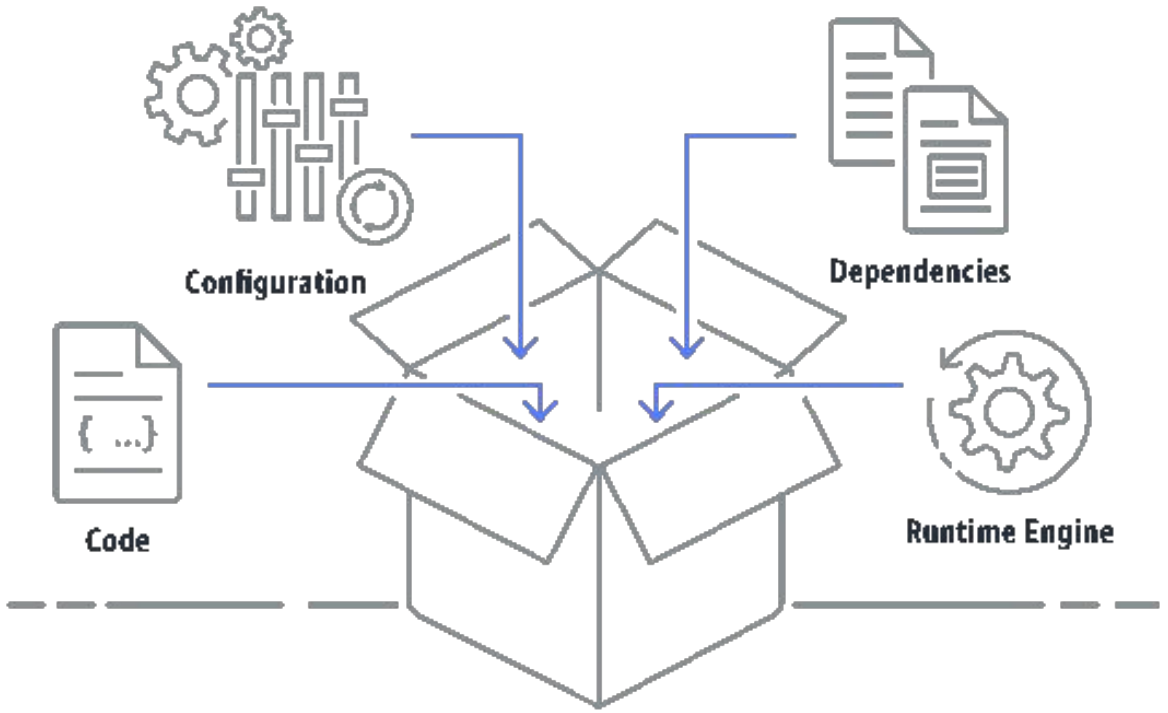
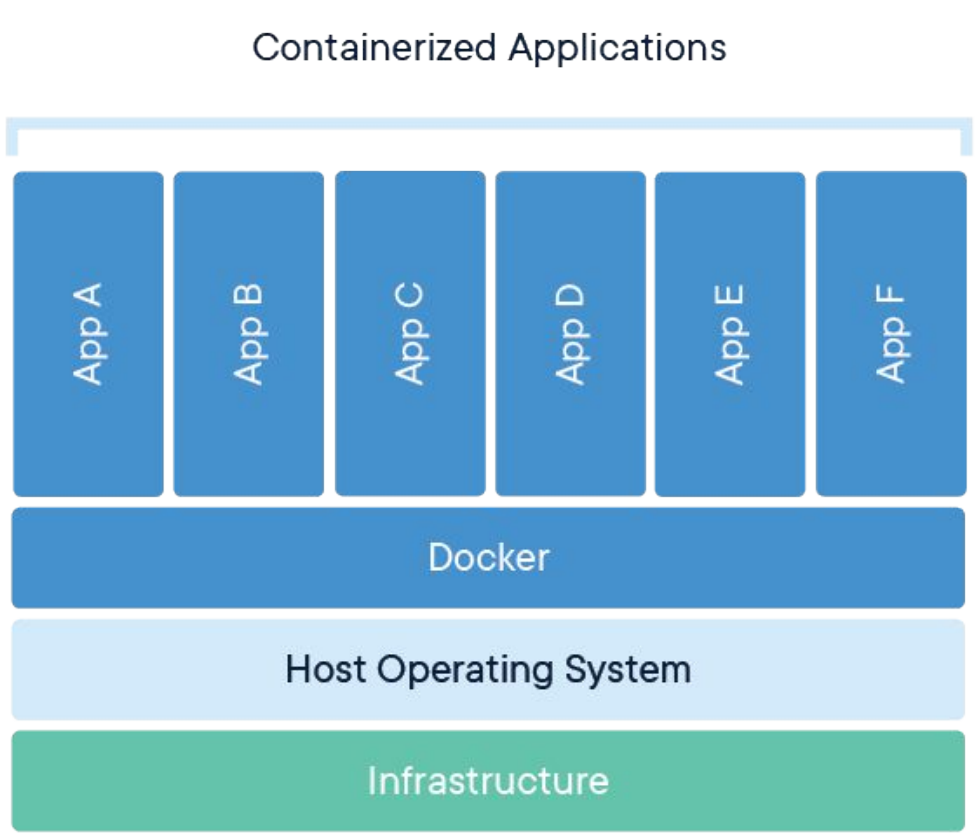
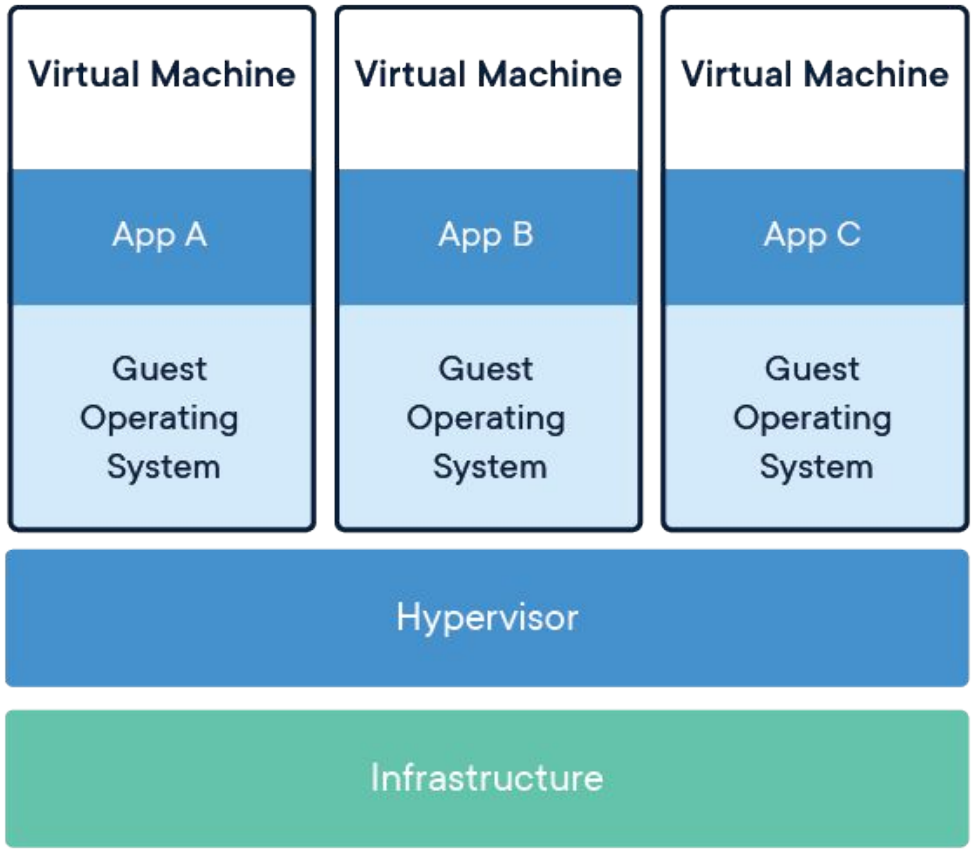
¿Qué es un contenedor?



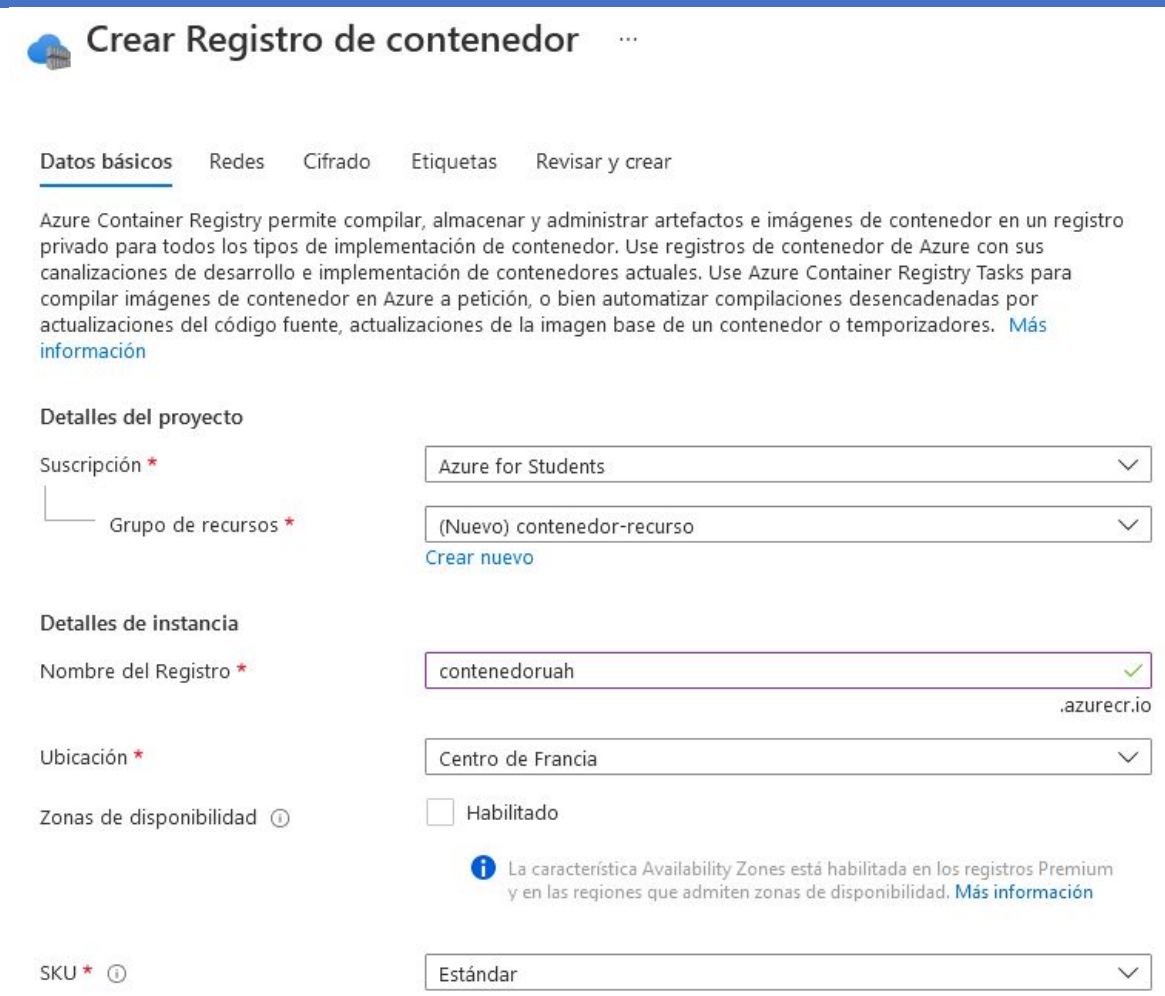
Contenedores vs. Máquinas virtuales





Azure Container Registry

Crear registro contenedor



Dockerfile

DockerFile

```
1  FROM   node:9-alpine
2  ADD    https://raw.githubusercontent.com/Azure-Samples/acr-build-helloworld-node/master/package.json /
3  ADD    https://raw.githubusercontent.com/Azure-Samples/acr-build-helloworld-node/master/server.js /
4  RUN    npm install
5  EXPOSE 80
6  CMD    ["node", "server.js"]
```

https://docs.docker.com/engine/reference/builder/
https://github.com/Azure-Samples/acr-build-helloworld-node

Compilar en Azure Container Registry

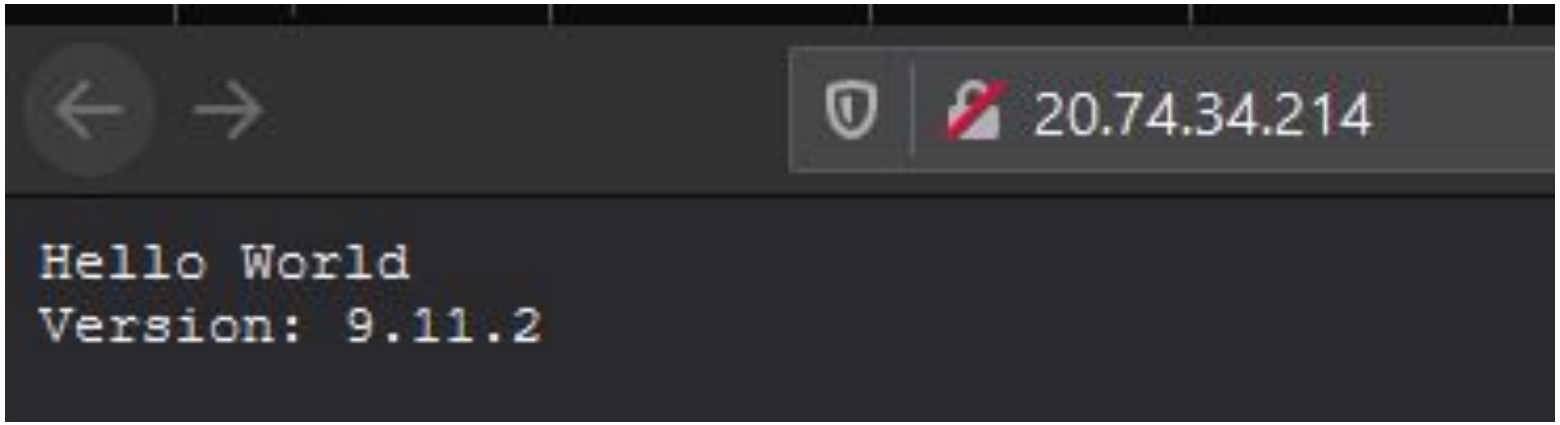
```
az acr build --registry repositoriouah --image helloacrtasks:v1 .
```

* El punto al final del comando hará que busque el archivo llamado Dockerfile en el directorio actual

Implementar instancia contenedor

```
az container create \
    --resource-group contenedor-recurso \
    --name acr-tasks \
    --image contenedoruah.azurecr.io/helloacrtasks:v1 \
    --registry-login-server contenedoruah.azurecr.io \
    --ip-address Public \
    --location francecentral \
    --registry-username contenedoruah \
    --registry-password +KwFXAfWOZ6GZqrLAcNv+5S5Bg8aRHIB
```

¡Funciona!



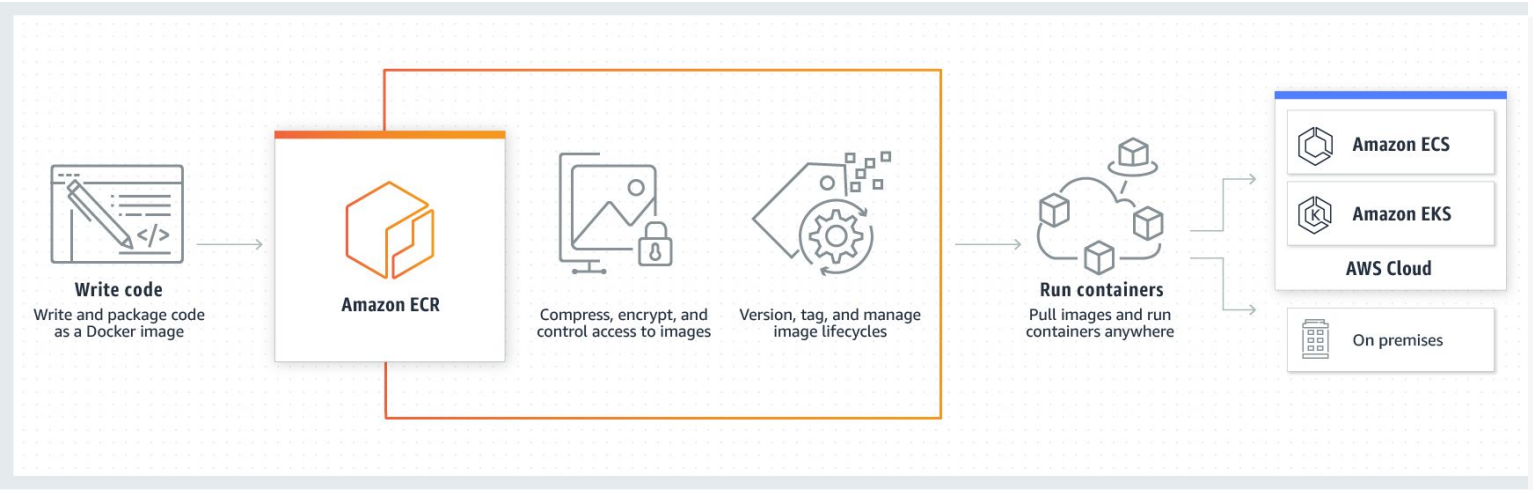
* La dirección IP se obtiene de la instancia contenedor de Azure

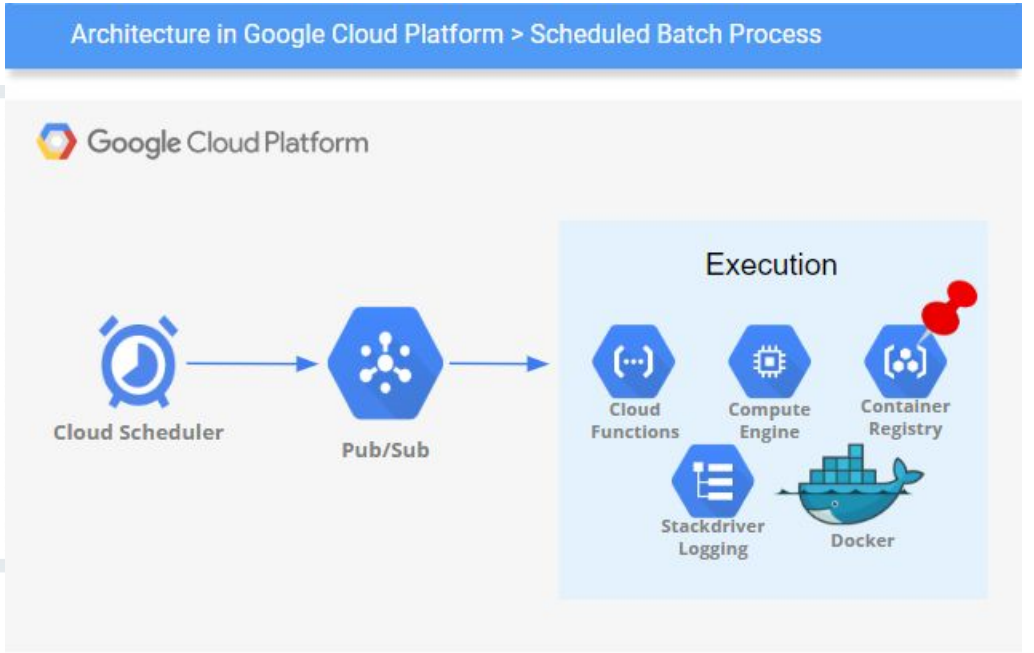
Replicación

Filtrar por nombre

Nombre ↑↓	Ubicación ↑↓	Estado de aprovisionamiento ↑↓	Estado ↑↓
northeurope	Europa del Norte	Succeeded	Ready
francecentral	Centro de Francia	Succeeded	Ready

Azure vs. Google Cloud vs. AWS





Es la misma idea, pero…

Azure vs. Google Cloud vs. AWS

Resource	Limit
Standard sku container groups per region per subscription	100[1]
Dedicated sku container groups per region per subscription	0[1]
Number of containers per container group	60
Number of volumes per container group	20

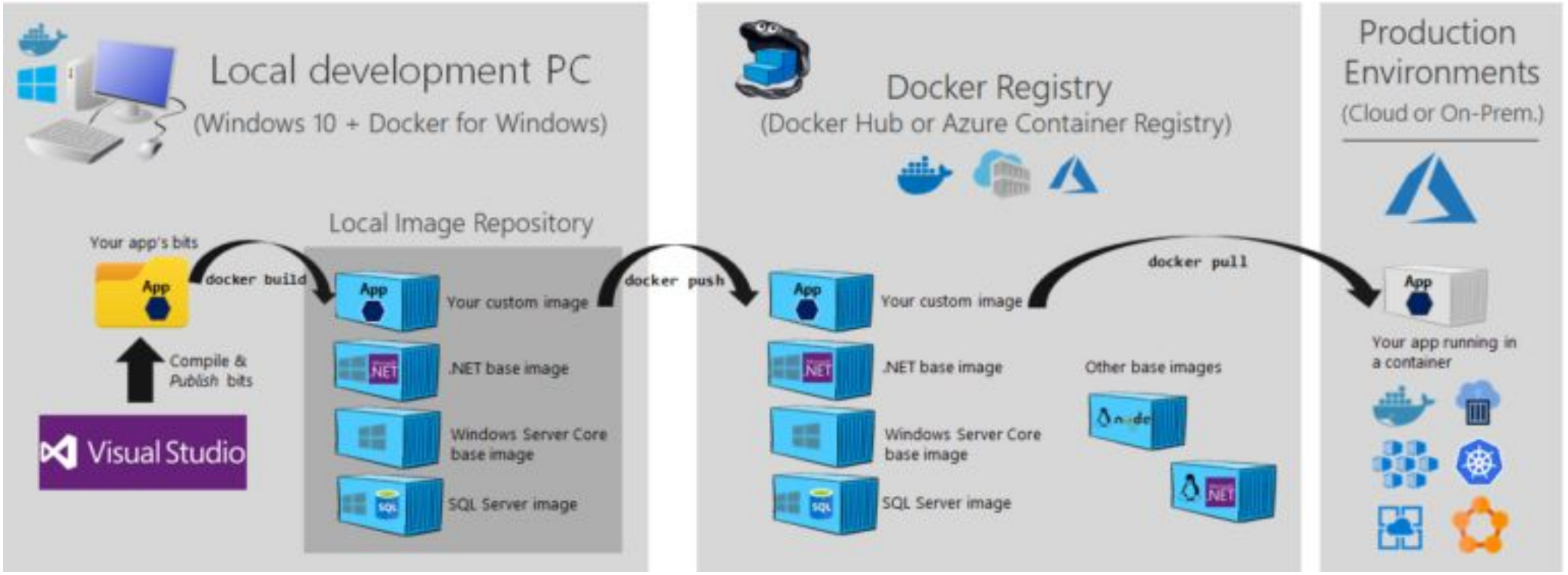
Service quota	Description	Default quota value
Registered repositories	The maximum number of repositories that you can create per Region.	10,000
Image per repository	The maximum number of images per repository.	10,000

Any request sent to a Container Registry host in the `gcr.io` domain has a 2 hour timeout limit.

The fixed rate limits per client IP address are:

- 50,000 HTTP requests every 10 minutes
- 1,000,000 HTTP requests per day

Conclusiones



Azure Container Instances

Ejecución de Azure Container Instances

```
a_cortesc@Azure:~$ az group create --name learn-deploy-aci-rg --location eastus
{
  "id": "/subscriptions/77f3f862-fea1-4862-ada8-d9898292c902/resourceGroups/learn-deploy-aci-rg",
  "location": "eastus",
  "managedBy": null,
  "name": "learn-deploy-aci-rg",
  "properties": {
    "provisioningState": "Succeeded"
  },
  "tags": null,
  "type": "Microsoft.Resources/resourceGroups"
}
```

Grupo de recursos

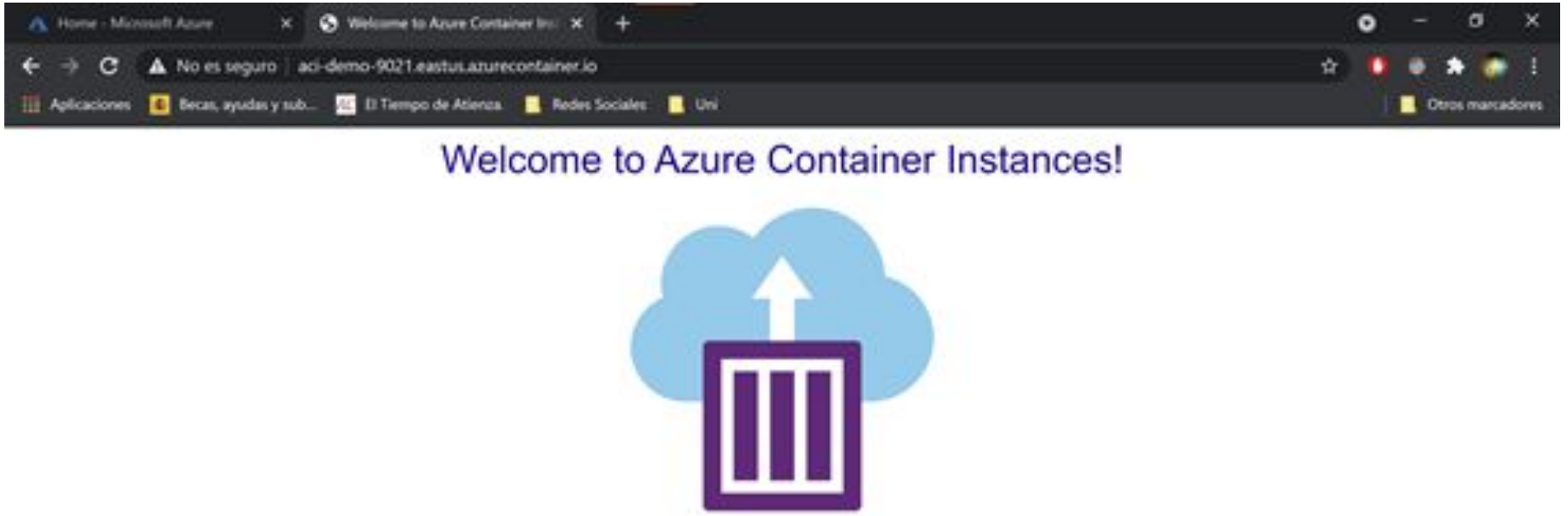
```
a_cortesc@Azure:~$ az container show \
>    --resource-group learn-deploy-aci-rg \
>    --name mycontainer \
>    --query "{FQDN:ipAddress.fqdn,ProvisioningState:provisioningState}" \
>    --out table
FQDN                                ProvisioningState
----------------------------------  -------------------
aci-demo-9021.eastus.azurecontainer.io  Succeeded
```

Comprobar su estado

```
a_cortesc@Azure:~$ az container create \
>    --resource-group learn-deploy-aci-rg \
>    --name mycontainer \
>    --image microsoft/aci-helloworld \
>    --ports 80 \
>    --dns-name-label $DNS_NAME_LABEL \
>    --location eastus
- Running ..
```

Instancia de contenedor

Vista desde un explorador...



Control del comportamiento de reinicio

```
a_cortesc@Azure:~$ az container create \
>   --resource-group learn-deploy-aci-rg \
>   --name mycontainer-restart-demo \
>   --image microsoft/aci-wordcount:latest \
>   --restart-policy OnFailure \
>   --location eastus
/ Running ..
```

Iniciar el contenedor

```
a_cortesc@Azure:~$ az container logs \
>   --resource-group learn-deploy-aci-rg \
>   --name mycontainer-restart-demo
[('the', 990),
 ('and', 702),
 ('of', 628),
 ('to', 610),
 ('I', 544),
 ('you', 495),
 ('a', 453),
 ('my', 441),
 ('in', 399),
 ('HAMLET', 386)]
```

Registros del contenedor

Establecimiento de variables de entorno

```
a_cortesc@Azure:~$ COSMOS_DB_ENDPOINT=$(az cosmosdb create \
>   --resource-group learn-deploy-aci-rg \
>   --name $COSMOS_DB_NAME \
>   --query documentEndpoint \
>   --output tsv)
```

Crear instancia de Cosmos DB

```
a_cortesc@Azure:~$ COSMOS_DB_MASTERKEY=$(az cosmosdb keys list \
>   --resource-group learn-deploy-aci-rg \
>   --name $COSMOS_DB_NAME \
>   --query primaryMasterKey \
>   --output tsv)
```

Clave de conexión

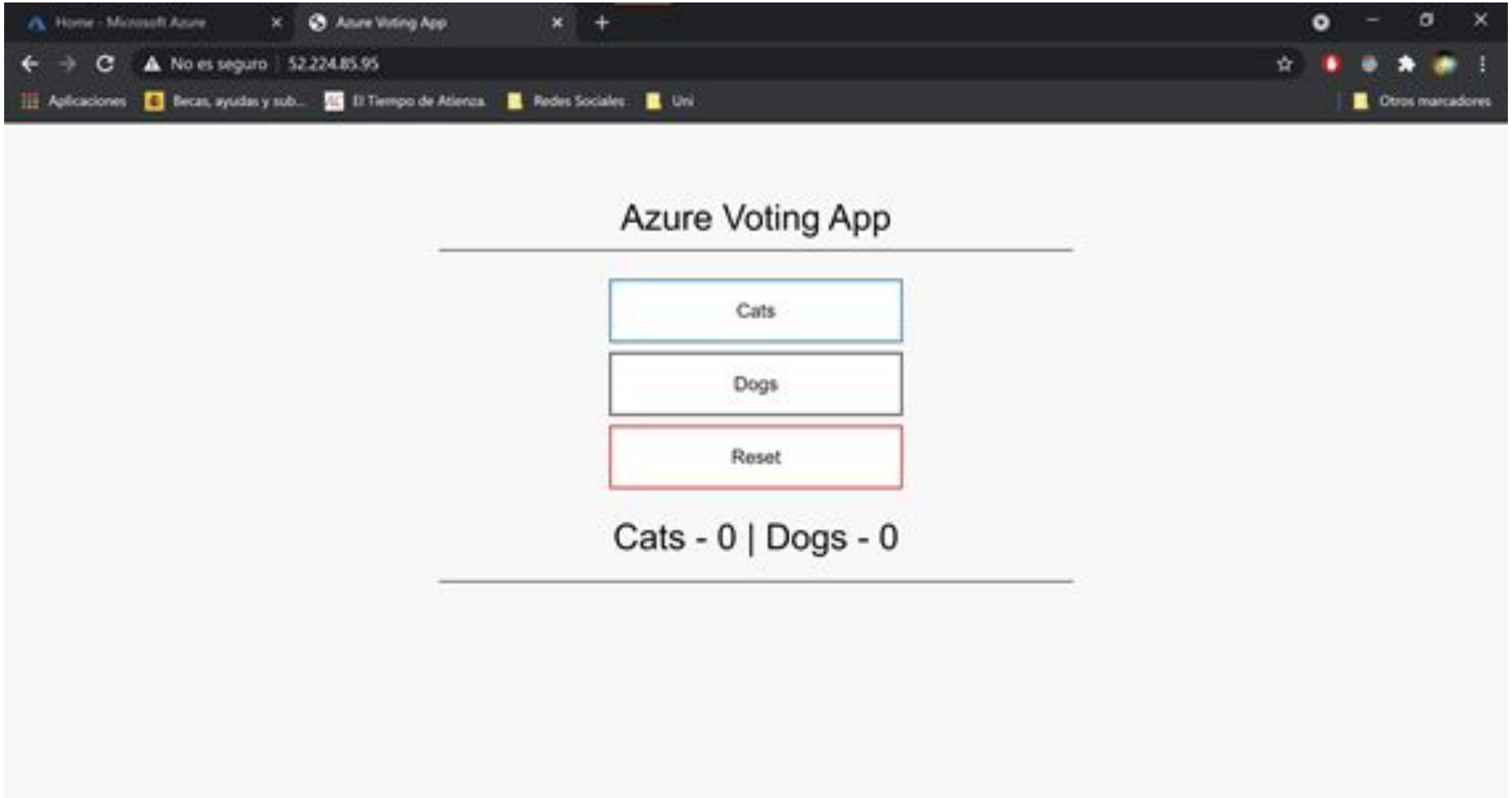
```
a_cortesc@Azure:~$ az container create \
>   --resource-group learn-deploy-aci-rg \
>   --name aci-demo \
>   --image microsoft/azure-vote-front:cosmosdb \
>   --ip-address Public \
>   --location eastus \
>   --environment-variables \
>     COSMOS_DB_ENDPOINT=$COSMOS_DB_ENDPOINT \
>     COSMOS_DB_MASTERKEY=$COSMOS_DB_MASTERKEY
- Running ..
```

Crear contenedor

```
a_cortesc@Azure:~$ az container show \
>   --resource-group learn-deploy-aci-rg \
>   --name aci-demo \
>   --query ipAddress.ip \
>   --output tsv
52.224.85.95
```

Obtener dirección IP

Vista desde un explorador...



Uso de volúmenes de datos

```
a_cortesc@Azure:~$ az storage account create \
>    --resource-group learn-deploy-aci-rg \
>    --name $STORAGE_ACCOUNT_NAME \
>    --sku Standard_LRS \
>    --location eastus
- Running ..
```

Crear cuenta de almacenamiento

```
a_cortesc@Azure:~$ az storage share create --name aci-share-demo
{
  "created": true
}
```

Crear recurso compartido de archivos

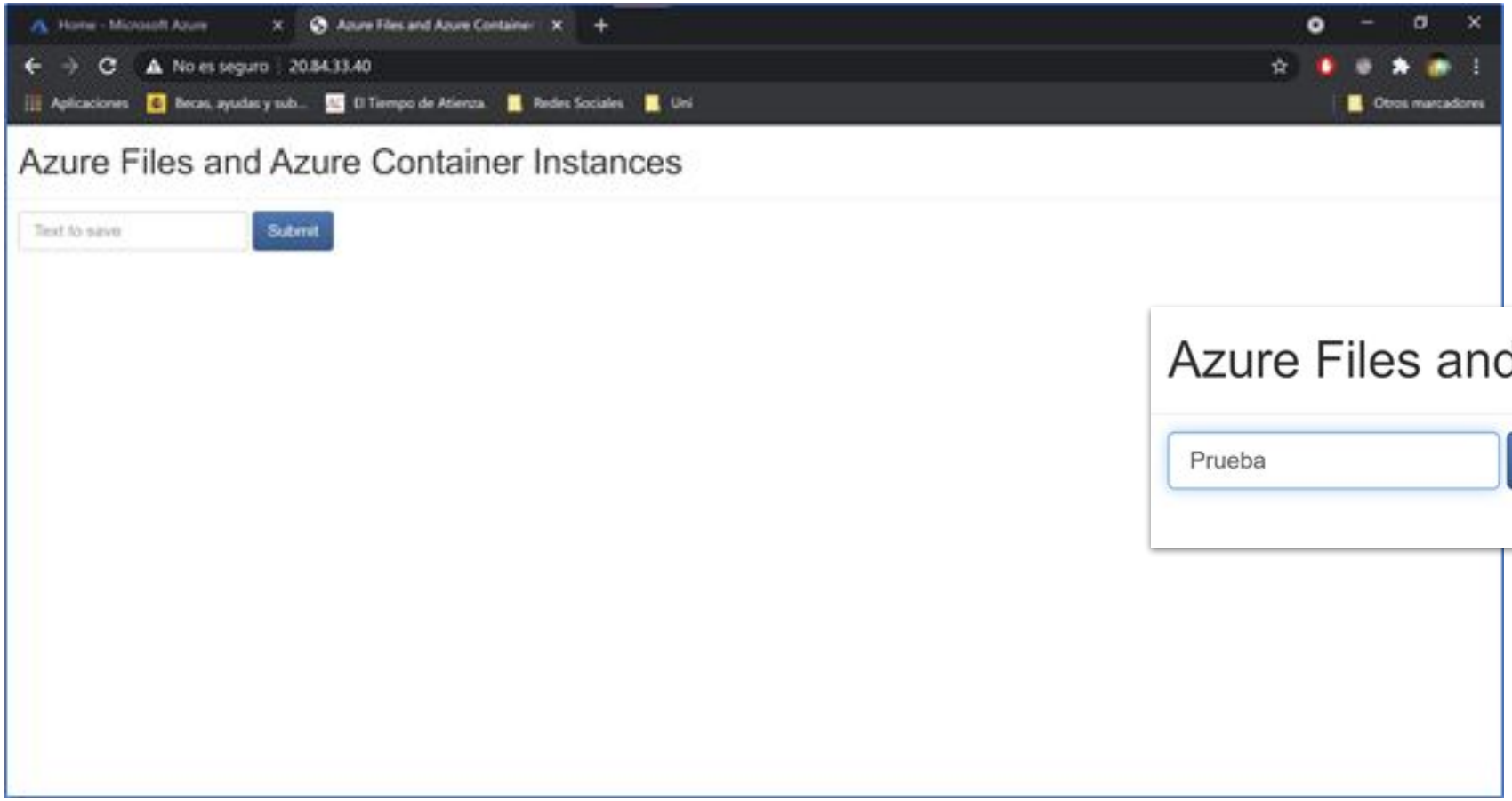
```
a_cortesc@Azure:~$ az container create \
>    --resource-group learn-deploy-aci-rg \
>    --name aci-demo-files \
>    --image microsoft/aci-hellofiles \
>    --location eastus \
>    --ports 80 \
>    --ip-address Public \
>    --azure-file-volume-account-name $STORAGE_ACCOUNT_NAME \
>    --azure-file-volume-account-key $STORAGE_KEY \
>    --azure-file-volume-share-name aci-share-demo \
>    --azure-file-volume-mount-path /aci/logs/
- Running ..
```

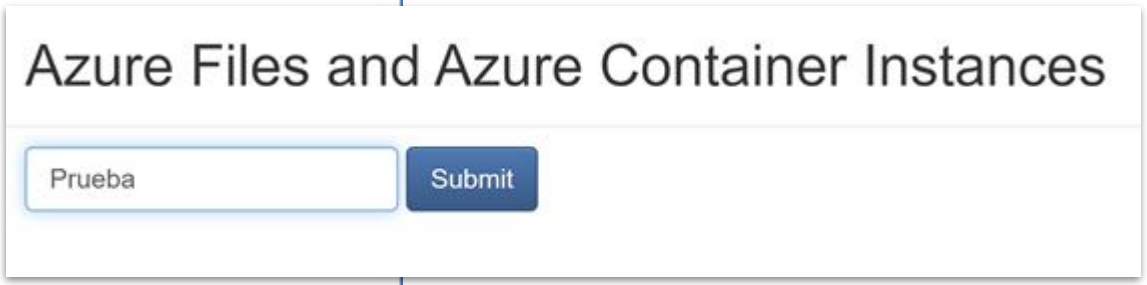
Crear contenedor

```
a_cortesc@Azure:~$ az container show \
>    --resource-group learn-deploy-aci-rg \
>    --name aci-demo-files \
>    --query ipAddress.ip \
>    --output tsv
20.84.33.40
```

Obtener IP

Vista desde un explorador...

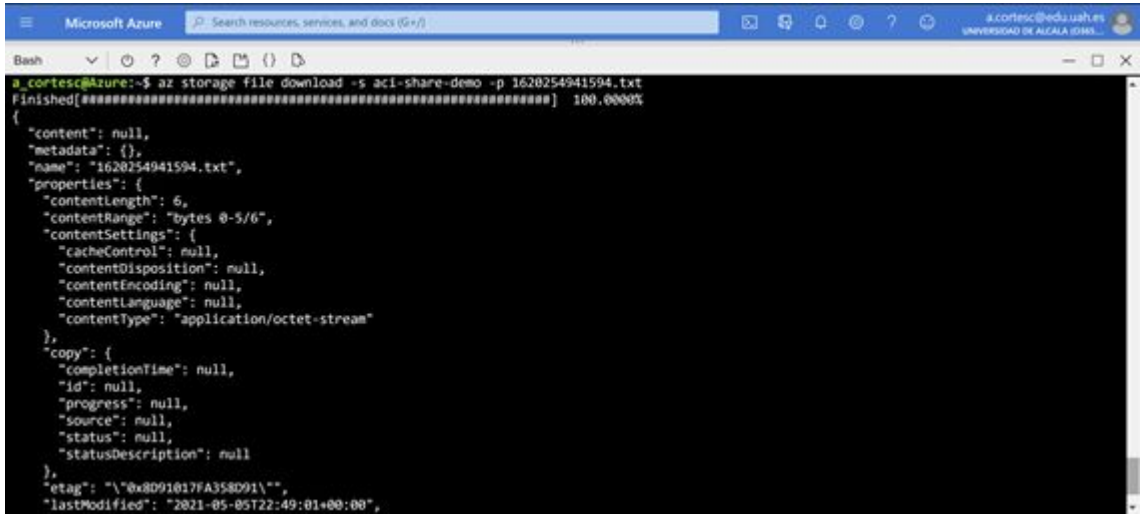




Mostrar contenido del archivo

```
a_cortesc@Azure:~$ az storage file list -s aci-share-demo -o table
Name              Content Length    Type    Last Modified
----------------  ----------------  ------  ---------------
1620254941594.txt  6                file
```

Archivos en el recurso compartido

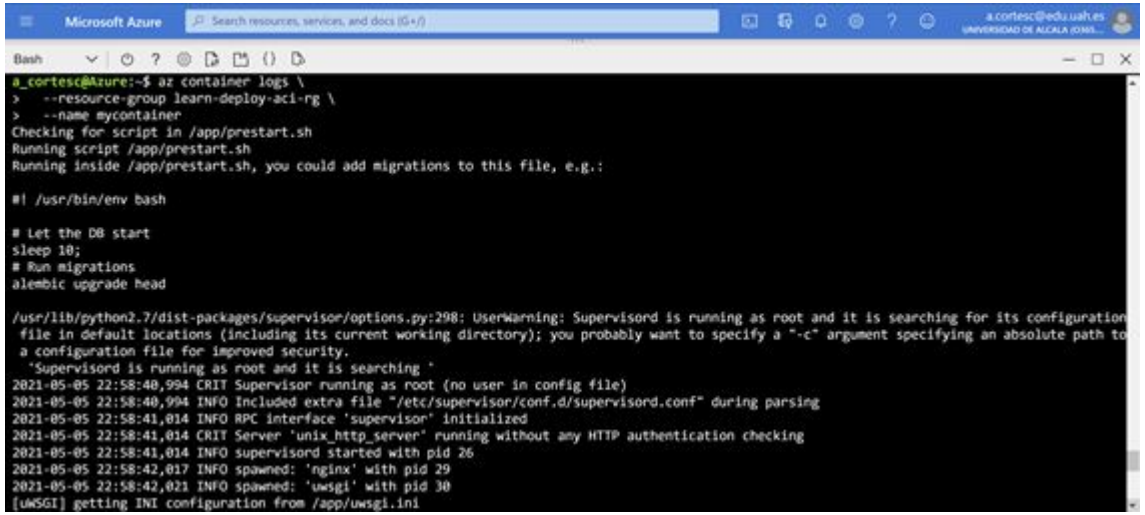


Descarga del archivo

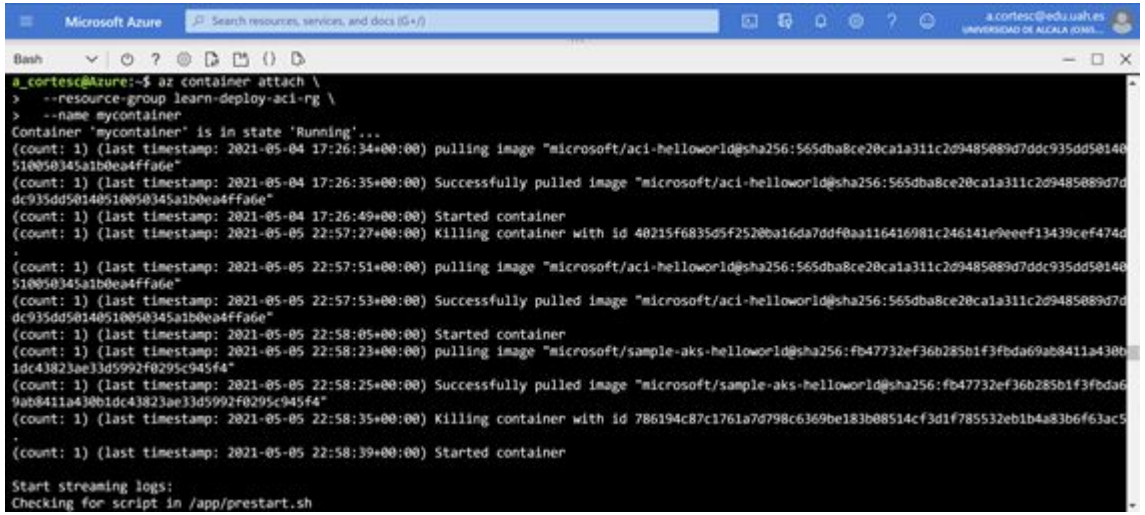
```
a_cortesc@Azure:~$ cat 1620254941594.txt
Pruebaa_cortesc@Azure:~$
```

Imprimir contenido

Solución de problemas de Azure Container Instances



Obtención de registros de una instancia de contenedor

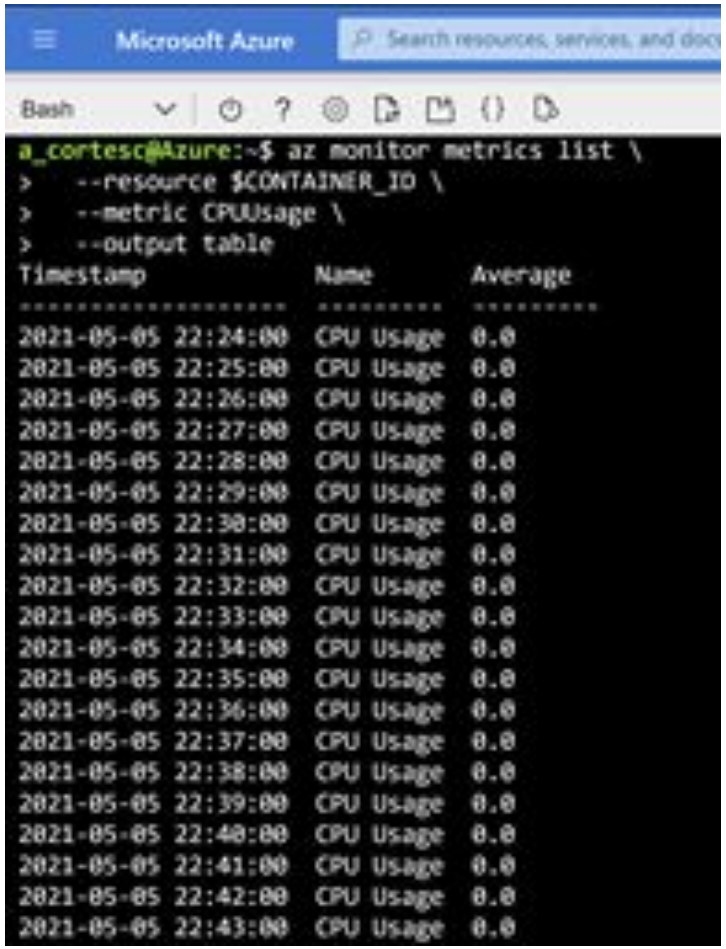


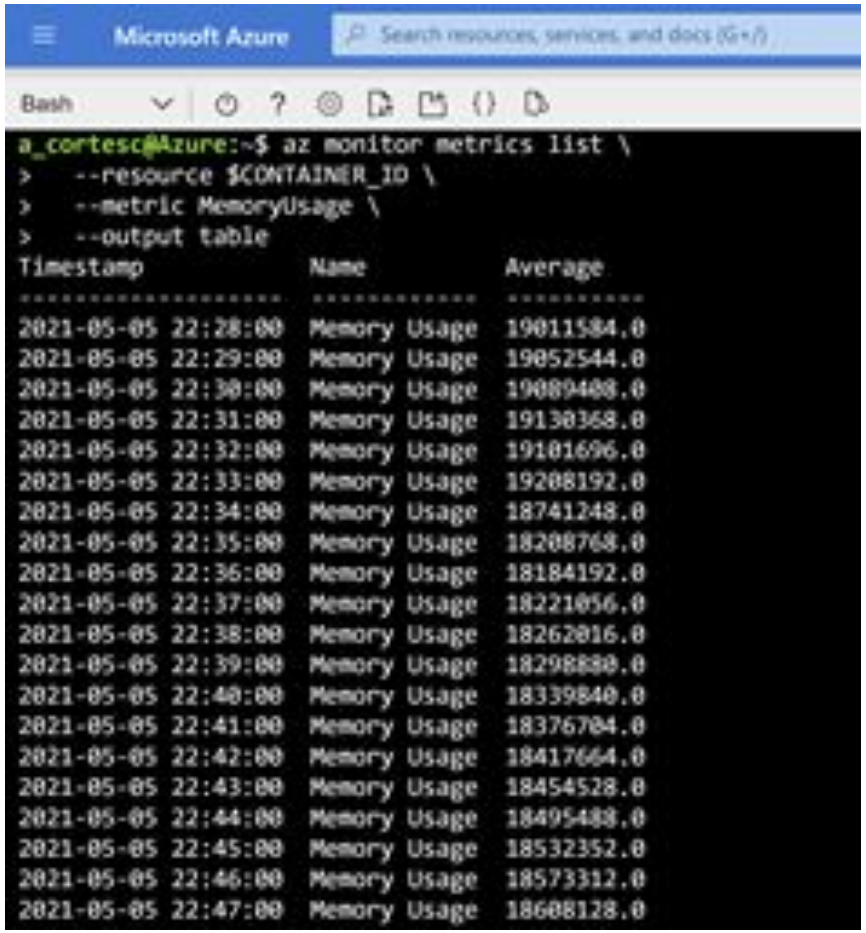
Obtención de eventos de contenedor

```
a_cortesc@Azure:~$ az container exec \
>   --resource-group learn-deploy-aci-rg \
>   --name mycontainer \
>   --exec-command /bin/sh
# ls
__pycache__  main.py  prestart.sh  static  templates  uwsgi.ini
# exit
```

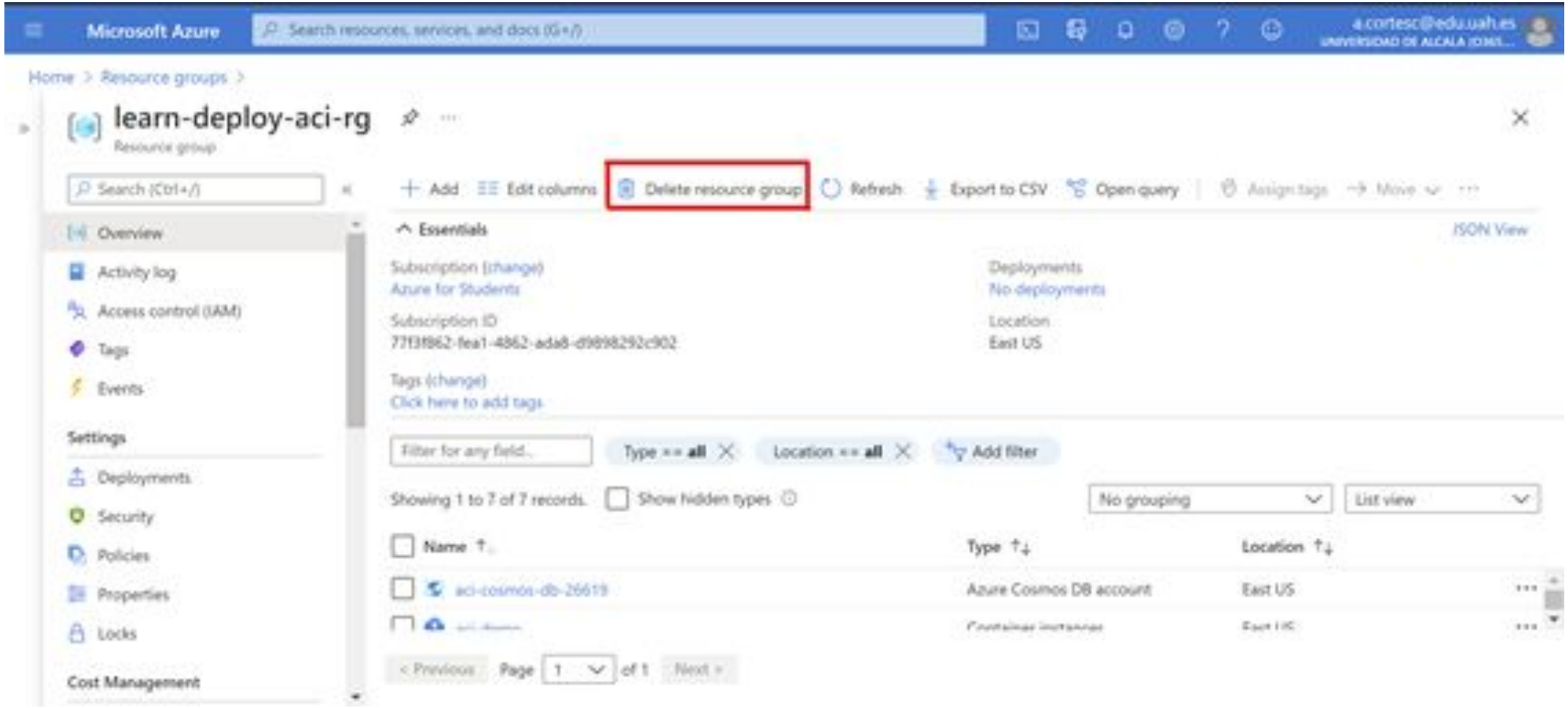
Ejecución de un comando en el contenedor

Supervisión del uso de CPU y memoria en su contenedor





Limpieza de recursos



Azure vs. Google Cloud vs. AWS

Azure: Container Instances

Ejecución de contenedores sin administrar servidores.

AWS: AWS Fargate

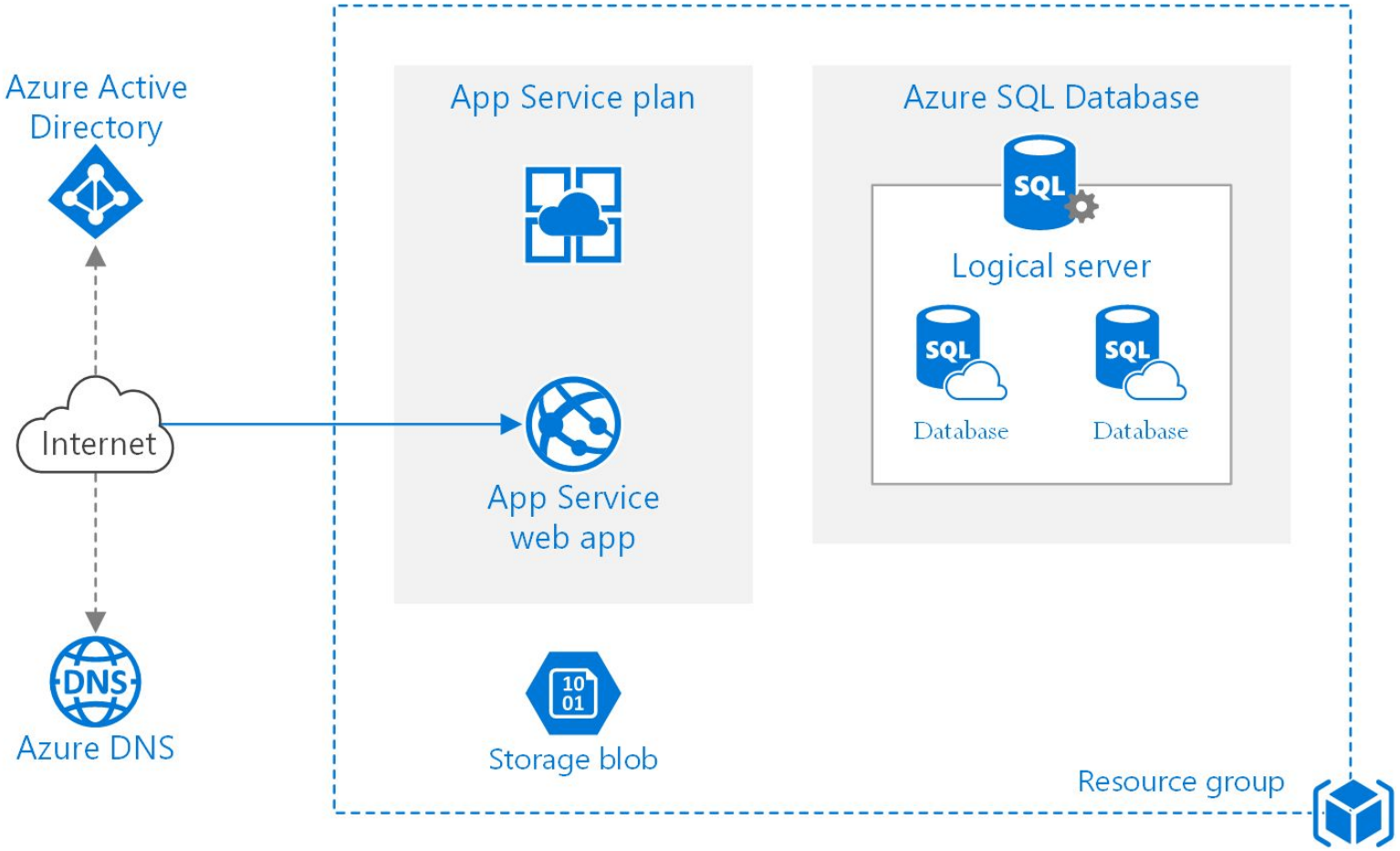
Cómputo sin servidor para contenedores.

Google Cloud: Cloud Run

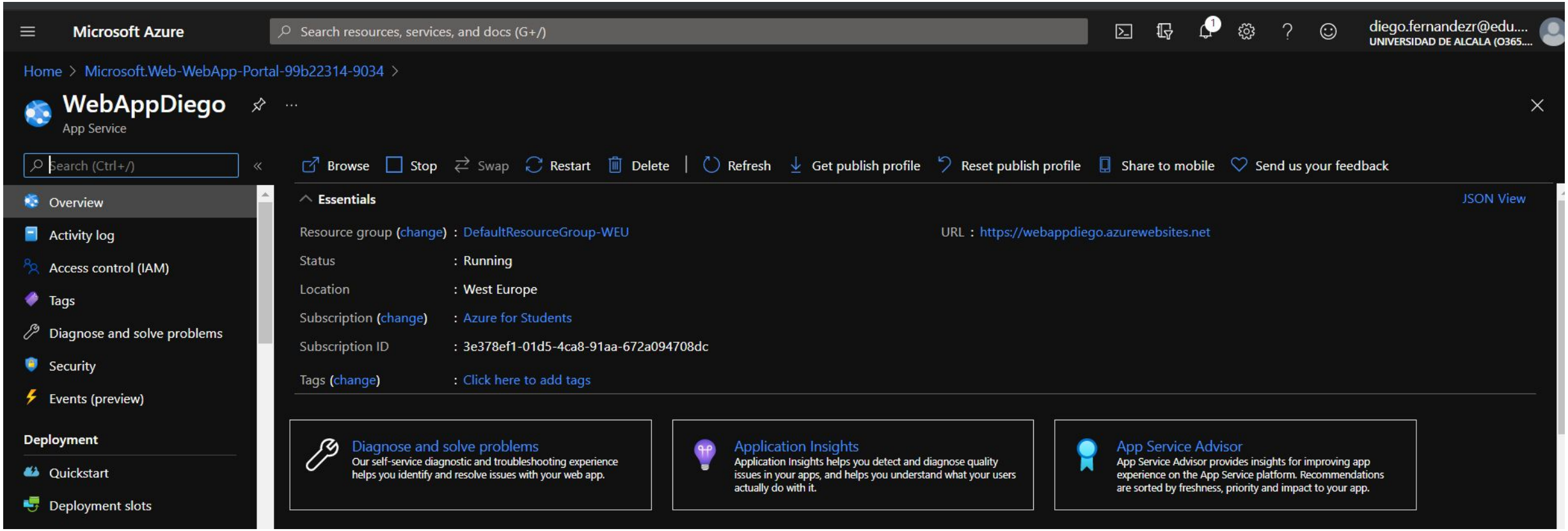
Desarrollo y despliegue de aplicaciones en contenedores en una plataforma sin servidor totalmente gestionada.

Conclusiones

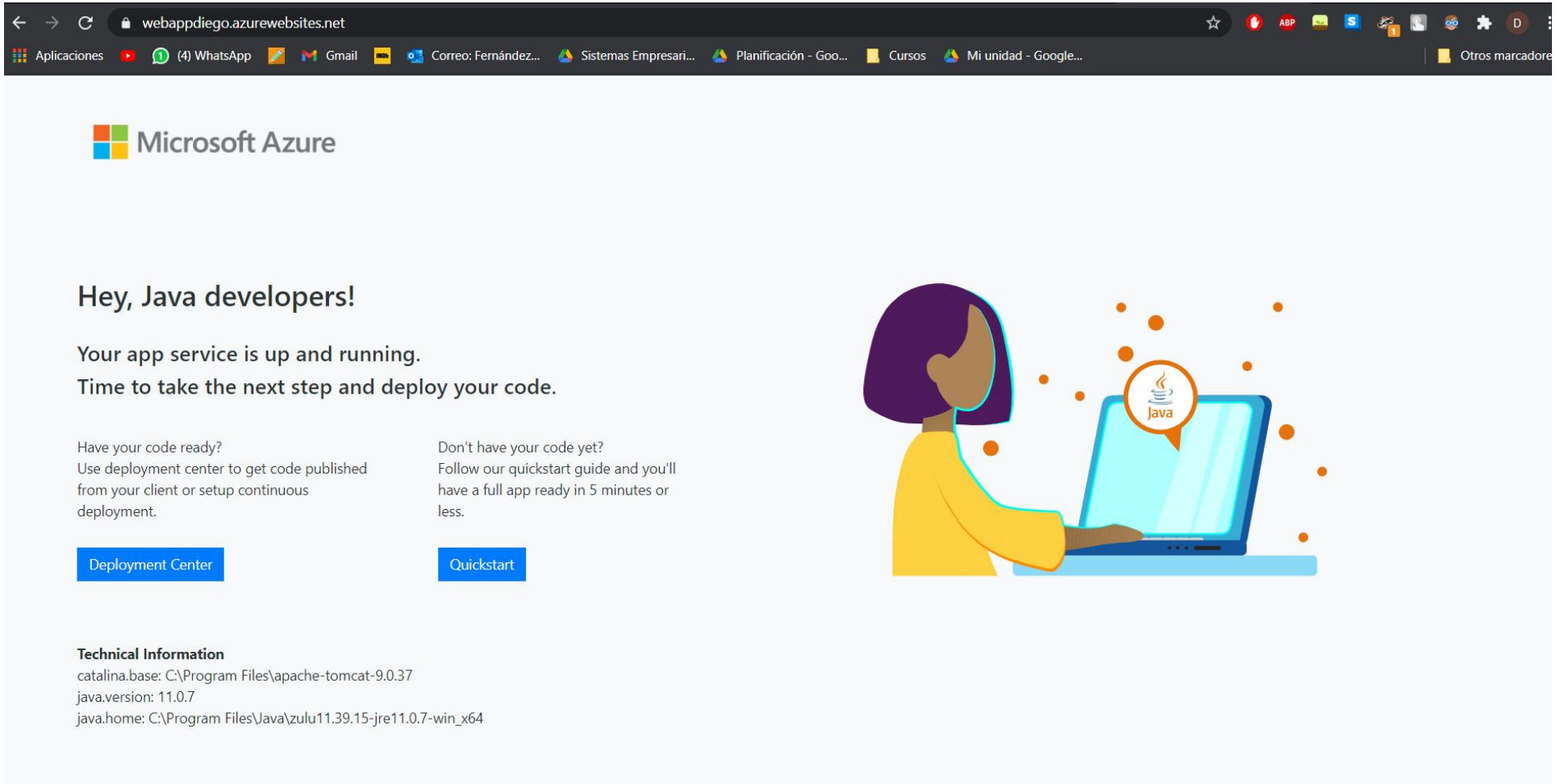
Hospedaje de una aplicación web con Azure App Service



Creación de una aplicación web



Comprobación de la URL



Iniciación y uso de Git

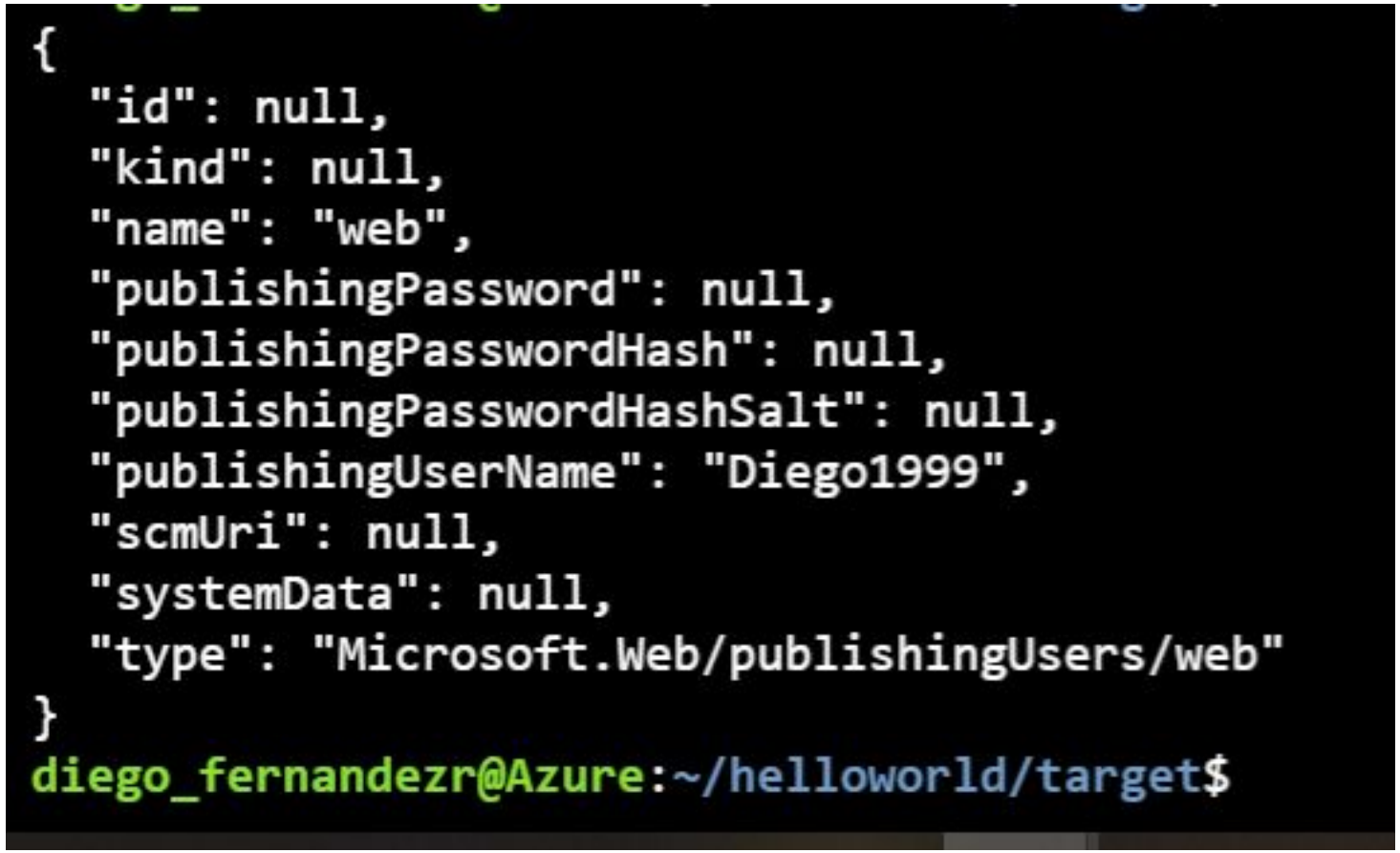
```
diego_fernandezr@Azure:~$ git init
Initialized empty Git repository in /home/diego_fernandezr/.git/
diego_fernandezr@Azure:~$ git add .

^C
diego_fernandezr@Azure:~$ git add .
^Z
[1]+  Stopped                 git add .
diego_fernandezr@Azure:~$ git init
Reinitialized existing Git repository in /home/diego_fernandezr/.git/
diego_fernandezr@Azure:~$ git add .
fatal: Unable to create '/home/diego_fernandezr/.git/index.lock': File exists.
```

Empaquetado de contenidos de la app

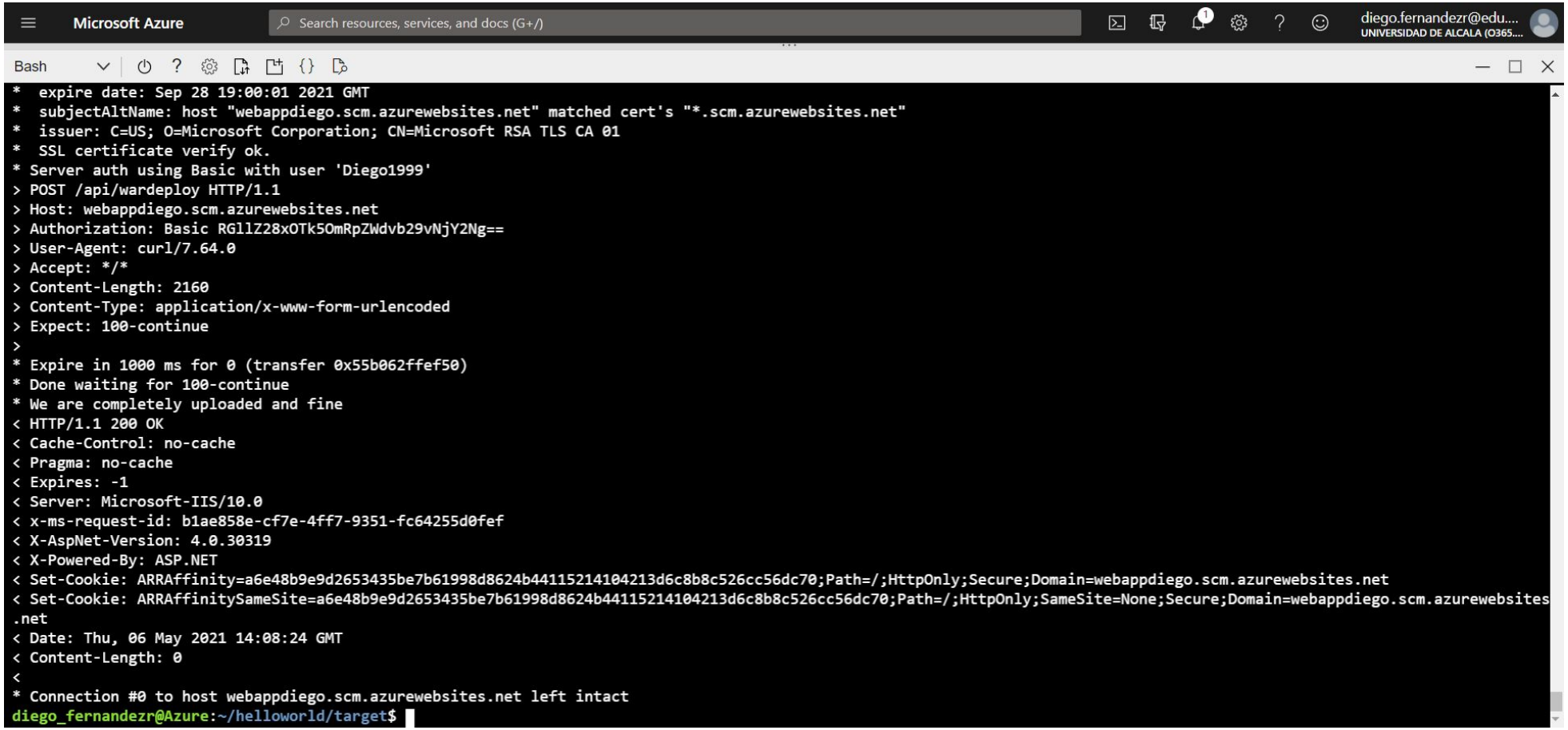
```
[INFO] Packaging webapp
[INFO] Assembling webapp [helloworld] in [/home/diego_fernandezr/helloworld/target/helloworld]
[INFO] Processing war project
[INFO] Copying webapp resources [/home/diego_fernandezr/helloworld/src/main/webapp]
[INFO] Webapp assembled in [60 msecs]
[INFO] Building war: /home/diego_fernandezr/helloworld/target/helloworld.war
[INFO] WEB-INF/web.xml already added, skipping
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  7.657 s
[INFO] Finished at: 2021-05-06T13:54:31Z
[INFO] ------------------------------------------------------------------------
diego_fernandezr@Azure:~/helloworld$
```

```
diego_fernandezr@Azure:~/helloworld$ cd target
diego_fernandezr@Azure:~/helloworld/target$ ls
classes  helloworld  helloworld.war  maven-archiver
diego_fernandezr@Azure:~/helloworld/target$
```

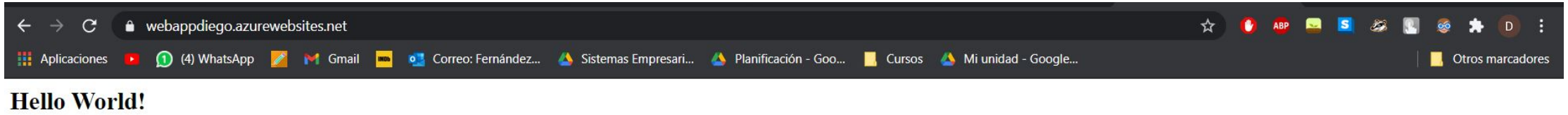
Creación de credenciales



Traspaso de contenidos a la web hospedada

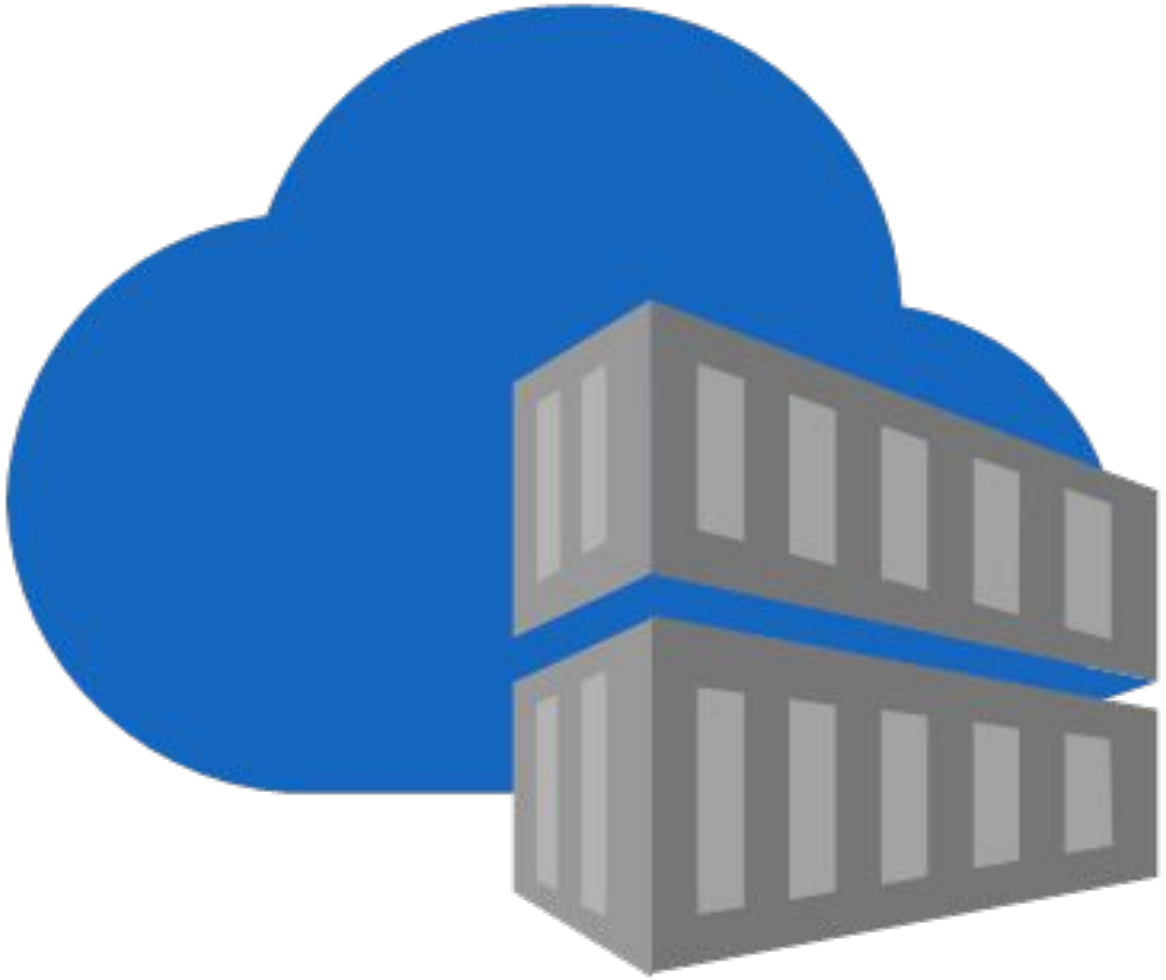


Resultado y comparación con otros servicios



Conclusiones

Contenedores y Api



Api Apps

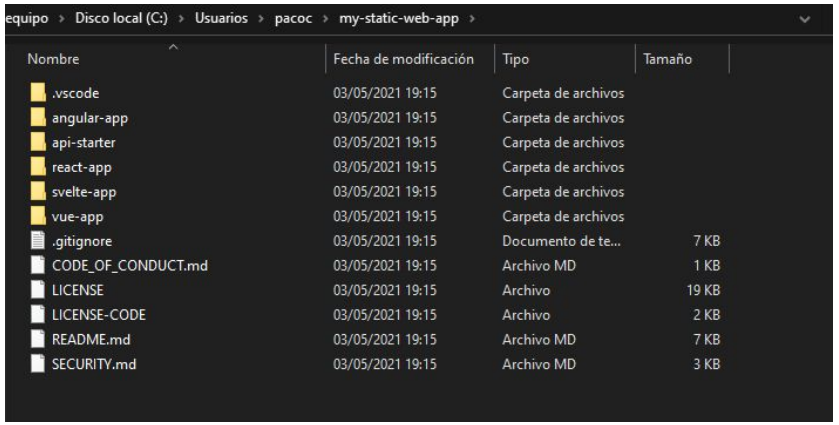
Azure Static Web Apps

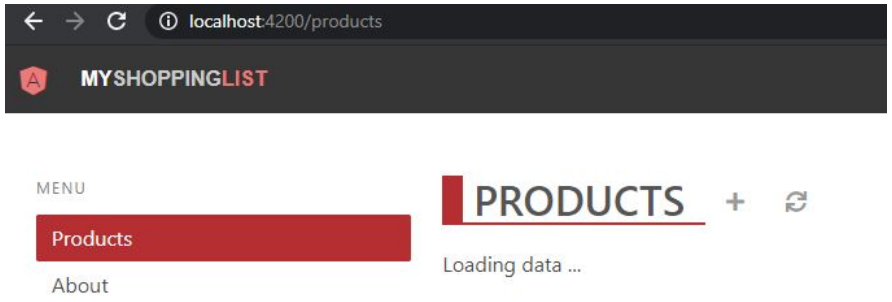
Aplicación de lista de la compra

Ejecución de la aplicación localmente

```
C:\Users\pacoc\my-static-web-app\angular-app>npm start

> angular-app@0.0.0 start C:\Users\pacoc\my-static-web-app\angular-app
> ng serve --proxy-config proxy.conf.json --open

? Would you like to share anonymous usage data about this project with the Angular Team at
Google under Google's Privacy Policy at https://policies.google.com/privacy? For more
details and how to change this setting, see https://angular.io/analytics. Yes

Thank you for sharing anonymous usage data. Would you change your mind, the following
command will disable this feature entirely:

    ng analytics project off

Compiling @angular/core : es2015 as esm2015
Compiling @angular/common : es2015 as esm2015
Compiling @ngrx/store : es2015 as esm2015
Compiling @angular/platform-browser : es2015 as esm2015
Compiling @angular/platform-browser-dynamic : es2015 as esm2015
Compiling @angular/common/http : es2015 as esm2015
Compiling @angular/forms : es2015 as esm2015
Compiling @angular/router : es2015 as esm2015
Compiling @ngrx/entity : es2015 as esm2015
Compiling @ngrx/effects : es2015 as esm2015
Compiling @ngrx/store-devtools : es2015 as esm2015
Compiling @ngrx/data : es2015 as esm2015
√ Browser application bundle generation complete.

Initial Chunk Files         | Names                      |      Size
vendor.js                   | vendor                     |   3.28 MB
styles.css, styles.js       | styles                     |   1.03 MB
polyfills.js                | polyfills                  | 486.51 kB
main.js                     | main                       |  34.22 kB
runtime.js                  | runtime                    |   9.02 kB

                            | Initial Total              |   4.83 MB

Lazy Chunk Files            | Names                      |      Size
products-products-module.js | products-products-module | 342.13 kB

Build at: 2021-05-03T17:36:22.663Z - Hash: 78875486e714c09a2e75 - Time: 19269ms

** Angular Live Development Server is listening on localhost:4200, open your browser on http://localhost:4200/ **


√ Compiled successfully.
√ Browser application bundle generation complete.

Initial Chunk Files   | Names  |    Size
styles.css, styles.js | styles | 1.03 MB

5 unchanged chunks

Build at: 2021-05-03T17:36:25.169Z - Hash: 56737364bdea7add9880 - Time: 2064ms

√ Compiled successfully.
```

Repositorio local de la aplicación

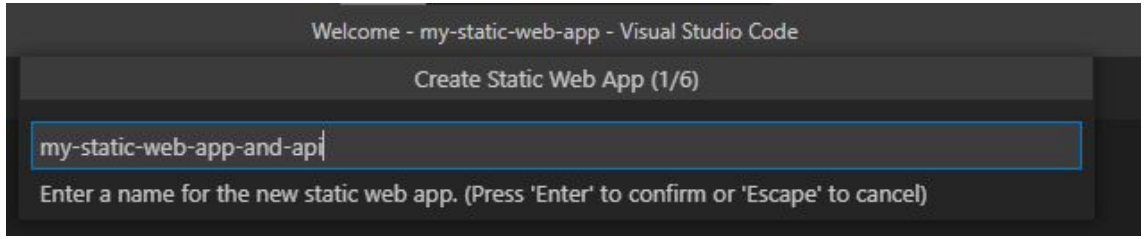




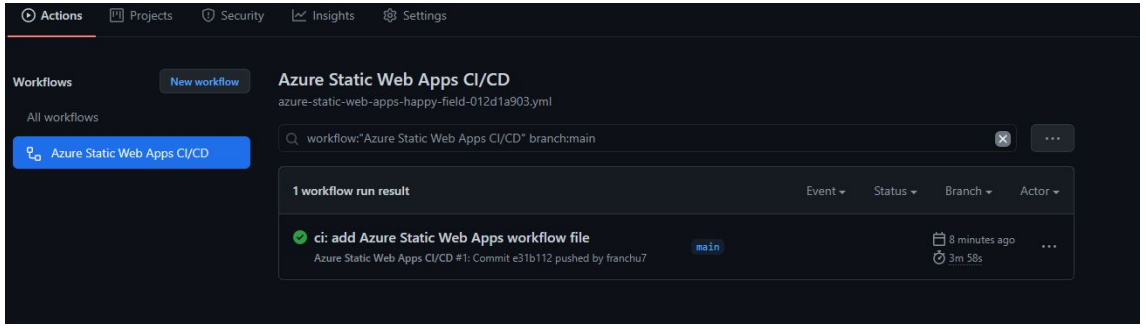
Aplicación web desde acceso local

Creación de la instancia de Static Web Apps

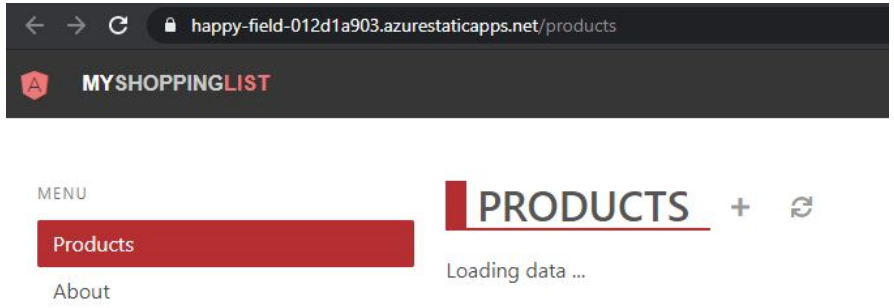
App estática desde VS Code



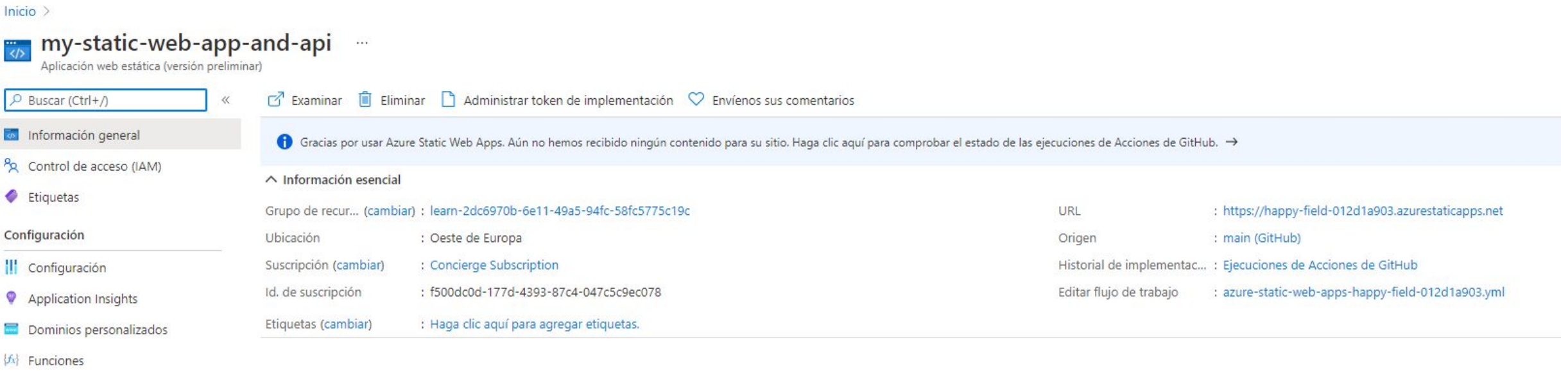
Acción de GitHub



Aplicación web accedida desde la instancia creada

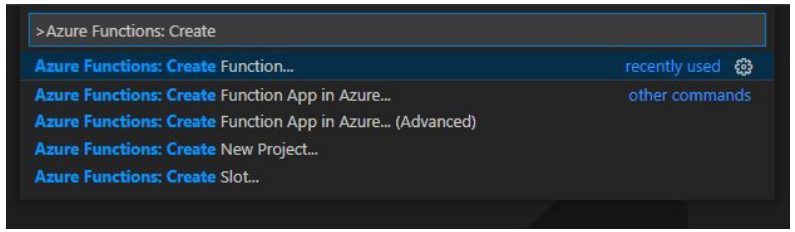


Aplicación web estática



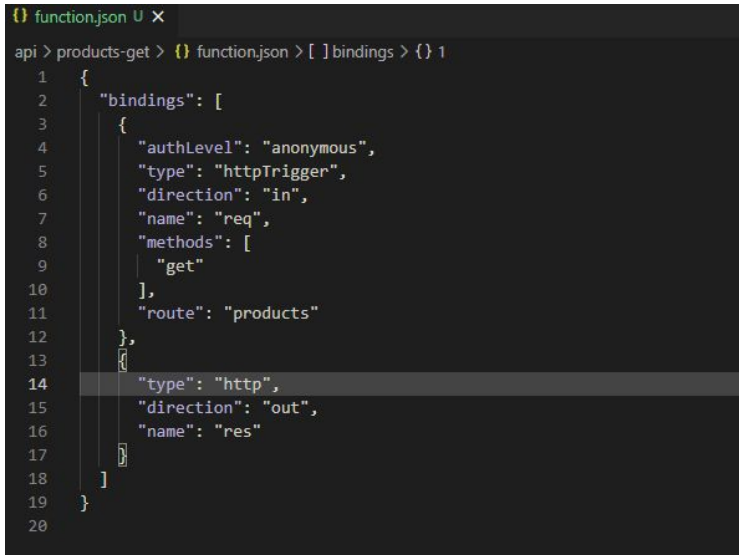
Función products-get

Creación de la función



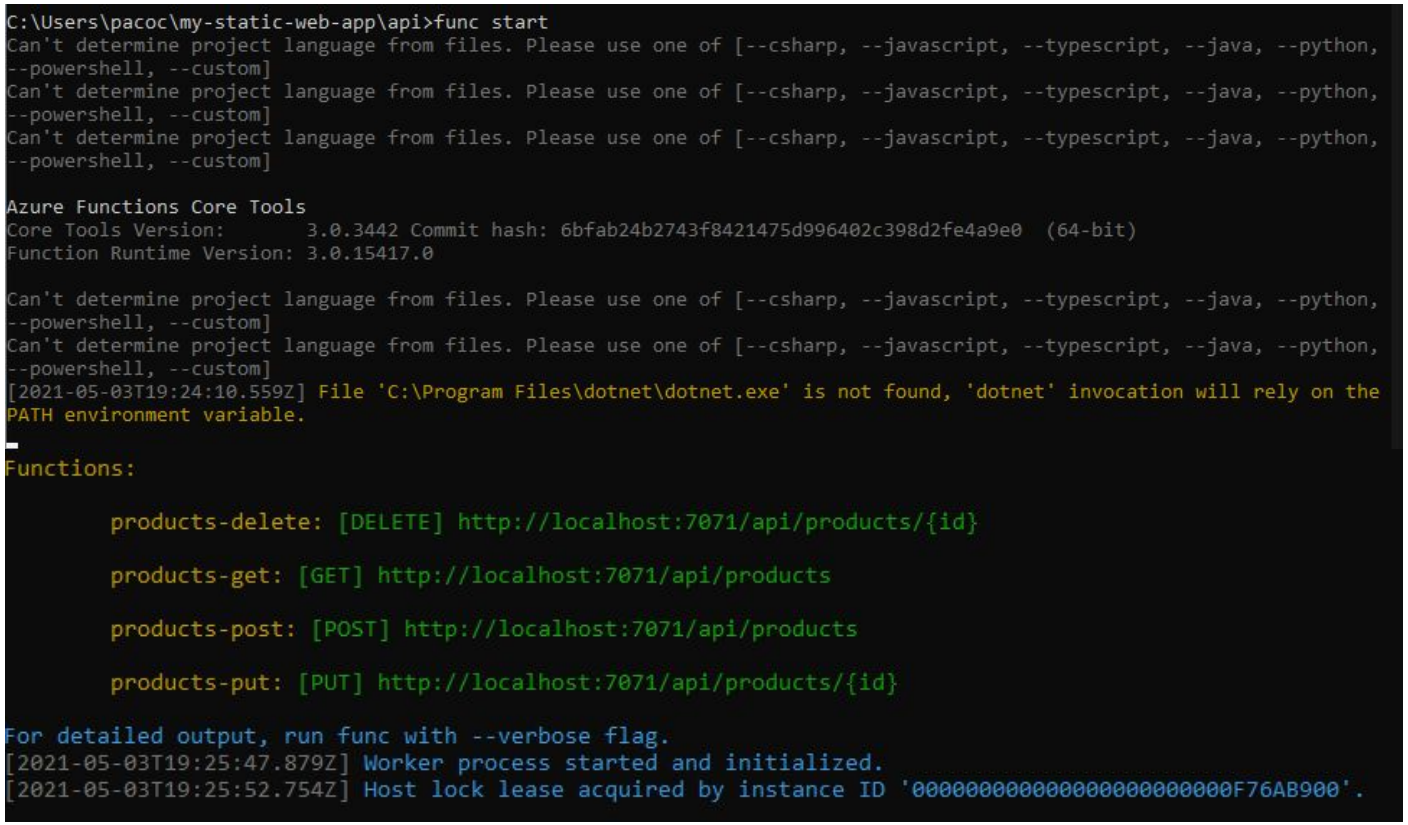
Azure Functions

Configuración de la función



Ejecución de la API

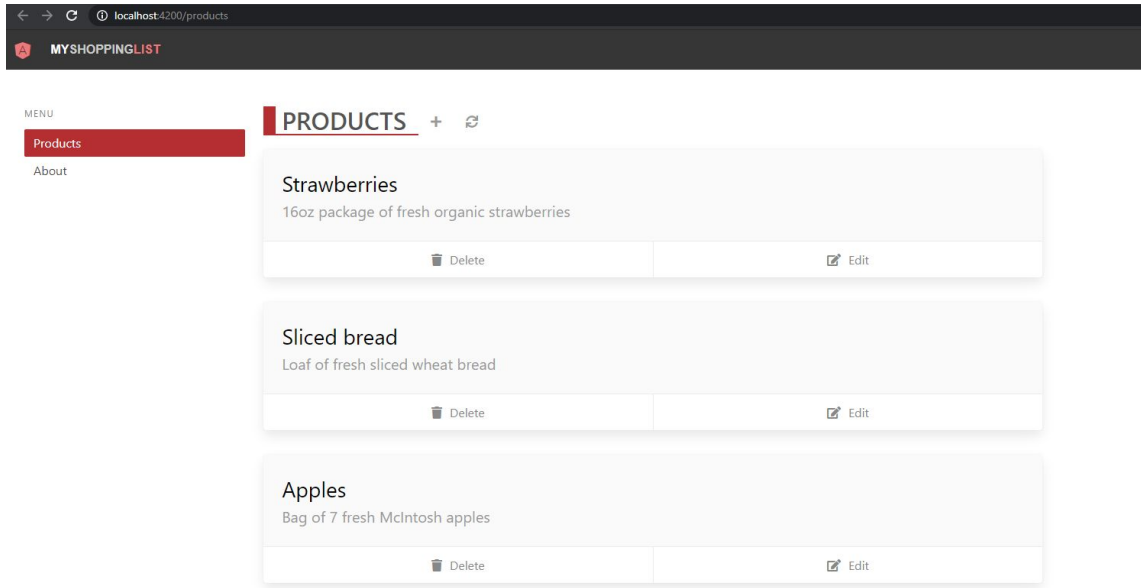
Ejecución con Azure Functions Core Tools



Aplicación web local

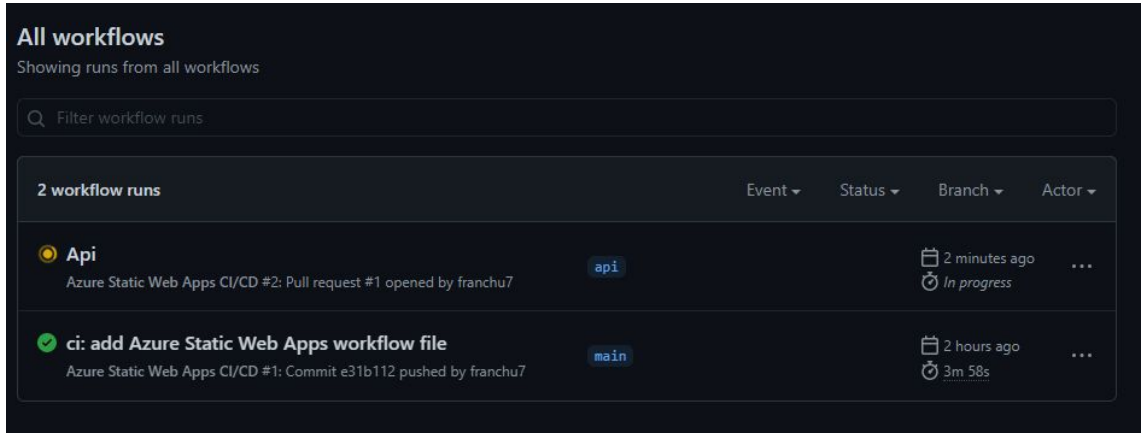
Página web tras ejecutar:

- La aplicación web localmente
- La API con las cuatro funciones

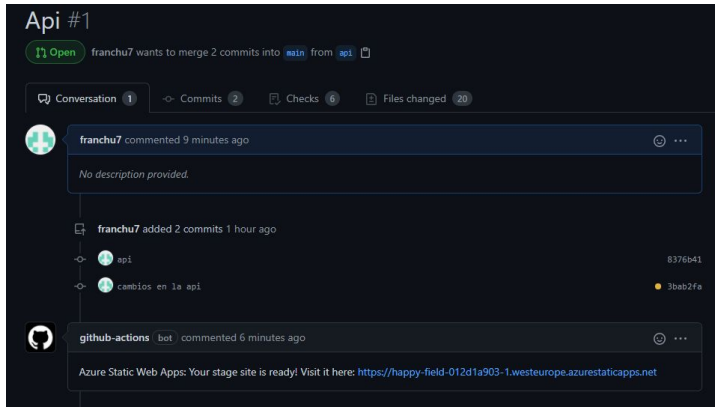


Publicación de la API

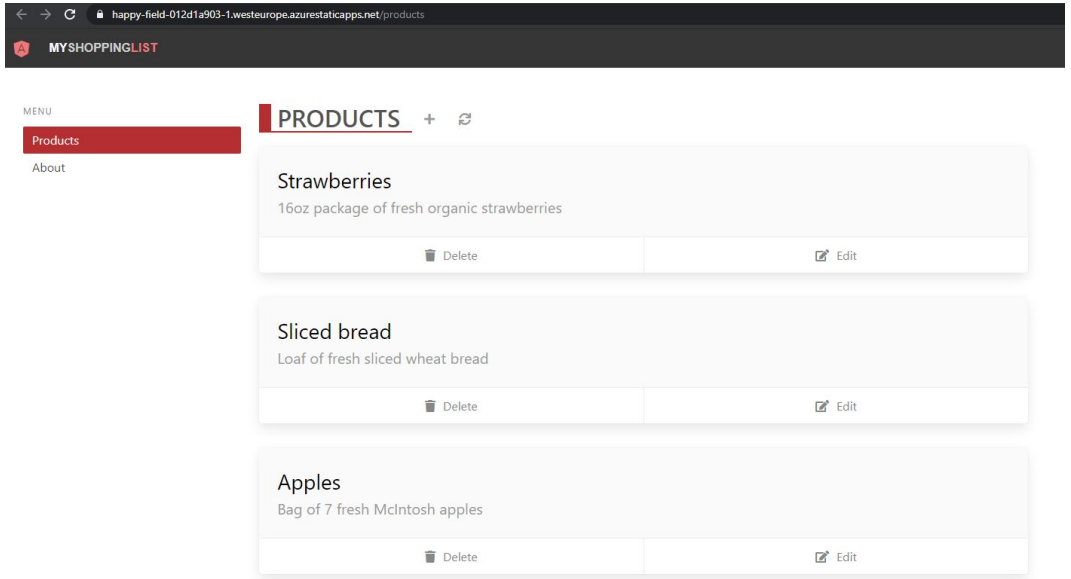
Acción de la api en GitHub



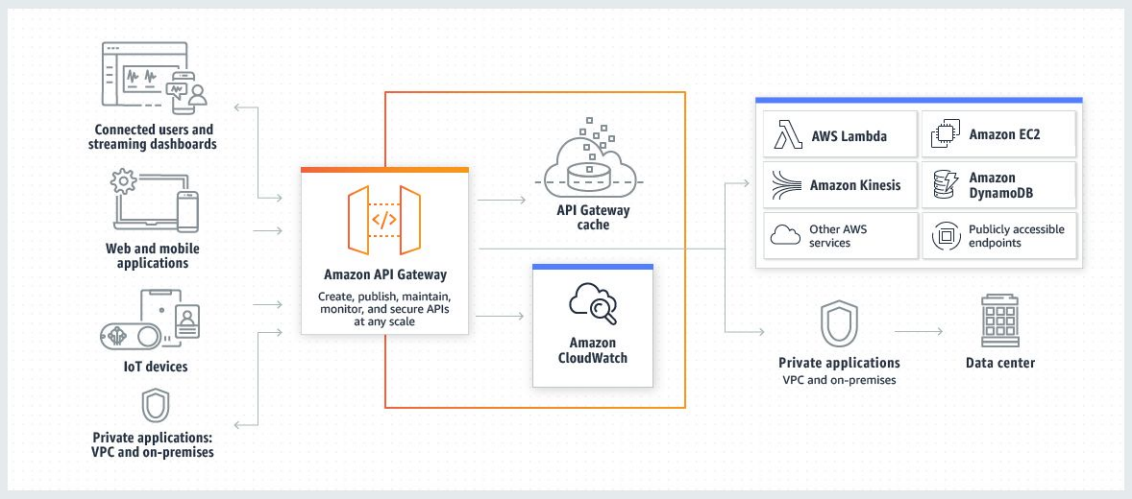
URL de la vista previa de la página

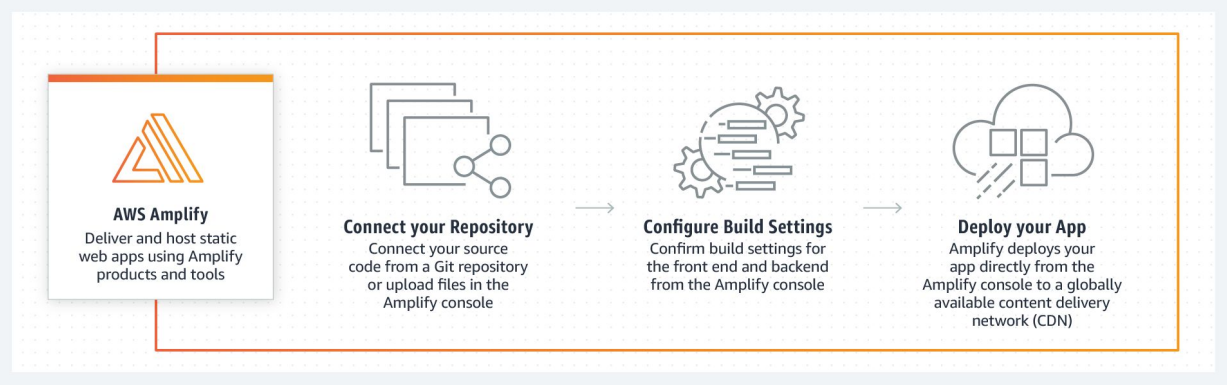


Página web estática (Versión actual)



AWS y Google Cloud





apigee

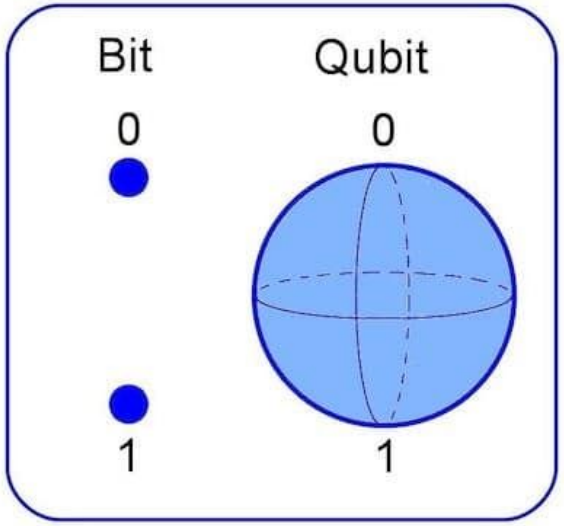
Google App Engine

Conclusiones

Azure Quantum

Honeywell

Primer programa de Q# con Quantum Development Kit

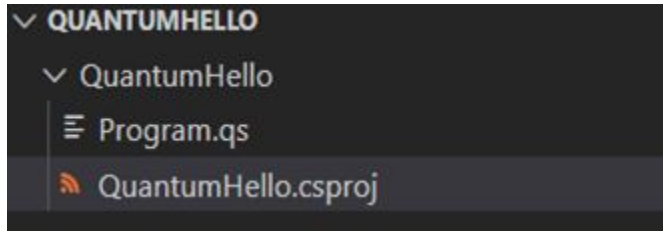


QDK

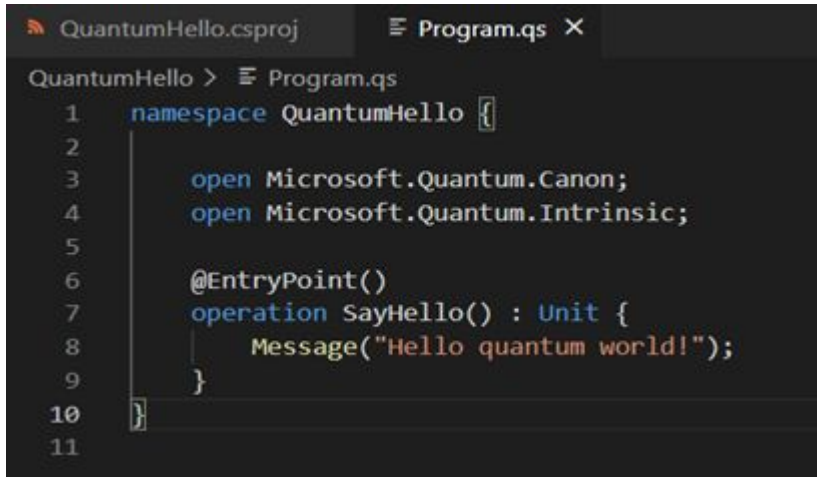
Q#

Programa “Hola mundo”

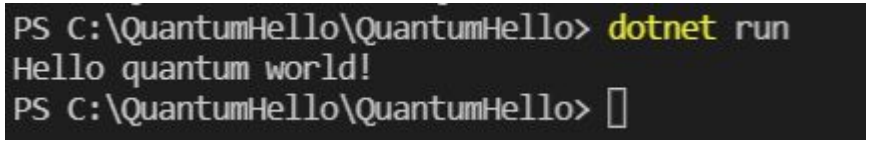
Proyecto QuantumHello



Código

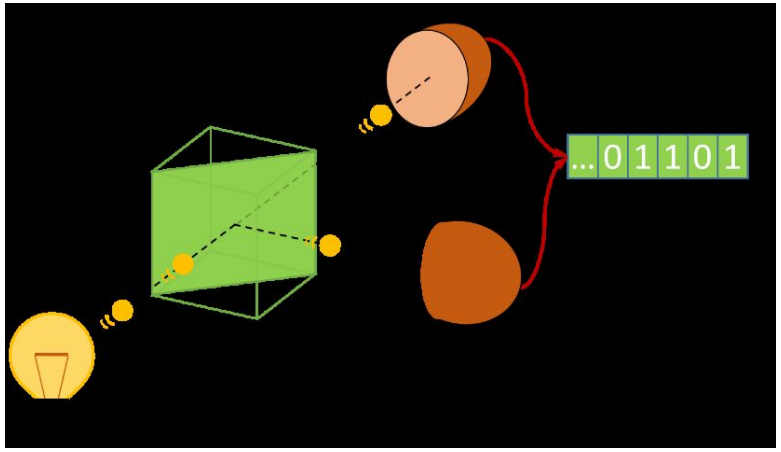


Ejecución y salida por consola

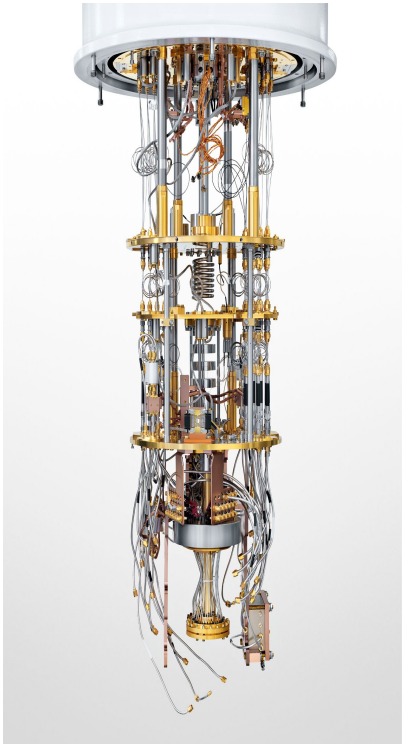


Generador cuántico de un bit aleatorio

QNRG



Ordenador cuántico



Código QuantumRNG

```
namespace QuantumRNG {

    open Microsoft.Quantum.Canon;
    open Microsoft.Quantum.Intrinsic;
    open Microsoft.Quantum.Measurement;

    @EntryPoint()
    operation GenerateRandomBit() : Result {
        // Allocate a qubit.
        use q = Qubit();
        // Put the qubit to superposition.
        H(q);
        // It now has a 50% chance of being measured 0 or 1.
        // Measure the qubit value.
        return M(q);
    }
}
```

Salida por consola

```
PS C:\QuantumRNG\QuantumRNG> dotnet run
Zero
PS C:\QuantumRNG\QuantumRNG>
PS C:\QuantumRNG\QuantumRNG> dotnet run
One
```

Generador cuántico de números aleatorios

Bibliotecas

```
1   namespace QuantumRNG {
2
3       open Microsoft.Quantum.Canon;
4       open Microsoft.Quantum.Intrinsic;
5       open Microsoft.Quantum.Measurement;
6       open Microsoft.Quantum.Math;
7       open Microsoft.Quantum.Convert;
8
```

Devolver el número aleatorio entre 0 y el max

```
32      @EntryPoint()
33      operation SampleRandomNumber():Int{
34          let max = 50;
35          Message($"Sampling a random number between 0 and {max}: ");
36          return SampleRandomNumberInRange(max);
37      }
```

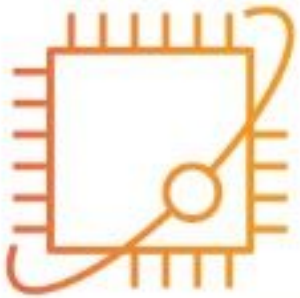
Función principal

```
20      operation SampleRandomNumberInRange(max : Int) : Int {
21          mutable output = 0;
22          repeat {
23              mutable bits = new Result[0];
24              for idxBit in 1..BitSizeI(max) {
25                  set bits += [GenerateRandomBit()];
26              }
27              set output = ResultArrayAsInt(bits);
28          } until (output <= max);
29          return output;
30      }
```

```
Sampling a random number between 0 and 50:
42
```

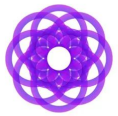
Comparación con AWS y Google Cloud

Microsoft Azure



aws

Amazon Braket



Q-CTRL

Conclusiones