Dapr Introduction

This sample introduces on how to code, debug and deploy a Dapr based microservices to Azure Container Apps. It is based on the Dapr quickstarts.

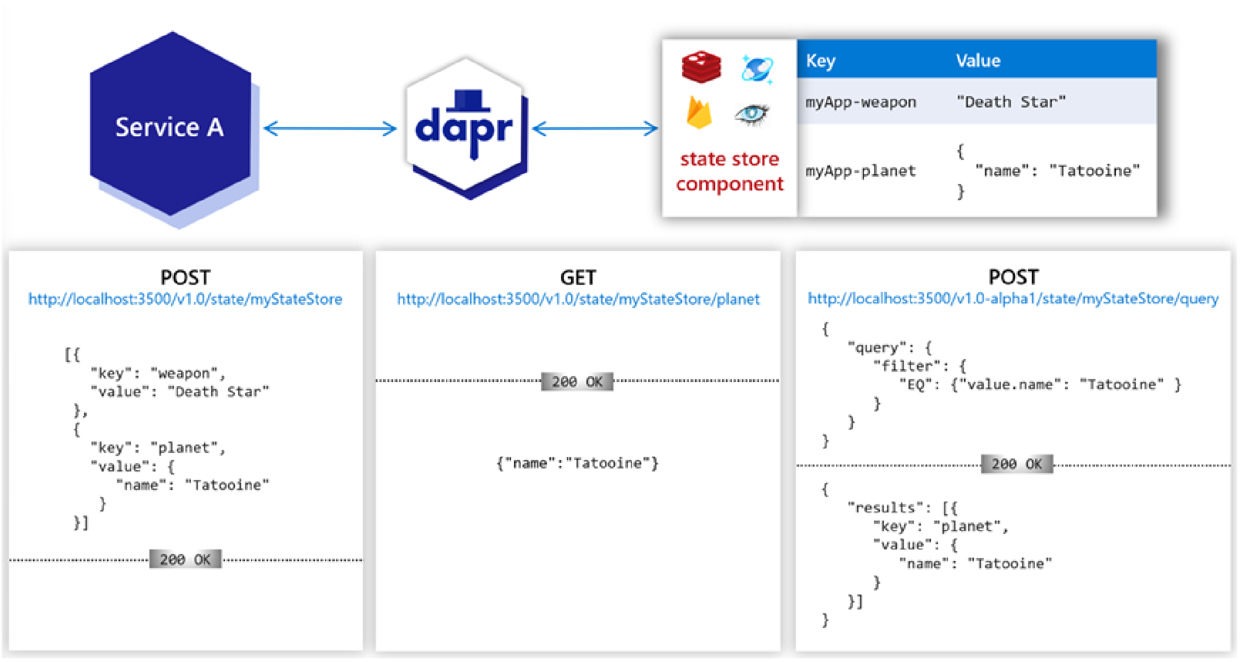
It contains two projects:

- `food-dapr-backend` - A .NET Core Web API project that uses Entity Framework and Dapr to store and retrieve state.
- `food-dapr-frontend` - A .NET MVC project that uses Dapr to consume the backend in a PubSub Pattern. This will be used in a sperate damo.

Dapr configuration is stored in the components folder and containes the following file. During development it will use `Redis` as the default state store. When deploying it will use Azure Blob Storage. We could also use Azure Cosmos DB as a state store just by changing the state store configuration.

- `statestore.yaml` - Configures the state store to use Azure Blob Storage.

```
componentType: state.azure.blobstorage
version: v1
metadata:
- name: accountName
value: aznativedev
- name: accountKey
value: account-key
- name: containerName
value: food-dapr-backend
secrets:
- name: account-key
value: "<ACCOUNT_KEY>"
```



Key	Value
myApp-weapon	"Death Star"
myApp-planet	{ "name": "Tatooine" }

POST
http://localhost:3500/v1.0/state/myStateStore

```
[{
  "key": "weapon",
  "value": "Death Star"
 },
 {
  "key": "planet",
  "value": {
    "name": "Tatooine"
  }
}]
```

200 OK

GET
http://localhost:3500/v1.0/state/myStateStore/planet

200 OK

```
{"name":"Tatooine"}
```

POST
http://localhost:3500/v1.0-alpha1/state/myStateStore/query

```
{
  "query": {
    "filter": {
      "EQ": {"value.name": "Tatooine" }
    }
  }
}
```

200 OK

```
{
  "results": [{
    "key": "planet",
    "value": {
      "name": "Tatooine"
    }
  }]
}
```

Readings

Dapr CLI

Dapr Visual Studio Code extension

Developing Dapr applications with Dev Containers

Getting started, Basic State & Deployment to Azure Container Apps

> Note: This demo assumes that you have created an Azure Container Apps environment. If you haven't done so, please follow the instructions to create one.

Dapr Environment Setup & Degugging

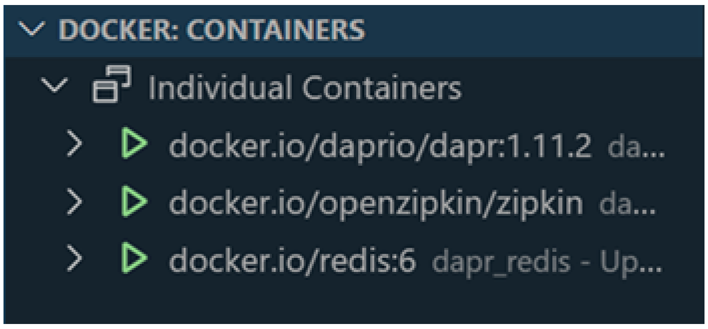
- Install Dapr CLI

  ```
  Set-ExecutionPolicy RemoteSigned -scope CurrentUser
  powershell -Command "iwr -useb
  https://raw.githubusercontent.com/dapr/cli/master/install/install.ps1 | iex"
  ```

  > Note: Restart the terminal after installing the Dapr CLI

- Initialize default Dapr containers and check running containers:

  ```
  dapr init
  ```

  ```
  docker.io/daprio/dapr:1.11.2 da...
  docker.io/openzipkin/zipkin da...
  docker.io/redis:6 dapr_redis - Up...
  ```

  > Note: To remove the default Dapr containers run `dapr uninstall`

- Run project `food-dapr-backend`

  ```
  cd food-dapr-backend
  dapr run --app-id food-backend --app-port 5001 --dapr-http-port 5010 dotnet
  run --launch-profile https
  ```

- Test the API by invoking `http://localhost:5000/food` several times using the dapr sidecar. The sidecar is listening on port `5010` and the app is listening on port `5000`. The sidecar that listens to port

`5010` forwards the request to the app. The sidecar is also responsible for service discovery and pub/sub.

```
GET http://localhost/<dapr-http-port>/v1.0/invoke/<app-id>/method/<method-
name>
GET http://localhost:5010/v1.0/invoke/food-backend/method/food
```

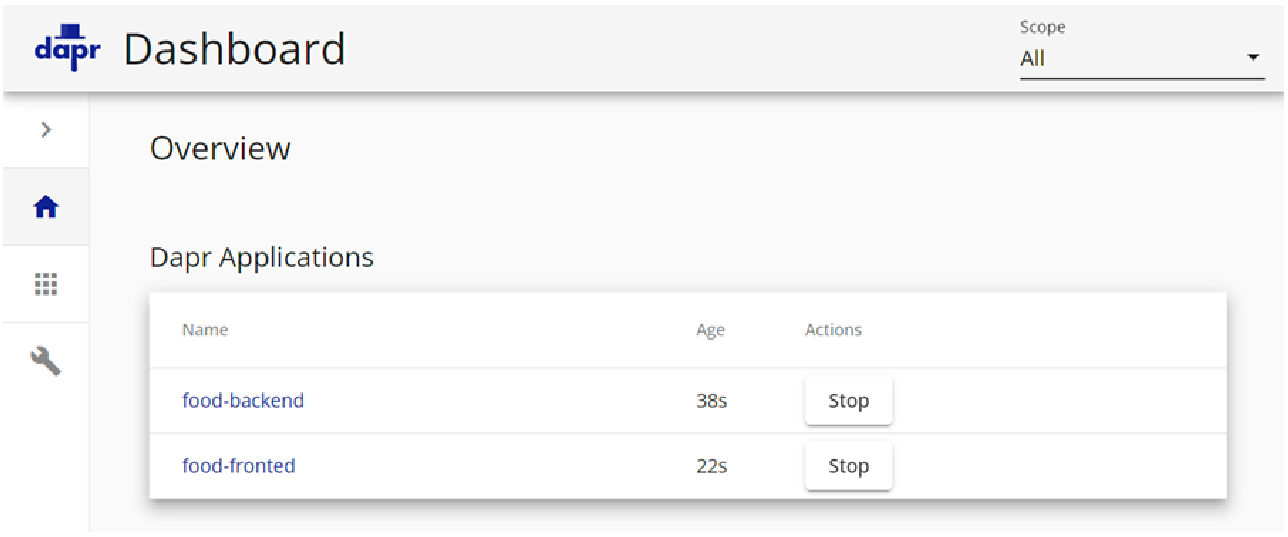
- Run project `food-dapr-fronted`

```
cd food-dapr-fronted
dapr run --app-id food-fronted --app-port 5002 --dapr-http-port 5011 dotnet
run
```

- Show Dapr Dashboard

```
dapr dashboard
```

- Examine Dapr Dashboard on http://localhost:8080:



Dapr Applications

Name	Age	Actions
food-backend	38s	Stop
food-fronted	22s	Stop

Running multiple microservices with Tye

- Install Tye. Project Tye is an experimental developer tool that makes developing, testing, and deploying microservices and distributed applications easier

```
dotnet tool install -g Microsoft.Tye --version "0.11.0-alpha.22111.1"
```

- Create a `tye.yaml` file in the root of the solution by running:

```
tye init
```

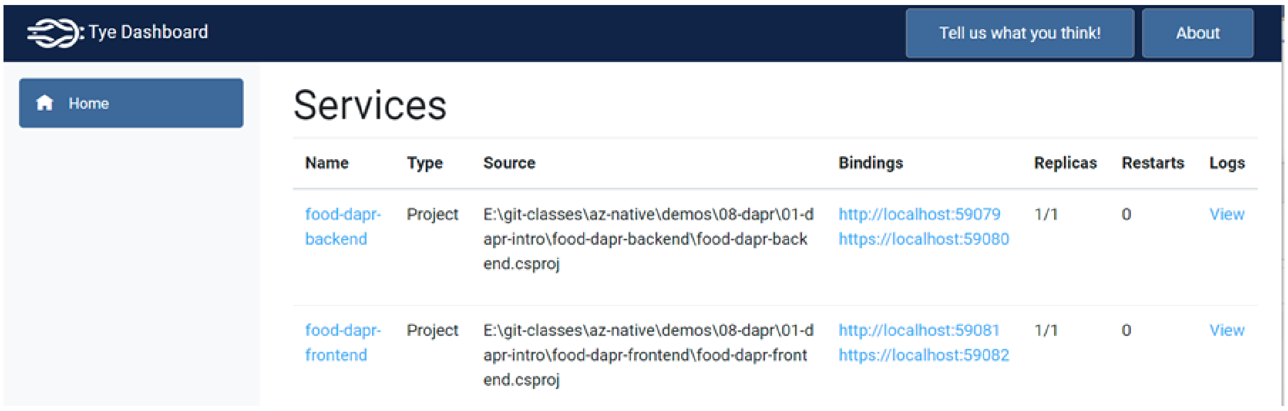
> Note: You can skip this step as the `tye.yaml` file is already included in the solution.

- A typical tye file could look like this:

```
name: dapr-services
services:
- name: food-dapr-backend
project: food-dapr-backend/food-dapr-backend.csproj
bindings:
- port: 5000
- name: food-dapr-frontend
project: food-dapr-frontend/food-dapr-frontend.csproj
bindings:
- port: 5002
```

- Run the two projects with Tye

```
tye run
```



Services

Name	Type	Source	Bindings	Replicas	Restarts	Logs
food-dapr-backend	Project	E:\git-classes\az-native\demos\08-dapr\01-dapr-intro\food-dapr-backend\food-dapr-backend.csproj	http://localhost:59079 https://localhost:59080	1/1	0	View
food-dapr-frontend	Project	E:\git-classes\az-native\demos\08-dapr\01-dapr-intro\food-dapr-frontend\food-dapr-frontend.csproj	http://localhost:59081 https://localhost:59082	1/1	0	View

Using Default State Store

- Examine `CountController.cs` and call it multiple times to increment the counter:

```
[HttpGet("getCount")]
public async Task<int> Get()
{
    var daprClient = new DaprClientBuilder().Build();
    var counter = await daprClient.GetStateAsync<int>(storeName, key);
    await daprClient.SaveStateAsync(storeName, key, counter + 1);
    return counter;
}
```

- To increment the counter execute the following code using [Rest Client for Visual Studio Code]()

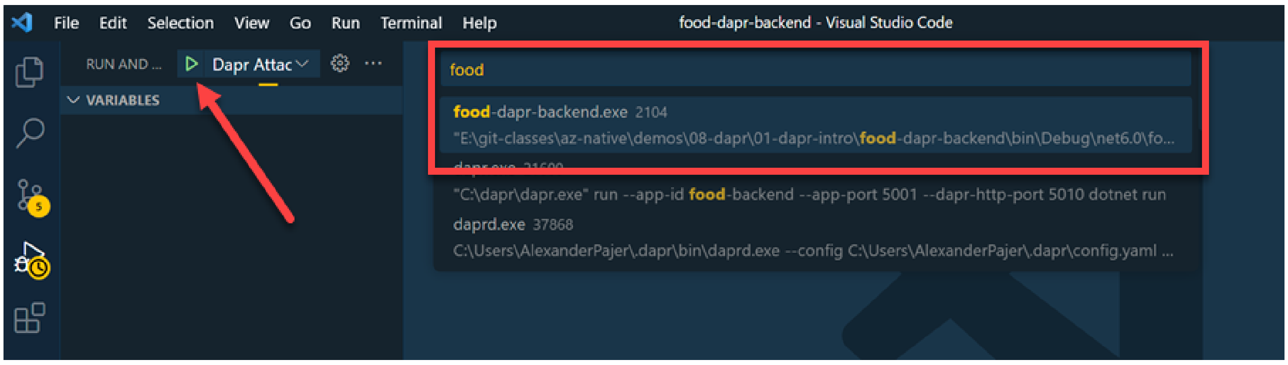
```
@baseUrl = http://localhost:5000
### Get the count and icrement it by 1
GET {{baseUrl}}/count/getcount HTTP/1.1
```

- Check the state store data in the default state store - Redis:

```
dapr state list --store-name statestore
```

- Examine the `Dapr Attach` config in `launch.json` and use it to attach the debugger to the `food-dapr-backend` process and debug the state store code:

```
{
    "name": "Dapr Attach",
    "type": "coreclr",
    "request": "attach",
    "processId": "${command:pickProcess}"
}
```



```
food
food-dapr-backend.exe 2104
"E:\git-classes\az-native\demos\08-dapr\01-dapr-intro\food-dapr-backend\bin\Debug\net6.0\fo...
"C:\dapr\dapr.exe" run --app-id food-backend --app-port 5001 --dapr-http-port 5010 dotnet run
daprd.exe 37868
C:\Users\AlexanderPajer\.dapr\bin\daprd.exe --config C:\Users\AlexanderPajer\.dapr\config.yaml ...
```

Deploy to Azure Container Apps

- Build the food-dapr-backend image

```
env=dev
grp=az-native-$env
loc=westeurope
acr=aznative$env
imgBackend=food-dapr-backend:v1
az acr build --image $imgBackend --registry $acr --file dockerfile .
```

- Create a storage account to be used as state store

```
stg=aznative$env
az storage account create -n $stg -g $grp -l $loc --sku Standard_LRS
```

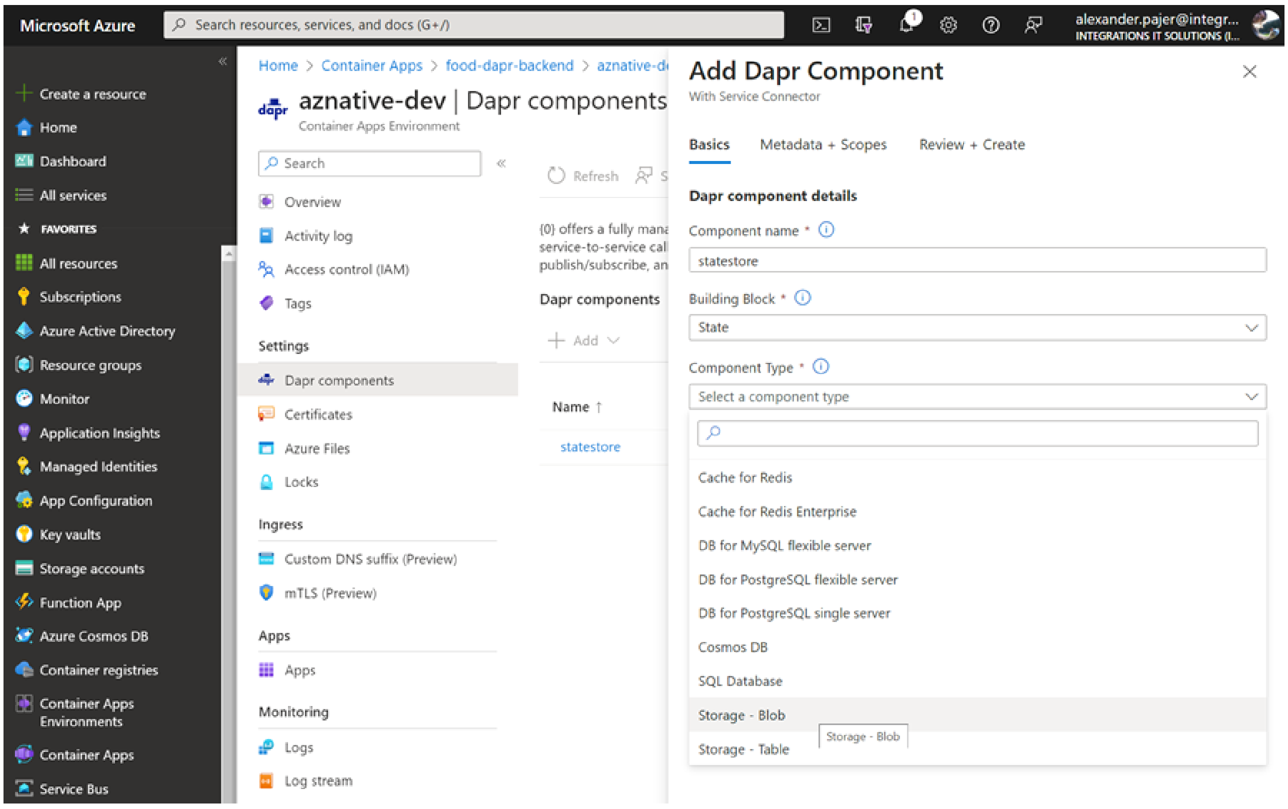
- Update its values in `components/statestore.yml`

```
apiVersion: dapr.io/v1alpha1
kind: Component
metadata:
name: statestore
spec:
type: state.azure.blobstorage
metadata:
    - name: storageAccount
    value: aznative$env
    - name: storageAccessKey
    value: <storage-account-key>
```

- Add the Dapr component to the Azure Container Apps environment

```
az containerapp env dapr-component set -n $acaenv -g $grp \
--dapr-component-name statestore \
--yaml './components/statestore.yml'
```

> Note. In Azure Portal you can see the Dapr component in the Azure Container Apps environment:



{0} offers a fully mana service-to-service cal publish/subscribe, an

Dapr components

Dapr component details

Component name * : statestore

Building Block * : State

Component Type * : Select a component type

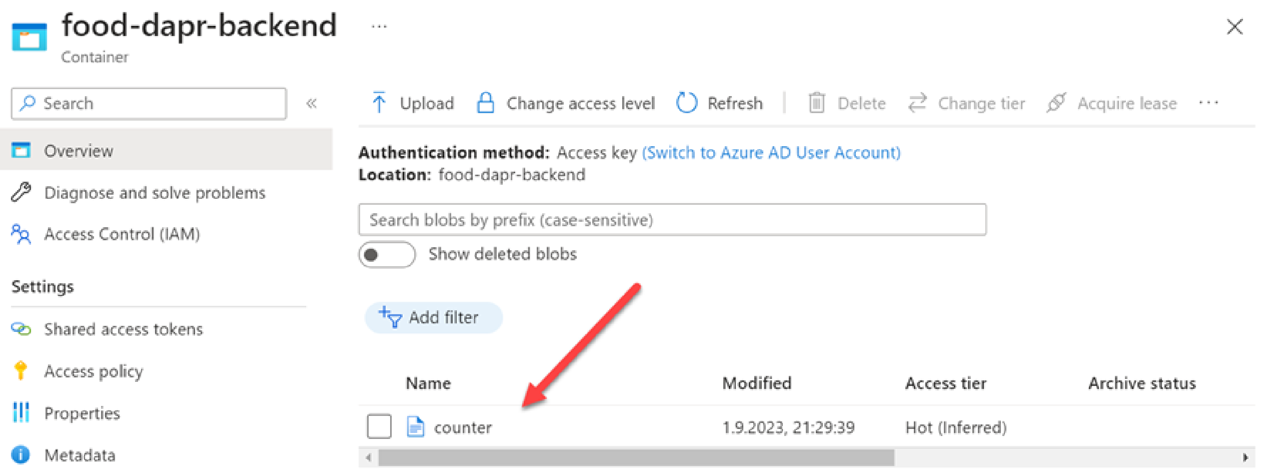
- Execute deploy-app.azcli to create the container app

```
az containerapp create -n $appBackend -g $grp \
--image $imgBackend \
--environment $acaenv \
--target-port 80 --ingress external \
--min-replicas 0 --max-replicas 1 \
--enable-dapr \
--dapr-app-port 80 \
--dapr-app-id $appBackend \
--registry-server $loginSrv \
--registry-username $acr \
--registry-password $pwd
```

- Execute the /count/getCount method multiple times to increment the counter

```
curl -X GET "http://<URL>.$loc.azurecontainer.io/count/getCount" -H
"accept: text/plain"
```

- Examine the storage account to see the state store data



Authentication method: Access key (Switch to Azure AD User Account)
Location: food-dapr-backend

Name	Modified	Access tier	Archive status
counter	1.9.2023, 21:29:39	Hot (Inferred)	