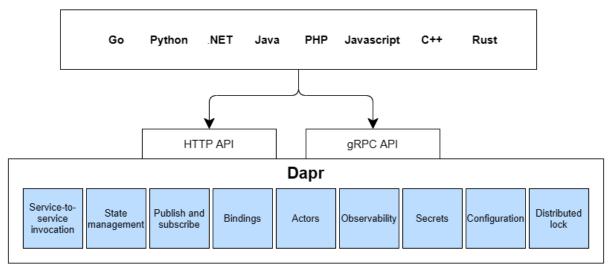# Chapter 1: Introducing Dapr

Go	Python	.NET	Java	PHP	Javascript	C++	Rust

HTTP API	gRPC API

Dapr

Service-to-service invocation	State management	Publish and subscribe	Bindings	Actors	Observability	Secrets	Configuration	Distributed lock

Standalone mode   Kubernetes mode

Application

HTTP/gRPC

Dapr API

Publish/Subscribe	Service-to-service invocation
State management	Actor runtime
Secrets	Bindings
Configuration	Distributed lock
Observability	

Pod

Container

Application

HTTP/gRPC

Container

Dapr API

Publish/Subscribe	Service-to-service invocation
State management	Actor runtime
Secrets	Bindings
Configuration	Distributed lock
Observability	

dapr Dashboard

Application: hello-world

Summary   Actors

Summary

App ID	hello-world
App Port	5000
Dapr HTTP Port	5010
Dapr gRPC Port	52443
Command	dotnet run
Replicas	1
Address	localhost:5010
PID	15148
Created	2020-08-27 22:44.13
Age	11m

---

dapr Dashboard

Scope
All

Dapr Components

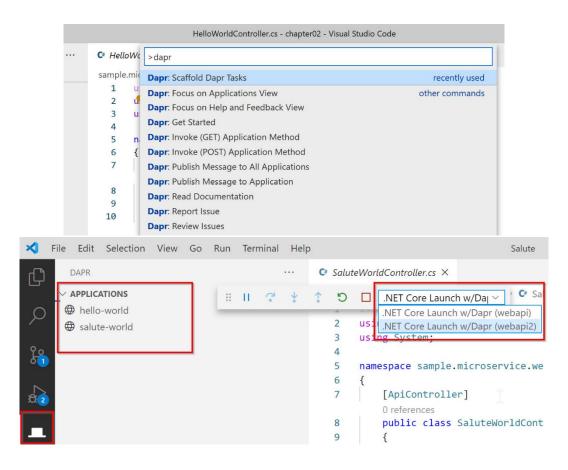|	Name	Type	Age	Created
➤	pubsub	pubsub.redis	2d	2020-08-27 17:48.17
🗄	statestore	state.redis	2d	2020-08-27 17:48.17
⚛	zipkin	exporters.zipkin	2d	2020-08-27 17:48.17

Chapter 2: Debugging Dapr Solutions

HelloWorldController.cs - chapter02 - Visual Studio Code

> dapr

Dapr: Scaffold Dapr Tasks	recently used
Dapr: Focus on Applications View	other commands
Dapr: Focus on Help and Feedback View	
Dapr: Get Started	
Dapr: Invoke (GET) Application Method	
Dapr: Invoke (POST) Application Method	
Dapr: Publish Message to All Applications	
Dapr: Publish Message to Application	
Dapr: Read Documentation	
Dapr: Report Issue	
Dapr: Review Issues	

File   Edit   Selection   View   Go   Run   Terminal   Help   Salute

DAPR   ...   C# SaluteWorldController.cs ×

∨ APPLICATIONS   .NET Core Launch w/Dapr ∨   C# Sa
  ⊕ hello-world   .NET Core Launch w/Dapr (webapi)
  ⊕ salute-world   .NET Core Launch w/Dapr (webapi2)

```
2    usi
3    using System;
4
5    namespace sample.microservice.we
6    {
7        [ApiController]
         0 references
8        public class SaluteWorldCont
9        {
```


Tye Dashboard   Tell us what you think!   About

Services

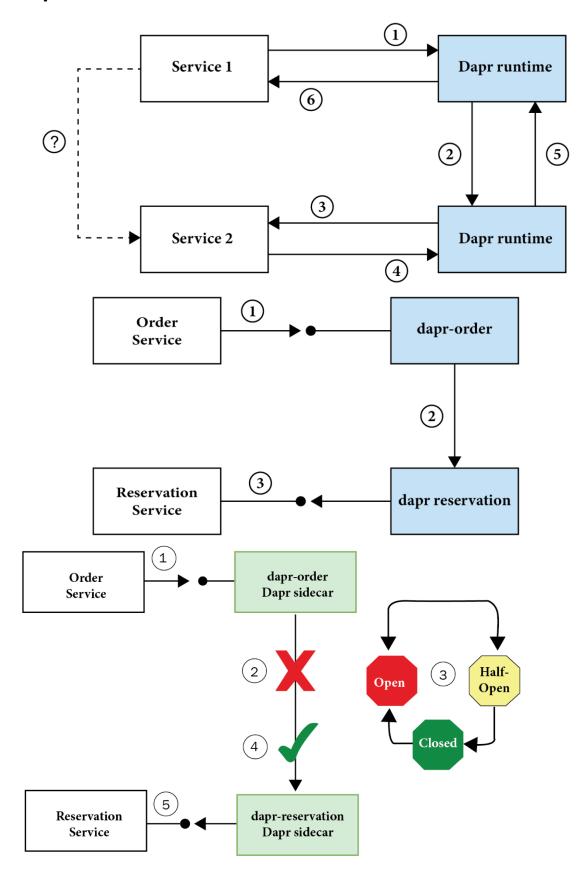| Name	Type	Source	Bindings	Replicas	Restarts	Logs
hello-world	Project	C:\Repos\dapr-samples\chapter02\hello-world-debug\dapr.microservice. webapi\dapr.microservice.webapi.csproj	http://localhost:60146 https://localhost:60147	1/1	0	View
salute-world	Project	C:\Repos\dapr-samples\chapter02\hello-world-debug\dapr.microservice. webapi2\dapr.microservice.webapi2.csproj	http://localhost:60148 https://localhost:60149	1/1	0	View
hello-world-dapr	Executable		https://localhost:60150 http://localhost:60151 http://localhost:60152	1/1	0	View
salute-world-dapr	Executable		https://localhost:60153 http://localhost:60154 http://localhost:60155	1/1	0	View

Chapter 3: Microservices Architecture with Dapr
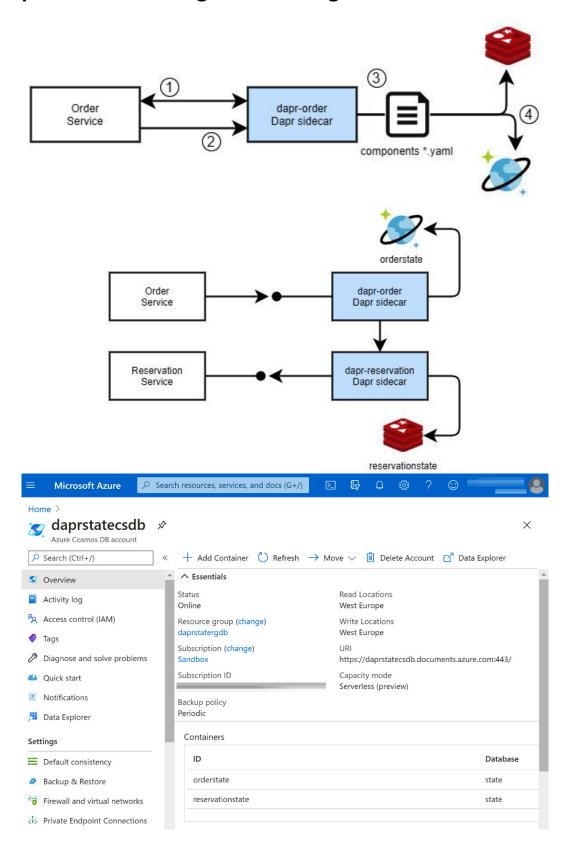
Chapter 4: Service-to-Service invocation

Order Service →① gRPC *always via SDK* → dapr-order

latency gain: x ms * y calls

dapr-order →② gRPC → dapr-reservation
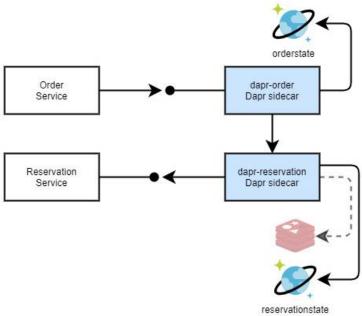
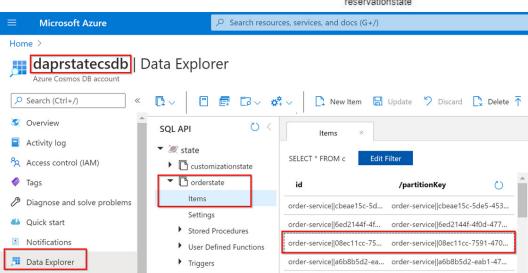Reservation Service ←③ gRPC *Added!!!* ← dapr-reservation

latency advantage: x ms

Chapter 5: Introducing State Management
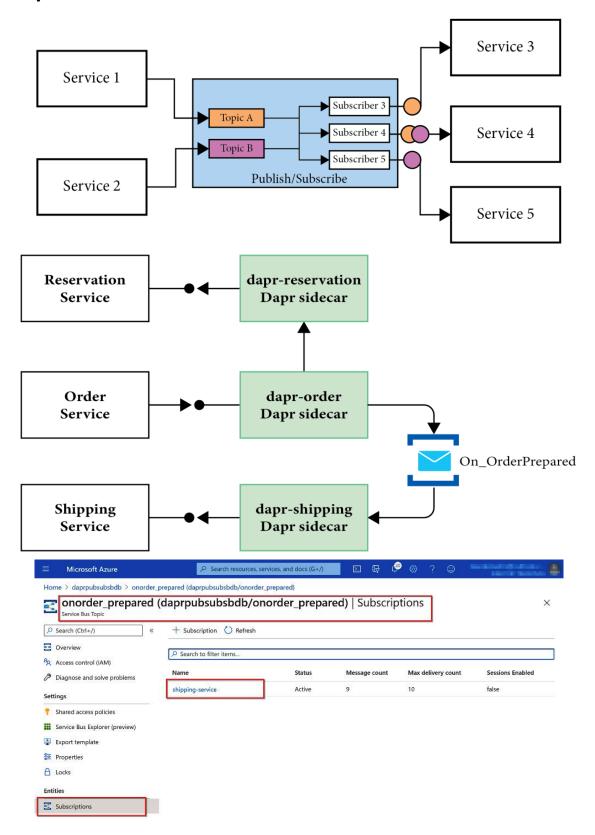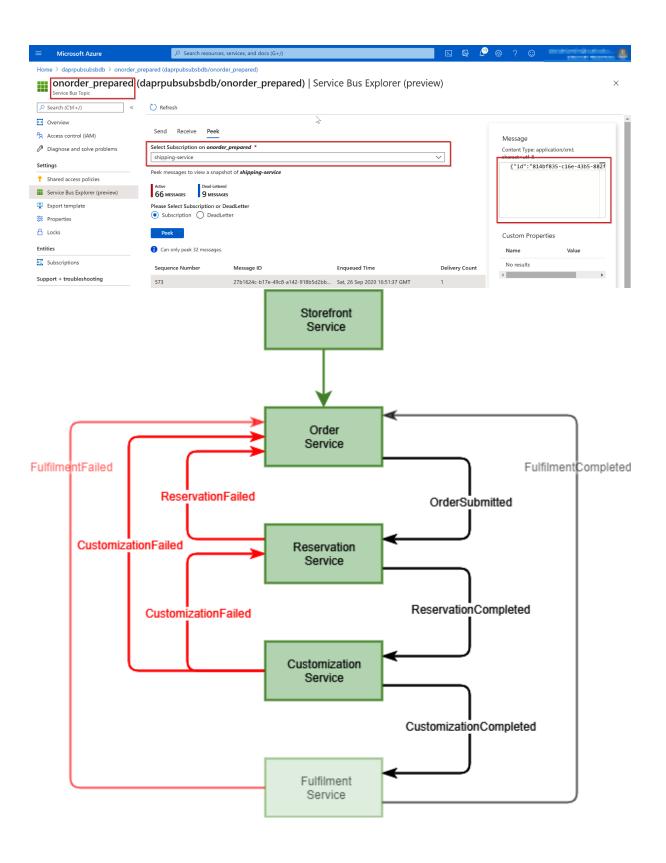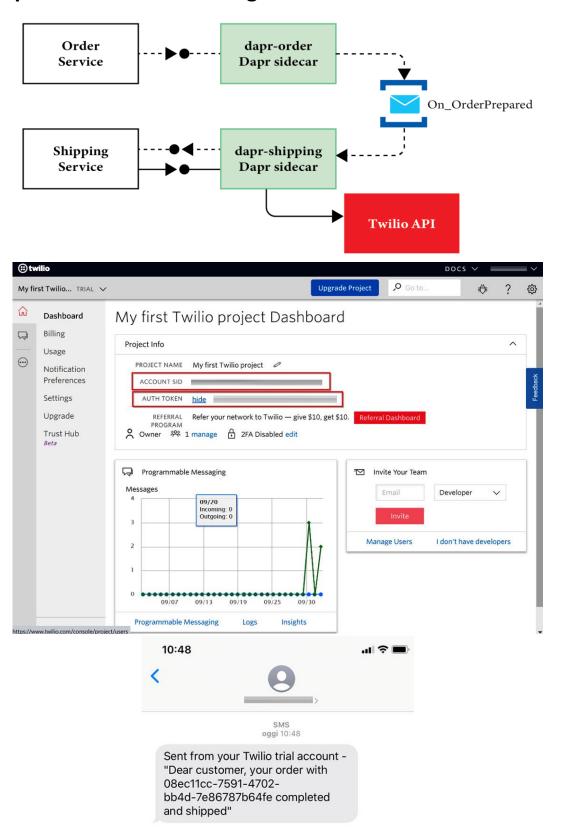
```json
{
    "id": "order-service||08ec11cc-7591-4702-bb4d-7e86787b64fe",
    "value": {
        "CreatedOn": "2020-09-19T12:28:19.2450723Z",
        "UpdatedOn": "2020-09-19T12:28:19.2451555Z",
        "Order": {
            "Date": "2020-09-19T08:47:53.1224585Z",
            "Id": "08ec11cc-7591-4702-bb4d-7e86787b64fe",
            "CustomerCode": "Davide",
            "Items": [
                {
                    "ProductCode": "cookie4",
                    "Quantity": 7
                },
                {
                    "ProductCode": "bussola1",
                    "Quantity": 6
                }
            ]
        }
    },
    "partitionKey": "order-service||08ec11cc-7591-4702-bb4d-7e86787b64fe",
    "_rid": "h+ETAOzuFXEMAAAAAAAAAA==",
    "_self": "dbs/h+ETAA==/colls/h+ETAOzuFXE=/docs/h+ETAOzuFXEMAAAAAAAAAA==/",
    "_etag": "\"18006115-0000-0d00-0000-5f65f9630000\"",
    "_attachments": "attachments/",
    "_ts": 1600518499
}
```
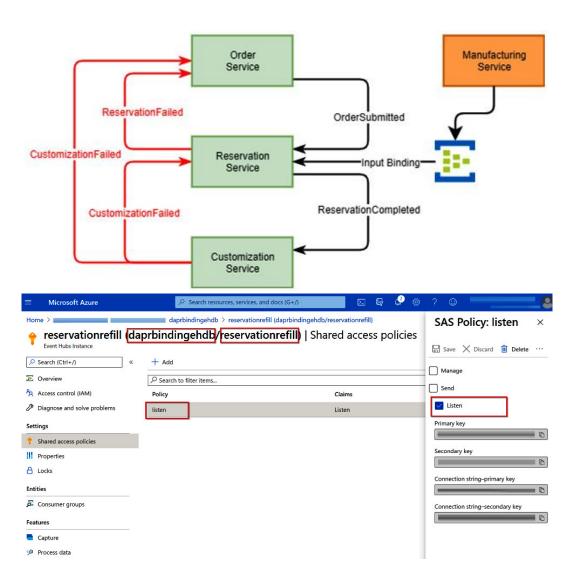
Chapter 6: Publish and Subscribe

onorder_prepared (daprpubsubsbdb/onorder_prepared) | Service Bus Explorer (preview)

Service Bus Topic

Search (Ctrl+/)

- Overview
- Access control (IAM)
- Diagnose and solve problems

Settings

- Shared access policies
- Service Bus Explorer (preview)
- Export template
- Properties
- Locks

Entities

- Subscriptions

Support + troubleshooting

Refresh

Send Receive **Peek**

Select Subscription on *onorder_prepared* *

shipping-service

Peek messages to view a snapshot of *shipping-service*

Active	Dead-Lettered
66 MESSAGES	**9** MESSAGES

Please Select Subscription or DeadLetter

◉ Subscription ◯ DeadLetter

Peek

ℹ Can only peek 32 messages.

Sequence Number	Message ID	Enqueued Time	Delivery Count
573	27b1624c-b17e-49c8-a142-918b5d2bb...	Sat, 26 Sep 2020 16:51:37 GMT	1

Message

Content Type: application/xml; charset=utf-8

{"id":"814bf835-c16e-43b5-882f

Custom Properties

Name	Value
No results	

Storefront Service

Order Service

FulfilmentFailed

FulfilmentCompleted

ReservationFailed

OrderSubmitted

CustomizationFailed

Reservation Service

ReservationCompleted
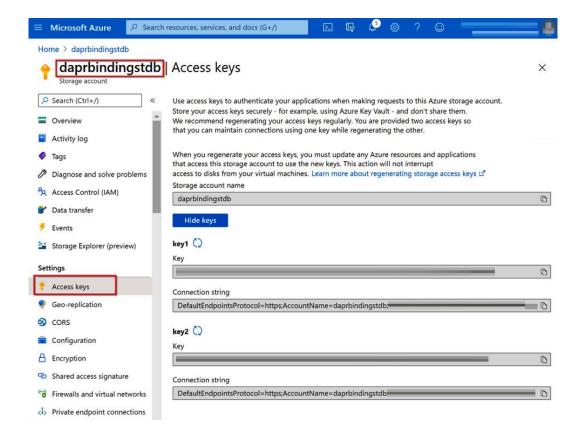
CustomizationFailed

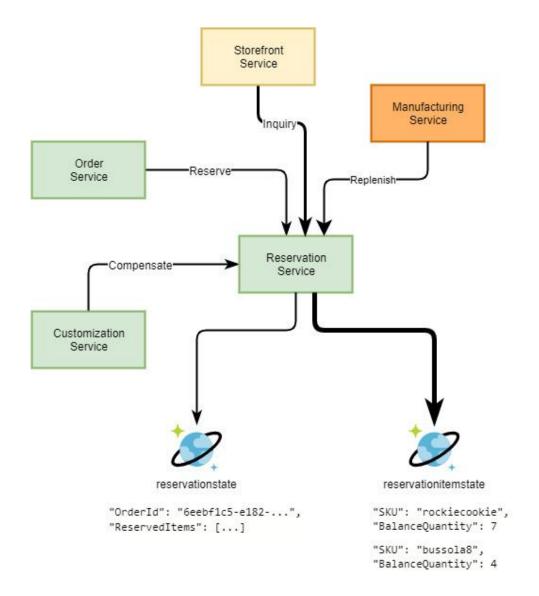Customization Service

CustomizationCompleted

Fulfilment Service

Chapter 7: Resource bindings

Chapter 8: Using Actors

reservationstate

"OrderId": "6eebf1c5-e182-...",
"ReservedItems": [...]

reservationitemstate

"SKU": "rockiecookie",
"BalanceQuantity": 7

"SKU": "bussola8",
"BalanceQuantity": 4

Storefront Service

Order Service — Reserve →

Manufacturing Service

Inquiry →

Reservation Service

Compensate →

Customization Service

← Replenish

ReservationItem Actor /rockiecookie

ReservationItem Actor /bussola8

reservationstate

```
"OrderId": "6eebf1c5-e182-...",
"ReservedItems": [...]
```

reservationitemactorstate

```
"SKU": "crazycookie",
"BalanceQuantity": 7

"SKU": "bussola8",
"BalanceQuantity": 4
```
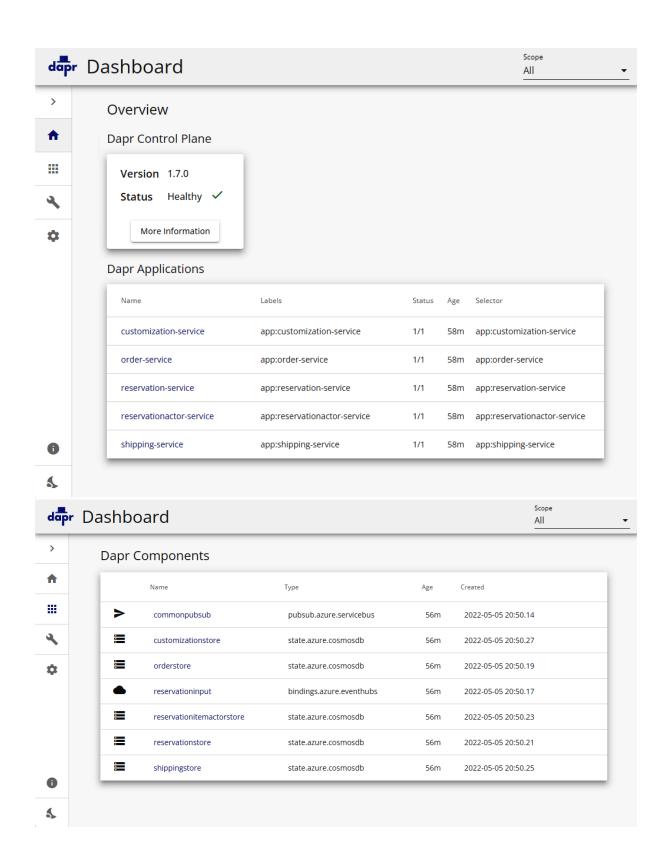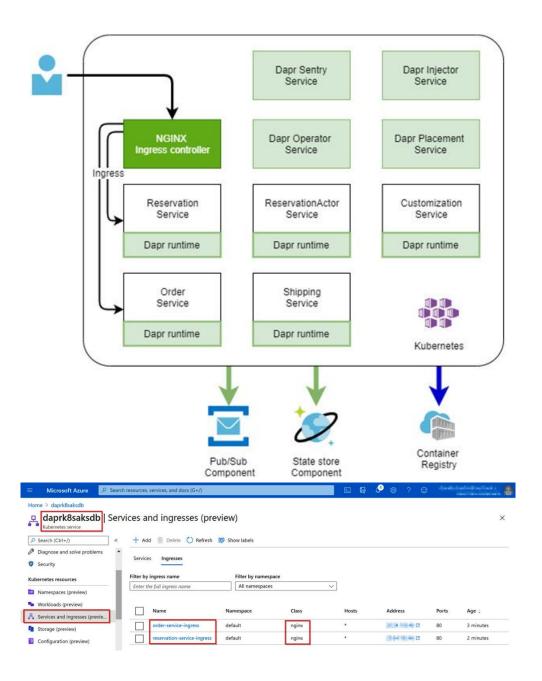
Chapter 9: Deployment to Kubernetes

Dashboard

Overview

Dapr Control Plane

Version 1.7.0
Status Healthy ✓

More Information

Dapr Applications

Name	Labels	Status	Age	Selector
customization-service	app:customization-service	1/1	58m	app:customization-service
order-service	app:order-service	1/1	58m	app:order-service
reservation-service	app:reservation-service	1/1	58m	app:reservation-service
reservationactor-service	app:reservationactor-service	1/1	58m	app:reservationactor-service
shipping-service	app:shipping-service	1/1	58m	app:shipping-service

Dashboard

Dapr Components

	Name	Type	Age	Created
➤	commonpubsub	pubsub.azure.servicebus	56m	2022-05-05 20:50.14
▤	customizationstore	state.azure.cosmosdb	56m	2022-05-05 20:50.27
▤	orderstore	state.azure.cosmosdb	56m	2022-05-05 20:50.19
☁	reservationinput	bindings.azure.eventhubs	56m	2022-05-05 20:50.17
▤	reservationitemactorstore	state.azure.cosmosdb	56m	2022-05-05 20:50.23
▤	reservationstore	state.azure.cosmosdb	56m	2022-05-05 20:50.21
▤	shippingstore	state.azure.cosmosdb	56m	2022-05-05 20:50.25

order.test.http M

order.test.http > baseUrl

Response(3478ms)

```
6 references
1   @baseUrl = x.y.z.k
2   ###
3   # @name simpleOrderRequest
    Send Request
4   POST http://{{baseUrl}}/bbmb/order HTTP/1.1
5   content-type: application/json
6
7   {
8     "CustomerCode": "Davide",
9     "Date": "{{$datetime 'YYYY-MM-DD'}}",
10    "Items": [
11      {
12        "ProductCode": "rockiecookie",
13        "Quantity": {{$randomInt 2 8}}
14      },
15      {
16        "ProductCode": "bussola{{$randomInt 1 100}}",
17        "Quantity": {{$randomInt 1 8}}
18      }
19    ],
20    "SpecialRequests" : [
21      {
22        "CustomizationId" : "08ffffcc-7591-4702-ffff-fff6787bfffe",
23        "Scope":
24        {
25          "ProductCode": "rockiecookie",
26          "Quantity": 2
27        }
28      }
29    ]
30  }
31  ###
    1 reference
32  @orderId = {{simpleOrderRequest.response.body.$}}
33  # get order from ASP.NET endpoint
    Send Request
34  GET http://{{baseUrl}}/bbmb/order/{{orderId}}
35  ###
36  # get balance for a cookie
    Send Request
37  GET http://{{baseUrl}}/bbmb/balance/rockiecookie
38  ###
```

```
1   HTTP/1.1 200 OK
2   Date: Sat, 07 May 2022 16:01:28 GMT
3   Content-Type: application/json; charset=utf-8
4   Transfer-Encoding: chunked
5   Connection: close
6
7   "eb68d2b0-49d8-4c51-87b4-9123bc96d87c"
```
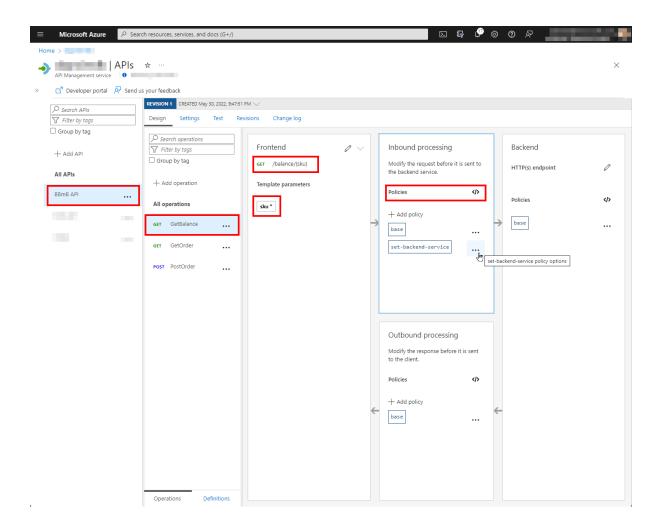
Chapter 10: Exposing Dapr Applications

Chapter 11: Tracing Dapr Application

dapr Dashboard

Configuration: tracing

Summary   Applications   Configuration

Applications configured with **tracing**

customization-service

order-service

reservation-service

reservationactor-service

shipping-service

Data Sources / Dapr
Type: Prometheus

Settings   Dashboards

Name   ⓘ   Dapr   Default 🔵

HTTP

URL   ⓘ   http://dapr-prom-prometheus-server.dapr-moni...

Access   Server (default)   ˅   Help ›

Whitelisted Cookies ⓘ   Add Name   Add

Dapr System Services Dashboard ☆ ⌁

Last 30 minutes | 15m

⌄ Health & Resource

Uptime

dapr-operator	**57.7 min**
dapr-placement	**57.7 min**
dapr-sentry	**56.2 min**
dapr-sidecar-injector	**57.5 min**

Total CPU usage (kernel and user)

8 ms
6 ms
4 ms
2 ms
0 ns
      10:40   10:50   11:00

— dapr-operator-74cdb5fff9-wvknl
— dapr-placement-7b5bbdd95c-gpnxh
— dapr-sentry-65d64b7cd8-5sxzk
— dapr-sidecar-injector-7759b8b9c4-mh4hm

Memory usage in bytes

50 MB
40 MB
30 MB
20 MB
10 MB
      10:40   10:50   11:00

— dapr-operator — dapr-placement
— dapr-sentry — dapr-sidecar-injector

Number of GO routines

100
75
50
25
0
      10:40   10:50   11:00

— dapr-operator — dapr-placement
— dapr-sentry — dapr-sidecar-injector

› Operator *(2 panels)*

⌄ Sidecar Injector

sidecar injection requests

13.25
13.00
12.75
12.50
12.25
12.00
11.75
   10:40 10:45 10:50 10:55 11:00 11:05

successful sidecar injected

10.0
7.5
5.0
2.5
0
   10:40 10:45 10:50 10:55 11:00 11:05

— customization-service — order-service — reservation-service
— reservationactor-service — shipping-service

Chapter 12: Load testing and Scaling Dapr

Requests growth

2 * vCPU
low usage

2 * vCPU
high usage

8 * vCPU
higher usage

Requests growth

	pod C replica 2	pod A replica 3	
	pod B replica 3	pod C replica 3	pod C replica 4
	pod B replica 2	pod B replica 3	pod B replica 4
pod C replica 1	pod C replica 1	pod C replica 1	pod C replica 2
pod B replica 1	pod B replica 1	pod B replica 1	pod B replica 2
pod A replica 1	pod A replica 1	pod A replica 1	pod A replica 2

LOCUST

HOST
STATUS **SPAWNING** 704 users Edit
RPS **472.5**
FAILURES **0%**
STOP
Reset Stats

Statistics **Charts** Failures Exceptions Download Data

Total Requests per Second

LOCUST

Statistics Charts Failures Exceptions Download Data

Type	Name	# Requests	# Fails	Median (ms)	90%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	balance	226942	0	490	1000	540	31	4125	43	387.9	0
POST	order	22779	0	220	410	266	125	1422	38	39.8	0
	Aggregated	**249721**	**0**	**440**	**1000**	**515**	**31**	**4125**	**43**	**427.7**	**0**

About

Chapter 13: Leveraging serverless containers with Dapr

daprcacaedb | Dapr Components

Container Apps Environment

Search (Ctrl+/)

- Overview
- Access control (IAM)
- Tags

Settings

- **Dapr Components**
- Certificates
- Locks

Apps

- Apps

Automation

- Tasks (preview)

Refresh   Send us your feedback

Azure Container Apps offers a fully managed version of the Dapr APIs in y
get reliable service-to-service calls for your new revision. Select more Dap
message publish/subscribe, and more.

Dapr components

+ Add

Name ↑	Type ↑
commonpubsub	pubsub.azure.servicebus
customizationstore	state.azure.cosmosdb
orderstore	state.azure.cosmosdb
reservationitemactorstore	state.azure.cosmosdb
reservationstore	state.azure.cosmosdb

Edit Dapr component

Dapr component details

Name *

commonpubsub

Component type * ⓘ

pubsub.azure.servicebus

Version *

v1

Scopes

Dapr scopes ensure your component is only loaded by applications with specific Dapr App Ids at runtime.

+ Add

App Id	App Name	Delete
order-service ⌄	t1-order	🗑
reservation-serv... ⌄	t1-reservation	🗑
reservationacto... ⌄	t1-reservationactor	🗑
customization-s... ⌄	t1-customization	🗑

Secrets

+ Add

Name	Value	Delete
pubsub-servicebus-...	Endpoint=sb://dap...	🗑

Metadata

+ Add

Name	Source	Value	Delete
connectionString	Reference a se... ⌄	pubsub-service... ⌄	🗑

Home >

🔵 ▓▓▓▓▓▓▓▓ | Apps ···
Container Apps Environment | ❶ ▓▓▓▓▓

🔎 Search (Ctrl+/)   «   + Create

🔲 Overview

🔒 Access control (IAM)

🏷 Tags

Settings

ᵈᵃᵖʳ Dapr Components

🛡 Certificates

🔒 Locks

Apps

🔲 Apps

🔎 Filter by name

Name ↑↓

t1-customization

t1-reservation

t1-order

t1-reservationactor

Enable ingress for applications that need an HTTP endpoint.

HTTP Ingress ⓘ   ◯ Disabled

                          ⦿ Enabled

Ingress traffic   ◯ **Limited to Container Apps Environment**

                          ◯ **Limited to VNet:** Applies if internalOnly is set to true on the Container Apps
                            environment

                          ⦿ **Accepting traffic from anywhere:** Applies if internalOnly is set to false on
                            the Container Apps environment

Target port * ⓘ   80

Replica   t1-proxy--0ccml0y-6c854447bc-nbkw2 ▾

Container   t1-proxy   ▾

☐ Stop   ⧉ Copy   ✕ Clear   ⊙ Maximize

```
Connecting...
2022-06-12T15:33:41.05958   Connecting to the container 't1-proxy'...
2022-06-12T15:33:41.08697   Successfully Connected to container: 't1-proxy' [Revision: 't1-proxy--0ccml0y'
, Replica: 't1-proxy--0ccml0y-6c854447bc-nbkw2']
2022-06-12T13:59:07.100473310Z info: Yarp.ReverseProxy.Forwarder.HttpForwarder[9]
2022-06-12T13:59:07.100527511Z       Proxying to http://localhost:3500/v1.0/invoke/order-service/method/o
rder HTTP/2 RequestVersionOrLower no-streaming
2022-06-12T13:59:07.392150577Z info: Yarp.ReverseProxy.Forwarder.HttpForwarder[56]
2022-06-12T13:59:07.392308579Z       Received HTTP/1.1 response 200.
2022-06-12T13:59:13.515466056Z info: Yarp.ReverseProxy.Forwarder.HttpForwarder[9]
2022-06-12T13:59:13.515964863Z       Proxying to http://localhost:3500/v1.0/invoke/order-service/method/o
rder/a3bf2483-f841-41a6-babb-e1ef86429caf HTTP/2 RequestVersionOrLower no-streaming
2022-06-12T13:59:13.525566193Z info: Yarp.ReverseProxy.Forwarder.HttpForwarder[56]
2022-06-12T13:59:13.525684895Z       Received HTTP/1.1 response 200.
```

Replica   t1-reservationactor--▓▓▓▓▓▓▓▓▓▓ ▾

Container   t1-reservationactor   ▾

☐ Stop   ⧉ Copy   ✕ Clear   ⬈ Maximize

```
Connecting...
2022-06-26T11:43:43.92367   Connecting to the container 't1-reservationactor'...
2022-06-26T11:43:43.94046   Successfully Connected to container: 't1-reservationactor' [Revision: 't1-reservation
actor--v766vea', Replica: 't1-reservationactor--v766vea-7bd84469bc-tkszd']
2022-06-26T10:49:08.525017442Z Balance of esse81 was -2, now -3
2022-06-26T10:49:08.5433841222Z Balance of bussola1 was 631, now 629
2022-06-26T10:49:08.942139201Z Balance of rockiecookie31 was -1, now -2
2022-06-26T10:49:08.962122505Z Activating actor id: bussola70
2022-06-26T10:49:08.966366270Z Balance of bussola70 was -7, now -8
2022-06-26T10:49:08.984618848Z Activating actor id: esse22
2022-06-26T10:49:08.989613425Z Balance of esse22 was -3, now -4
2022-06-26T10:49:09.007782101Z Balance of bussola1 was 629, now 627
2022-06-26T10:49:12.255864711Z Balance of rockiecookie37 was -2, now -6
2022-06-26T10:49:12.274446794Z Activating actor id: bussola45
```

Update map components | Intelligent view: ⓘ [On] Off | Low Medium High | Exclude 4xx: ⓘ [On] Off | Layout: ⓘ

+99
/v1
OTHER

+103
/v1
STATE

65.5 ms
403 calls

259 ms
116 calls

1
instance
reservationactor-service

17.4 ms
422 calls

1
instance
reservation-service

86.1 ms
19 calls

17 ms
41 calls

16 ms
41 calls

12.9 ms
484 calls

55 ms
46 calls

1
instance
proxy-service

1
instance
order-service

21.2 ms
41 calls

1
instance
customization-service

15.5 ms
169 calls

+2
/dapr
STATE

✏️ Edit and deploy   🔄 Refresh

One or more containers, along with settings such as scale rules, can be specified in a container app

Scale rule setting

Min / max replicas ⓘ   1 - 5

Scale rule

Name ↑	Type ↑
servicebus	Custom

View 'servicebus'   ✕

Scale rule details

Rule name   servicebus
Type   Custom

Authentication

Secret reference ↑	Trigger parameter ↑
sec	connection

Metadata

Name ↑	Value ↑
messageCount	5
subscriptionName	reservation-service
topicName	onorder_submitted

Max Replica Count for t1-proxy

Replica Count (Max)
t1-proxy
1

Max Replica Count for t1-order

Replica Count (Max)
t1-order
1

Max Replica Count for t1-reservation

Replica Count (Max)
t1-reservation
5

Max Replica Count for t1-reservationactor

Replica Count (Max)
t1-reservationactor
2

Max Replica Count for t1-customization

Replica Count (Max)
t1-customization
3