

## 7.5 Dockerfiles de cada microservicio

Se agrego a la carpeta de cada proyecto el archivo Dockerfile y se uso el mismo para todos los proyectos. La creación del archivo Dockerfile y la construcción de la imagen tuvo los siguientes pasos:

Pasos:

- Crea Dockerfile en cada proyecto y se repite para GA, GC y SW con el mismo Dockerfile. Ejemplo:

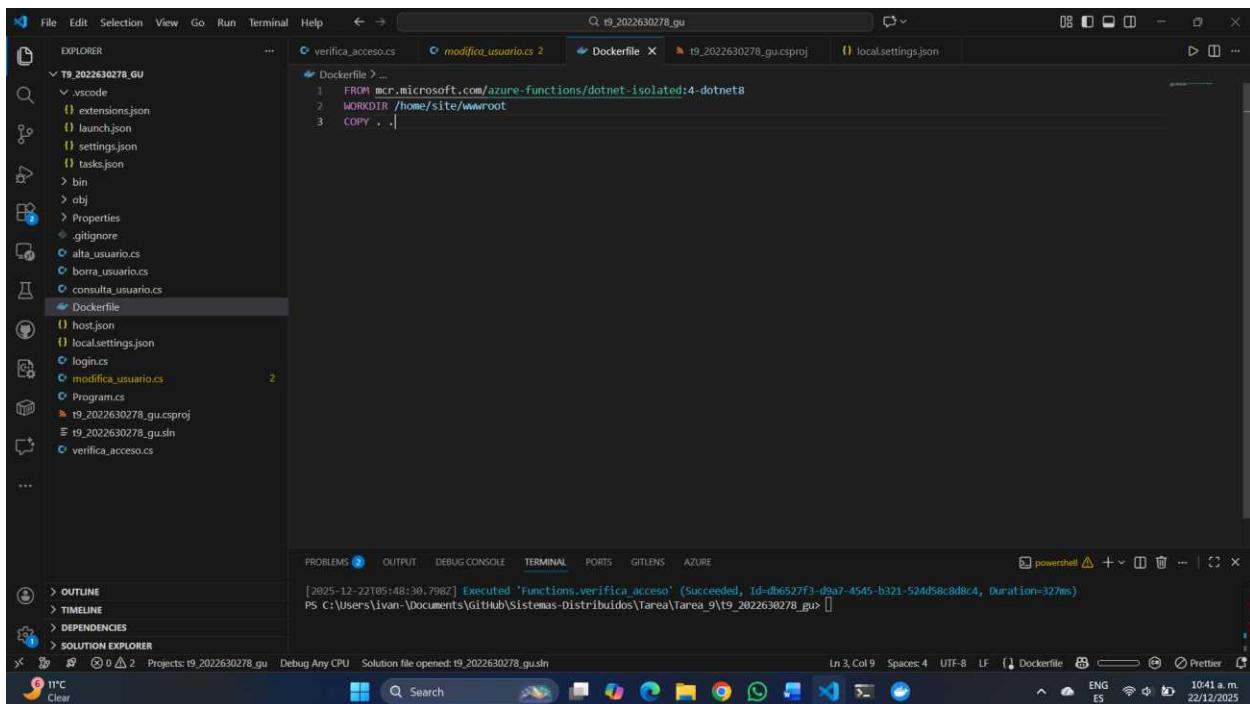


Figura 10.1 Archivo Dockerfile

- Elegir la imagen base recomendada: mcr.microsoft.com/azure-functions/dotnet-isolated:4-dotnet8
- Publicar y empujar cada imagen a ACR.

Se abrió la terminal en cada proyecto y se ejecutó Build y push (Ejemplo para GU)

- az acr login --name t92022630278acr
- docker build -t t92022630278acr.azurecr.io/t9\_2022630278\_gu:latest .
- docker push t92022630278acr.azurecr.io/t9\_2022630278\_gu:latest

- Se realizo lo mismo para:
  - t9\_2022630278\_ga:latest
  - t9\_2022630278\_gc:latest
  - t9\_2022630278\_sw:latest

Para GU:

```

FROM mcr.microsoft.com/dotnet/sdk:8.0 AS installer-env
COPY . /src/dotnet-function-app
RUN cd /src/dotnet-function-app && \
    mkdir -p /home/site/wwwroot && \
    dotnet publish *.csproj --output /home/site/wwwroot
# To enable ssh & remote debugging on app service change the base image to the one below

```

PS C:\Users\livan\Documents\GitHub\Sistemas-Distribuidos\Tarea\Tarea\_9\t9\_2022630278\_gu> az acr login --name t92022630278acr  
Login Succeeded  
PS C:\Users\livan\Documents\GitHub\Sistemas-Distribuidos\Tarea\Tarea\_9\t9\_2022630278\_gu> docker build -t t92022630278acr.azurecr.io/t9\_2022630278\_gu:latest .  
Building 1032.1s (11/11)  
[+] host[1] load build definition from Dockerfile  
=> [internal] load transferring dockerfile: 680B  
=> [internal] load metadata for mcr.microsoft.com/dotnet/sdk:8.0  
=> [internal] load metadata for mcr.microsoft.com/azure-functions/dotnet-isolated:4-dotnet-isolated8.0  
=> [internal] load .dockerignore  
=> [internal] load context: 2B  
=> [internal] load build context  
=> [internal] transfer context: 4.09B  
=> [internal] FROM mcr.microsoft.com/dotnet/sdk:8.0@sha256:8f710c2ff3e66392fbab1d408dc9c30c26295bd4ded326cb7cf6cc6fd66cfde  
=> => resolve mcr.microsoft.com/dotnet/sdk:8.0@sha256:8f710c2ff3e66392fbab1d408dc9c30c26295bd4ded326cb7cf6cc6fd66cfde  
=> sha256:234d1a7a8248d7aeb90a8c55ddcdfffc644fe6344da72a28889d53a9d935c91 30.899B / 30.899B  
=> sha256:837ec781c0e8b2679e1ab95:169006f5a9d0a9852c7b70e122469206f796b127 2.669B / 2.669B  
=> sha256:26702a758b1ch005h71039881a3663b9540b985ae8f205965f23aaad7e7f88a 16.959B / 16.959B  
=> sha256:1115a5bba37061772c7f710c2ff3e66392fbab1d408dc9c30c26295bd4ded326cb7cf6cc6fd66cfde 178.279B / 178.279B  
=> sha256:7f14ffce00ecea3a5d692faa58edffefc98e0e0f579f1a1189790ffcc0 11.899B / 11.899B  
=> sha256:6e38d4d5b07a8274b15e0e05013ec5at3da255bd1e01bfccff1da24393 154B / 154B  
=> sha256:39f35a788c0f7271af7b510009a3bd1d4d1b1be5490abf4c06acd4d4d81c 32.259B / 32.259B  
=> sha256:fb1028c922714c22e03f5f5ef185 Folk 38057/bee95ec7c46495d34d7423 3.289B / 3.289B  
=> sha256:0b5a0a7f72771c3b4bb51b7f0a52a55b81bf7e8a4bf1a1df39f09 18.749B / 18.749B  
=> sha256:4ec50de1c1bc51b881a11b7952d65590991aef552010b337790231behead 28.239B / 28.239B  
=> extracting sha256:4ec50de1c1bc51b881a11b7952d65590991aef552010b337790231behead  
=> extracting sha256:4b5a07f72771c3b4bb51b7f0a52a55b81bf7e8a4bf1a1df39f09  
=> extracting sha256:bb1028c932714ec52e8911be5fe1a85f98c30857/bee95ec7c5466b5d34d3742  
=> extracting sha256:39f35a788c0f7271af7b510009a3bd1d4d1b1be5490abf4c06acd4d4d81c  
=> extracting sha256:4ec50de1c1bc51b881a11b7952d65590991aef552010b337790231behead

```

FROM mcr.microsoft.com/dotnet/sdk:8.0 AS installer-env
COPY . /src/dotnet-function-app
RUN cd /src/dotnet-function-app && \
    mkdir -p /home/site/wwwroot && \
    dotnet publish *.csproj --output /home/site/wwwroot
# To enable ssh & remote debugging on app service change the base image to the one below

```

PS C:\Users\livan\Documents\GitHub\Sistemas-Distribuidos\Tarea\Tarea\_9\t9\_2022630278\_gu> docker build -t t92022630278acr.azurecr.io/t9\_2022630278\_gu:latest .  
-> naming to t92022630278acr.azurecr.io/t9\_2022630278\_gu:latest  
-> -> unpacking to t92022630278acr.azurecr.io/t9\_2022630278\_gu:latest  
View build details: docker desktop/build/desktop\_linux/desktop\_linux/vkbt8wlr0y56vjb68:sagm  
PS C:\Users\livan\Documents\GitHub\Sistemas-Distribuidos\Tarea\Tarea\_9\t9\_2022630278\_gu> docker push t92022630278acr.azurecr.io/t9\_2022630278\_gu:latest  
The push refers to repository [t92022630278acr.azurecr.io/t9\_2022630278\_gu]  
e095cde17ec: Pushed  
83304400a327: Pushed  
ac50879d5e: Pushed  
e4f69e4df1fb: Pushed  
93b0405b25b7: Pushed  
aecdce4d01c1: Pushed  
f11410f6090f: Pushed  
7f265938c6: Pushed  
73fc2ff96280: Pushed  
39f35a788c0f: Pushed  
8877d426a83C: Pushed  
5e3bd4ed5d61: Pushed  
9fad05d4fb2a: Pushed  
0e11259f1a49: Pushed  
04cdf79b62d: Pushed  
4b5ab07f27f1: Pushed  
69ff1847cb3: Pushed  
fb61028c9327: Pushed  
a4e5253467ff: Pushed  
latest: digest: sha256:39a54858927aef4e40022f70cb9e39f45eb2eacd0f1bdc31e9344bd22241ce size: 856

**Figura 10.2 Despliegue de Dockerfiles**

Para GA:

The screenshot shows the Visual Studio Code interface with the following details:

- Explorer:** Shows the project structure for "T9\_2022630278\_GA" with files like ".vscode", "bin", "obj", "Properties", ".gitignore", "alta\_articulo.cs", "consulta\_articulo\_por\_ids.cs", "consulta\_articulos.cs", "Dockerfile", "host.json", "local.settings.json", "Program.cs", "t9\_2022630278\_ga.csproj", and "t9\_2022630278\_ga.sln".
- Dockerfile:** Contains the following Dockerfile code:

```

FROM mcr.microsoft.com/dotnet/sdk:8.0 AS installer-env
COPY . /src/dotnet-function-app
RUN cd /src/dotnet-function-app && \
    mkdir -p /home/site/wwwroot && \
    dotnet publish *.csproj --output /home/site/wwwroot

# To enable ssh & remote debugging on app service change the base image to the one below
# FROM mcr.microsoft.com/azure-functions/dotnet-isolated:4-dotnet-isolated8.0-appservice
FROM mcr.microsoft.com/azure-functions/dotnet-isolated:4-dotnet-isolated8.0
ENV AzureWebJobsScriptRoot=/home/site/wwwroot \
    AzureFunctionsJobHost__Logging__Console_IsEnabled=true

```
- Terminal:** Shows the command "az acr login --name t92022630278acr" followed by the Docker build process output:

```

PS C:\Users\ivan\Documents\GitHub\Sistemas-Distribuidos\Tarea\Tarea_9\t9_2022630278_ga> az acr login --name t92022630278acr
Login Succeeded
PS C:\Users\ivan\Documents\GitHub\Sistemas-Distribuidos\Tarea\Tarea_9\t9_2022630278_ga> docker build -t t92022630278acr.azurecr.io/t9_2022630278_ga:latest .
[+] Building 934.2s (11/11) FINISHED
--> [internal] load build definition from Dockerfile
--> => transferring dockerfile: 683B
--> [internal] load metadata for mcr.microsoft.com/azure-functions/dotnet-isolated:4-dotnet-isolated8.0
--> [internal] load metadata for mcr.microsoft.com/dotnet/sdk:8.0
--> [internal] load .dockerignore
--> => transferring context: 2B
--> [stage-1 1/2] FROM mcr.microsoft.com/azure-functions/dotnet-isolated:4-dotnet-isolated8.0@sha256:b592aaed9f87bc85cd6d4593ada13aa8046a79e94f40d33fd40776acebf
--> => resolve mcr.microsoft.com/azure-functions/dotnet-isolated:4-dotnet-isolated8.0@sha256:b592aaed9f87bc85cd6d4593ada13aa8046a79e94f40d33fd40776acebf
--> => sha256:0877d426a83cf409a795c2a8d5aa5fc4dd8e5f280bfb4ca5a091f0e147449217afce7cfbaecac9 98B / 22.60MB
--> => sha256:ade5253467ff74785f280bfb4ca5a091f0e147449217afce7cfbaecac9 98B / 90B
--> => sha256:129a1a494a2c20c75117a491f4d12a74316923ab4ca5a091f0e147449217afce7cfbaecac9 145B / 145B
--> => sha256:73f27fb2b2a0f30110810476fe052e7719e7a08bbe90c464a23aaf240 620B / 620B
--> => sha256:fa2a94fb2a097a0eef11285c17fb8b491f9a593922c736a71fb9caea8f877 126.59KB / 126.59KB
--> => sha256:acd5b179d25ee1fc40a70d6cc931e6e69b214551179cc01a1f71c91ac2febf1a3340bf 668B / 668B
--> => sha256:848cf7d8bb2d462679409f1ff7fa15e59b214551179cc01a1f71c91ac2febf1a3340bf 2.72KB / 2.72KB
--> => sha256:00f00041f7fb0d5767e08474887480f8ed7c658720355f5 15.23MB / 15.23MB
--> => sha256:69f1b18472b3910f1bf4801c5d7afezeeb13423572e5bc295199cbfb92f3e1 110.27MB / 110.27MB
--> => sha256:7f4659584eccc956a47795186e6cda6533ac987071e1f579c85b6c11a64f5 135.51MB / 135.51MB

```
- Output:** Shows the Docker build command and its progress.

The screenshot shows the Visual Studio Code interface with the following details:

- Explorer:** Shows the project structure for "T9\_2022630278\_GA" with files like ".vscode", "bin", "obj", "Properties", ".gitignore", "alta\_articulo.cs", "consulta\_articulo\_por\_ids.cs", "consulta\_articulos.cs", "Dockerfile", "host.json", "local.settings.json", "Program.cs", "t9\_2022630278\_ga.csproj", and "t9\_2022630278\_ga.sln".
- Dockerfile:** Contains the same Dockerfile code as the first screenshot.
- Terminal:** Shows the command "PS C:\Users\ivan\Documents\GitHub\Sistemas-Distribuidos\Tarea\Tarea\_9\t9\_2022630278\_ga> docker build -t t92022630278acr.azurecr.io/t9\_2022630278\_ga:latest" followed by the Docker build process output:

```

PS C:\Users\ivan\Documents\GitHub\Sistemas-Distribuidos\Tarea\Tarea_9\t9_2022630278_ga> docker build -t t92022630278acr.azurecr.io/t9_2022630278_ga:latest .
View build details: docker desktop://dashboard/build/desktop-linux/desktop-
PS C:\Users\ivan\Documents\GitHub\Sistemas-Distribuidos\Tarea\Tarea_9\t9_2022630278_ga> docker push t92022630278acr.azurecr.io/t9_2022630278_ga
20f35a708cc0: waiting
d877d426a83c: Waiting
7f14fdf5e60e: Waiting
7f14fdf5e60e: Waiting from t9_2022630278_gu
7f2659338c6e: Mounted from t9_2022630278_gu
aesc8ea0e1c: Mounted from t9_2022630278_gu
edf69eda1f7b: Mounted from t9_2022630278_gu
e967eb95daff: Pushed
840419c96935: Pushed
fb1028c9327: Mounted from t9_2022630278_gu
0e11259c1a49: Mounted from t9_2022630278_gu
4b5bab07f27f7: Mounted from t9_2022630278_gu
73fc2ff96280: Mounted from t9_2022630278_gu
93b0445b25b67: Mounted from t9_2022630278_gu
04cf7d95b62d: Mounted from t9_2022630278_gu
69f1b18472b3: Mounted from t9_2022630278_gu
9fad054dfb2a: Mounted from t9_2022630278_gu
ac05b97d5e: Mounted from t9_2022630278_gu
5e2b4ed5d9b: Mounted from t9_2022630278_gu
latest: digest: sha256:16e93b88b2972d66549/ee8b88a8f78941a3efbe54a6b3869593fb316d945 size: 856
PS C:\Users\ivan\Documents\GitHub\Sistemas-Distribuidos\Tarea\Tarea_9\t9_2022630278_ga>

```
- Output:** Shows the Docker build command and its progress.

Figura 10.3 Despliegue de Dockerfiles

Para GC:

The screenshot shows a Visual Studio Code interface with several tabs open. The main editor area contains a Dockerfile:

```
FROM mcr.microsoft.com/dotnet/sdk:8.0 AS installer-env  
COPY . /src/dotnet-function-app
```

Below the editor, a terminal window shows the command: `docker build -t t9_2022630278acr.azurecr.io/t9_2022630278_gc:latest`. The output of the build command is displayed, showing various layers being pushed to the Docker registry.

On the left sidebar, there's a tree view of files and folders, including a `Dockerfile`, `elimina_articulo_compra.cs`, and `modifica_articulo_compra.cs`.

## Figura 10.4 Despliegue de Dockerfiles

Para SW:

The screenshot shows a Visual Studio Code interface with a dark theme. The left sidebar displays a file tree for a project named 'T9\_2022630278\_SW'. The 'Dockerfile' is selected in the tree. The main editor area shows a Dockerfile with the following content:

```
FROM mcr.microsoft.com/dotnet/sdk:8.0 AS installer-env
COPY . /src/dotnet-function-app
```

Below the code, the terminal window shows the command being run and its output:

```
PS C:\Users\ivan\Documents\GitHub\Sistemas-Distribuidos\Tarea\Tarea_9\t9_2022630278_sw> docker build -t t9_2022630278acr.azurecr.io/t9_2022630278_sw:latest .
PS C:\Users\ivan\Documents\GitHub\Sistemas-Distribuidos\Tarea\Tarea_9\t9_2022630278_sw> docker push t9_2022630278acr.azurecr.io/t9_2022630278_sw:latest
The push refers to repository [t9_2022630278acr.azurecr.io/t9_2022630278_sw]
28c2c6a95e39: Waiting
28c2c6a95e39: Waiting
9fad05d0f2a: Waiting
28c2c6a95e39: Pushed
fb10289327: Mounted from t9_2022630278_gu
4b5ab07f2ff: Mounted from t9_2022630278_gu
d62bf1f99281: Pushed
a4e5253467ff: Mounted from t9_2022630278_gu
acd56b79d25e: Mounted from t9_2022630278_gu
aecc4e008e1c: Mounted from t9_2022630278_gu
0e11259e1a49: Mounted from t9_2022630278_gu
e4f690d4f7fb: Mounted from t9_2022630278_gu
69ff11847203: Mounted from t9_2022630278_gu
d87764268a3c: Mounted from t9_2022630278_gu
04cd7d9b82d: Mounted from t9_2022630278_gu
7f1afdf6ea0e: Mounted from t9_2022630278_gu
39f3aa4788c0: Mounted from t9_2022630278_gu
73fc2ff9b280: Mounted from t9_2022630278_gu
93b045b25b67: Mounted from t9_2022630278_gu
latest: digest: sha256:3b7f755887eb2a2a1fd1861610d9823ad1e224ef741d5b6ffe12005d970225 size: 856
```

The status bar at the bottom indicates the file is open ('Projects: t9\_2022630278\_sw') and the terminal is active ('Debug Any CPU').

## **Figura 10.4 Despliegue de Dockerfiles**

## 8 Conexión al cluster AKS desde VS Code o Cloud Shell

- Portal > AKS > t9-2022630278-aks > “Connect” > Copia el comando para descargar kubeconfig en Cloud Shell o usa local:

```
az aks get-credentials -n t9-2022630278-aks -g t9-2022630278-rg
```

Verifica:

```
kubectl get nodes
```

**t9-2022630278-aks** Kubernetes service

**Essentials**

- Resource group: t9-2022630278-rg
- Power state: Running
- Cluster operation status: Succeeded
- Subscription: Azure for Students
- Location: Canada Central
- Subscription ID: fd58a3da-fcef-47d1-ac0e-5b891faa4251
- Fleet Manager: Click here to assign
- Kubernetes version: 1.33.5
- API server address: t9-2022630278-aks-dns-qd5by2u7.hcp.canadacentral.azmk8s.io
- SKU: Base
- Pricing tier: Free
- Network configuration: Azure CNI Overlay
- Node pools: 1 node pool
- Container registries: t9-2022630278-aks
- Created time: December 21, 2025 at 06:20 PM

**Properties**

**Kubernetes services**

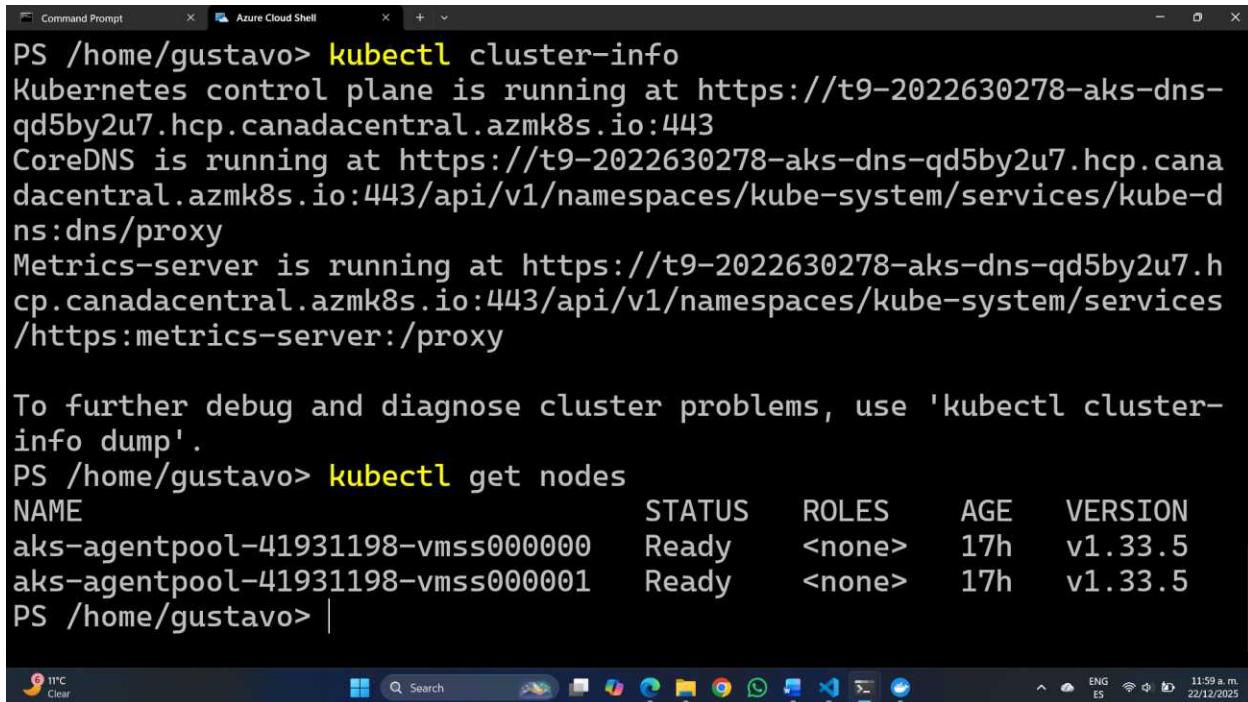
- Encryption type: Encryption at-rest with a platform-managed key
- Virtual node pools: Not enabled

**Networking**

- API server address: t9-2022630278-aks-dns-qd5by2u7.hcp.canadacentral.azmk8s.io
- Network configuration: Azure CNI Overlay
- Pod CIDR: 10.244.0.0/16
- Service CIDR: 10.0.0.0/16

```
f-a6b8-5f174b11ec1az aks get-credentials -n t9-2022630278-aks -g t9-2022630278-rg
az aks get-credentials -n t9-2022630278-aks -g t9-2022630278-rg
Merged "t9-2022630278-aks" as current context in /home/gustavo/.kube/config
PS /home/gustavo>
PS /home/gustavo> add-AzADAppPermission -ObjectId 9cc74d5e-1162-4b90-8696-65f3d6a3f7d0 -ApiId 00000003-0000-0000-c000-000000000000 -PermissionId 5f8c59db-677d-491f-a6b8-5f174b11ec1az
az aks get-credentials -n t9-2022630278-aks -g t9-2022630278-rg
az aks get-credentials -n t9-2022630278-aks -g t9-2022630278-rg
Merged "t9-2022630278-aks" as current context in /home/gustavo/.kube/config
PS /home/gustavo> kubectl cluster-info
Kubernetes control plane is running at https://t9-2022630278-aks-dns-qd5by2u7.hcp.canadacentral.azmk8s.io:443
CoreDNS is running at https://t9-2022630278-aks-dns-qd5by2u7.hcp.canadacentral.azmk8s.io:443/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy
Metrics-server is running at https://t9-2022630278-aks-dns-qd5by2u7.hcp.canadacentral.azmk8s.io:443/api/v1/namespaces/kube-system/services/https:metrics-server:/proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
PS /home/gustavo>
```



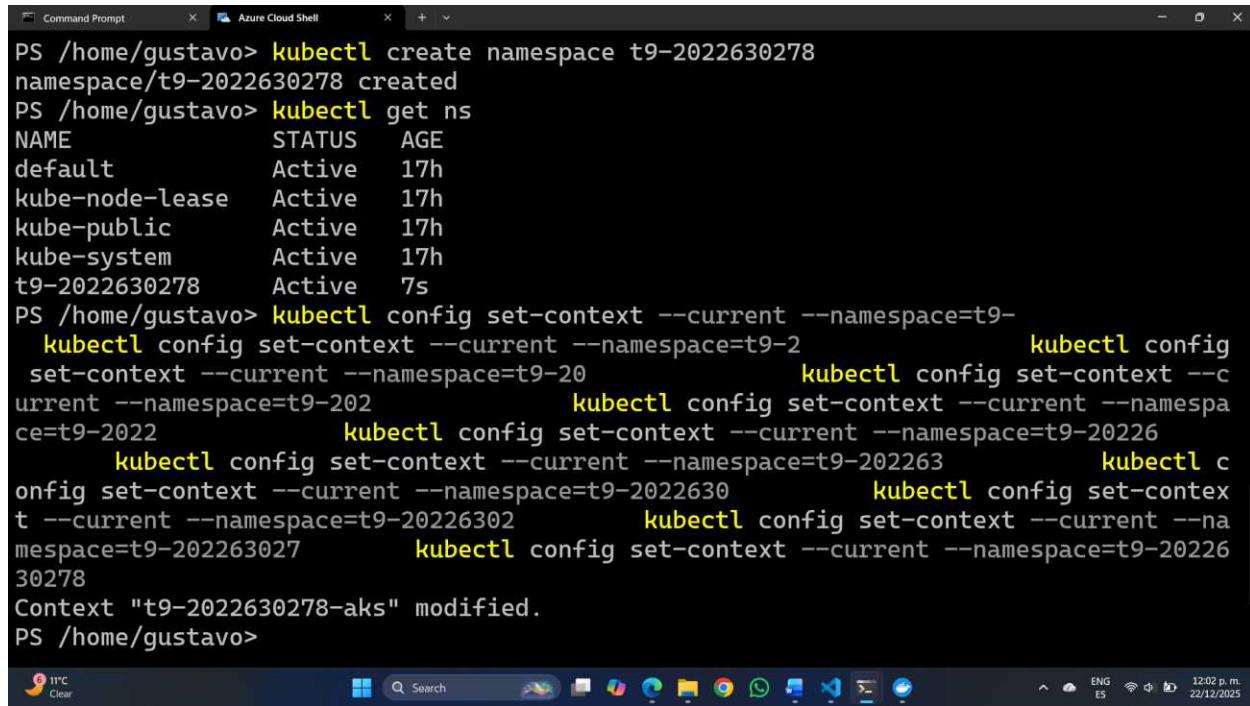
```
PS /home/gustavo> kubectl cluster-info
Kubernetes control plane is running at https://t9-2022630278-aks-dns-qd5by2u7.hcp.canadacentral.azmk8s.io:443
CoreDNS is running at https://t9-2022630278-aks-dns-qd5by2u7.hcp.canadacentral.azmk8s.io:443/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy
Metrics-server is running at https://t9-2022630278-aks-dns-qd5by2u7.hcp.canadacentral.azmk8s.io:443/api/v1/namespaces/kube-system/services/https:metrics-server:/proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
PS /home/gustavo> kubectl get nodes
NAME                      STATUS   ROLES      AGE   VERSION
aks-agentpool-41931198-vmss000000   Ready    <none>    17h   v1.33.5
aks-agentpool-41931198-vmss000001   Ready    <none>    17h   v1.33.5
PS /home/gustavo> |
```

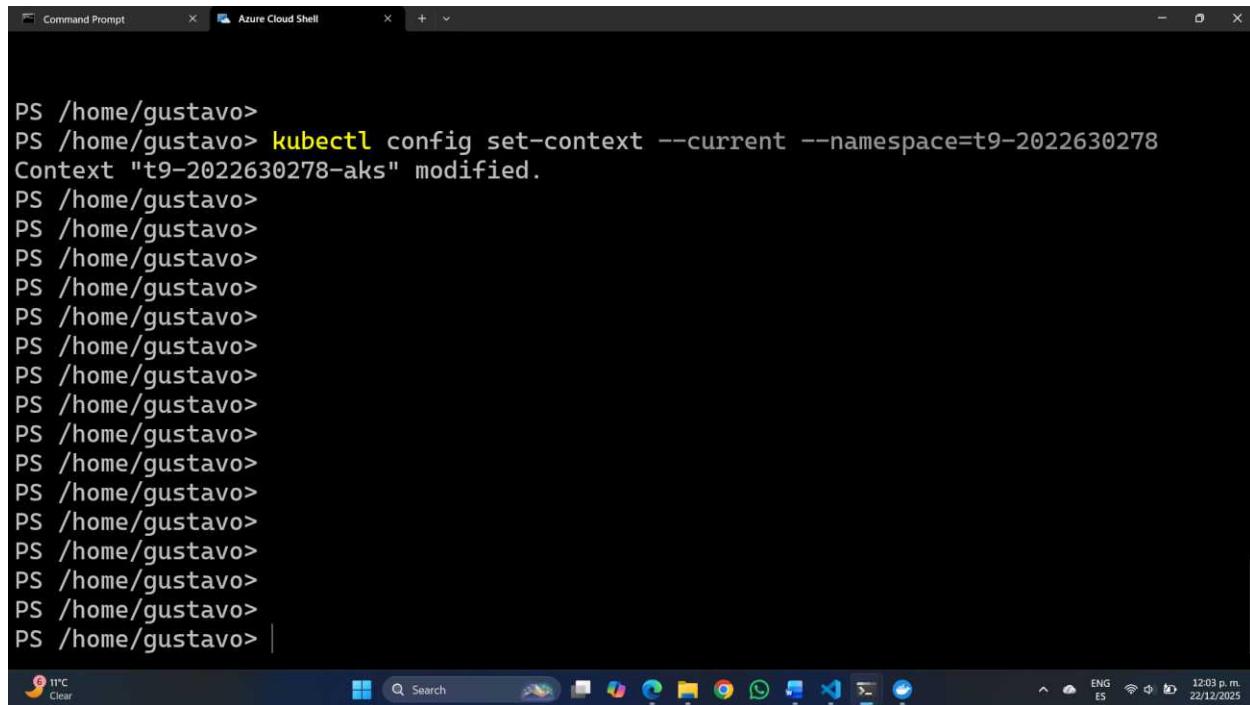
## Variables de entorno, Secrets y ConfigMaps

Se realizó la configuración de variables de entorno tanto en local como en Kubernetes. En Kubernetes, se instalaron Secrets para credenciales sensibles (Server, UserID, Password, Database por microservicio) y ConfigMaps para parámetros no sensibles (URLs internas de servicios y ROOT del servidor web). Se accedió a los manifests y se aplicaron con kubectl, verificando su creación correcta en el namespace del proyecto.

- Se crearon el namespace y se fijaron en el contexto actual usando estos comandos en una terminal de azure cloud Shell:
  - kubectl create namespace t9-2022630278
  - kubectl get ns
  - kubectl config set-context --current --namespace=t9-2022630278



```
PS /home/gustavo> kubectl create namespace t9-2022630278
namespace/t9-2022630278 created
PS /home/gustavo> kubectl get ns
NAME      STATUS   AGE
default   Active   17h
kube-node-lease Active  17h
kube-public Active  17h
kube-system Active  17h
t9-2022630278 Active  7s
PS /home/gustavo> kubectl config set-context --current --namespace=t9-
    kubectl config set-context --current --namespace=t9-2          kubectl config
    set-context --current --namespace=t9-20          kubectl config set-context --c
urrent --namespace=t9-20          kubectl config set-context --current --namespa
ce=t9-2022          kubectl config set-context --current --namespace=t9-20226
    kubectl config set-context --current --namespace=t9-202263          kubectl c
onfig set-context --current --namespace=t9-2022630          kubectl config set-contex
t --current --namespace=t9-20226302          kubectl config set-context --current --na
mespace=t9-202263027          kubectl config set-context --current --namespace=t9-20226
30278
Context "t9-2022630278-aks" modified.
PS /home/gustavo>
```



```
PS /home/gustavo>
PS /home/gustavo> kubectl config set-context --current --namespace=t9-2022630278
Context "t9-2022630278-aks" modified.
PS /home/gustavo>
PS /home/gustavo> |
```

**Figura 10.2 Creacion del namespace**

- Se instaló el Secret mysql-credentials-gu, mysql-credentials-ga, mysql-credentials-gc con los parámetros de conexión de MySQL por servicio.