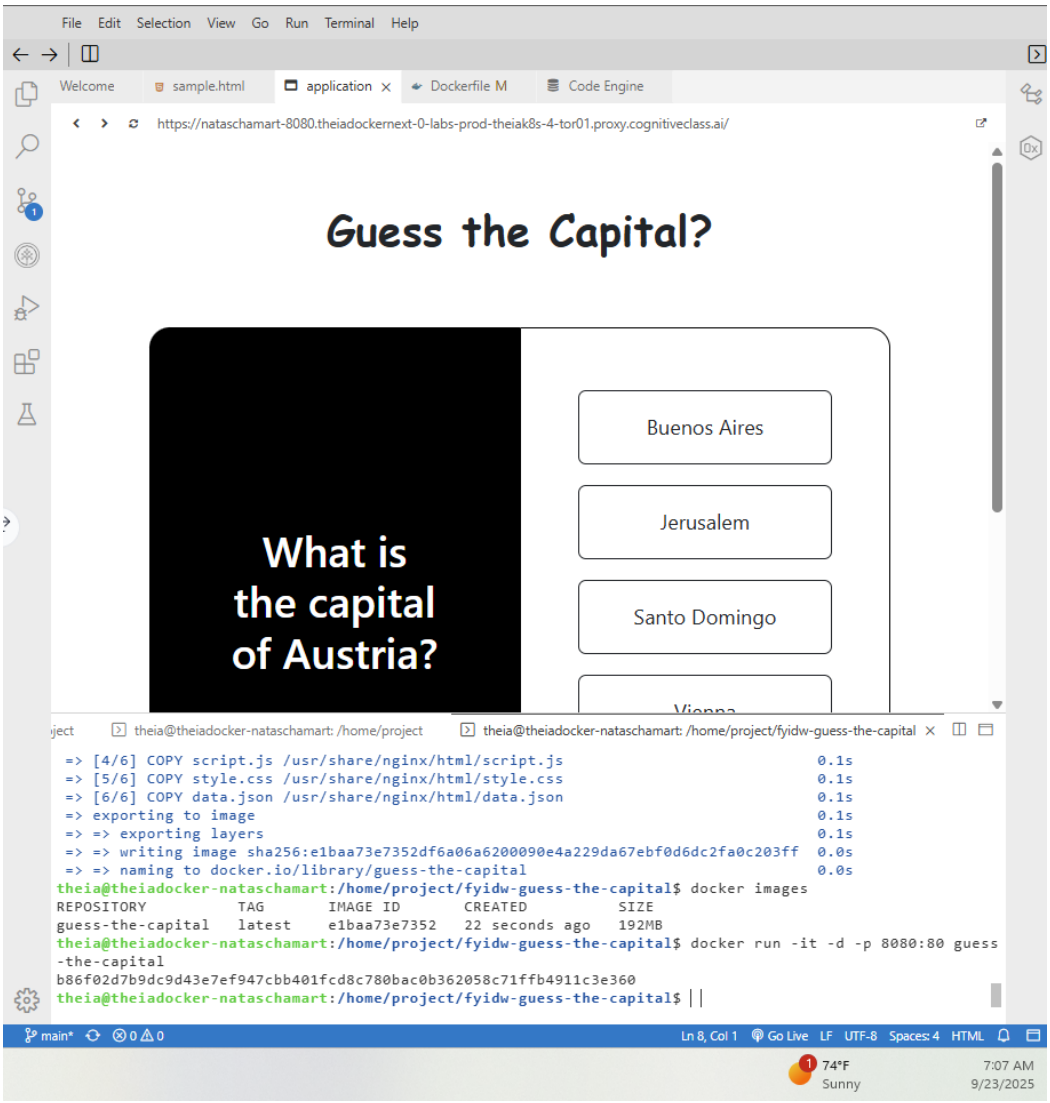
3. List built images



4. Run the image

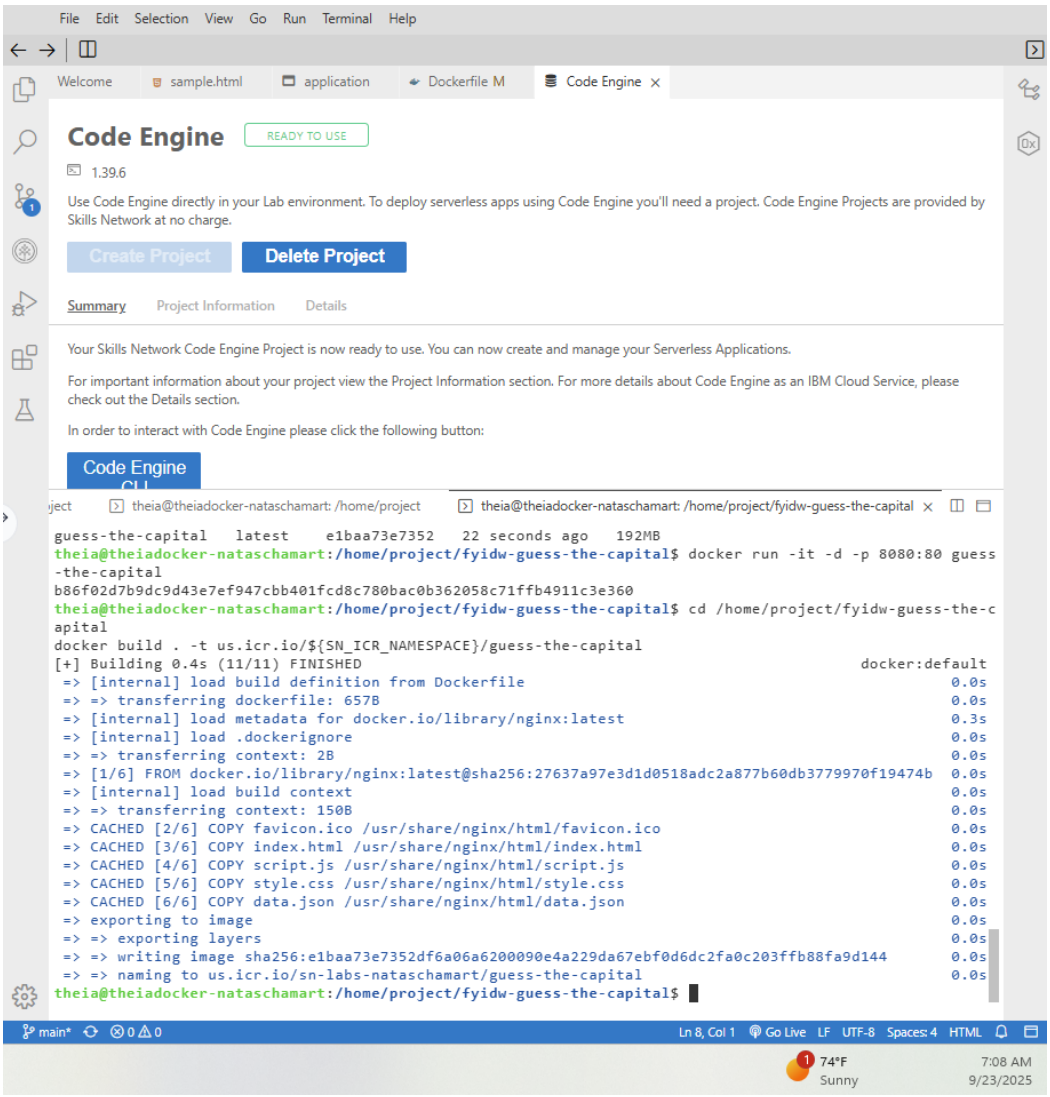


5. Verify in browser

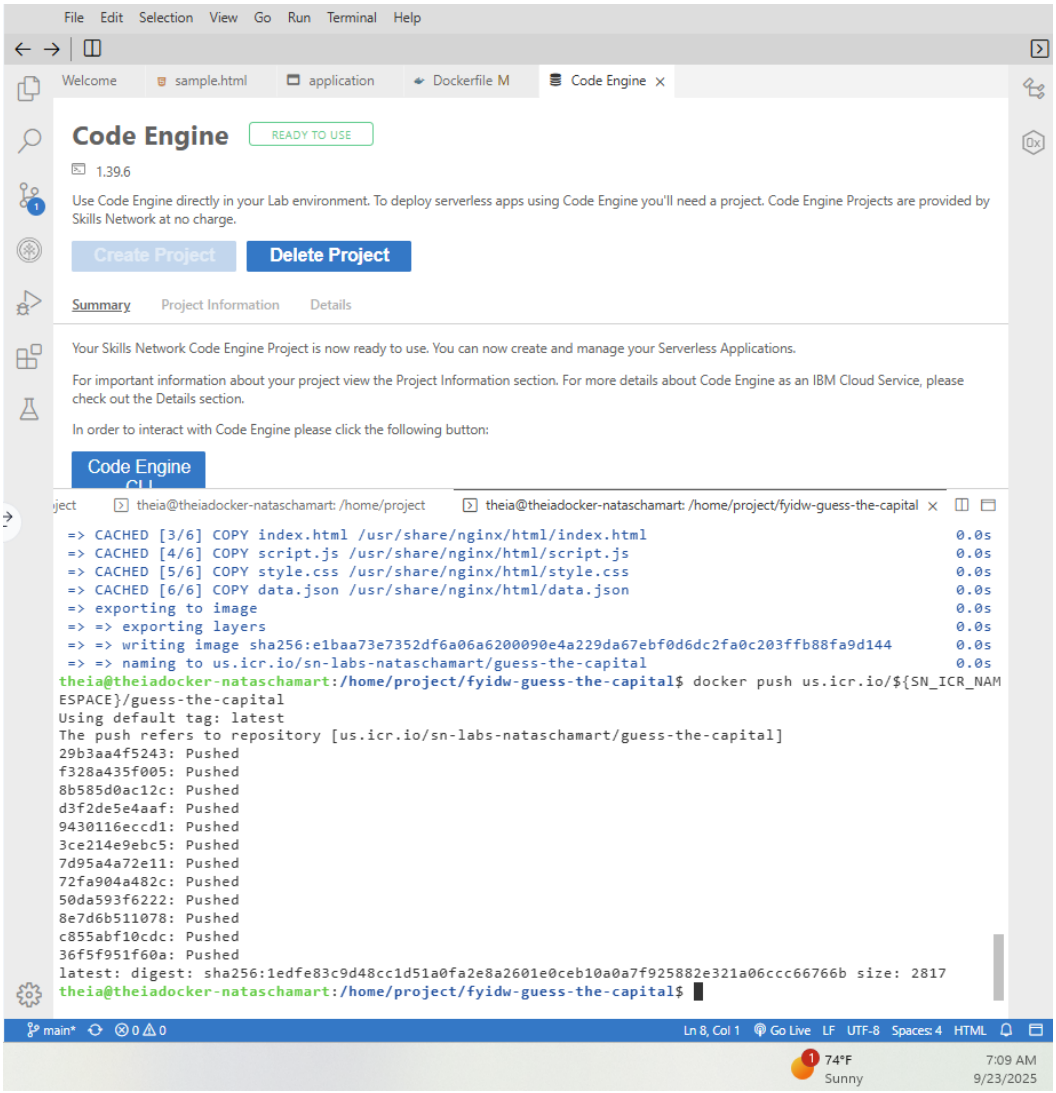


Task 2: Deploy on IBM Cloud

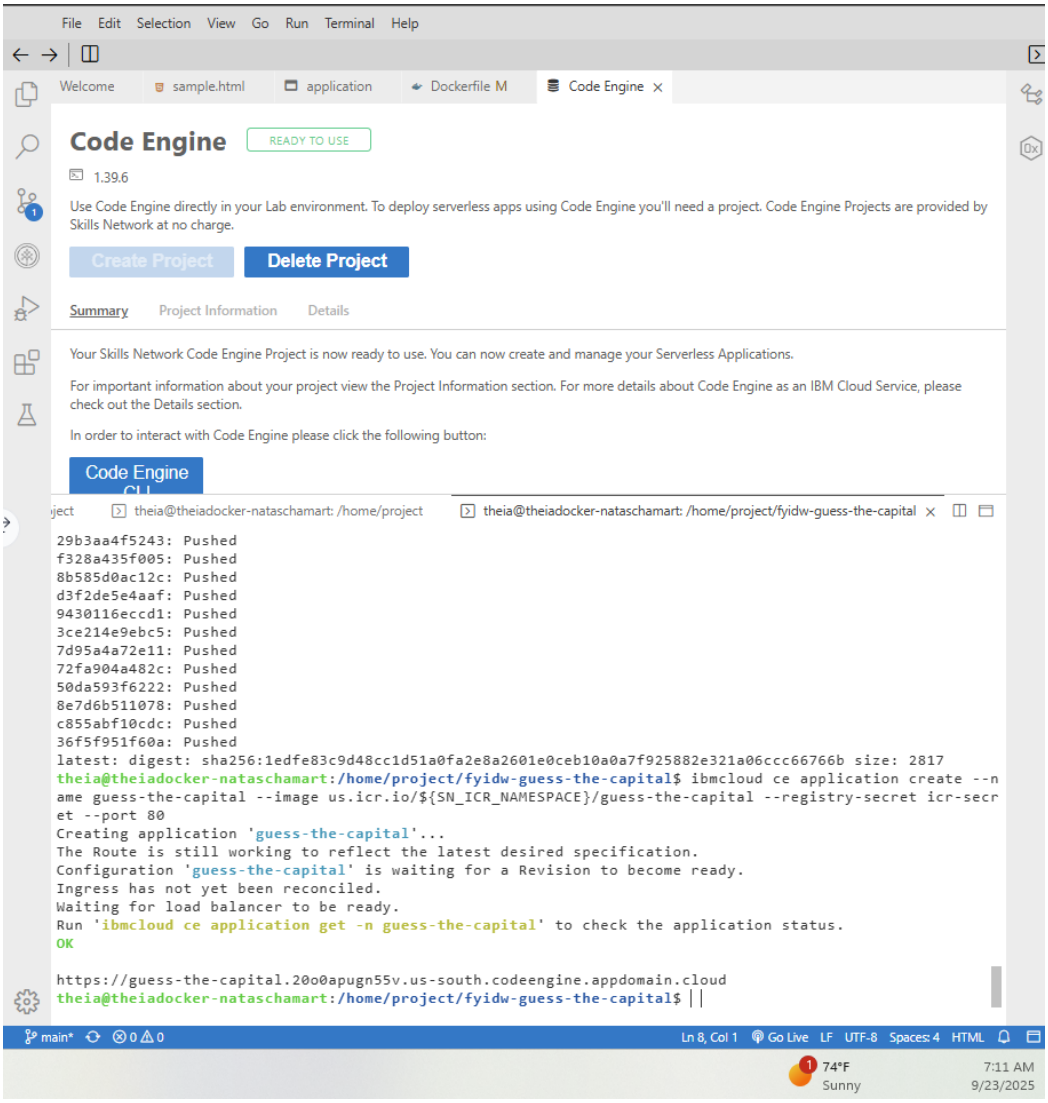
Let's start with launching Code Engine CLI.



Push the image to IBM Cloud



Deploy the image on IBM CE


File Edit Selection View Go Run Terminal Help
Welcome
sample.html
application
Dockerfile M
Code Engine
Code Engine
READY TO USE
1.39.6
Use Code Engine directly in your Lab environment. To deploy serverless apps using Code Engine you'll need a project. Code Engine Projects are provided by Skills Network at no charge.
Create Project
Delete Project
Summary
Project Information
Details
Your Skills Network Code Engine Project is now ready to use. You can now create and manage your Serverless Applications.
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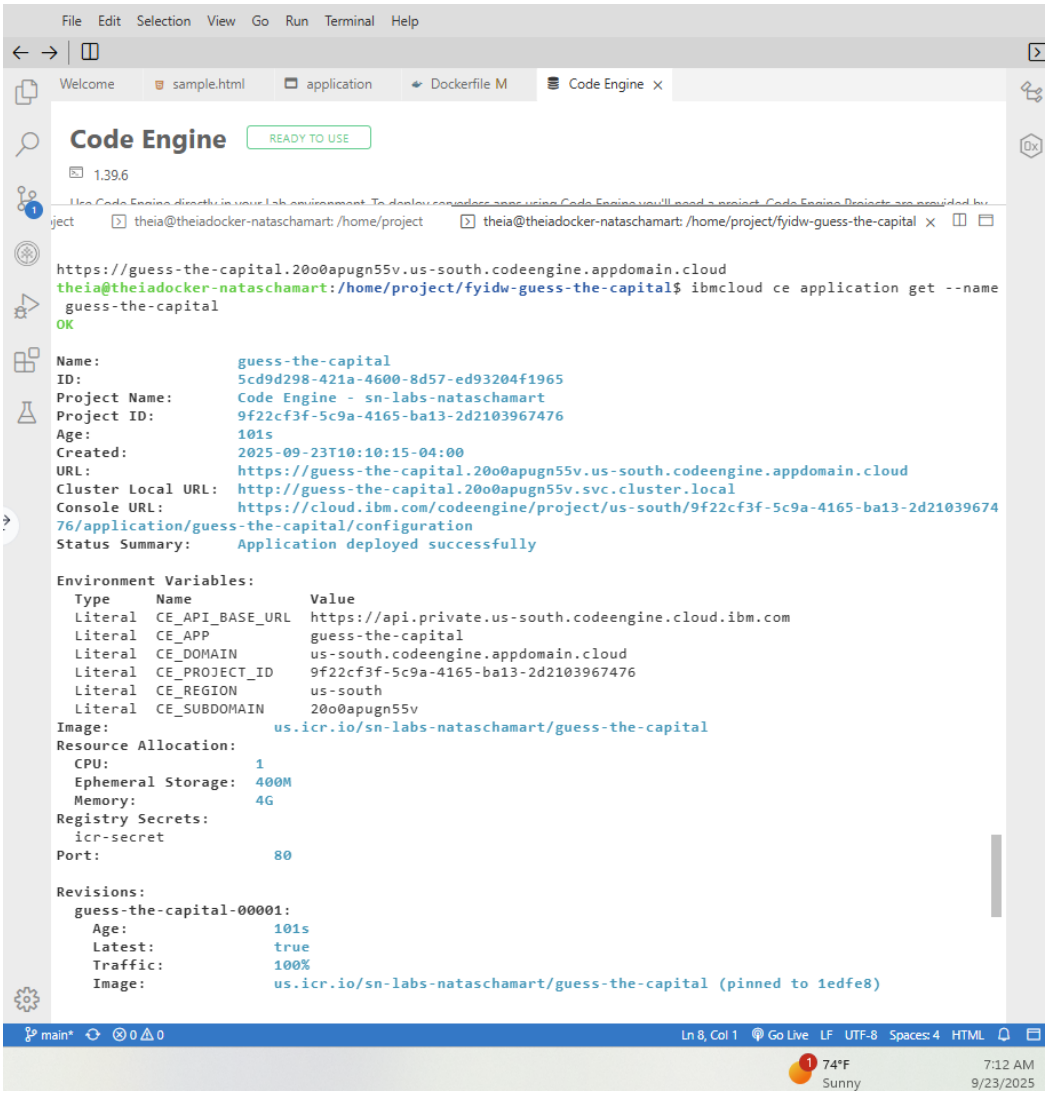
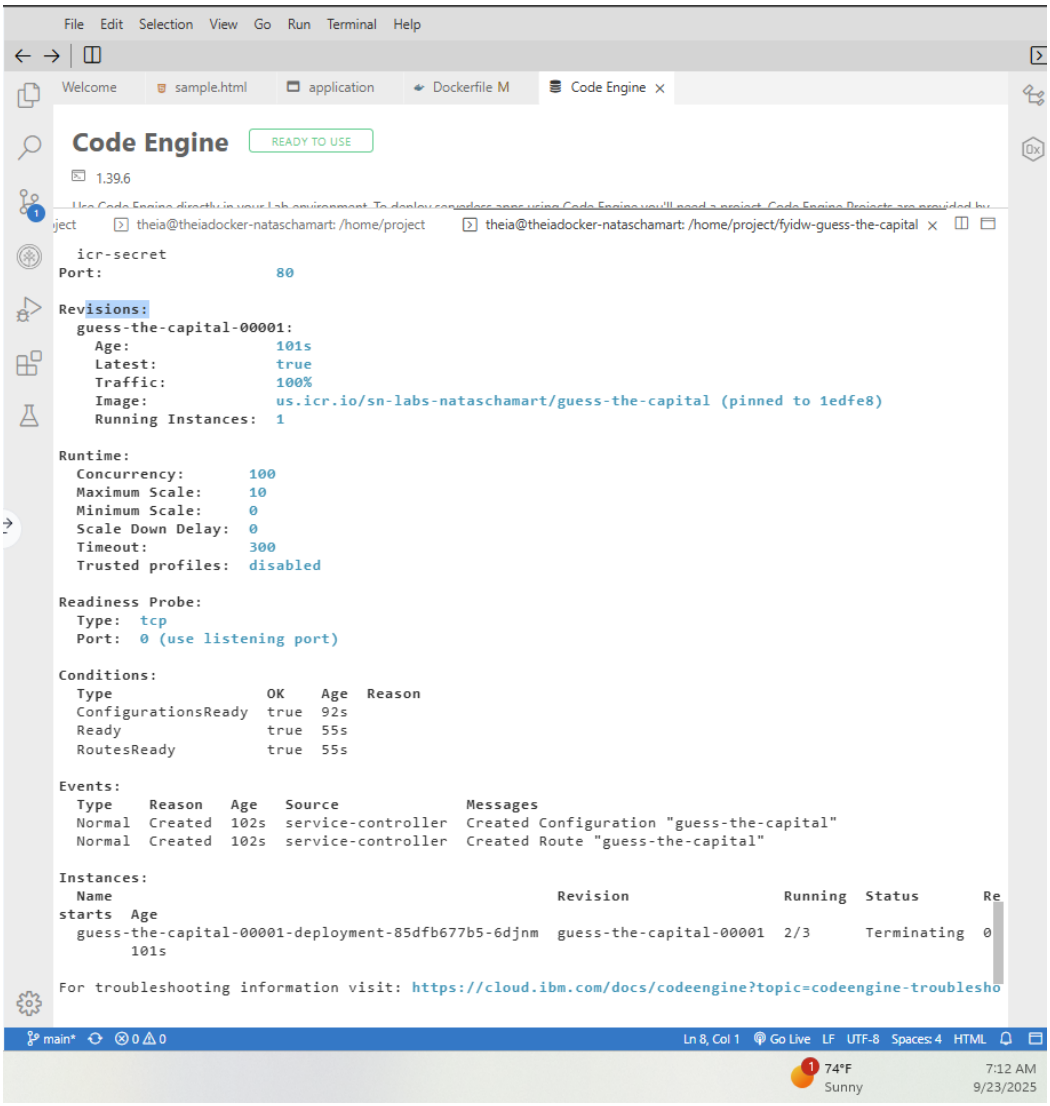
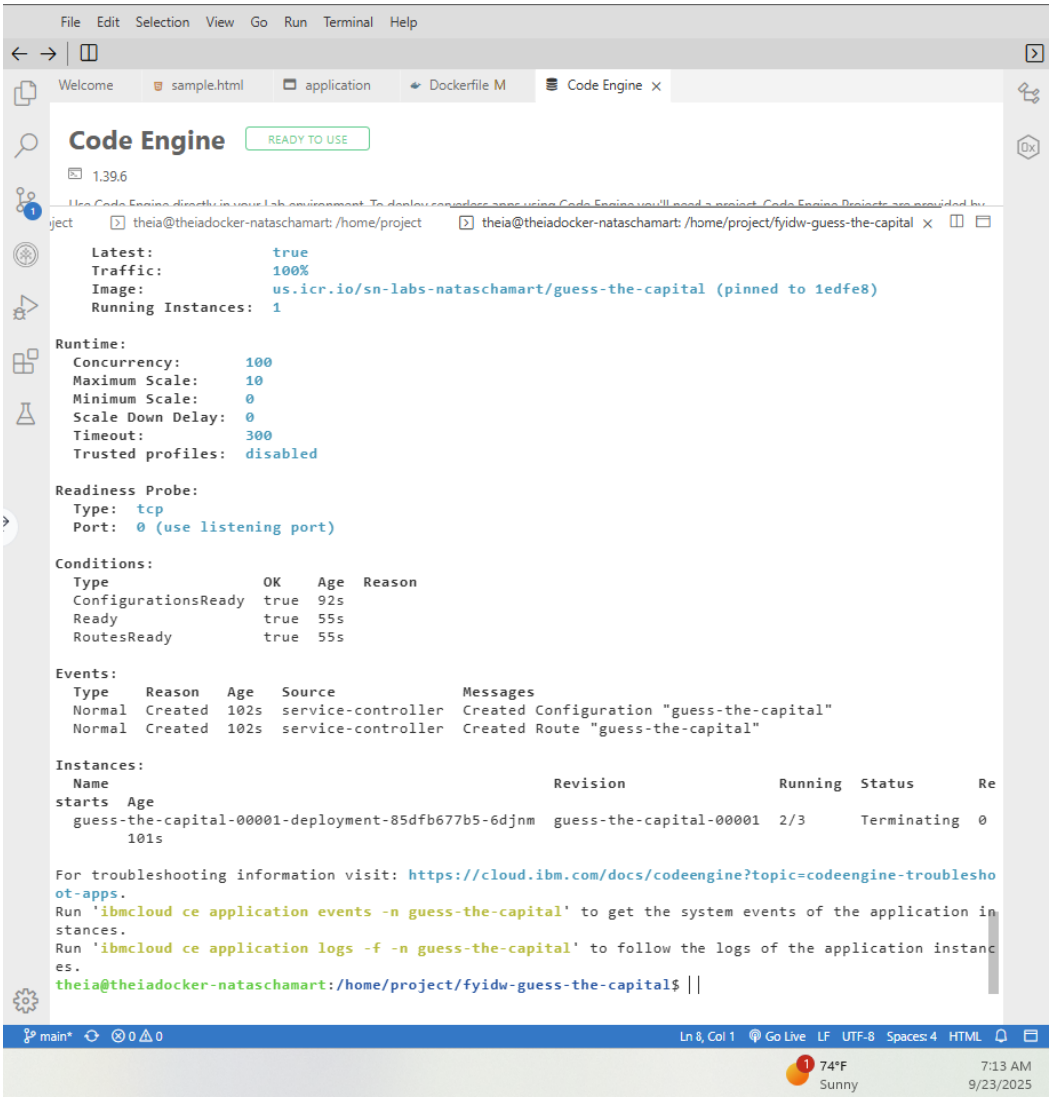
Code Engine
theia@theiadocker-nataschamart: /home/project
theia@theiadocker-nataschamart: /home/project/fyidw-guess-the-capital
29b3aa4f5243: Pushed
f328a435f005: Pushed
8b585d0ac12c: Pushed
d3f2de5e4aaf: Pushed
9430116eccd1: Pushed
3ce214e9ebc5: Pushed
7d95a4a72e11: Pushed
72fa904a482c: Pushed
50da593f6222: Pushed
8e7d6b511078: Pushed
c855abf10cdc: Pushed
36f5f951f60a: Pushed
latest: digest: sha256:1edfe83c9d48cc1d51a0fa2e8a2601e0ceb10a0a7f925882e321a06ccc66766b size: 2817
theia@theiadocker-nataschamart:/home/project/fyidw-guess-the-capital$ ibmcloud ce application create --name guess-the-capital --image us.icr.io/${SN_ICR_NAMESPACE}/guess-the-capital --registry-secret icr-secret --port 80
Creating application 'guess-the-capital'...
The Route is still working to reflect the latest desired specification.
Configuration 'guess-the-capital' is waiting for a Revision to become ready.
Ingress has not yet been reconciled.
Waiting for load balancer to be ready.
Run 'ibmcloud ce application get -n guess-the-capital' to check the application status.
OK
https://guess-the-capital.20o0apugn55v.us-south.codeengine.appdomain.cloud
theia@theiadocker-nataschamart:/home/project/fyidw-guess-the-capital$
main*
Ln 8, Col 1
Go Live
LF
UTF-8
Spaces: 4
HTML
74°F
Sunny
7:11 AM
9/23/2025


File Edit Selection View Go Run Terminal Help
Welcome
sample.html
application
Dockerfile M
Code Engine
Code Engine
READY TO USE
1.39.6
theia@theiadocker-nataschamart: /home/project
theia@theiadocker-nataschamart: /home/project/fyidw-guess-the-capital
https://guess-the-capital.20o0apugn55v.us-south.codeengine.appdomain.cloud
theia@theiadocker-nataschamart:/home/project/fyidw-guess-the-capital$ ibmcloud ce application get --name guess-the-capital
OK
Name: guess-the-capital
ID: 5cd9d298-421a-4600-8d57-ed93204f1965
Project Name: Code Engine - sn-labs-nataschamart
Project ID: 9f22cf3f-5c9a-4165-ba13-2d2103967476
Age: 101s
Created: 2025-09-23T10:10:15-04:00
URL: https://guess-the-capital.20o0apugn55v.us-south.codeengine.appdomain.cloud
Cluster Local URL: http://guess-the-capital.20o0apugn55v.svc.cluster.local
Console URL: https://cloud.ibm.com/codeengine/project/us-south/9f22cf3f-5c9a-4165-ba13-2d2103967476/application/guess-the-capital/configuration
Status Summary: Application deployed successfully
Environment Variables:
Type Name Value
Literal CE_API_BASE_URL https://api.private.us-south.codeengine.cloud.ibm.com
Literal CE_APP guess-the-capital
Literal CE_DOMAIN us-south.codeengine.appdomain.cloud
Literal CE_PROJECT_ID 9f22cf3f-5c9a-4165-ba13-2d2103967476
Literal CE_REGION us-south
Literal CE_SUBDOMAIN 20o0apugn55v
Image: us.icr.io/sn-labs-nataschamart/guess-the-capital
Resource Allocation:
CPU: 1
Ephemeral Storage: 400M
Memory: 4G
Registry Secrets:
icr-secret
Port: 80
Revisions:
guess-the-capital-00001:
Age: 101s
Latest: true
Traffic: 100%
Image: us.icr.io/sn-labs-nataschamart/guess-the-capital (pinned to 1edfe8)
main*
Ln 8, Col 1
Go Live
LF
UTF-8
Spaces: 4
HTML
74°F
Sunny
7:12 AM
9/23/2025


File Edit Selection View Go Run Terminal Help
Welcome
sample.html
application
Dockerfile M
Code Engine
Code Engine
READY TO USE
1.39.6
theia@theiadocker-nataschamart: /home/project
theia@theiadocker-nataschamart: /home/project/fyidw-guess-the-capital
icr-secret
Port: 80
Revisions:
guess-the-capital-00001:
Age: 101s
Latest: true
Traffic: 100%
Image: us.icr.io/sn-labs-nataschamart/guess-the-capital (pinned to 1edfe8)
Running Instances: 1
Runtime:
Concurrency: 100
Maximum Scale: 10
Minimum Scale: 0
Scale Down Delay: 0
Timeout: 300
Trusted profiles: disabled
Readiness Probe:
Type: tcp
Port: 0 (use listening port)
Conditions:
Type OK Age Reason
ConfigurationsReady true 92s
Ready true 55s
RoutesReady true 55s
Events:
Type Reason Age Source Messages
Normal Created 102s service-controller Created Configuration "guess-the-capital"
Normal Created 102s service-controller Created Route "guess-the-capital"
Instances:
Name Revision Running Status Re
starts Age
guess-the-capital-00001-deployment-85dfb677b5-6djnm guess-the-capital-00001 2/3 Terminating 0
101s
For troubleshooting information visit: https://cloud.ibm.com/docs/codeengine?topic=codeengine-troublesho
main*
Ln 8, Col 1
Go Live
LF
UTF-8
Spaces: 4
HTML
74°F
Sunny
7:12 AM
9/23/2025



Lab Summary – Final Project: Guess the Capital

Objective

Deploy a sample web application (“Guess the Capital”) to the IBM Cloud using Docker and IBM Code Engine. The project demonstrated how to containerize an app, push it to the IBM Cloud Container Registry, and run it in a serverless environment.

Steps Completed

Environment Verification

- Opened terminal in the Cloud IDE.
- Verified docker CLI was installed and working (docker --version).
- Verified ibmcloud CLI was installed and working (ibmcloud version).

Local Application Setup

- Cloned the application source code from GitHub (fyi-guess-the-capital).
- Confirmed app files were available (index.html, script.js, style.css).
- Ran a local server (python3 -m http.server) to test functionality at port 8000.

Task 1: Containerization with Docker

- Created a Dockerfile defining the app environment.
- Built a Docker image locally from the Dockerfile.
- Verified the image was created by listing Docker images.
- Ran the container locally to confirm the app was accessible in a browser.

Task 2: Deploy to IBM Cloud

- Targeted the correct resource group in IBM Cloud (ibmcloud target -g Default).
- Created a new Code Engine project (ibmcloud ce project create).
- Tagged the local Docker image for IBM Cloud Container Registry (us.icr.io/<namespace>/guess-the-capital:v1).
- Pushed the image to IBM Cloud.
- Deployed the containerized application to Code Engine (ibmcloud ce app create).
- Verified deployment status using ibmcloud ce app get.

Reflection

This final project tied together all course concepts into a complete workflow: starting from local development, containerization with Docker, and deployment using IBM Code Engine. Challenges included adapting when the Code Engine GUI panel was missing and using CLI commands instead, as well as targeting the correct IBM Cloud resource group before creating projects. Successfully resolving these issues reinforced troubleshooting and cloud deployment skills.