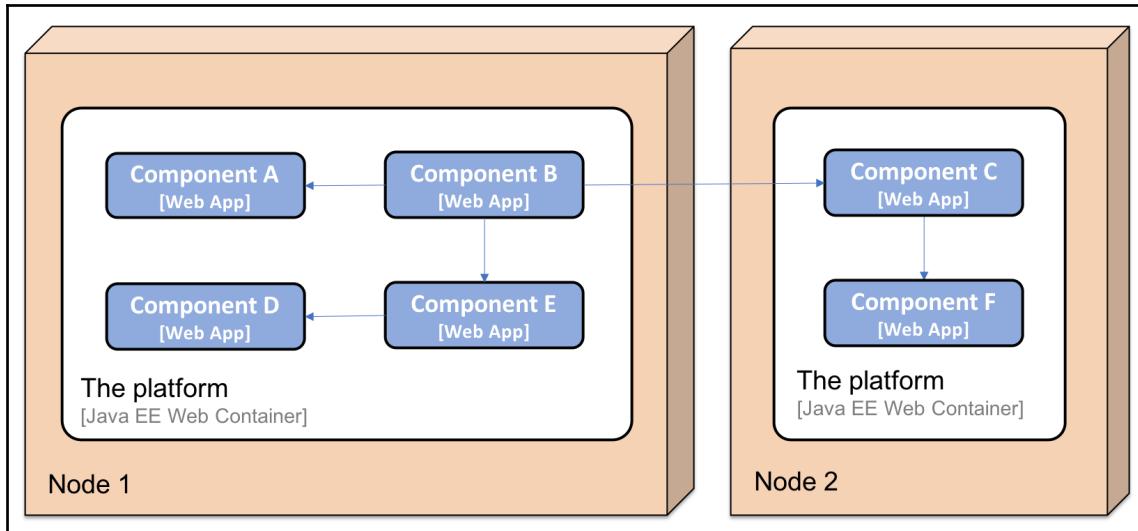
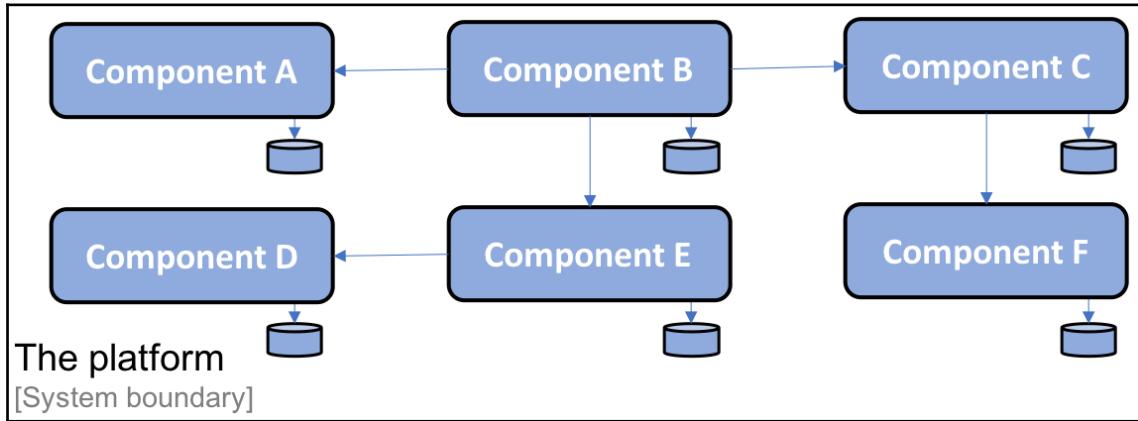
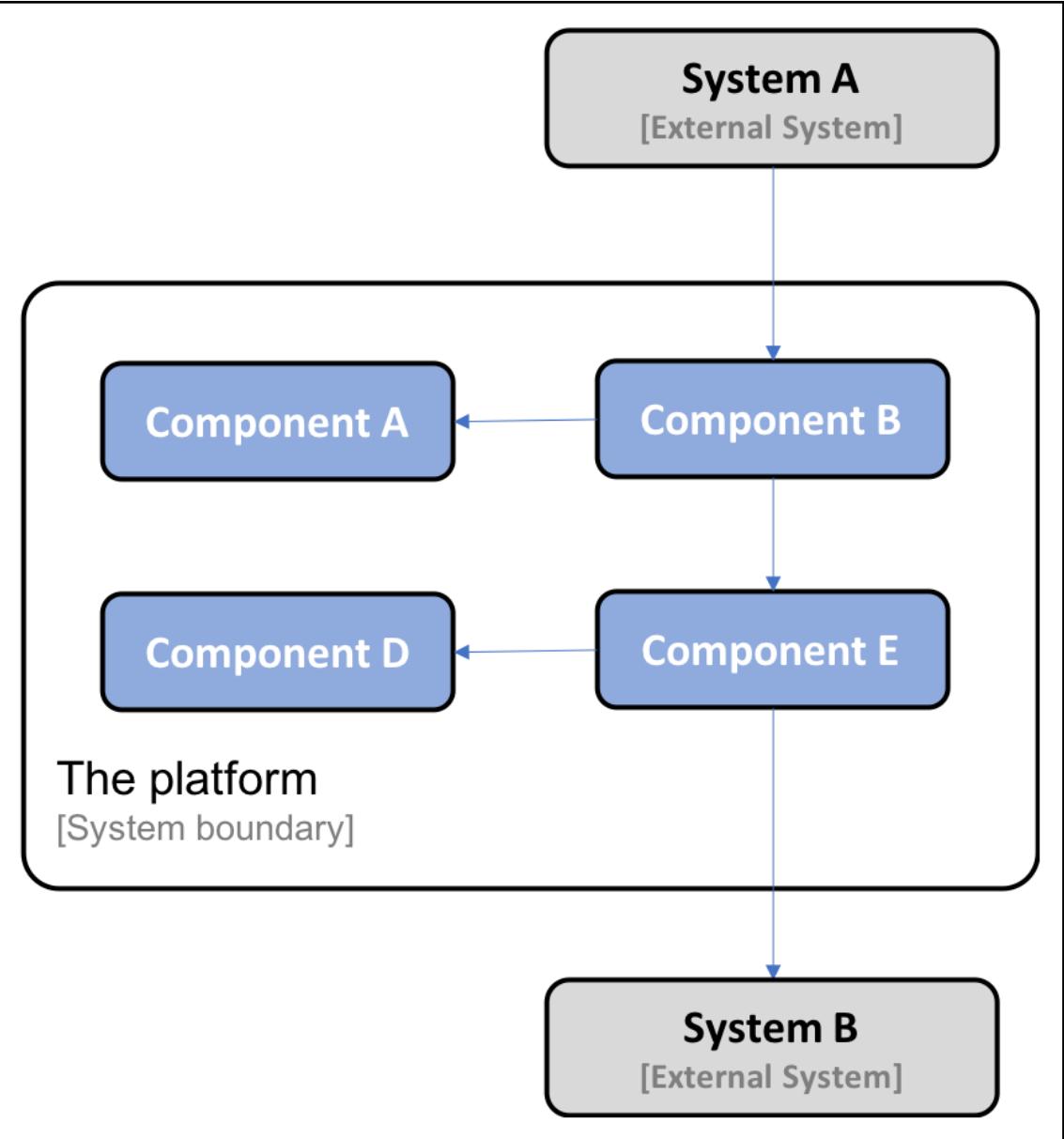
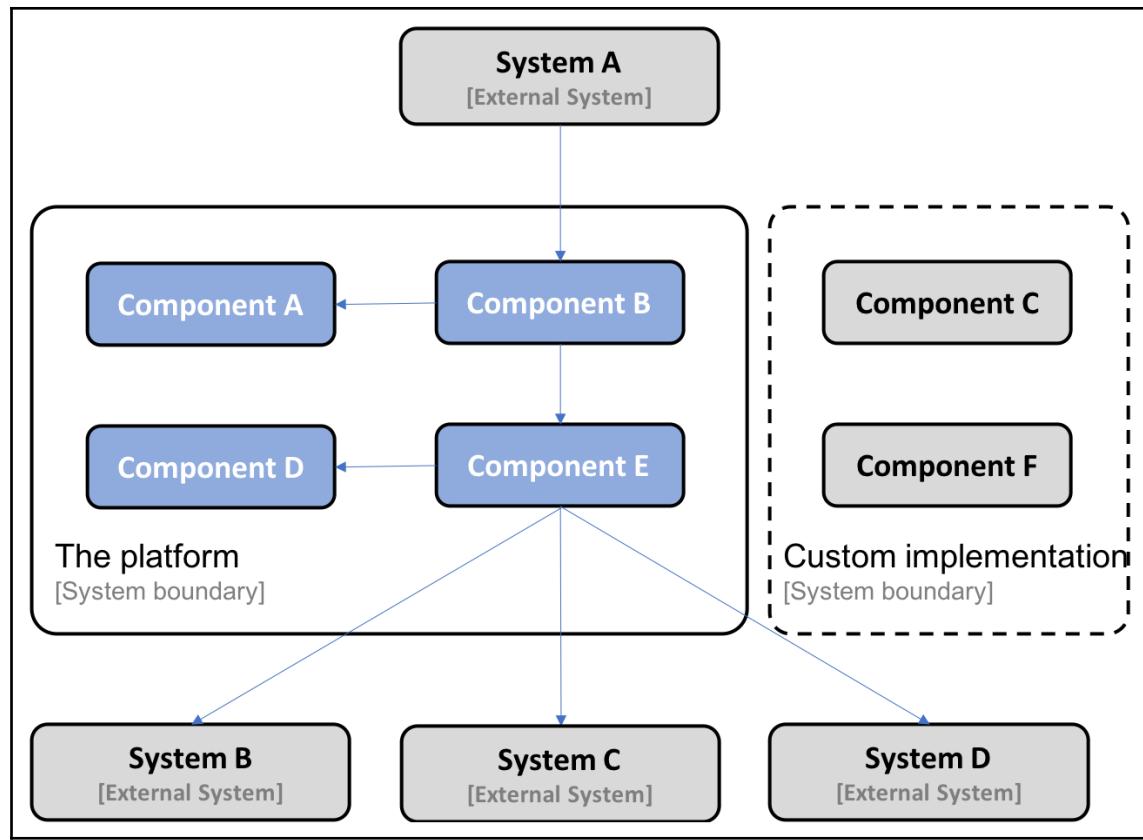
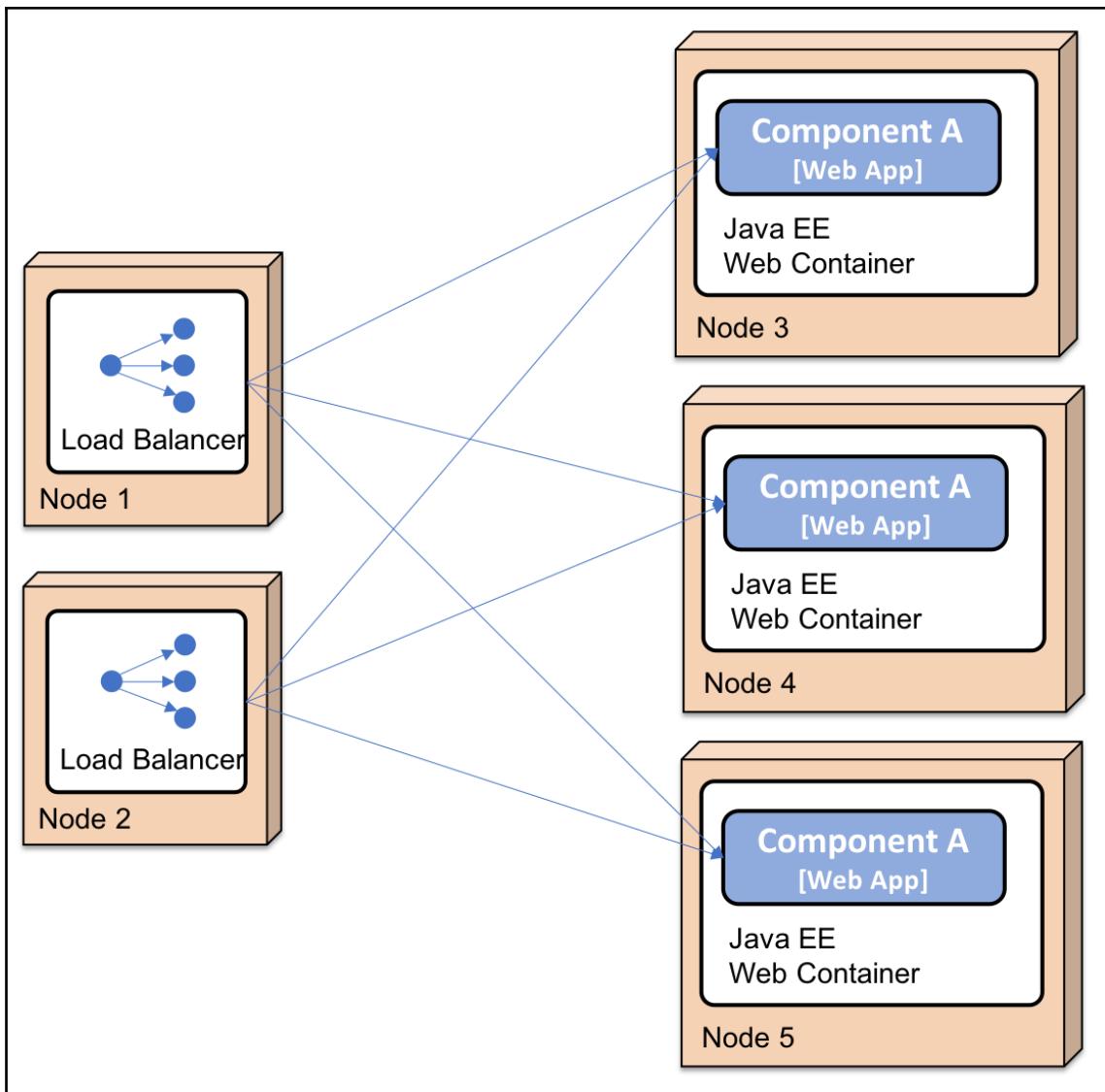


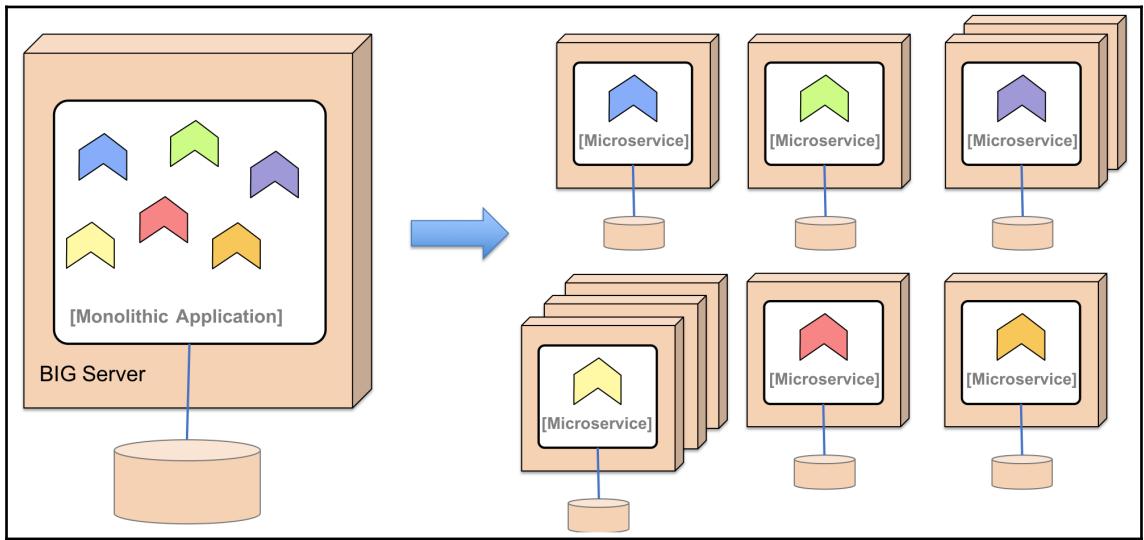
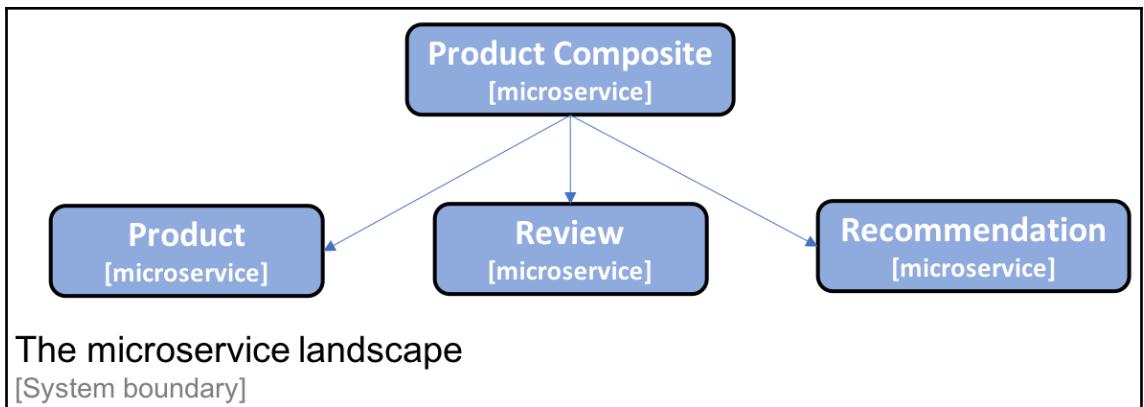
Chapter 1: Introduction to Microservices

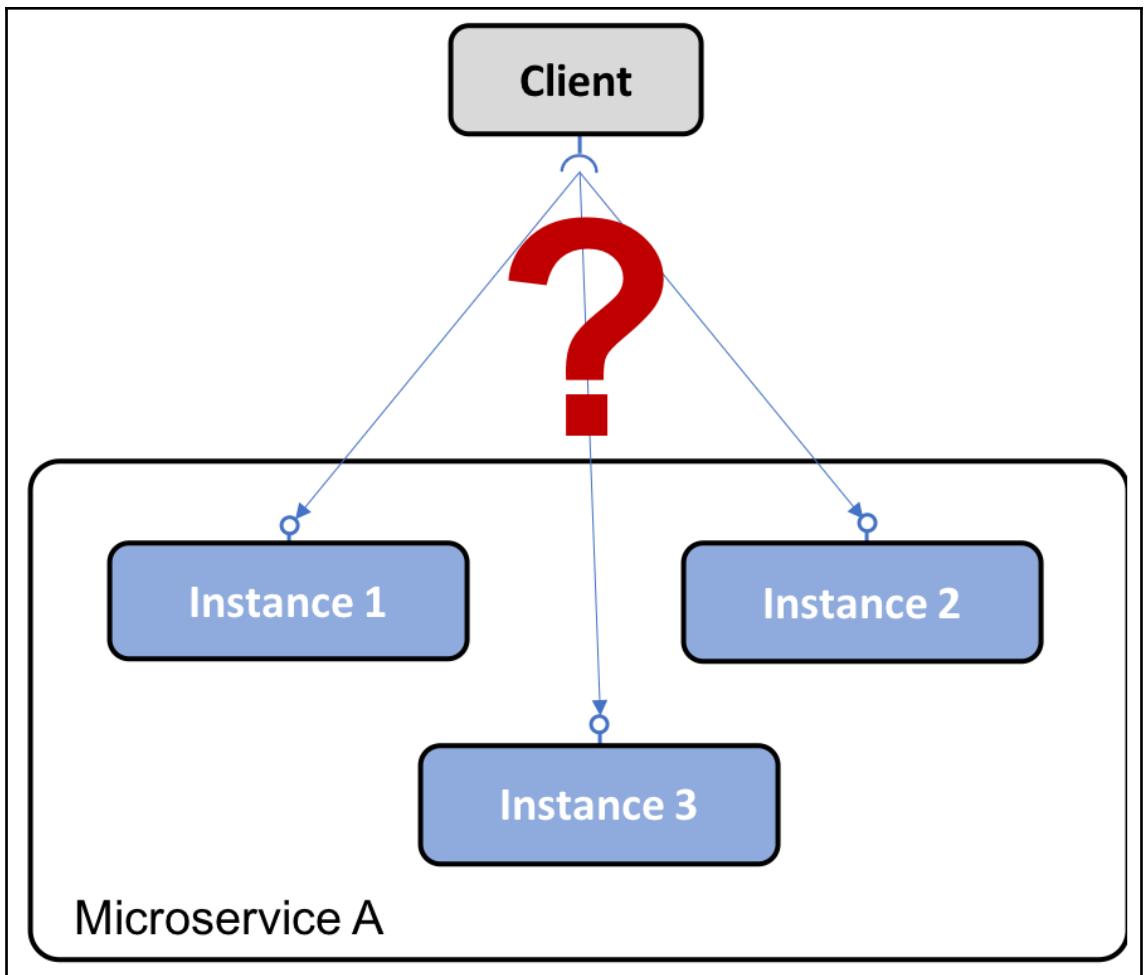


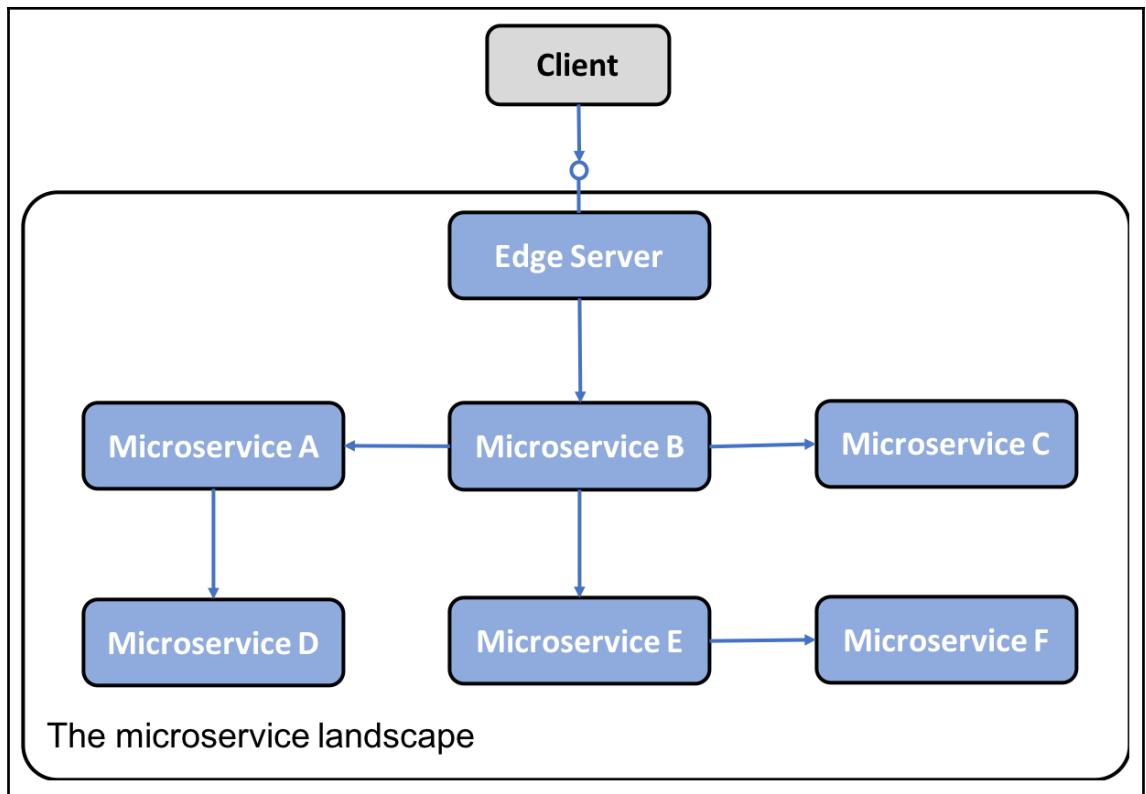


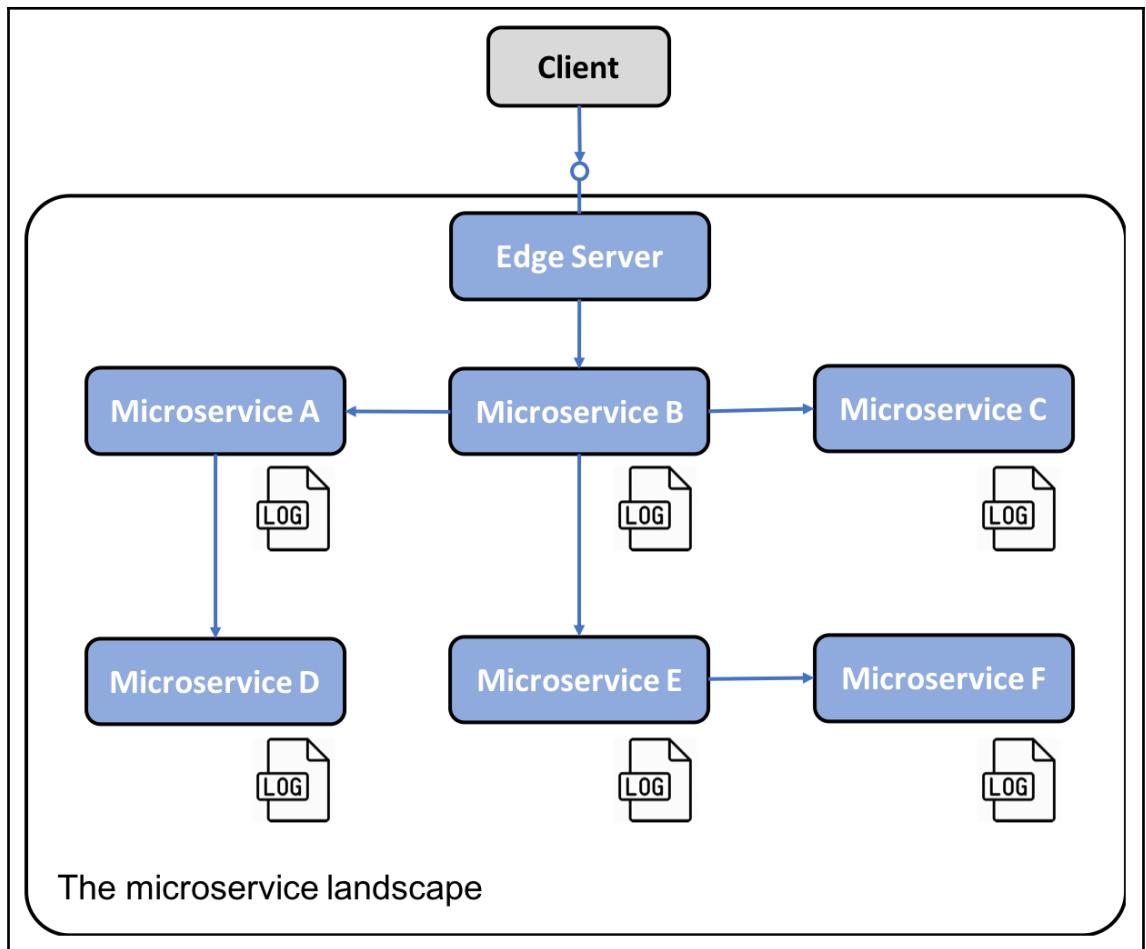


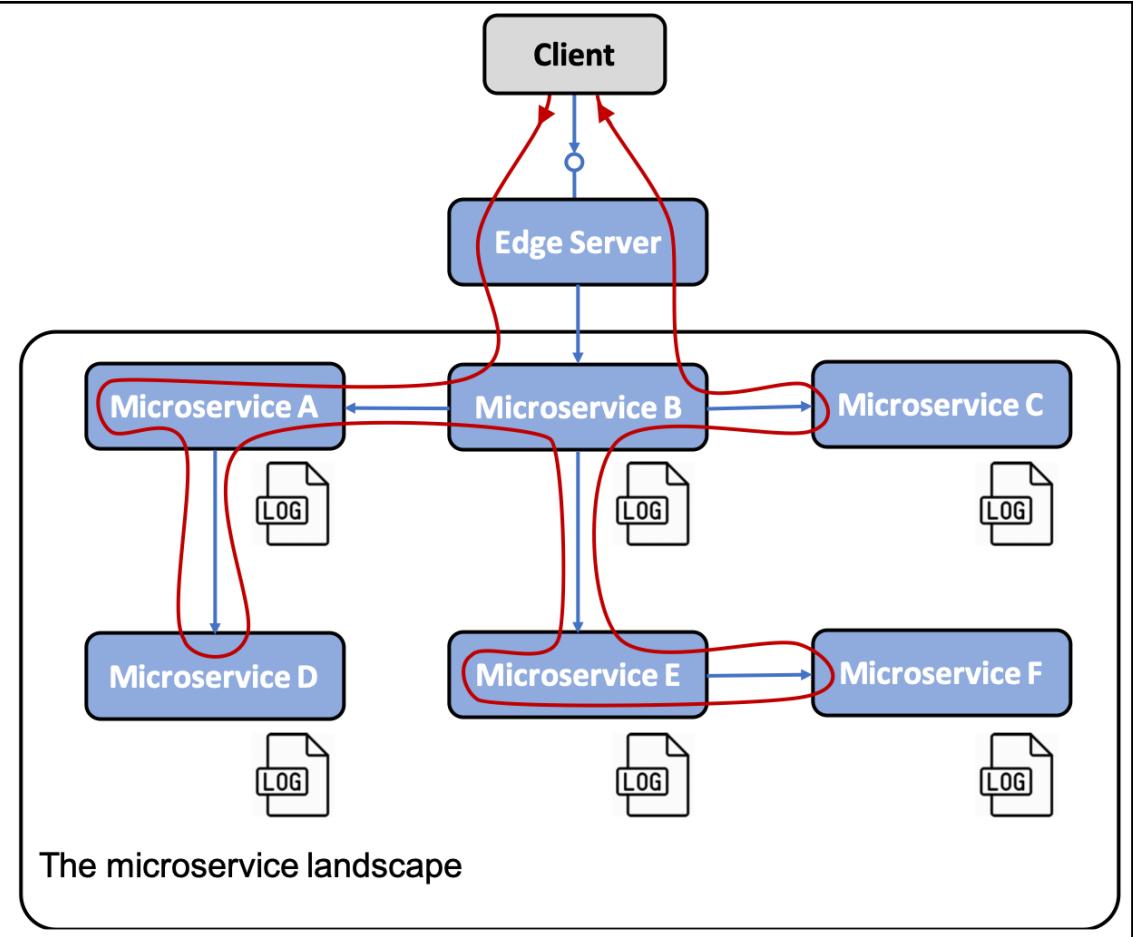


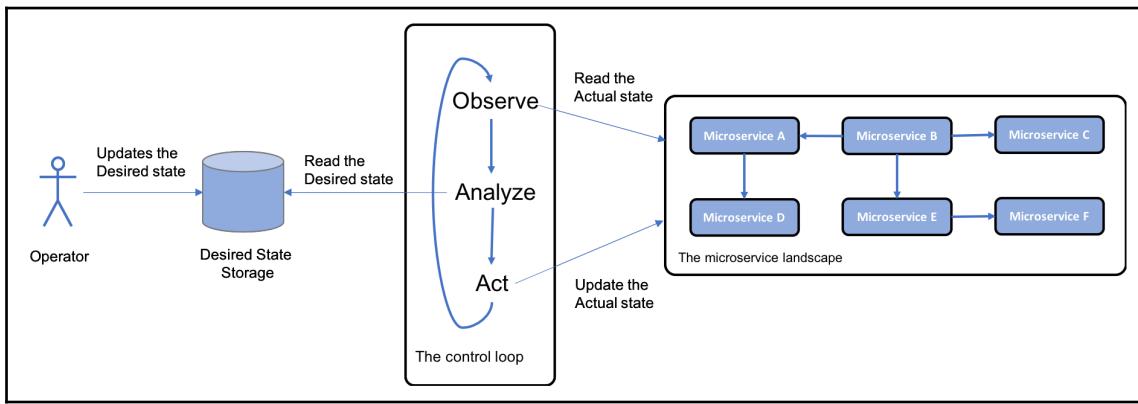
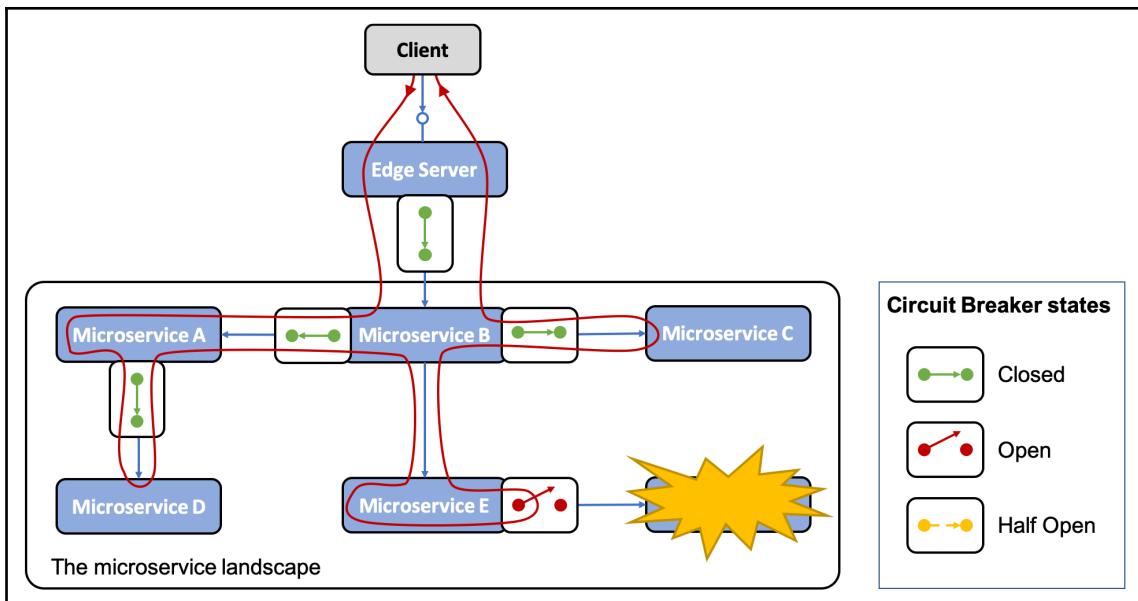


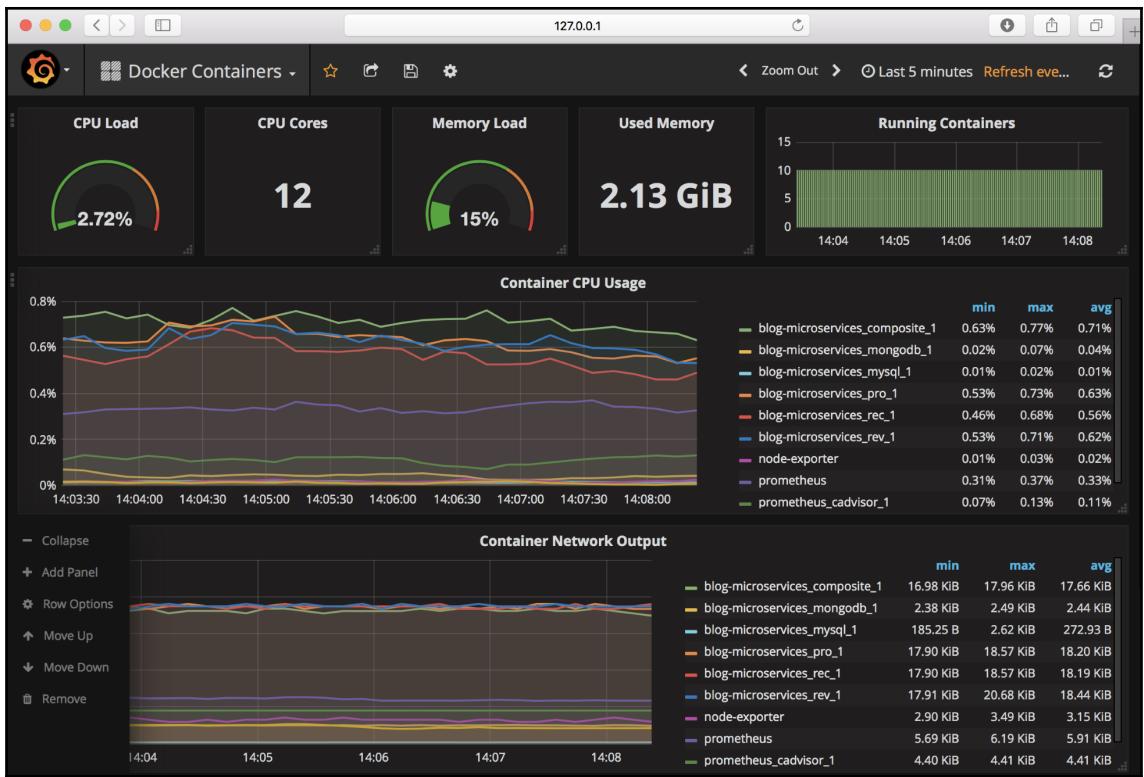












Chapter 2: Introduction to Spring Boot

The screenshot shows the Swagger UI interface running on a local host. The top navigation bar includes the title "swagger", a dropdown for "Select a spec" set to "default", and a dropdown for "Base URL" set to "localhost". Below the header, the title "Sample API" is displayed with a version "1.0.2" badge. A note indicates the base URL is "localhost:7000/" and provides a direct link "http://localhost:7000/v2/api-docs".

Under the API title, there is a "Description of the API" section containing links to "Terms of service" and "License".

The main content area is titled "product-composite-service-impl" and describes it as a "REST API for composite product information".

A specific endpoint is shown: **GET /product-composite/{productId}** getProduct. This endpoint has one parameter:

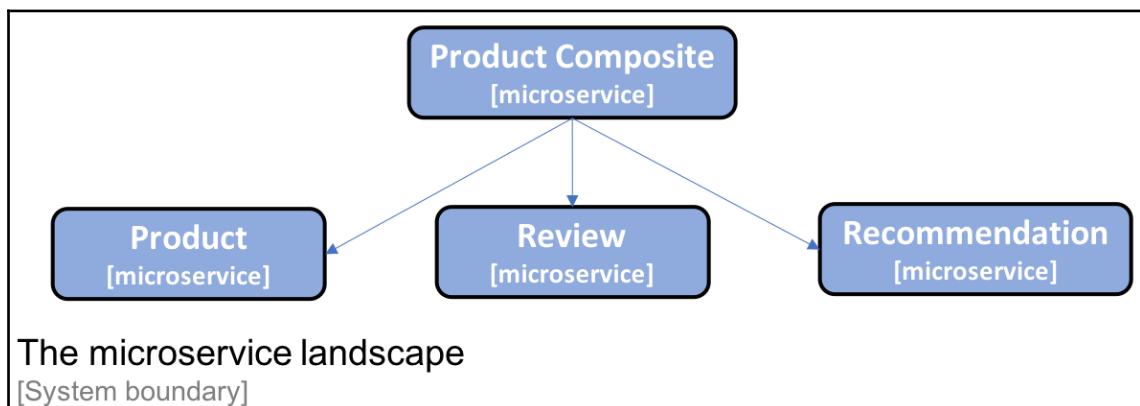
Name	Description
productId * required integer(\$int32) (path)	productId productId - productId

Below the table is a large blue "Execute" button.

At the bottom, there is a "Responses" section with a dropdown for "Response content type" set to "application/json".

Chapter 3: Creating a Set of Cooperating Microservices

```
6. @b394afed9384:/ (bash)
git version 2.17.1 (Apple Git-112)
openjdk version "11" 2018-09-25
curl 7.54.0 ...
jq-1.5
Spring CLI v2.0.5.RELEASE
```



```
4. bash
$ find microservices/product-service -type f
microservices/product-service/gradle/wrapper/gradle-wrapper.jar
microservices/product-service/gradle/wrapper/gradle-wrapper.properties
microservices/product-service/gradlew
microservices/product-service/.gitignore
microservices/product-service/build.gradle
microservices/product-service/gradlew.bat
microservices/product-service/settings.gradle
microservices/product-service/src/test/java/se/magnus/microservices/core/product/ProductServiceApplicationTests.java
microservices/product-service/src/main/resources/application.properties
microservices/product-service/src/main/java/se/magnus/microservices/core/product/ProductServiceApplication.java
$
```

4. bash

```
$ ./gradlew build
Starting a Gradle Daemon (subsequent builds will be faster)
Download ...
> Task :microservices:product-composite-service:test
...
> Task :microservices:product-service:test
...
> Task :microservices:recommendation-service:test
...
> Task :microservices:review-service:test
...
BUILD SUCCESSFUL in 34s
$ 
```

4. bash

```
$ java -jar microservices/product-service/build/libs/*.jar &
._____,_____
 \  \ /  /  \  \
  )  ) (  (  )  )
 /  / \  \ /  / \  \
  '  '  '  '  '  '
   |  |  |  |  |  |
   =  =  =  =  =
 :: Spring Boot ::      (v2.1.0.RC1)

...Started ProductServiceApplication in 2.339 seconds (JVM running for 2.771)
```

4. bash

```
$ curl http://localhost:7001/product/123
{"productId":123,"name":"name-123","weight":123,"serviceAddress":"Magnus-MBP32.local/192.168.1.185:7001"}
$ 
```

```
4. bash
...Started ProductCompositeServiceApplication...
...Started RecommendationServiceApplication...
...Started ProductServiceApplication...
...Started ReviewServiceApplication...
```

```
4. bash
$ curl http://localhost:7000/product-composite/1
{"productId":1,"name":"name-1","weight":123,"recommendations":[{"recommendationId":1,"author":"Author 1","rate":1},{"recommendationId":2,"author":"Author 2","rate":2},{"recommendationId":3,"author":"Author 3","rate":3}],"reviews":[{"reviewId":1,"author":"Author 1","subject":"Subject 1"}, {"reviewId":2,"author":"Author 2","subject":"Subject 2"}, {"reviewId":3,"author":"Author 3","subject":"Subject 3"}],"serviceAddresses":{"cm": "Magnus-MBP32.lan/192.168.1.185:7000", "pro": "Magnus-MBP32.lan/192.168.1.185:7001", "rev": "Magnus-MBP32.lan/192.168.1.185:7003", "rec": "Magnus-MBP32.lan/192.168.1.185:7002"}]}$
```

```
4. bash
$ curl http://localhost:7000/product-composite/1 -s | jq .
{
  "productId": 123,
  ...
  "recommendations": [ ... ],
  "reviews": [ ... ],
  "serviceAddresses": { ... }
}
$
```

Type tags, projects, or working set names t

local

- Install local cloud services
- api
- product-composite-service [7000] **product-composite-service**
- product-service [7001]
- recommendation-service [7002]
- review-service [7003]
- util

```
2018-10-15 17:38:19.638 INFO 52138 --- [main] m.c.p.ProductCompositeServiceApplication : Starting P
2018-10-15 17:38:19.641 DEBUG 52138 --- [main] m.c.p.ProductCompositeServiceApplication : Running wi
2018-10-15 17:38:19.642 INFO 52138 --- [main] m.c.p.ProductCompositeServiceApplication : No active
2018-10-15 17:38:19.891 INFO 52138 --- [main] onfigReactiveWebServerApplicationContext : Refreshing
2018-10-15 17:38:20.900 INFO 52138 --- [main] S.w.r.r.m.a.RequestMappingHandlerMapping : Mapped "{/r
2018-10-15 17:38:20.901 INFO 52138 --- [main] S.w.r.r.m.a.RequestMappingHandlerMapping : Mapped "{/[
2018-10-15 17:38:20.902 INFO 52138 --- [main] S.w.r.r.m.a.RequestMappingHandlerMapping : Mapped "{/[
2018-10-15 17:38:20.904 INFO 52138 --- [main] S.w.r.r.m.a.RequestMappingHandlerMapping : Mapped "{/[
2018-10-15 17:38:20.955 INFO 52138 --- [main] o.s.w.r.handler.SimpleUrlHandlerMapping : Mapped URL
2018-10-15 17:38:20.955 INFO 52138 --- [main] o.s.w.r.handler.SimpleUrlHandlerMapping : Mapped URL
2018-10-15 17:38:21.347 INFO 52138 --- [main] o.s.b.a.e.web.EndpointLinksResolver : Exposing 2 en
2018-10-15 17:38:21.364 INFO 52138 --- [main] .b.a.e.w.r.WebFluxEndpointHandlerMapping : Mapped "{/[
2018-10-15 17:38:21.366 INFO 52138 --- [main] .b.a.e.w.r.WebFluxEndpointHandlerMapping : Mapped "{/[
2018-10-15 17:38:21.367 INFO 52138 --- [main] .b.a.e.w.r.WebFluxEndpointHandlerMapping : Mapped "{/[
2018-10-15 17:38:21.483 INFO 52138 --- [main] o.s.w.r.r.m.a.ControllerMethodResolver : Looking fo
```

4 elements hidden by filter

Run Dashboard: ProductCompositeServiceApplication (1) ×

Spring Boot

Running

- ProductCompositeServiceApplication (1) :7000
- ProductServiceApplication (1) :7001
- RecommendationServiceApplication (1) :7002
- ReviewServiceApplication (1) :7003

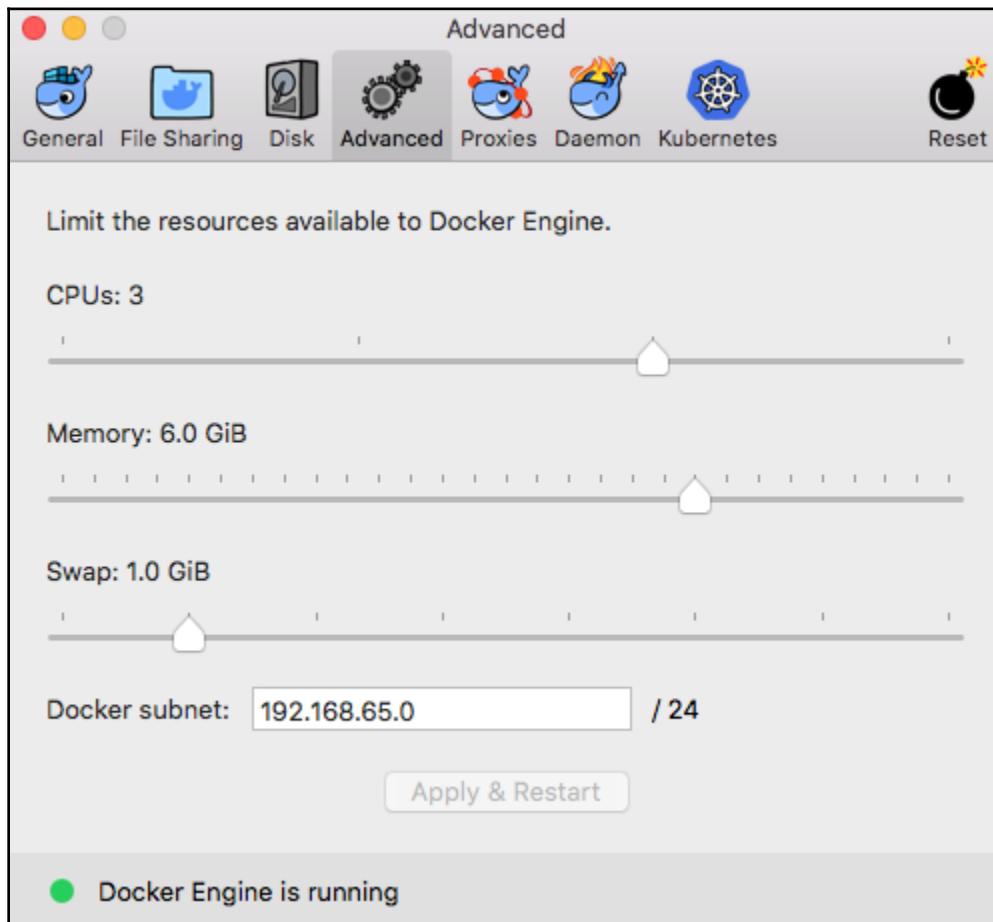
```
2018-10-15 17:33:00.657 INFO 50983 --- [main] m.c.p.ProductCompositeServiceApplication : Starting Prod
2018-10-15 17:33:00.661 DEBUG 50983 --- [main] m.c.p.ProductCompositeServiceApplication : Running with
2018-10-15 17:33:00.661 INFO 50983 --- [main] m.c.p.ProductCompositeServiceApplication : No active pro
2018-10-15 17:33:00.719 INFO 50983 --- [main] onfigReactiveWebServerApplicationContext : Refreshing or
2018-10-15 17:33:02.048 INFO 50983 --- [main] S.w.r.r.m.a.RequestMappingHandlerMapping : Mapped "{/pr
2018-10-15 17:33:02.106 INFO 50983 --- [main] o.s.w.r.handler.SimpleUrlHandlerMapping : Mapped URL pa
2018-10-15 17:33:02.106 INFO 50983 --- [main] o.s.w.r.handler.SimpleUrlHandlerMapping : Mapped URL pa
2018-10-15 17:33:02.539 INFO 50983 --- [main] o.s.b.a.e.web.EndpointLinksResolver : Exposing 2 en
2018-10-15 17:33:02.548 INFO 50983 --- [main] .b.a.e.w.r.WebFluxEndpointHandlerMapping : Mapped "{/act
2018-10-15 17:33:02.549 INFO 50983 --- [main] .b.a.e.w.r.WebFluxEndpointHandlerMapping : Mapped "{/act
2018-10-15 17:33:02.550 INFO 50983 --- [main] .b.a.e.w.r.WebFluxEndpointHandlerMapping : Mapped "{/act
```

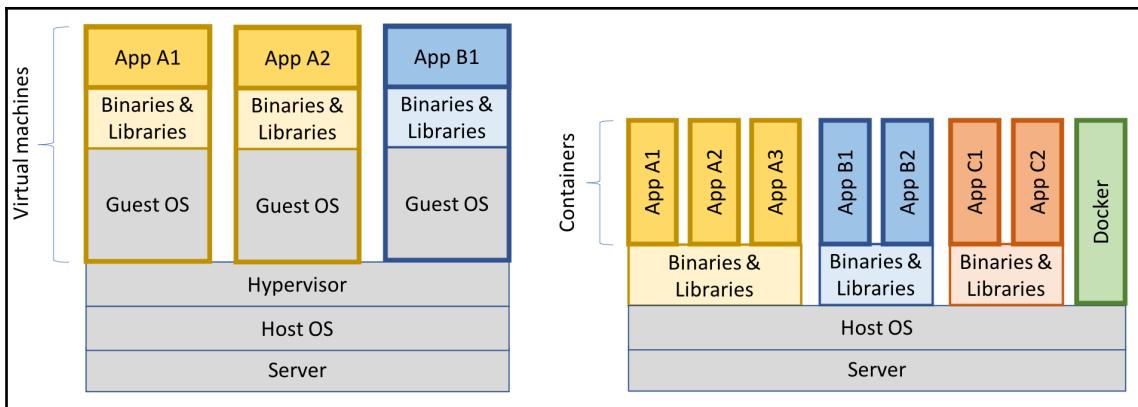
```
6. @b394afed9384:/ (bash)
$ java -jar inetTester/bin/inetTester.jar
Calling the hostname resolution method...
Method called, hostname Magnuss-Mac.local, elapsed time: 5010 (ms)
$
```

```
6. @b394afed9384:/ (bash)
$ java -jar inetTester/bin/inetTester.jar
Calling the hostname resolution method...
Method called, hostname Magnuss-Mac.local, elapsed time: 9 (ms)
$
```

```
6. @b394afed9384:/ (bash)
$ ./test-em-all.bash
Test OK (HTTP Code: 200)
Test OK (actual value: 1)
Test OK (actual value: 3)
Test OK (actual value: 3)
Test OK (HTTP Code: 404, {"timestamp":"2018-10-18T14:00:49.62+02:00","path":"/product-compo
site/13","message":"No product found for productId: 13","status":404,"error":"Not Found"})
Test OK (HTTP Code: 200)
Test OK (actual value: 113)
Test OK (actual value: 0)
Test OK (actual value: 3)
Test OK (HTTP Code: 200)
Test OK (actual value: 213)
Test OK (actual value: 3)
Test OK (actual value: 0)
Test OK (HTTP Code: 422, {"timestamp":"2018-10-18T14:00:49.811+02:00","path":"/product-comp
osite/-1","message":"Invalid productId: -1","status":422,"error":"Unprocessable Entity"})
Test OK (actual value: "Invalid productId: -1")
Test OK (HTTP Code: 400, {"timestamp":"2018-10-18T12:00:49.858+0000","path":"/product-compo
site/invalidProductId","status":400,"error":"Bad Request","message":"Type mismatch."})
Test OK (actual value: "Type mismatch.")
$ █
```

Chapter 4: Deploying Our Microservices Using Docker





```
● ○ ● 4. root@435dc56d39f6: / (docker)
$ docker run -it --rm ubuntu
root@435dc56d39f6:/#
```

```
● ○ ● 4. root@435dc56d39f6: / (docker)
root@435dc56d39f6:/# cat /etc/os-release | grep 'VERSION='
VERSION="18.04.3 LTS (Bionic Beaver)"
root@435dc56d39f6:/#
```

```
● ○ ● 4. @700dd0df9ffe:/ (docker)
$ docker run --rm -it centos
[root@700dd0df9ffe /]# cat /etc/redhat-release
CentOS Linux release 7.6.1810 (Core)
[root@700dd0df9ffe /]#
```

```
● ○ ● 4. @700dd0df9ffe:/ (bash)
$ echo 'Runtime.getRuntime().availableProcessors()' | jshell -q
jshell> Runtime.getRuntime().availableProcessors()$1 ==> 12
$
```

4. @700dd0df9ffe:/ (bash)

```
$ java -XX:+PrintFlagsFinal -version | grep MaxHeapSize
size_t MaxHeapSize = 8589934592 {product} {ergonomic}

...
```

6. @b394afed9384:/ (bash)

```
$ ls -l microservices/product-service/build/libs
-rw-r--r-- 1 magnus staff 19618829 Aug 30 18:59 product-service-1.0.0-SNAPSHOT.jar
$
```

4. @700dd0df9ffe:/ (bash)

```
$ docker images | grep product-service
product-service latest 119a3f98ad0c 9 seconds ago 490MB
$
```

4. @700dd0df9ffe:/ (docker)

```
$ docker run --rm -p8080:8080 -e "SPRING_PROFILES_ACTIVE=docker" product-service
.
.
.
:: Spring Boot ::          (v2.1.0.RELEASE)

2019-08-30 09:04:58.489  INFO 1 --- [    main] s.m.m.c.p.ProductServiceApplication : Starting ProductServiceApplication on 9dc086e4a88b
with PID 1 (/app.jar started by root in /)
2019-08-30 09:04:58.493 DEBUG 1 --- [    main] s.m.m.c.p.ProductServiceApplication : Running with Spring Boot v2.1.0.RELEASE, Spring v5.
1.2.RELEASE
2019-08-30 09:04:58.493  INFO 1 --- [    main] s.m.m.c.p.ProductServiceApplication : The following profiles are active: docker
2019-08-30 09:04:59.620  WARN 1 --- [    main] reactor.netty.tcp.TcpResources      : [Http] resources will use the default LoopResources
: DefaultLoopResources {prefix=reactor-http, daemon=true, selectCount=12, workerCount=12}
2019-08-30 09:04:59.620  WARN 1 --- [    main] reactor.netty.tcp.TcpResources      : [Http] resources will use the default ConnectionPro
vider: PooledConnectionProvider {name=http, poolFactory=reactor.netty.resources.ConnectionProviders$$Lambda$269/0x000000008013edc40e4c2bb6e0}
2019-08-30 09:05:00.277  INFO 1 --- [    main] o.s.b.a.e.web.EndpointLinksResolver : Exposing 2 endpoint(s) beneath base path '/actuator'
2019-08-30 09:05:00.816  INFO 1 --- [    main] o.s.b.web.embedded.netty.NettyWebServer : Netty started on port(s): 8080
2019-08-30 09:05:00.824  INFO 1 --- [    main] s.m.m.c.p.ProductServiceApplication : Started ProductServiceApplication in 2.824 seconds
(JVM running for 3.361)
```

6. @b394afed9384:/ (bash)

```
$ curl localhost:8080/product/3
>{"productId":3,"name":"name-3","weight":123,"serviceAddress":"9dc086e4a88b/172.17.0.2:8080"}
```

```
6. @b394afed9384:/ (bash)
$ docker ps
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS
9dc086e4a88b        product-service     "java -jar /app.jar"   3 minutes ago      Up 3 minutes
                                                               NAMES
$
```

```
6. @b394afed9384:/ (bash)
$ docker ps
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS
f4c8645902c6        product-service     "java -jar /app.jar"   13 seconds ago    Up 11 seconds
                                                               NAMES
$
```

```
6. @b394afed9384:/ (bash)
$ docker images | grep chapter04
chapter04_product-composite  latest  a04b5b1cf4a  19 seconds ago  490MB
chapter04_review              latest  72ca17df2799  21 seconds ago  490MB
chapter04_recommendation     latest  c44e8f50dc51  22 seconds ago  490MB
chapter04_product             latest  a0f9f70b6ed8  24 seconds ago  490MB
$
```

```
6. @b394afed9384:/ (bash)
$ docker-compose logs -f
...
review_1 | 2018-11-04 09:22:03.618 INFO 1 --- [ main] s.m.m.c.review.ReviewServiceApplication : Started ReviewServiceApplication in 6.051 seconds (JVM running for 6.952)
...
product-composite_1 | 2018-11-04 09:22:03.151 INFO 1 --- [ main] m.c.p.ProductCompositeServiceApplication : Started ProductCompositeServiceApplication in 6.414 seconds (JVM running for 6.936)
...
recommendation_1 | 2018-11-04 09:22:03.542 INFO 1 --- [ main] m.m.c.r.RecommendationServiceApplication : Started RecommendationServiceApplication in 6.199 seconds (JVM running for 7.131)
...
product_1 | 2018-11-04 09:22:04.250  INFO 1 --- [ main] s.m.m.c.p.ProductServiceApplication : Started ProductServiceApplication in 6.212 seconds (JVM running for 7.614)
```

```
6. @b394afed9384:/ (bash)
$ curl localhost:8080/product-composite/123 -s | jq .
{
  "productId": 123,
  ...
  "recommendations": [ ... ],
  "reviews": [ ... ],
  "serviceAddresses": { ... }
}
$
```

```
6. @b394afed9384:/ (bash)
"serviceAddresses": {
  "cmp": "98059be902bf/172.21.0.2:8080",
  "pro": "99774d9be7b8/172.21.0.4:8080",
  "rev": "a89da16763d9/172.21.0.5:8080",
  "rec": "2a846794a1d0/172.21.0.3:8080"
}
```

```
6. @b394afed9384:/ (bash)
$ ./test-em-all.bash start stop
Start: Sun Nov 4 13:17:45 CET 2018
HOST=localhost
PORT=8080
Restarting the test environment...
$ docker-compose down
Removing network chapter04_default
WARNING: Network chapter04_default not found.
$ docker-compose up -d
Creating network "chapter04_default" with the default driver
Creating chapter04_product_1 ... done
Creating chapter04_review_1 ... done
Creating chapter04_product-composite_1 ... done
Creating chapter04_recommendation_1 ... done
Wait for: http://localhost:8080/product-composite/1... not yet, retry #1 not yet, retry #2 Ok
...Tests OK...
We are done, stopping the test environment...
$ docker-compose down
Stopping chapter04_recommendation_1 ... done
Stopping chapter04_review_1 ... done
Stopping chapter04_product_1 ... done
Stopping chapter04_product-composite_1 ... done
Removing chapter04_recommendation_1 ... done
Removing chapter04_review_1 ... done
Removing chapter04_product_1 ... done
Removing chapter04_product-composite_1 ... done
Removing network chapter04_default
End: Sun Nov 4 13:18:03 CET 2018
$
```

```
2. Chapter04 (bash)
X Chapter04
Chapter04 $ docker-compose ps


| Name                          | Command            | State | Ports                  |
|-------------------------------|--------------------|-------|------------------------|
| -----                         |                    |       |                        |
| chapter04_product-composite_1 | java -jar /app.jar | Up    | 0.0.0.0:8080->8080/tcp |
| chapter04_product_1           | java -jar /app.jar | Up    | 8080/tcp               |
| chapter04_recommendation_1    | java -jar /app.jar | Up    | 8080/tcp               |
| chapter04_review_1            | java -jar /app.jar | Up    | 8080/tcp               |
| Chapter04 \$                  |                    |       |                        |


```

Chapter 5: Adding an API Description Using OpenAPI/Swagger

The screenshot shows a web browser window with the address bar set to 'localhost'. The main content area displays the Swagger UI for a 'Sample API' version 1.0.2. The API has a base URL of 'localhost:7000/' and is accessible via <http://localhost:7000/v2/api-docs>. Below the URL, there's a description of the API and links to 'Terms of service' and 'License'.

Under the 'product-composite-service-impl' section, there is a detailed view of a GET request for '/product-composite/{productId} getProduct'. The parameters for this endpoint are listed:

Name	Description
productId * required integer(\$int32) (path)	productId productId - productId

An 'Execute' button is available to run the API call. At the bottom, there's a 'Responses' section with a dropdown for 'Response content type' set to 'application/json'.

The screenshot shows a web browser window with the address bar set to 'localhost'. The main content area is a 'swagger' interface. At the top left is the 'swagger' logo. To its right is a dropdown menu labeled 'Select a spec' with 'default' selected. Below this is a green header bar containing the title 'Sample API' with a version '1.0.0' badge, and a red number '1' indicating a notification. The title is followed by a note '[Base URL: localhost:8080 /]' and a link 'http://localhost:8080/v2/api-docs'. Below the header, there's a section titled 'Description of the API...' which includes links to 'Terms of service', 'Contact - Website', 'Send email to Contact', and 'License'. A red box highlights this entire section. The next section, 'product-composite-service-impl', is also highlighted with a red box and contains the text 'REST API for composite product information.' with a red number '2' to its right. A red box highlights the 'Models' link in the following section, which has a red number '3' to its right. The bottom right corner of the page has a red 'X' icon.

localhost

swagger

Select a spec default

Sample API 1.0.0 1

[Base URL: localhost:8080 /]
<http://localhost:8080/v2/api-docs>

Description of the API...

[Terms of service](#)

[Contact - Website](#)

[Send email to Contact](#)

[License](#)

product-composite-service-impl REST API for composite product information. 2

Models 3

localhost

product-composite-service-impl REST API for composite product information.

GET /product-composite/{productId} Returns a composite view of the specified product id **1**

Normal response **2**

If the requested product id is found the method will return information regarding:

1. Base product information
2. Reviews
3. Recommendations
4. Service Addresses\n(technical information regarding the addresses of the microservices that created the response)

Expected partial and error responses

In the following cases, only a partial response be created (used to simplify testing of error conditions)

Product id 113

200 - Ok, but no recommendations will be returned

Product id 213

200 - Ok, but no reviews will be returned

Non numerical product id

400 - A **Bad Request** error will be returned

Product id 13

404 - A **Not Found** error will be returned

Negative product ids

422 - An **Unprocessable Entity** error will be returned

Parameters

Try it out

Name	Description
productId * required integer(\$int32) (path)	productId

localhost

Responses Response content type application/json

Code	Description
200	<p>OK</p> <p>Example Value Model</p> <pre>{ "name": "string", "productId": 0, "recommendations": [{ "author": "string", "rate": 0, "recommendationId": 0 }], "reviews": [{ "author": "string", "reviewId": 0, "subject": "string" }], "serviceAddresses": { "cmp": "string", "pro": "string", "rec": "string", "rev": "string" }, "weight": 0 }</pre>
400	<p>Bad Request, invalid format of the request. See response message for more information.</p>
404	<p>Not found, the specified id does not exist.</p>
422	<p>Unprocessable entity, input parameters caused the processing to fails. See response message for more information.</p>

The screenshot shows a REST API testing interface with the following details:

- Parameters**: A table with one row:

Name	Description
productId * required integer(\$int32) (path)	productId 123
- Responses**:
 - Curl**:

```
curl -X GET "http://localhost:8080/product-composite/123" -H "accept: application/json"
```
 - Request URL**:

```
http://localhost:8080/product-composite/123
```
 - Server response**:

Code	Details
200	Response body <pre>{ "productId": 123, "name": "name-123", "weight": 123, "recommendations": [{ "recommendationId": 1, "author": "Author 1", "rate": 1 }, { "recommendationId": 2, "author": "Author 2", "rate": 2 }] }</pre>

The screenshot shows a REST API testing interface with the following details:

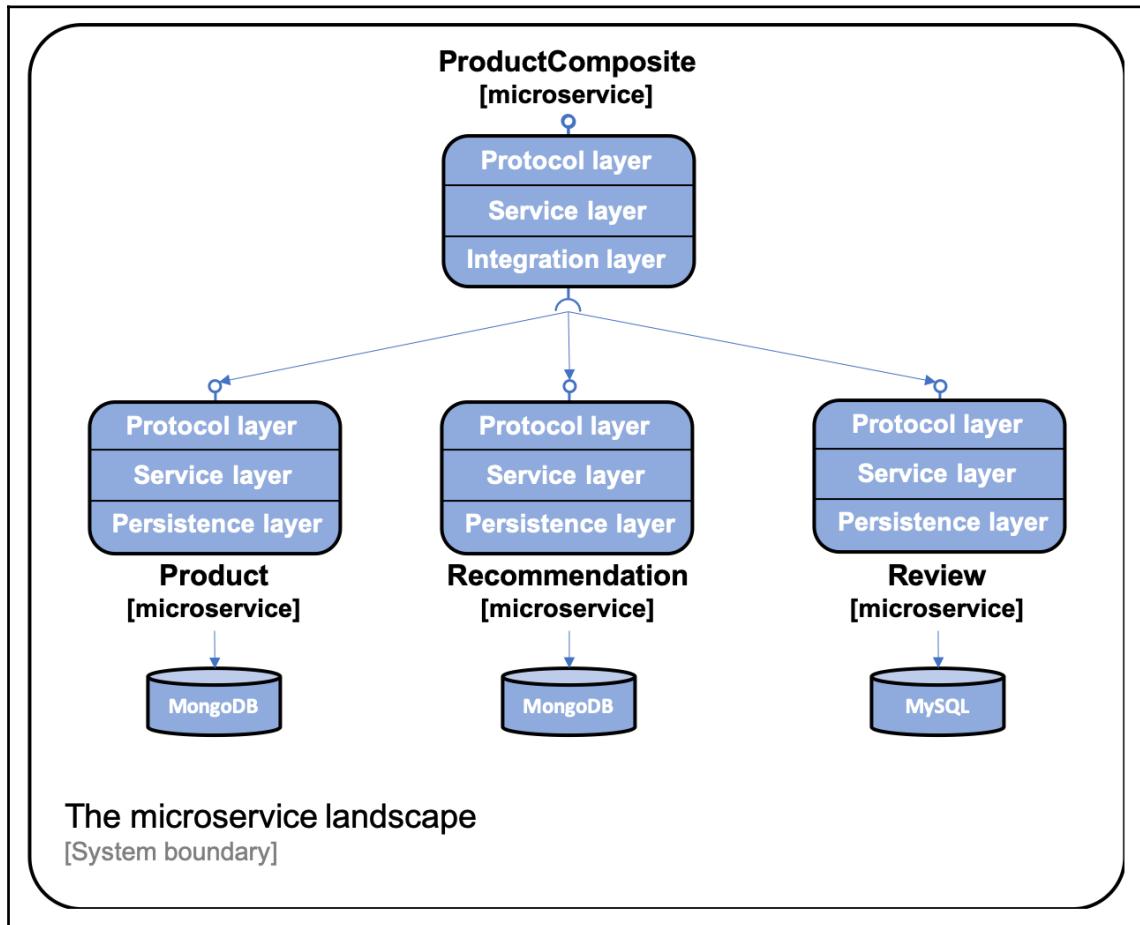
- Request URL:** `http://localhost:8080/product-composite/-1`
- Server response:** A red box highlights the error details:
 - Code:** 422
 - Details:** Error: Unprocessable Entity
 - Response body:**

```
{  
    "timestamp": "2018-11-13T04:57:14.516925Z",  
    "path": "/product-composite/-1",  
    "message": "Invalid productId: -1",  
    "status": 422,  
    "error": "Unprocessable Entity"  
}
```

[Download](#)
 - Response headers:**

```
content-length: 152  
content-type: application/json; charset=UTF-8
```

Chapter 6: Adding Persistence



```
2. bash
{
  "_id" : ... , "productId" : 1, "name" : "product 1", "weight" : 1 }
{
  "_id" : ... , "productId" : 113, "name" : "product 113", "weight" : 113 }
{
  "_id" : ... , "productId" : 213, "name" : "product 213", "weight" : 213 }
$
```

2. bash

id author content product_id review_id
1 author 1 content 1 1 1
2 author 2 content 2 1 2
\$

2. bash

BUILD SUCCESSFUL

\$ |

2. bash

Connected to MongoDB: localhost:27017

The screenshot shows a web browser window with the address bar set to 'localhost'. The main content area displays the REST API documentation for 'product-composite-service-impl'. The title is 'product-composite-service-impl REST API for composite product information.' Below the title, there are three method definitions:

- POST /product-composite** Creates a composite product
- GET /product-composite/{productId}** Returns a composite view of the specified product id
- DELETE /product-composite/{productId}** Deletes a product composite

A section titled 'Normal response' contains the following text:

Entities for product information, recommendations and reviews related to the specified productId will be deleted. The implementation of the delete method is idempotent, i.e. it can be called several times with the same response. This means that a delete request of a non existing product will return **200 Ok**.

Below the text, there are two buttons: 'Parameters' and 'Try it out'.

localhost

product-composite-service-impl REST API for composite product information.

1

POST /product-composite Creates a composite product

body * required

(body)

body

Edit Value | Model

```
{ "name": "string", "productId": 123456, "recommendations": [ { "author": "string", "content": "string", } ] }
```

2

3

4

Execute

Server response

Code 5

200

Details

Response headers

content-length: 0

2. bash

```
product-composite_1 | ... createCompositeProduct: creates a new composite entity for productId: 123456
product_1 | ... createProduct: entity created for productId: 123456
recommendation_1 | ... createRecommendation: created a recommendation entity: 123456/0
review_1 | ... createReview: created a review entity: 123456/0
```

2. bash

```
{ "_id": ObjectId("5c04ed370e8e3d000102ef94"), "version": 0, "productId": 123456, "name": "string", "weight": 0, "_class": "se.magnus.microservices.core.product.persistence.ProductEntity" }
```

2. bash

```
{ "_id": ObjectId("5c04ed378b87bc000133c349"), "version": 0, "productId": 123456, "recommendationId": 0, "author": "string", "rating": 0, "content": "string", "_class": "se.magnus.microservices.core.recommendation.persistence.RecommendationEntity" }
```



2. bash

id	author	content	product_id	review_id	subject	version
1	string	string	123456	0	string	0

\$ █

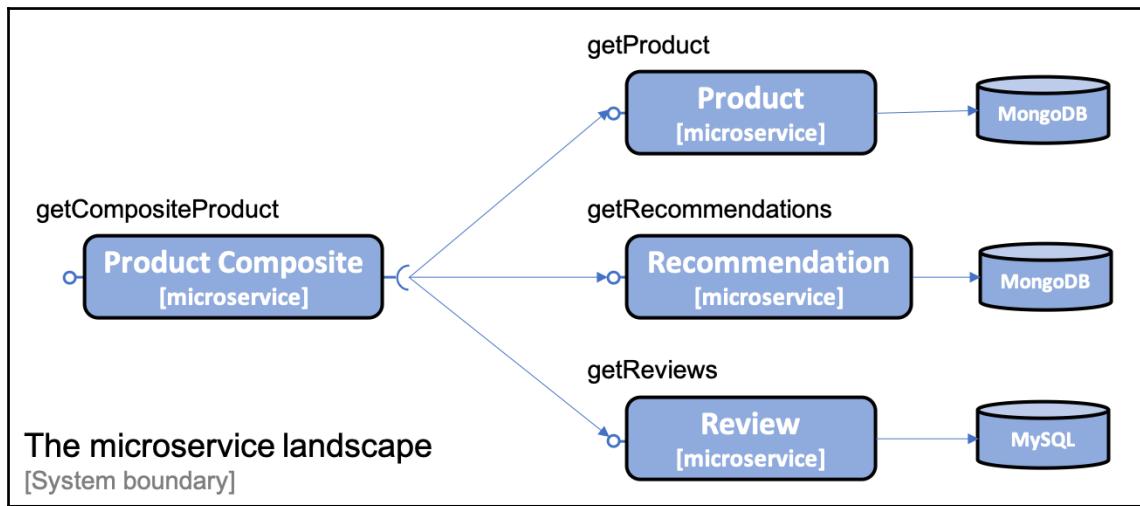
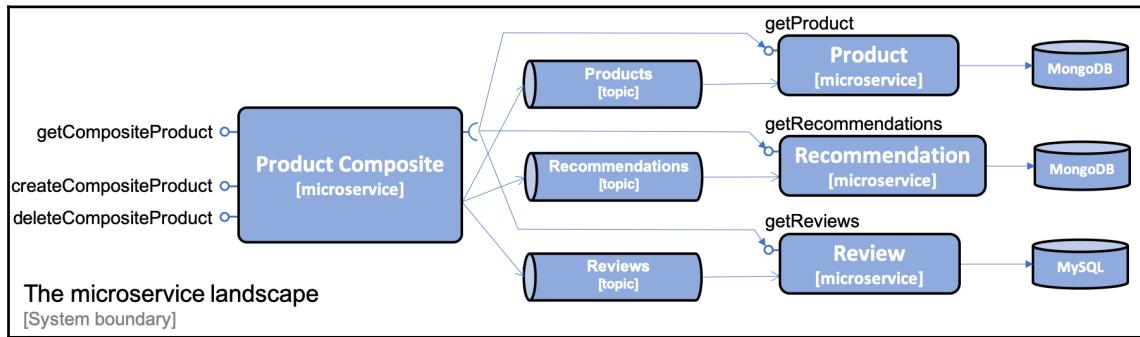


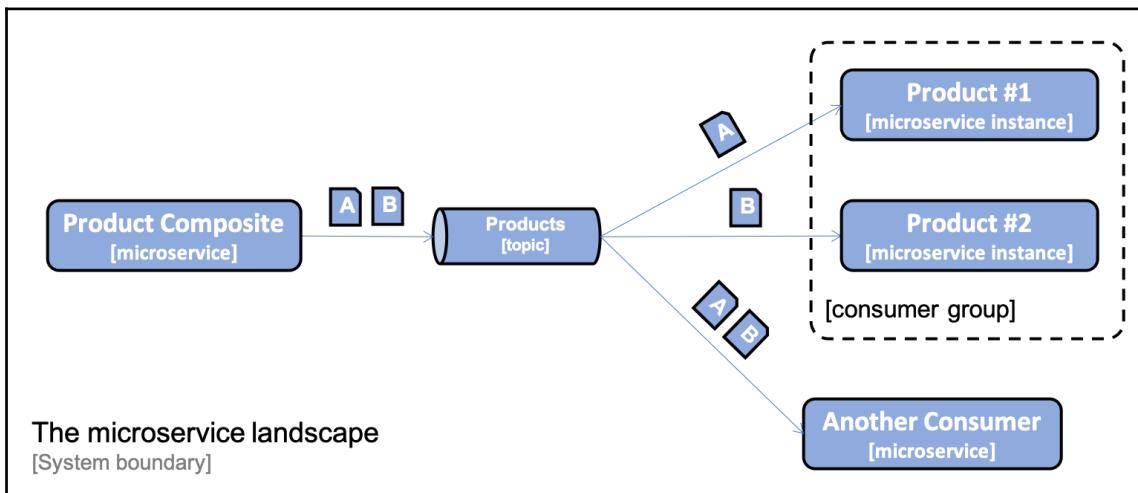
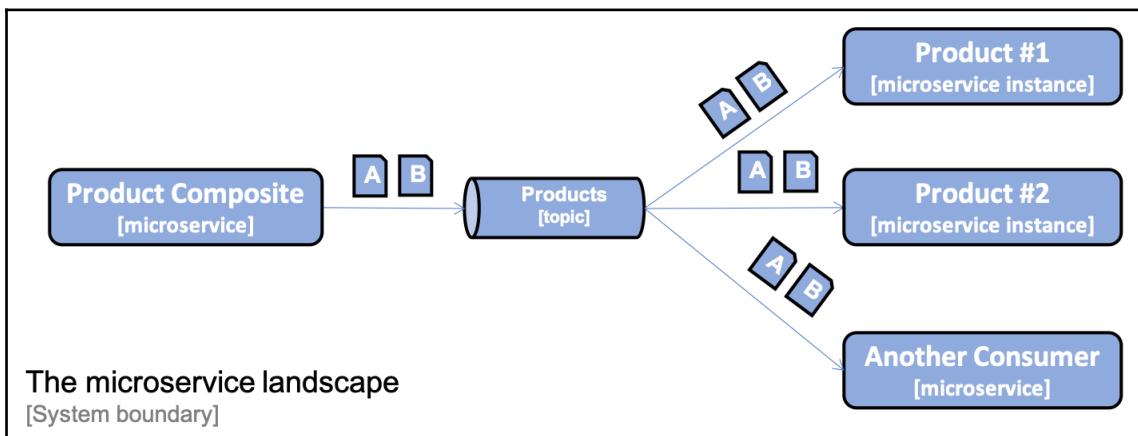
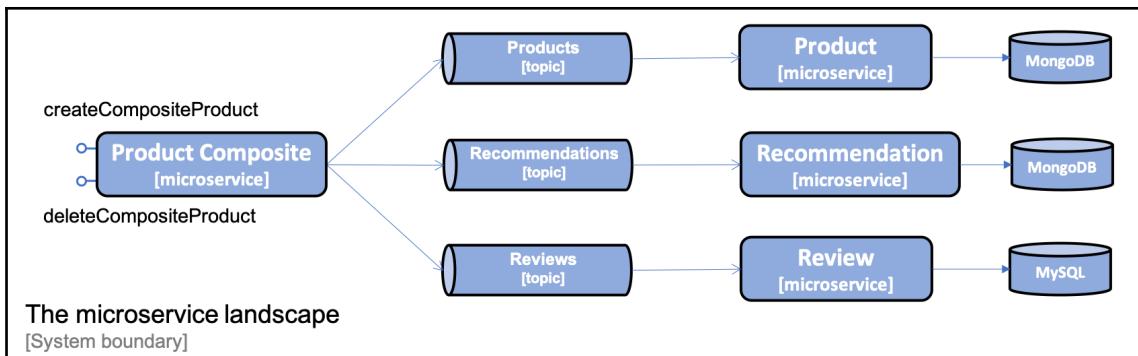
2. bash

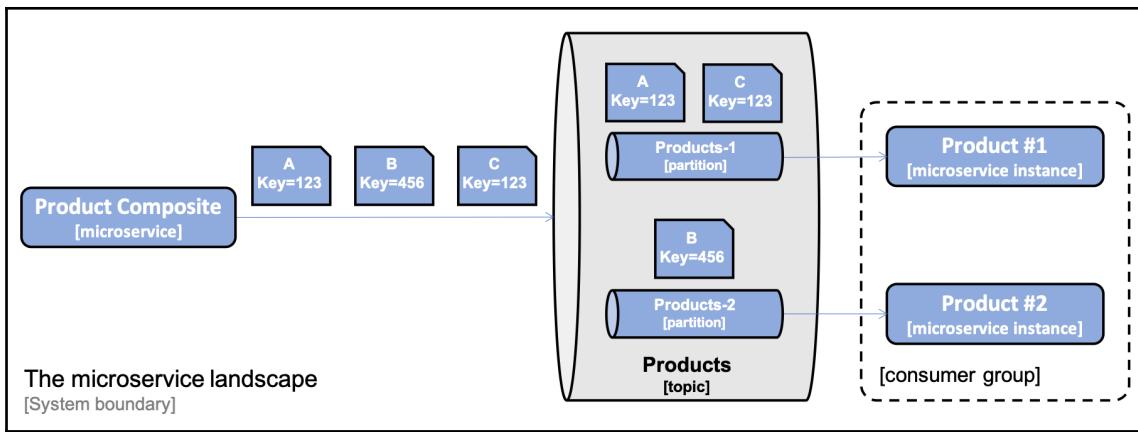
End: Wed Dec 5 06:48:20 CET 2018

\$ █

Chapter 7: Developing Reactive Microservices









2. @700dd0df9ffe:/ (bash)

```
{  
  "status": "UP",  
  ...  
  "coreServices": {  
    "status": "UP",  
    "details": {  
      "product": {  
        "status": "UP"  
      },  
      "review": {  
        "status": "UP"  
      },  
      "recommendation": {  
        "status": "UP"  
      }  
    }  
    ...  
$ |
```

RabbitMQ Management

localhost:15672/#/queues

Refreshed 2019-02-08 18:28:33 Refresh every 5 seconds

Virtual host All

Cluster rabbit@822c9e3ebc02

User guest Log out

Overview Connections Channels Exchanges Queues Admin

Queues

All queues (9)

Pagination

Page 1 of 1 - Filter: Regex ? Displaying 9 items , page size up to: 100

Overview			Messages			Message rates		
Name	Features	State	Ready	Unacked	Total	incoming	deliver / get	ack
products.auditGroup	D	idle	1	0	1	0.00/s	0.00/s	0.00/s
products.productsGroup	D DLX DLK	idle	0	0	0	0.00/s	0.00/s	0.00/s
products.productsGroup.dlq	D	idle	0	0	0			
recommendations.auditGroup	D	idle	3	0	3	0.00/s		
recommendations.recommendationsGroup	D DLX DLK	idle	0	0	0	0.00/s	0.00/s	0.00/s
recommendations.recommendationsGroup.dlq	D	idle	0	0	0			
reviews.auditGroup	D	idle	3	0	3	0.00/s		
reviews.reviewsGroup	D DLX DLK	idle	0	0	0	0.00/s	0.00/s	0.00/s
reviews.reviewsGroup.dlq	D	idle	0	0	0			

Add a new queue

HTTP API Server Docs Tutorials Community Support Community Slack Commercial Support Plugins GitHub Changelog

The screenshot shows the RabbitMQ Management interface at `localhost:15672/#/queues/%2F/products.auditGroup`. The top navigation bar includes tabs for Overview, Connections, Channels, Exchanges, Queues (which is selected), and Admin. The page title is "RabbitMQ" with version "3.7.8" and Erlang "20.3.8.5". The top right shows the date "Refreshed 2019-02-08 18:29:04", a "Refresh every 5 seconds" button, and user information for "User guest" and "Log out". The main content area has a heading "Get messages" with a warning: "Warning: getting messages from a queue is a destructive action." Below this are dropdowns for "Ack Mode" (set to "Nack message requeue true") and "Encoding" (set to "Auto string / base64"). A text input field "Messages:" contains the value "1". A large blue button labeled "Get Message(s)" is centered below these fields. The results section starts with "Message 1" and a note: "The server reported 0 messages remaining." It then displays detailed message properties in a table:

	Value
Exchange	products
Routing Key	products
Redelivered	•
Properties	timestamp: 1549645123 message_id: 0ada8221-6a2d-fa8d-9b8c-640879dcfdfd priority: 0 delivery_mode: 2 headers: content_type: application/json
Payload	{ "eventType": "CREATE", "key": 1, "data": { "productId": 1, "name": "product name C", "weight": 300, "serviceAddress": null }, "eventCreate

RabbitMQ Management x +

localhost:15672/#/queues

Refreshed 2019-02-08 18:53:19 Refresh every 5 seconds

Virtual host All Cluster rabbit@0d45af3c3f78 User guest Log out

RabbitMQ 3.7.8 Erlang 20.3.8.5

Overview Connections Channels Exchanges Queues Admin

Queues

All queues (15)

Pagination

Page 1 of 1 - Filter: Regex ? Displaying 15 items , page size up to: 100

Overview		Messages				Message rates		
Name	Features	State	Ready	Unacked	Total	incoming	deliver / get	ack
products.auditGroup-0	D	idle	1	0	1	0.00/s	0.00/s	0.00/s
products.auditGroup-1	D	idle	1	0	1	0.00/s		
products.productsGroup-0	D DLX DLK	idle	0	0	0	0.00/s	0.00/s	0.00/s
products.productsGroup-1	D DLX DLK	idle	0	0	0	0.00/s	0.00/s	0.00/s
products.productsGroup.dlq	D	idle	0	0	0			
recommendations.auditGroup-0	D	idle	3	0	3	0.00/s		
recommendations.auditGroup-1	D	idle	3	0	3	0.00/s		
recommendations.recommendationsGroup-0	D DLX DLK	idle	0	0	0	0.00/s	0.00/s	0.00/s
recommendations.recommendationsGroup-1	D DLX DLK	idle	0	0	0	0.00/s	0.00/s	0.00/s
recommendations.recommendationsGroup.dlq	D	idle	0	0	0			
reviews.auditGroup-0	D	idle	3	0	3	0.00/s		
reviews.auditGroup-1	D	idle	3	0	3	0.00/s		
reviews.reviewsGroup-0	D DLX DLK	idle	0	0	0	0.00/s	0.00/s	0.00/s
reviews.reviewsGroup-1	D DLX DLK	idle	0	0	0	0.00/s	0.00/s	0.00/s
reviews.reviewsGroup.dlq	D	idle	0	0	0			



2. @700dd0df9ffe:/ (bash)

```
error.products.productsGroup
error.recommendations.recommendationsGroup
error.reviews.reviewsGroup
products
recommendations
reviews
$ 
```



2. @700dd0df9ffe:/ (bash)

```
Topic:products PartitionCount:2 ReplicationFactor:1 Configs:
  Topic: products Partition: 0 Leader: 1001 Replicas: 1001 Isr: 1001
  Topic: products Partition: 1 Leader: 1001 Replicas: 1001 Isr: 1001
$ 
```



2. @700dd0df9ffe:/ (bash)

```
{"eventType": "CREATE", "key": 2, "data": {"productId": 2, "name": "product name C", "weight": 300, "serviceAddress": null}, "eventCreatedAt": "2019-02-09T07:21:09.014259"}
>{"eventType": "DELETE", "key": 2, "data": null, "eventCreatedAt": "2019-02-09T07:23:04.017709"}
>{"eventType": "CREATE", "key": 1, "data": {"productId": 1, "name": "product name C", "weight": 300, "serviceAddress": null}, "eventCreatedAt": "2019-02-09T07:18:11.600382"}
>{"eventType": "DELETE", "key": 1, "data": null, "eventCreatedAt": "2019-02-09T07:23:02.359117"}
$ 
```



2. @700dd0df9ffe:/ (bash)

```
{"eventType": "CREATE", "key": 1, "data": {"productId": 1, "name": "product name C", "weight": 300, "serviceAddress": null}, "eventCreatedAt": "2019-02-09T07:18:11.600382"}
>{"eventType": "DELETE", "key": 1, "data": null, "eventCreatedAt": "2019-02-09T07:23:02.359117"}
$ 
```

Chapter 8: Introduction to Spring Cloud

The screenshot shows the Spring Eureka dashboard running at `localhost:8761`. The top navigation bar includes links for `HOME` and `LAST 1000 SINCE STARTUP`. The main content area is divided into sections: **System Status** and **DS Replicas**.

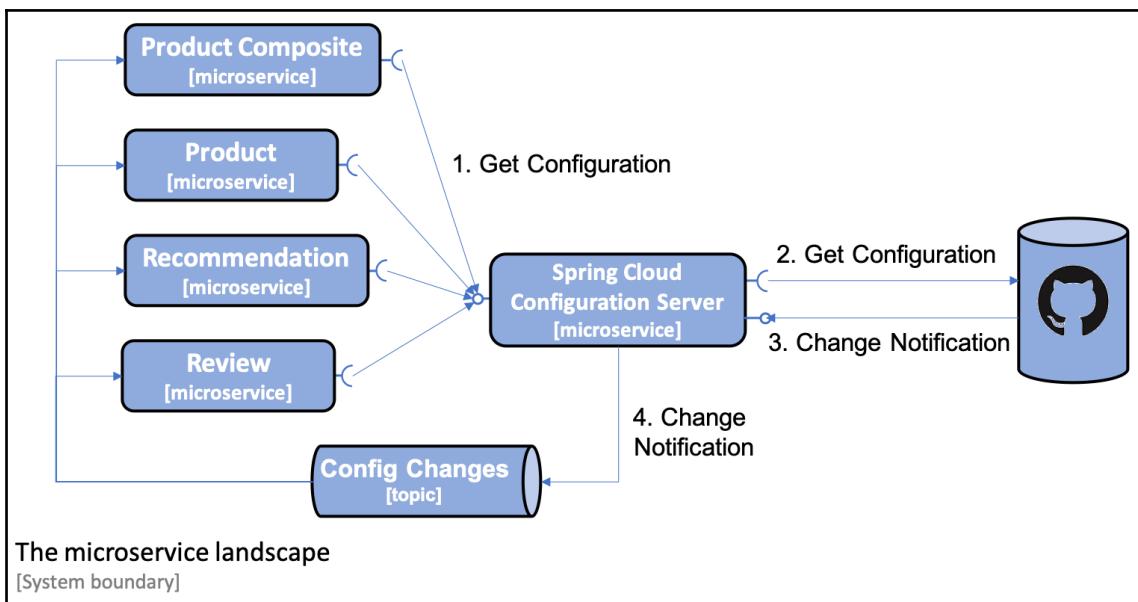
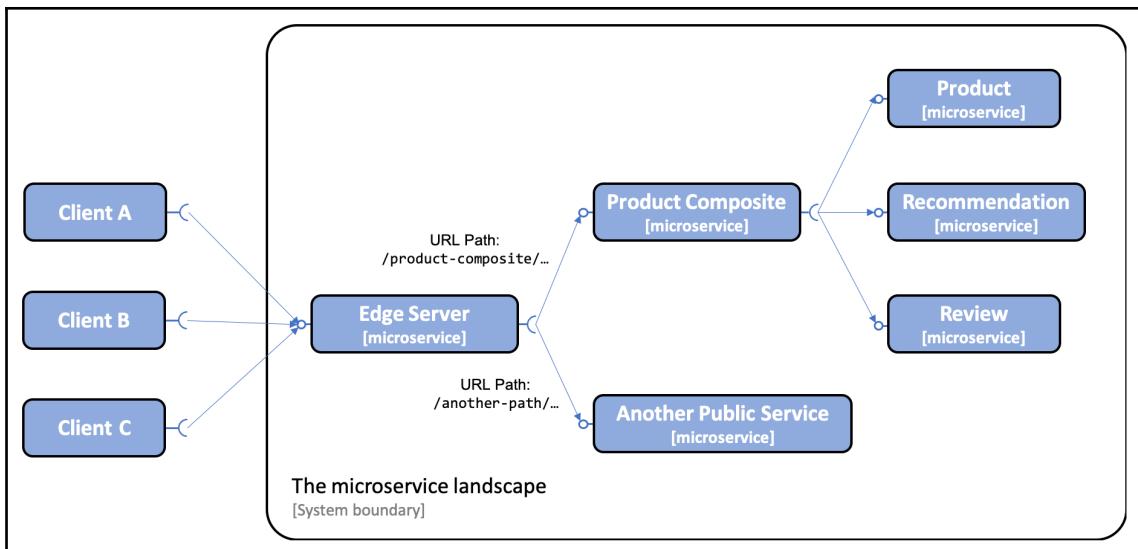
System Status table:

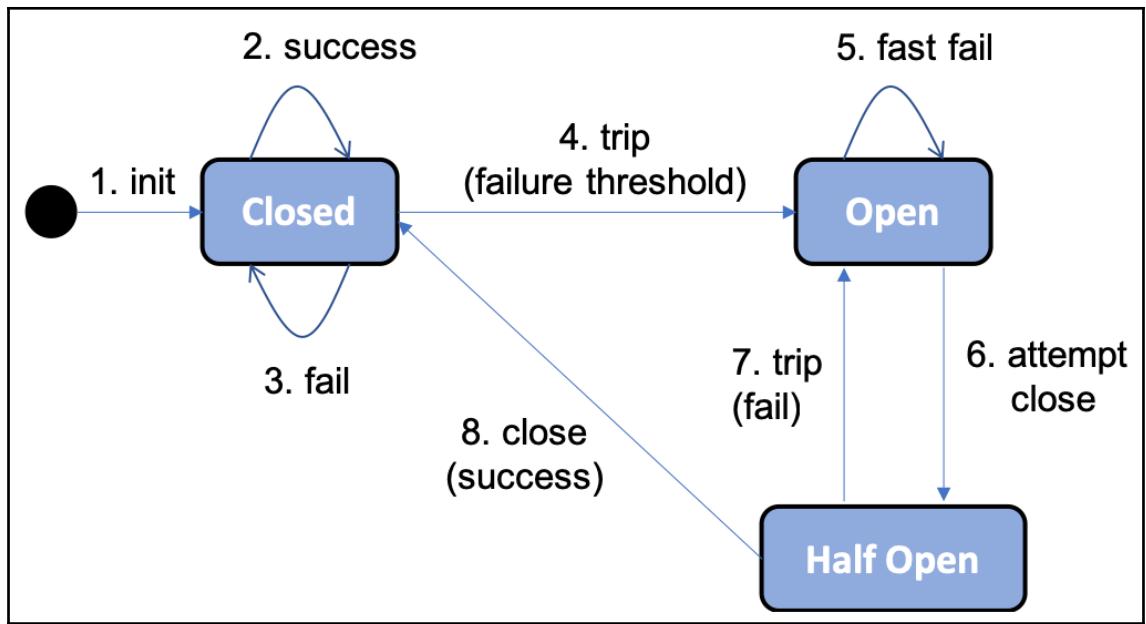
Environment	test
Data center	default

DS Replicas table:

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
PRODUCT	n/a (1)	(1)	UP (1) - <code>fa1fc9bf436f:product:8080</code>
PRODUCT-COMPOSITE	n/a (1)	(1)	UP (1) - <code>94d4177d3640:product-composite:8080</code>
RECOMMENDATION	n/a (1)	(1)	UP (1) - <code>c6e43eb833e9:recommendation:8080</code>
REVIEW	n/a (3)	(3)	UP (3) - <code>ab40a2d0737a:review:8080 , 7f27b4e75d9d:review:8080 , 61a078ca25c9:review:8080</code>



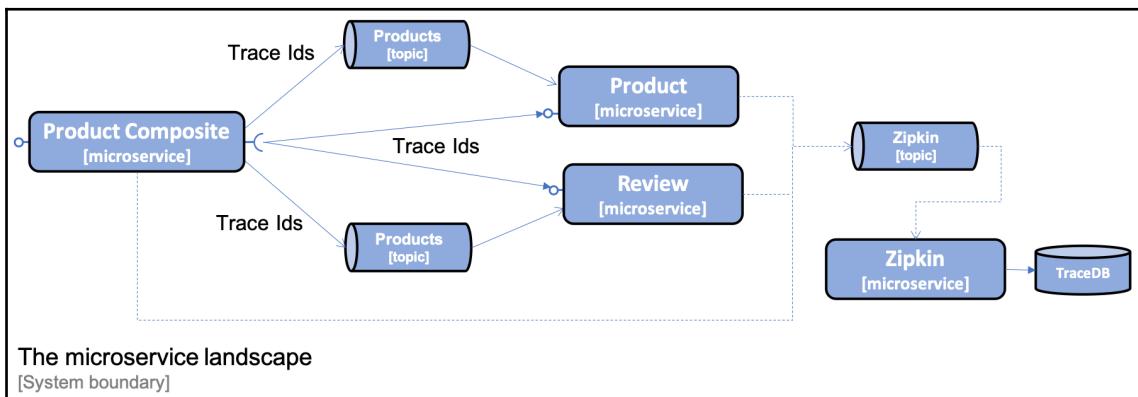


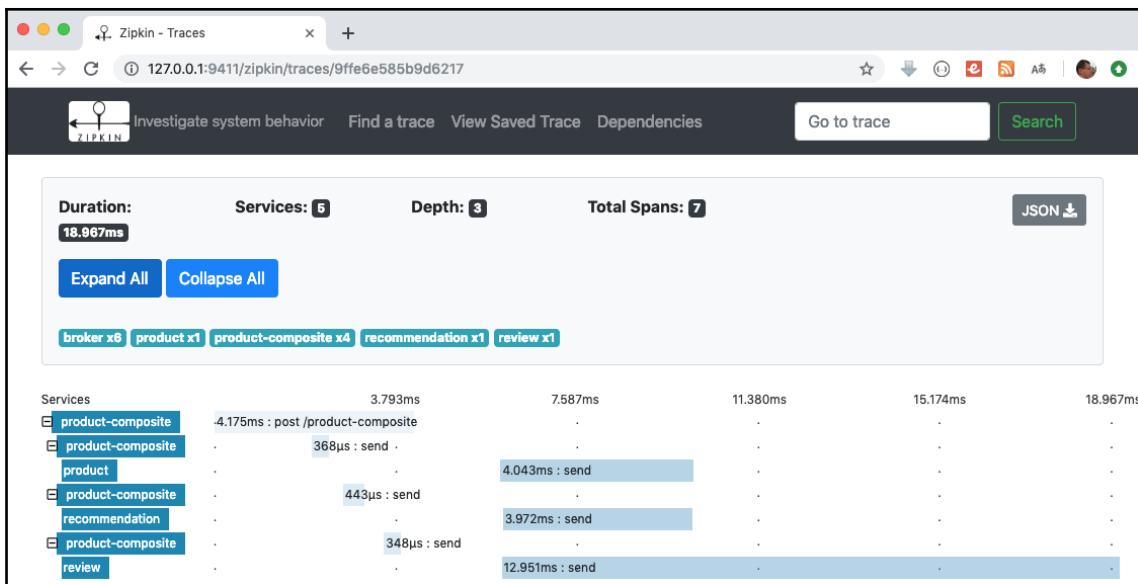
```
2. @700dd0df9fe:/ (bash)

{
  "status": "UP",
  "details": {
    "failureRate": "-1.0%",
    "failureRateThreshold": "50.0%",
    "maxBufferedCalls": 5,
    "bufferedCalls": 3,
    "failedCalls": 0,
    "notPermittedCalls": 0
  }
}
$ |
```

2. @700dd0df9ffe:/ (bash)

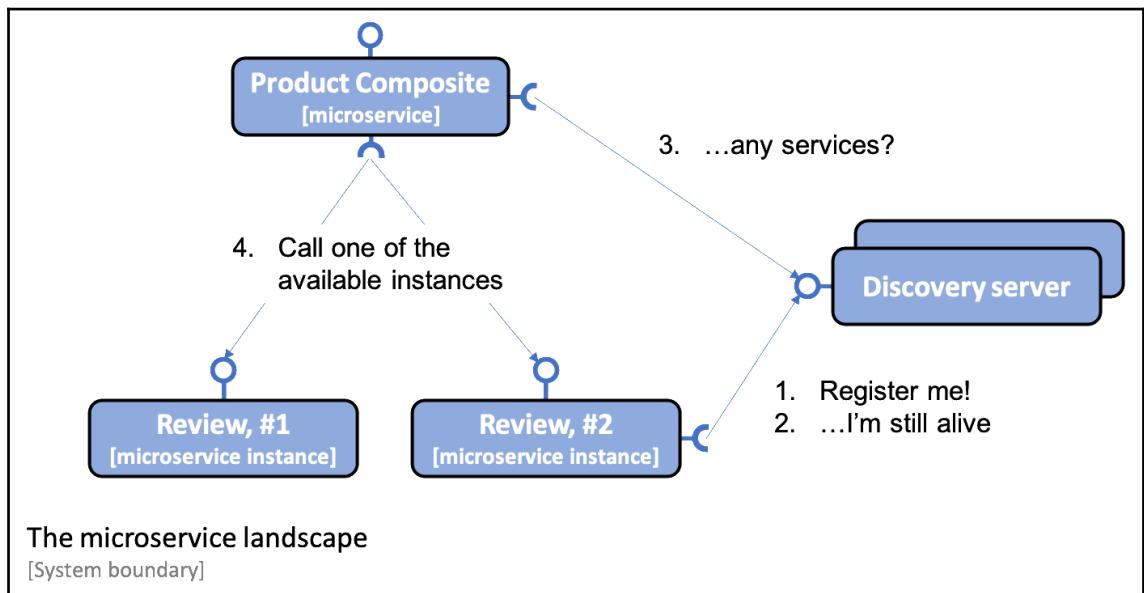
```
{  
  "status" : "DOWN",  
  "details" : {  
    "failureRate" : "100.0%",  
    "failureRateThreshold" : "50.0%",  
    "maxBufferedCalls" : 3,  
    "bufferedCalls" : 3,  
    "failedCalls" : 3,  
    "notPermittedCalls" : 1  
  }  
}  
$
```





Chapter 9: Adding Service Discovery Using Netflix Eureka and Ribbon

```
● ○ ● 2. @700dd0df9ffe:/ (bash)  
2a9c84113fc5/172.20.0.8:8080  
$ █
```



```
● ○ ● 2. @700dd0df9ffe:/ (bash)  
$ ./test-em-all.bash start  
Start Tests: Fri Sep 6 19:46:54 CEST 2019  
...  
Creating chapter09_rabbitmq_1 ... done  
...  
Wait for: curl http://localhost:8080/actuator/health... , retry #1 ... Test OK (HTTP Code: 200)  
Test OK ...  
End, all tests OK: Fri Sep 6 19:47:54 CEST 2019  
$ █
```

The screenshot shows the Spring Eureka dashboard at localhost:8761. The top navigation bar includes links for HOME and LAST 1000 SINCE STARTUP, along with various browser icons. The main content area is divided into sections: System Status, DS Replicas, and Instances currently registered with Eureka.

System Status

Environment	test	Current time	2019-02-18T08:47:32 +0000
Data center	default	Uptime	00:03
		Lease expiration enabled	true
		Renews threshold	11
		Renews (last min)	238

DS Replicas

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
PRODUCT	n/a (1)	(1)	UP (1) - fa1fc9bf436f:product:8080
PRODUCT-COMPOSITE	n/a (1)	(1)	UP (1) - 94d4177d3640:product-composite:8080
RECOMMENDATION	n/a (1)	(1)	UP (1) - c6e43eb833e9:recommendation:8080
REVIEW	n/a (3)	(3)	UP (3) - ab40a2d0737a:review:8080 , 7f27b4e75d9d:review:8080 , 61a078ca25c9:review:8080

```
2. @700dd0df9ffe:/ (bash)
review_2 | ... Started ReviewServiceApplication in 21.812 seconds (JVM running for 23.086)
review_3 | ... Started ReviewServiceApplication in 22.018 seconds (JVM running for 23.134)
```

```
● ○ ● 2. @700dd0df9ffe:/ (bash)  
3c7a676d8a5c:product-composite:8080  
ac0a272e4488:product:8080  
4034b100443e:review:8080  
9599fead507d:review:8080  
43d3788ce4e1:review:8080  
f50156c9882a:recommendation:8080  
$
```

```
● ○ ● 2. @700dd0df9ffe:/ (bash)  
4034b100443e/192.168.96.9:8080  
43d3788ce4e1/192.168.96.10:8080  
9599fead507d/192.168.96.11:8080  
$
```

```
● ○ ● 2. @700dd0df9ffe:/ (bash)  
review_1 | 2019-03-02 12:20:45.420 DEBUG ... : getReviews: response size: 3  
review_2 | 2019-03-02 12:20:46.059 DEBUG ... : getReviews: response size: 3  
review_3 | 2019-03-02 12:21:12.500 DEBUG ... : getReviews: response size: 3
```



2. @700dd0df9ffe:/ (bash)

```
"rev": "4034b100443e/192.168.96.9:8080"  
"rev": "9599fead507d/192.168.96.11:8080"
```



2. @700dd0df9ffe:/ (bash)

```
4034b100443e/192.168.96.9:8080  
9599fead507d/192.168.96.11:8080
```



2. @700dd0df9ffe:/ (bash)

```
"pro": "0a20cc1efaae/172.18.0.9:8080"
```



2. @700dd0df9ffe:/ (bash)

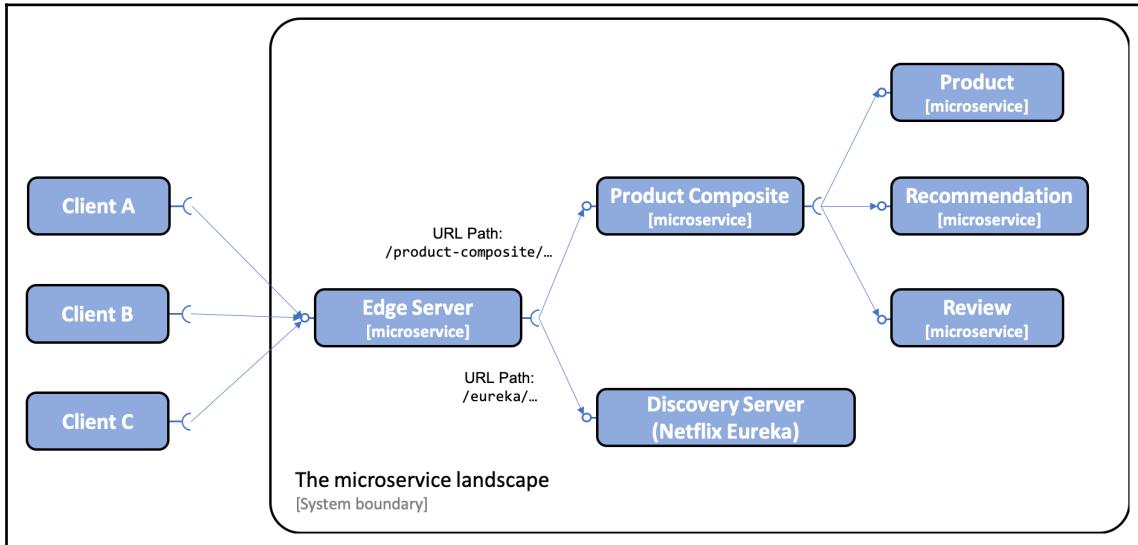
```
"pro": "cbfd07416ddc/192.168.128.3:8080",  
"rev": "c5cc1f087afe/192.168.128.9:8080",
```



2. @700dd0df9ffe:/ (bash)

```
"pro": "18d6e52267c2/192.168.128.7:8080",  
"rev": "c5cc1f087afe/192.168.128.9:8080",
```

Chapter 10: Using Spring Cloud Gateway to Hide Microservices Behind an Edge Server



```
2. @700dd0df9ffe:/ (bash)
$ ./test-em-all.bash start
Start Tests: Fri Sep 6 19:46:54 CEST 2019
...
Creating chapter09_rabbitmq_1 ... done
...
Wait for: curl http://localhost:8080/actuator/health... , retry #1 ... Test OK (HTTP Code: 200)
Test OK ...
End, all tests OK: Fri Sep 6 19:47:54 CEST 2019
$ █
```

```
2. @700dd0df9ffe:/ (bash)
book-source-code_gateway_1          0.0.0.0:8080->8080/tcp
book-source-code_eureka_1           8761/tcp
book-source-code_product-composite_1 8080/tcp
book-source-code_product_1          8080/tcp
book-source-code_recommendation_1   8080/tcp
book-source-code_review_1           8080/tcp
$
```

```
2. @700dd0df9ffe:/ (bash)

{
  "eureka-api": "/eureka/api/{segment}"
}
{
  "eureka-web-start": "/eureka/web"
}
{
  "eureka-web-other": "/eureka/**"
}
{
  "product-composite": "/product-composite/**"
}
{
  "host_route_200": "i.feel.lucky:8080"
}
{
  "host_route_418": "im.a.teapot:8080"
}
{
  "host_route_501": "/headerrouting/**"
}
$ 
```

```
● ● ● 2. @700dd0df9ffe:/ (bash)
{"productId":2, ... "recommendations": [...], "reviews": [...], "serviceAddresses": {...}}
$ █
```

```
● ● ● 2. @700dd0df9ffe:/ (bash)
b91cde7148d9:gateway:8080
b8013440aea0:product-composite:8080
7c9a92146991:product:8080
21668e72a668:review:8080
ffcbdb9f32a4:recommendation:8080
$ █
```

The screenshot shows the Spring Eureka web interface running at `localhost:8080/eureka/web`. The top navigation bar includes links for HOME and LAST 1000 SINCE STARTUP, along with various browser icons.

System Status

Environment	test
Data center	default

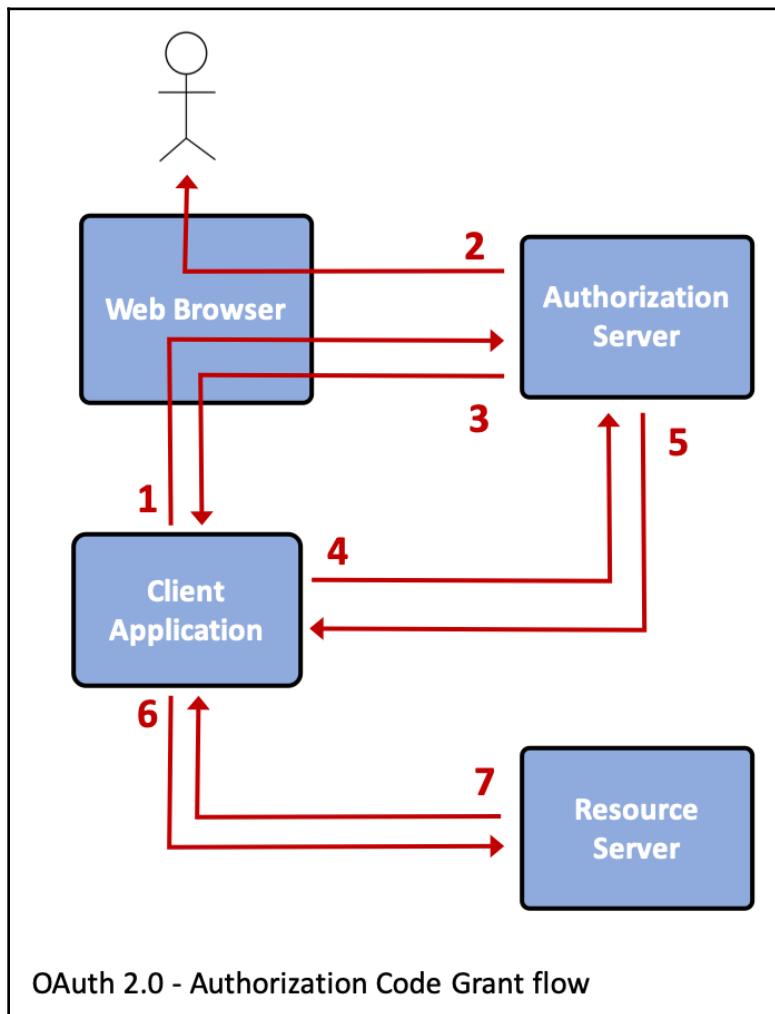
Current time	2019-03-28T19:43:51 +0000
Uptime	10:10
Lease expiration enabled	true
Renews threshold	17
Renews (last min)	60

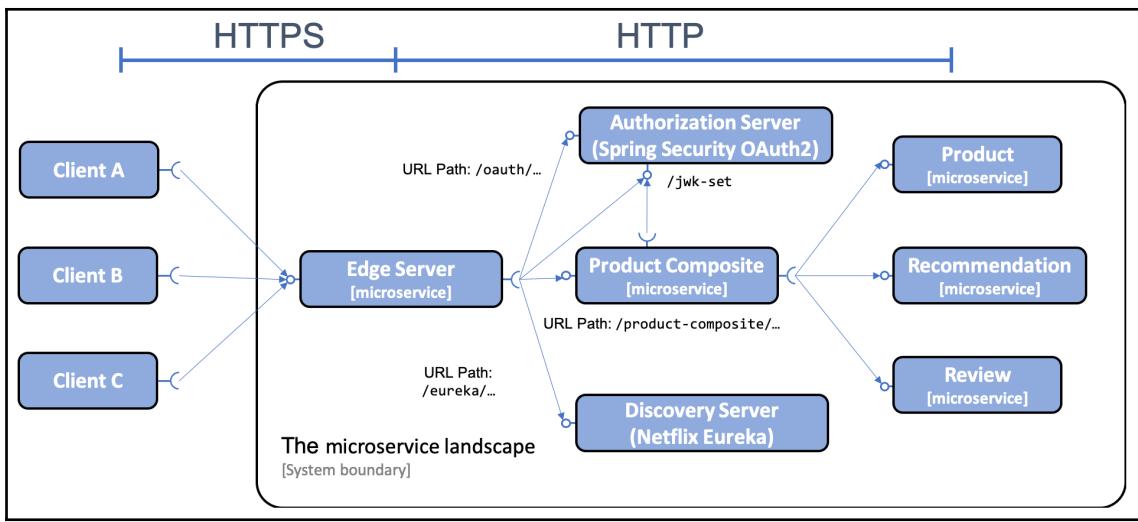
DS Replicas

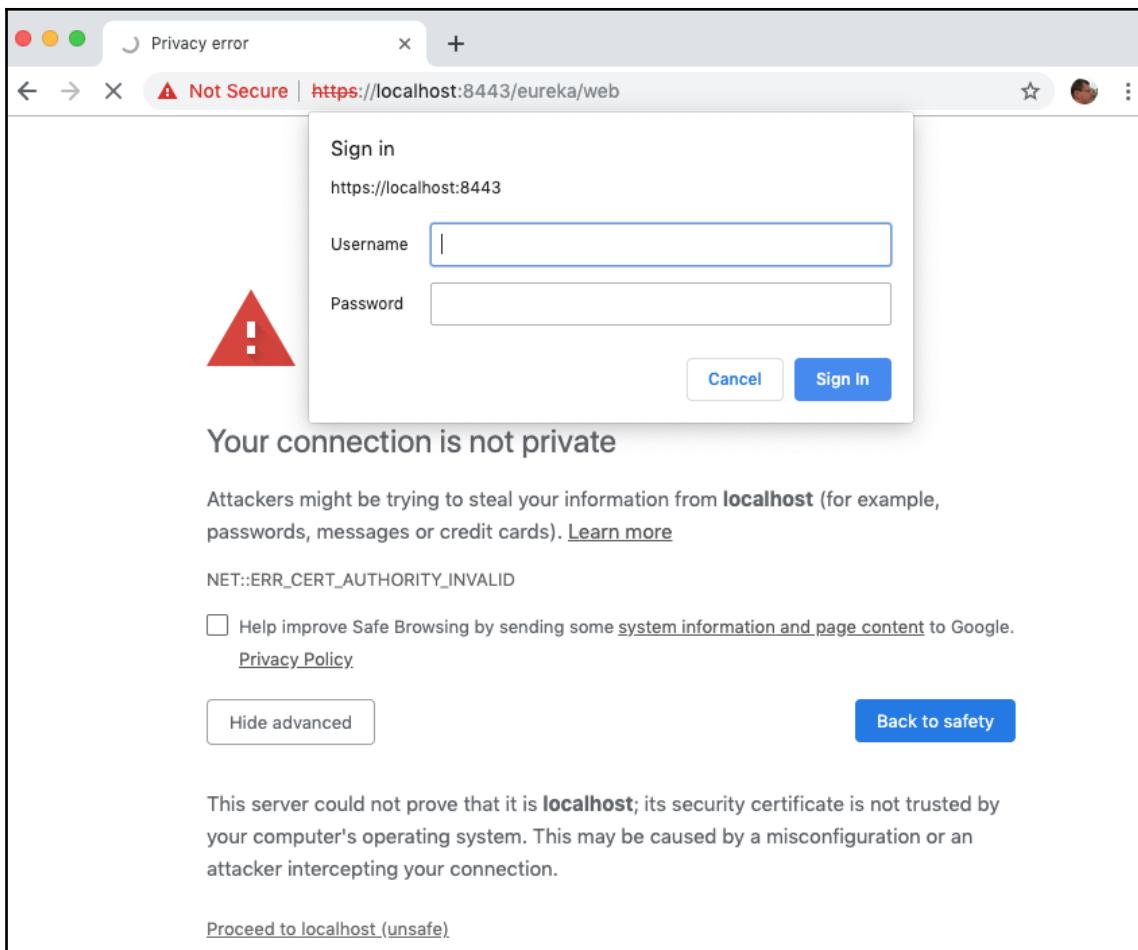
Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
GATEWAY	n/a (1)	(1)	UP (1) - b91cde7148d9:gateway:8080
PRODUCT	n/a (1)	(1)	UP (1) - 7c9a92146991:product:8080
PRODUCT-COMPOSITE	n/a (1)	(1)	UP (1) - b8013440aea0:product-composite:8080
RECOMMENDATION	n/a (1)	(1)	UP (1) - ffcbdb9f32a4:recommendation:8080
REVIEW	n/a (1)	(1)	UP (1) - 21668e72a668:review:8080

Chapter 11: Securing Access to APIs





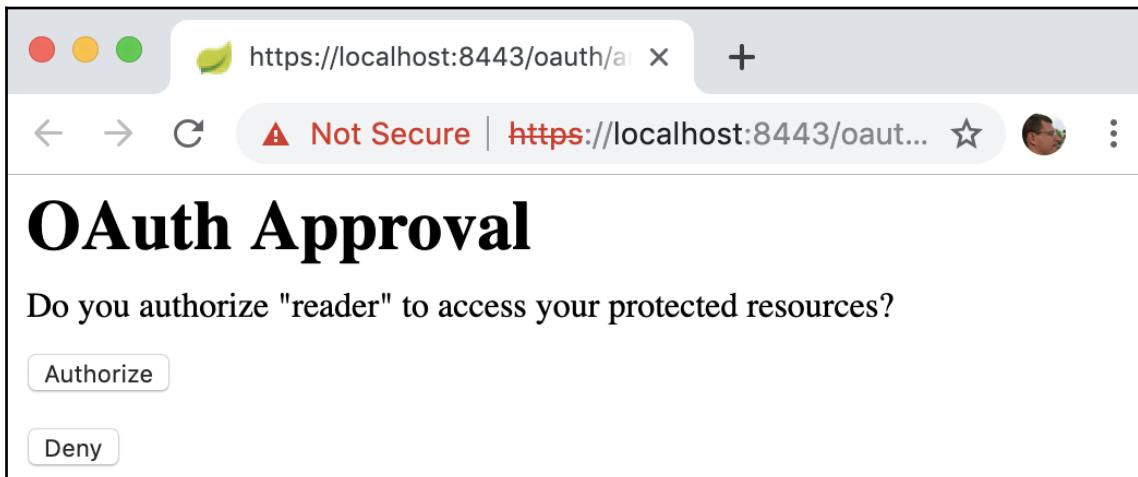
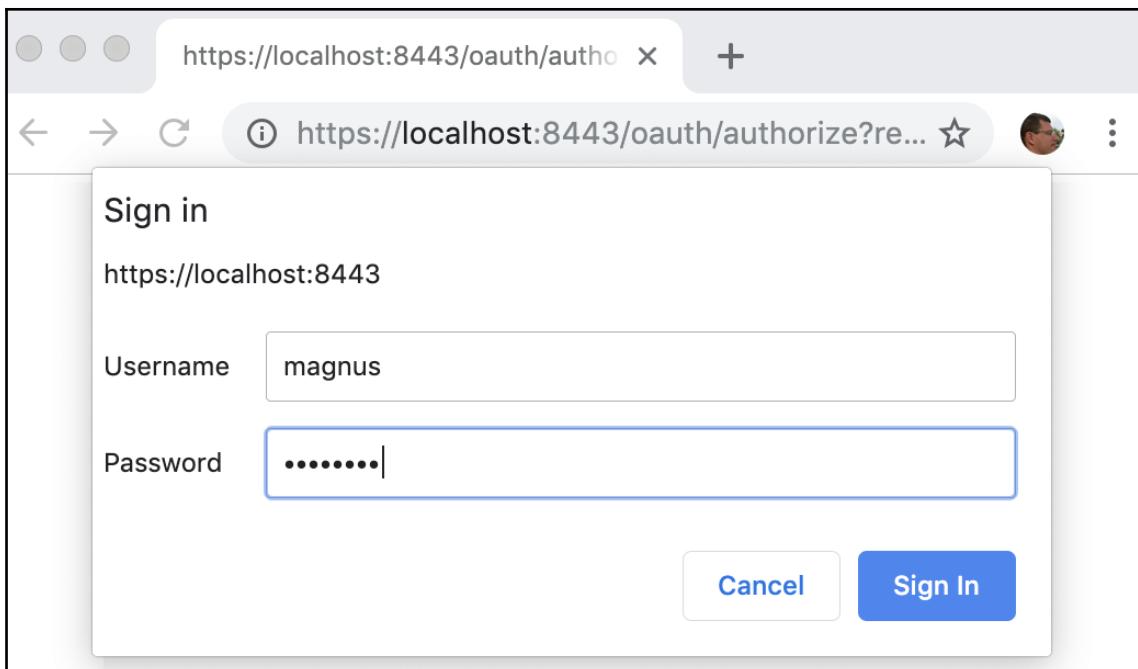


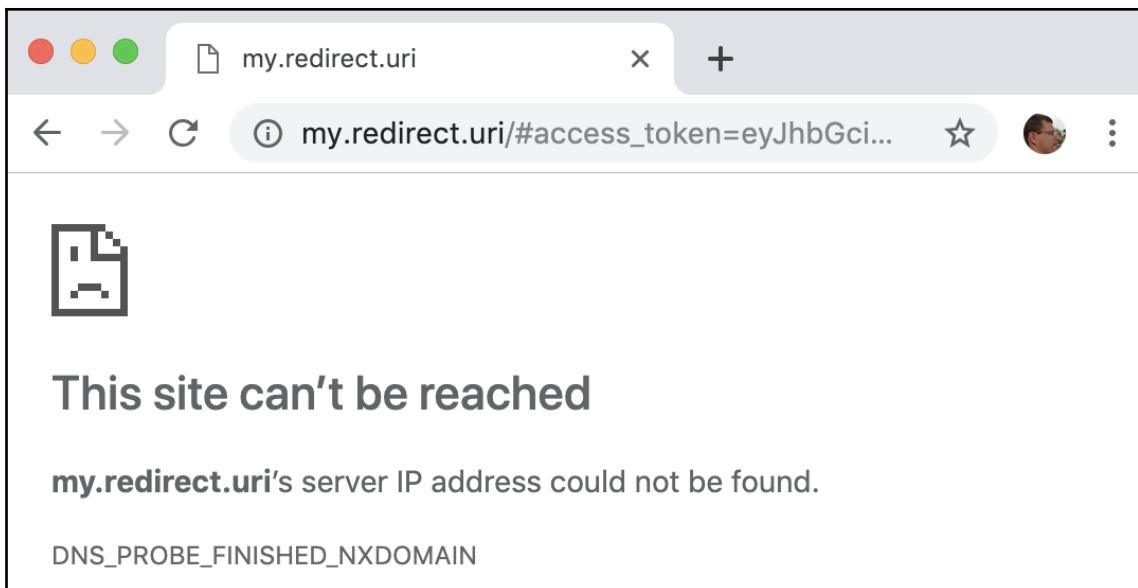
A screenshot of a web browser window titled "Eureka". The address bar shows "Not Secure | https://localhost:8443/eureka/web". The main content is a table titled "Instances currently registered with Eureka".

Application	AMIs	Availability Zones	Status
AUTH-SERVER	n/a (1)	(1)	UP (1) - 1fbb5fc7864:auth-server:9999
GATEWAY	n/a (1)	(1)	UP (1) - abe7ee8d450c:gateway:8443
PRODUCT	n/a (1)	(1)	UP (1) - 9975baef8ae7:product:8080
PRODUCT-COMPOSITE	n/a (1)	(1)	UP (1) - 6cdb02a5ad71:product-composite:8080
RECOMMENDATION	n/a (1)	(1)	UP (1) - d300f3e31c1f:recommendation:8080
REVIEW	n/a (1)	(1)	UP (1) - e7b8ac60ae6e:review:8080

A screenshot of a terminal window. The title bar says "2. @700dd0df9ffe:/ (bash)". The terminal displays a JSON object:

```
{  
  "access_token": "eyJ...SyIlQ",  
  "token_type": "bearer",  
  "expires_in": 599999999,  
  "scope": "product:read product:write",  
  "jti": "57502ce2-d325-4ffc-98cb-5dcccc0a53df"  
}
```





```
2. @700dd0df9ffe:/ (bash)
{
  "access_token": "eyJh...KUBA",
  "token_type": "bearer",
  "expires_in": 599999999,
  "scope": "product:read",
  "jti": "998764d2-b940-4aeb-b381-bbfd37c84282"
}
$
```

```
2. @700dd0df9ffe:/ (bash)
HTTP/1.1 401 Unauthorized
WWW-Authenticate: Bearer error="invalid_token"
$
```

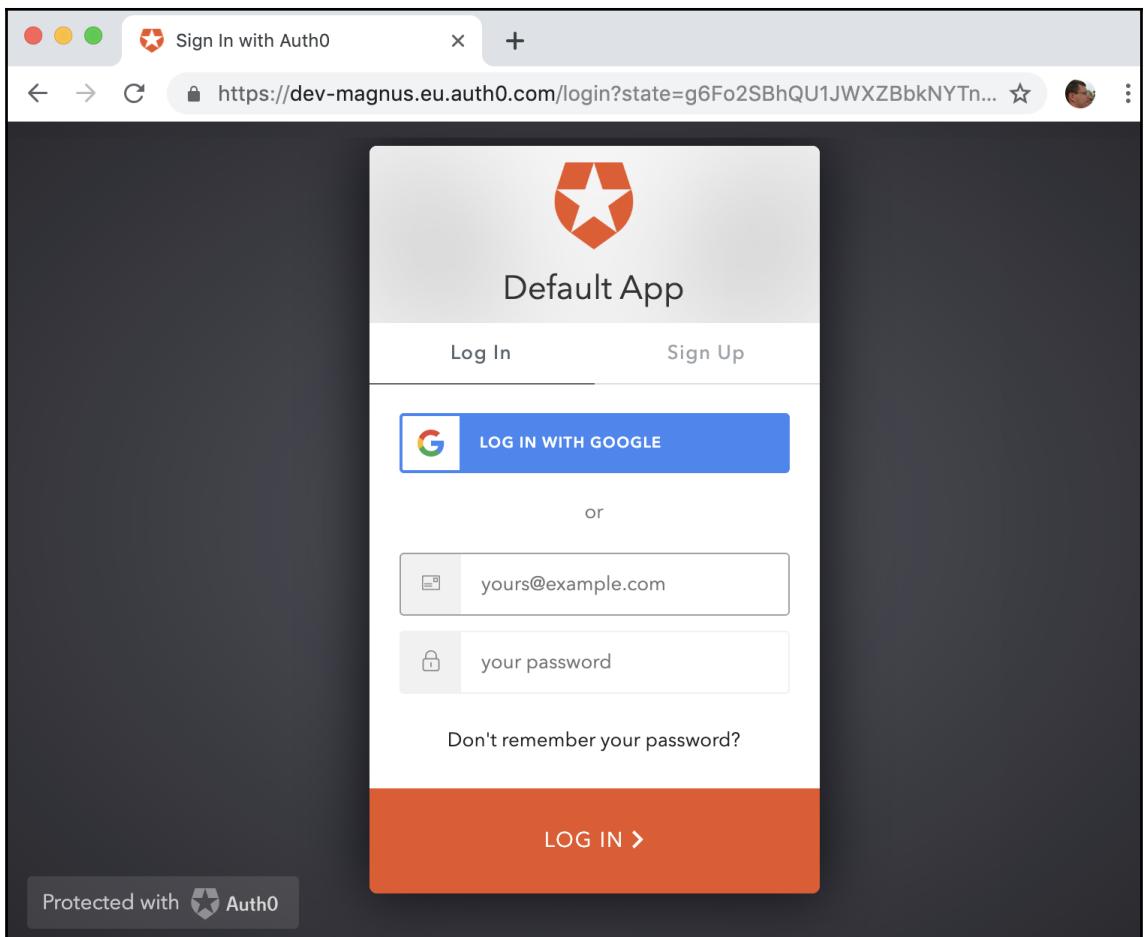
```
2. @700dd0df9ffe:/ (bash)
HTTP/1.1 200 OK
...
>{"productId":2, ...}
$ █
```

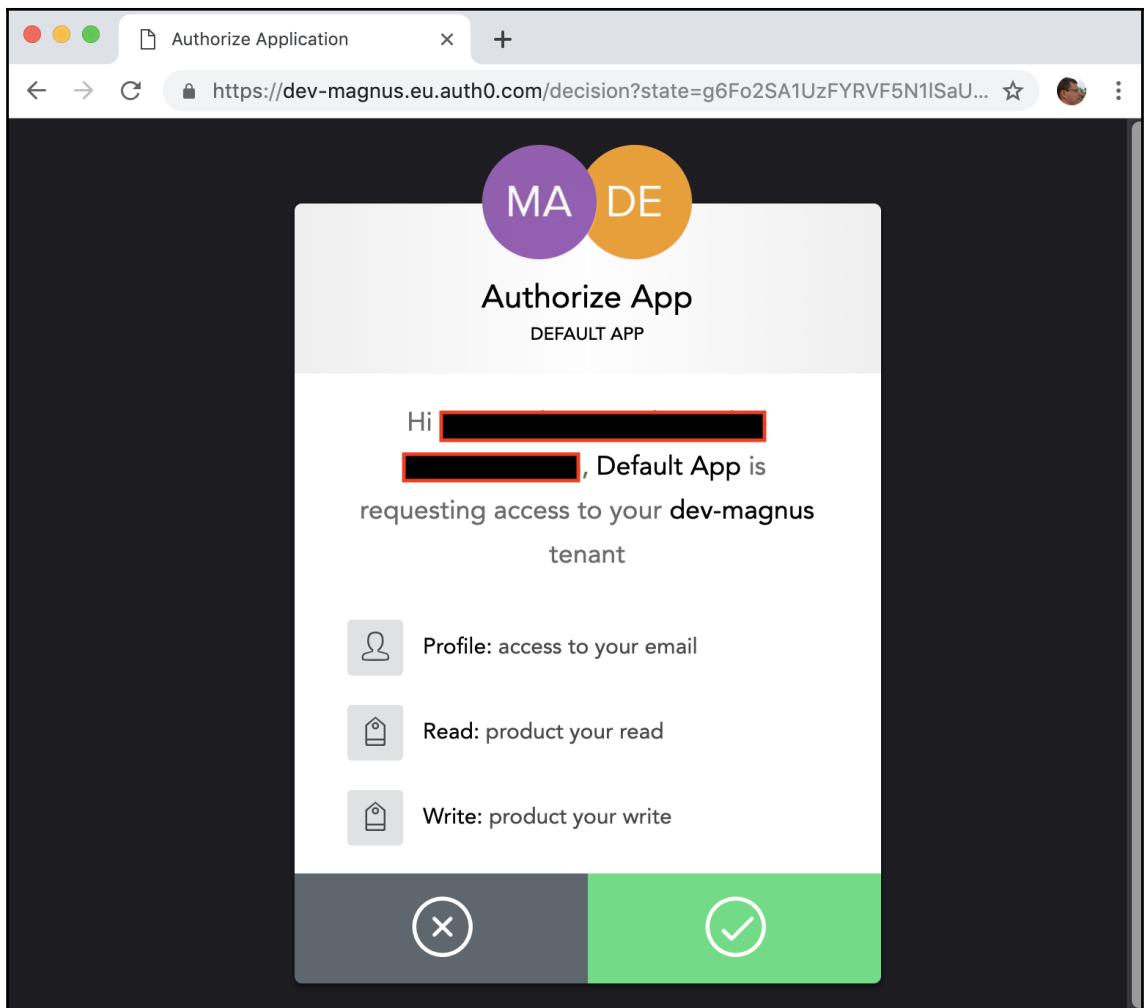
```
2. @700dd0df9ffe:/ (bash)
HTTP/1.1 403 Forbidden
WWW-Authenticate: Bearer error="insufficient_scope",
error_description="The token provided has insufficient scope [product:read] for this request",
error_uri="https://tools.ietf.org/html/rfc6750#section-3.1", scope="product:read"
$ █
```

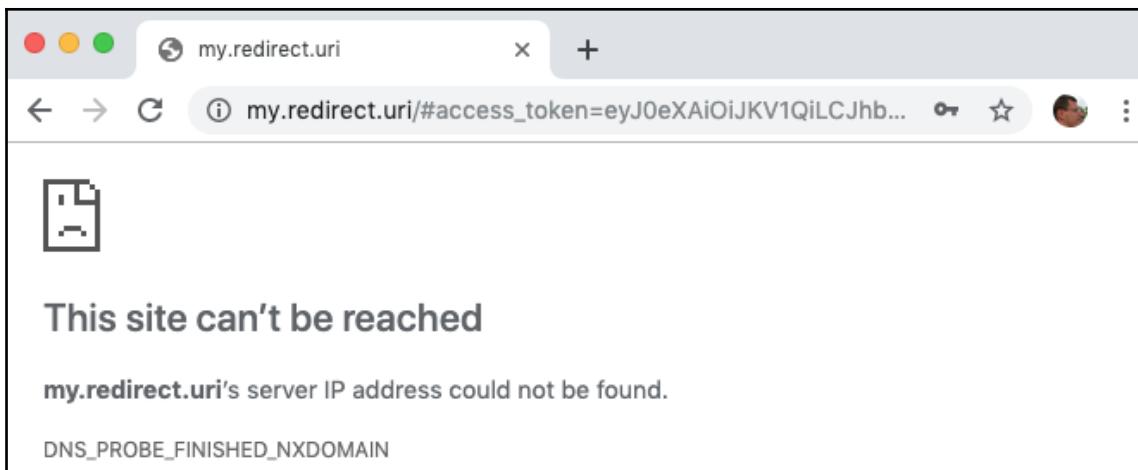
```
2. @700dd0df9ffe:/ (bash)
product-composite_1 ...
Authorization info: Subject: magnus, scopes: ["product:read", "product:write"],
expires Tue Apr 13 06:36:41 UTC 2038: issuer: null, audience: null
```

```
2. @700dd0df9ffe:/ (bash)
product-composite_1 ...
Authorization info: Subject: auth0|5ca0b73c97f31e11bc85a5e6,
scopes: openid email product:read product:write,
expires Mon Apr 08 10:46:35 UTC 2019: issuer: https://dev-ml.eu.auth0.com/,
audience: [https://localhost:8443/product-composite, https://dev-ml.eu.auth0.com/userinfo]
```

```
2. @700dd0df9ffe:/ (bash)
product-composite_1 ...
Authorization info: Subject: auth0|5ca0b73c97f31e11bc85a5e6,
scopes: openid email product:read,
expires Mon Apr 08 10:46:41 UTC 2019: issuer: https://dev-ml.eu.auth0.com/,
audience: [https://localhost:8443/product-composite, https://dev-ml.eu.auth0.com/userinfo]
```





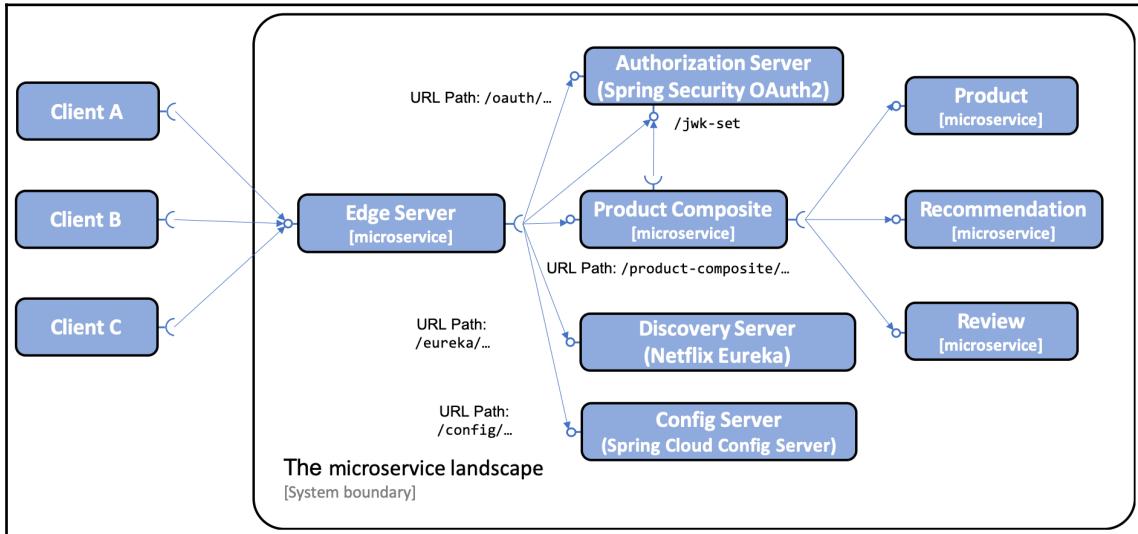


A screenshot of a terminal window. The title bar shows "2. @700dd0df9ffe:/ (bash)". The terminal displays a JSON object:

```
{  
  "sub": "auth0l...",  
  "email": "...my email...",  
  "email_verified": true  
}
```

The cursor is positioned at the end of the JSON object, indicated by a vertical bar on the right side of the terminal window.

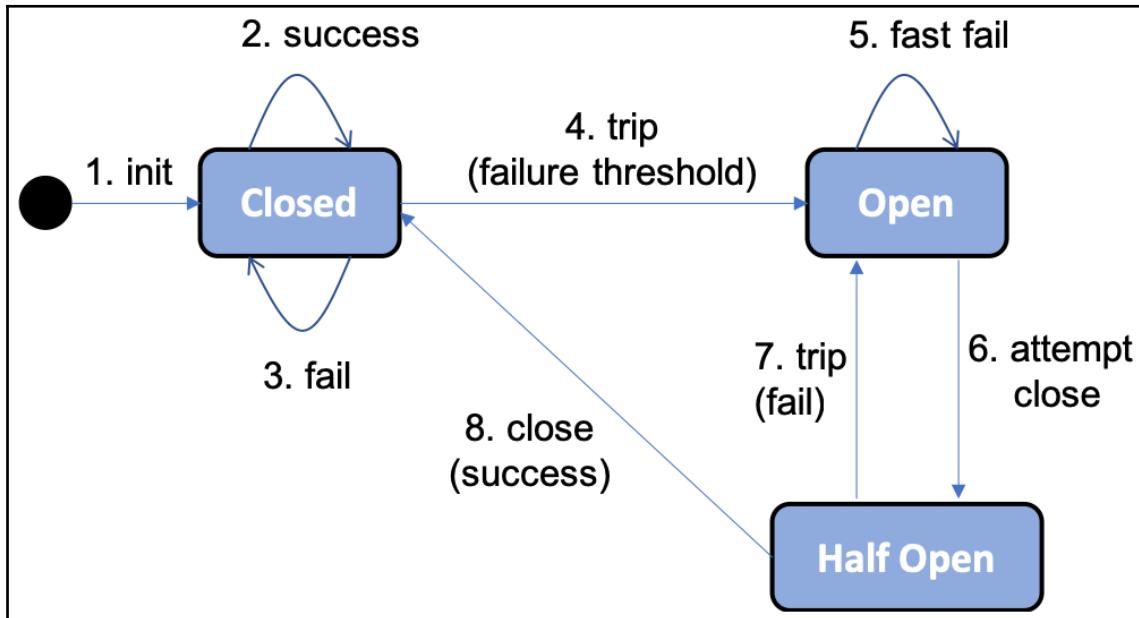
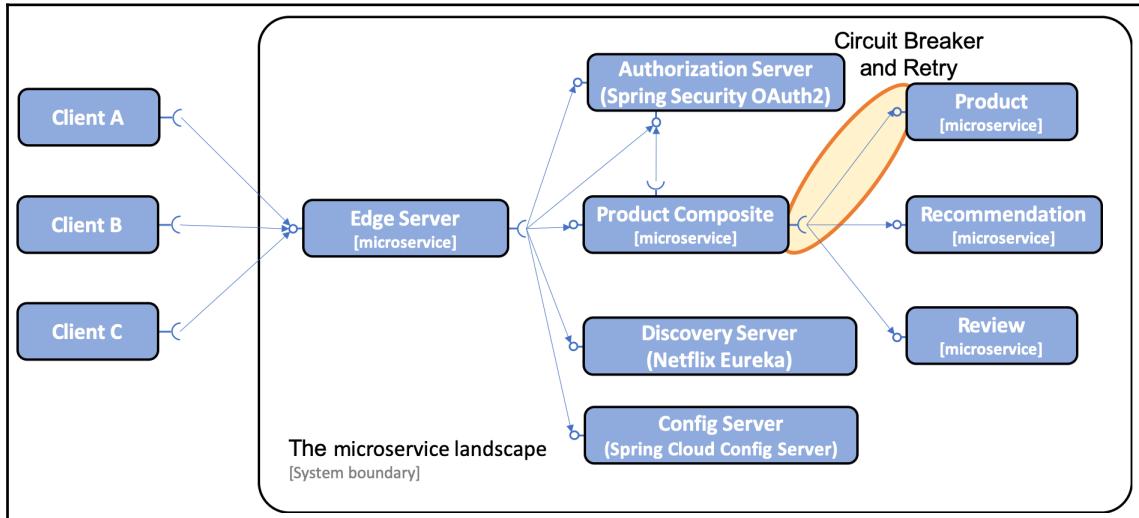
Chapter 12: Centralized Configuration



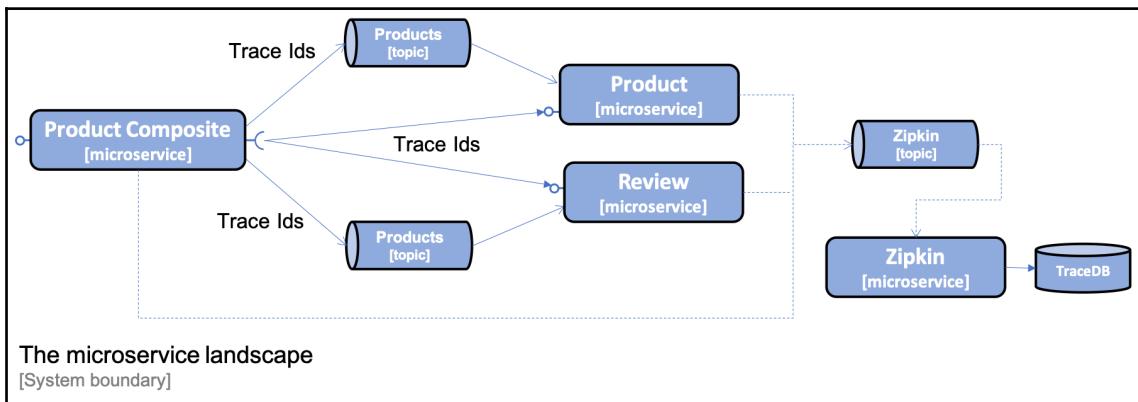
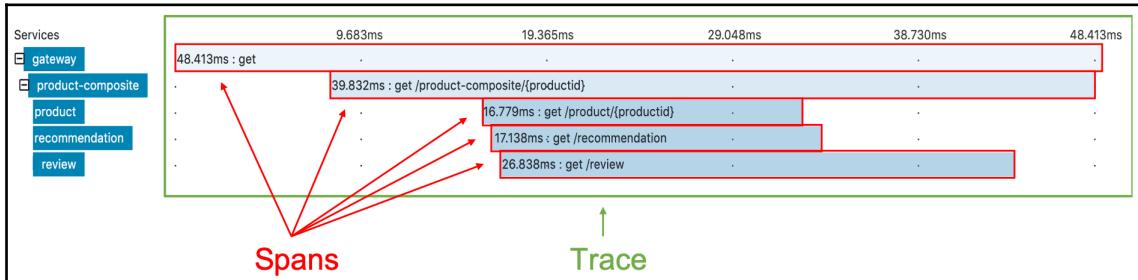
```
2. bash
9eca39e823957f37f0f0f4d8b2c6c46cd49ef461d1cab20c65710823a8b412ce
$ |
```

```
2. bash
hello world
$ |
```

Chapter 13: Improving Resilience Using Resilience4j



Chapter 14: Understanding Distributed Tracing



Zipkin - Index

localhost:9411/zipkin/?serviceName=gateway&spanName=all&lookback=3600000&startTs=1557651922641&endTs=1557655522641&annotati...

1 Investigate system behavior Find a trace View Saved Trace Dependencies Try Lens UI Go to trace Search

Service Name: gateway Span Name: all Lookback: 1 hour

Annotation Query: For example: http.path=/foo/bar/ and cluster=foo and cache.miss Duration (μs) >= Ex: 100ms or 5s Limit: 10 Sort: Newest First

2 **3** Find Traces ?

Showing: 10 of 10 Services: gateway JSON

48.413ms 10 spans gateway 100%
 gateway x2 48.413ms product-composite x4 36.692ms review x2 20.169ms product x1 14.399ms recommendation x1 13.139ms 5 minutes ago

98.794ms 3 spans gateway 100%
 gateway x2 98.794ms auth-server x1 85.091ms 5 minutes ago

74.756ms 10 spans gateway 100%
 gateway x2 74.756ms product-composite x4 60.569ms review x2 35.249ms product x1 22.712ms recommendation x1 15.509ms 10 minutes ago

Zipkin - Traces

localhost:9411/zipkin/traces/9dfadf96df5afc40

Investigate system behavior Find a trace View Saved Trace Dependencies Try Lens UI Go to trace Search

Duration: 48.413ms Services: 5 Depth: 4 Total Spans: 6 JSON

Expand All Collapse All

gateway x2 product x1 product-composite x4 recommendation x1 review x2

Services	Duration	Start Time	End Time	Duration	Start Time	End Time	Duration	Start Time	End Time	Duration	Start Time	End Time	Duration	Start Time	End Time		
gateway	48.413ms	-	-	9.683ms	-	-	19.365ms	-	-	29.048ms	-	-	38.730ms	-	-	48.413ms	-
product-composite				39.832ms	: get /product-composite/{productId}												
product							16.779ms	: get /product/{productId}									
recommendation							17.138ms	: get /recommendation									
review							26.838ms	: get /review									
review														2.524ms	: async		

gateway.get: 48.413ms

X

Services: gateway

Date Time	Relative Time	Annotation	Address
12/05/2019, 12:04:29		Server Start	192.168.176.2 (gateway)
12/05/2019, 12:04:29	48.413ms	Server Finish	192.168.176.2 (gateway)

Key	Value
http.method	GET
http.path	/product-composite/2

Show IDs

Zipkin - Index

localhost:9411/zipkin/?serviceName=gateway&spanName=all&lookback=3600000&startTs=1557652438233&endTs=1557656038233&annotat...

Investigate system behavior Find a trace View Saved Trace Dependencies Try Lens UI Go to trace Search

Service Name: gateway, Span Name: all, Lookback: 1 hour

Annotation Query: For example: http.path=/foo/bar/ and cluster=foo and cache.miss

Duration (μs) >= Ex: 100ms or 5s, Limit: 10, Sort: Newest First

Find Traces, ?

Showing: 10 of 10 Services: gateway

JSON

60.621ms 10 spans
gateway 100%

gateway x2 60.621ms product-composite x4 40.590ms review x2 16.431ms recommendation x1 15.952ms less than a minute ago

48.413ms 10 spans
gateway 100%

gateway x2 48.413ms product-composite x4 36.692ms review x2 20.169ms product x1 14.399ms recommendation x1 13.139ms 14 minutes ago

98.794ms 3 spans
gateway 100%

gateway x2 98.794ms auth-server x1 85.091ms 14 minutes ago

localhost:9411/zipkin/traces/9dfad96df5afc40

Zipkin - Traces

localhost:9411/zipkin/traces/124a1235c1b8cae

Investigate system behavior Find a trace View Saved Trace Dependencies Try Lens UI Go to trace Search

Duration: 60.621ms, Services: 5, Depth: 4, Total Spans: 6

JSON

Expand All, Collapse All

gateway x2 product x1 product-composite x4 recommendation x1 review x2

Services	60.621ms : get	12.124ms	24.248ms	36.373ms	48.497ms	60.621ms
gateway						
product-composite			43.648ms : get /product-composite/(productid)			
product				30.671ms : get /product/(productid)		
recommendation				20.685ms : get /recommendation		
review				21.808ms : get /review		
review					1.453ms : async-	

Zipkin - Traces

localhost:9411/zipkin/traces/124a1235c1b8cae

Investigate

ZIPKIN

Duration: 60.621ms

Services: gateway x2 product x1

Expand All Collaps

Services

- gateway
- product-composite
 - product
 - recommendation
- review
 - review

product.get /product/{productid}: 30.671ms

Services: product,product-composite

Date	Time	Relative Time	Annotation	Address
12/05/2019	12:18:15	22.953ms	Client Start	192.168.176.11 (product-composite)
12/05/2019	12:18:15	27ms	Server Start	192.168.176.9 (product)
12/05/2019	12:18:15	53.624ms	Client Finish	192.168.176.11 (product-composite)
12/05/2019	12:18:15	53.979ms	Server Finish	192.168.176.9 (product)

Key	Value
error	Status code of the response is [404] and the reason is [Not Found]
http.method	GET
http.path	/product/12345
http.status_code	404
error	404
mvc.controller.class	ProductServiceImpl
mvc.controller.method	getProduct

Show IDs

JSON

60.621ms

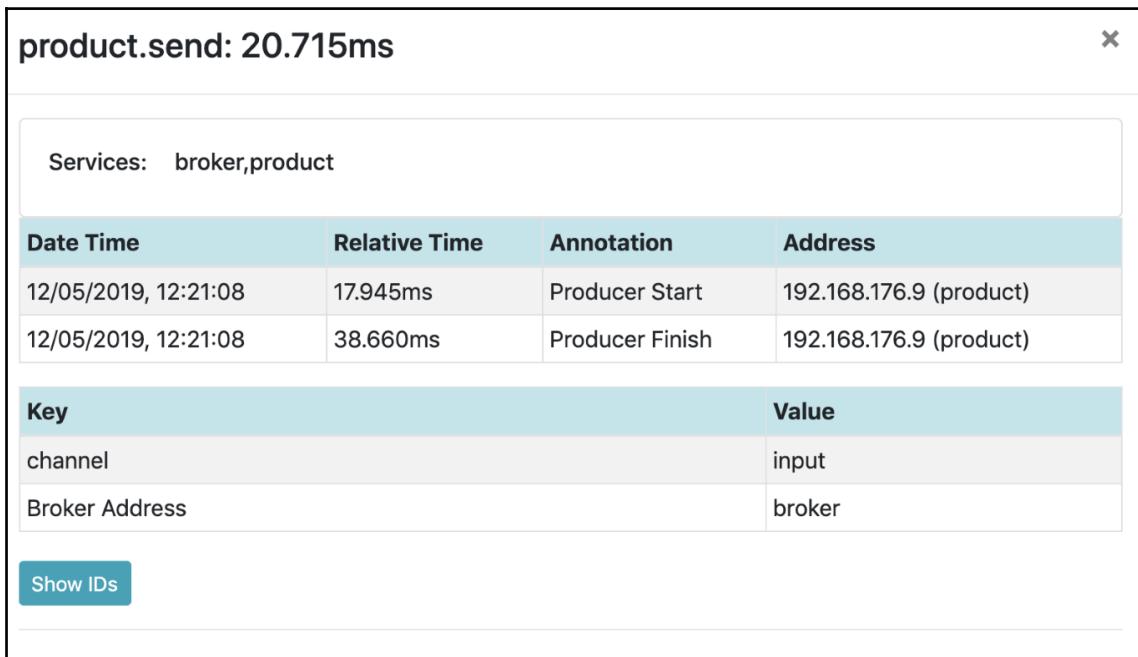
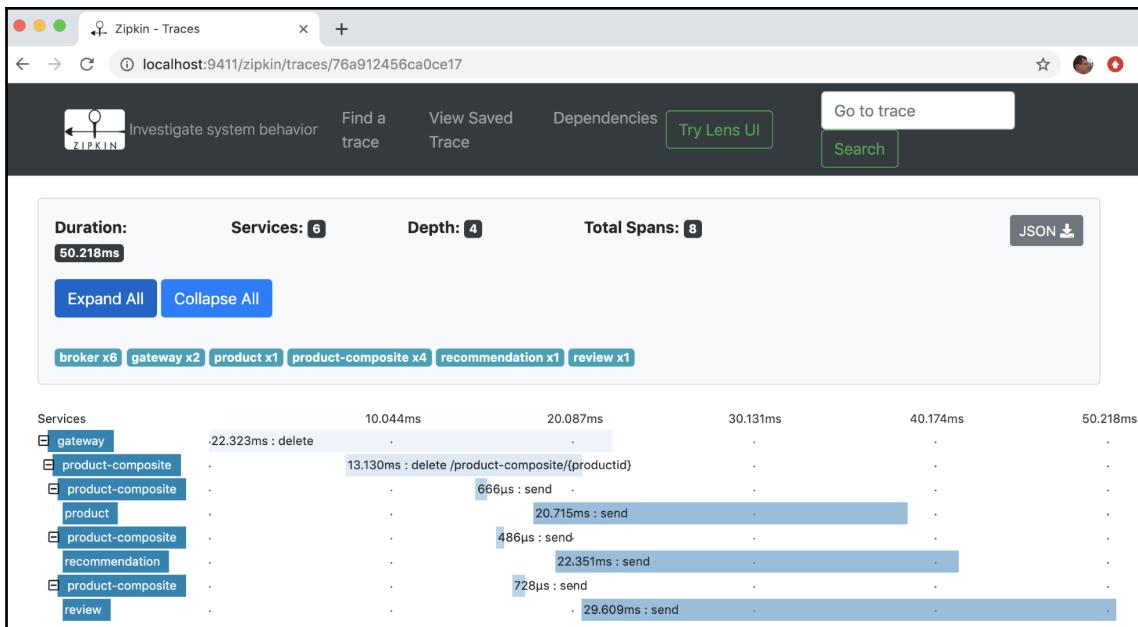
The screenshot shows the Zipkin UI interface. At the top, there are navigation buttons for back, forward, and search, followed by the URL `localhost:9411/zipkin/?serviceName=gateway&spanName=all&lookback=3600000&startTs=1557652438233&endTs=1557656038...`. Below the URL are several tabs: "Investigate system behavior", "Find a trace", "View Saved Trace", "Dependencies", "Try Lens UI" (which is highlighted), and "Search".

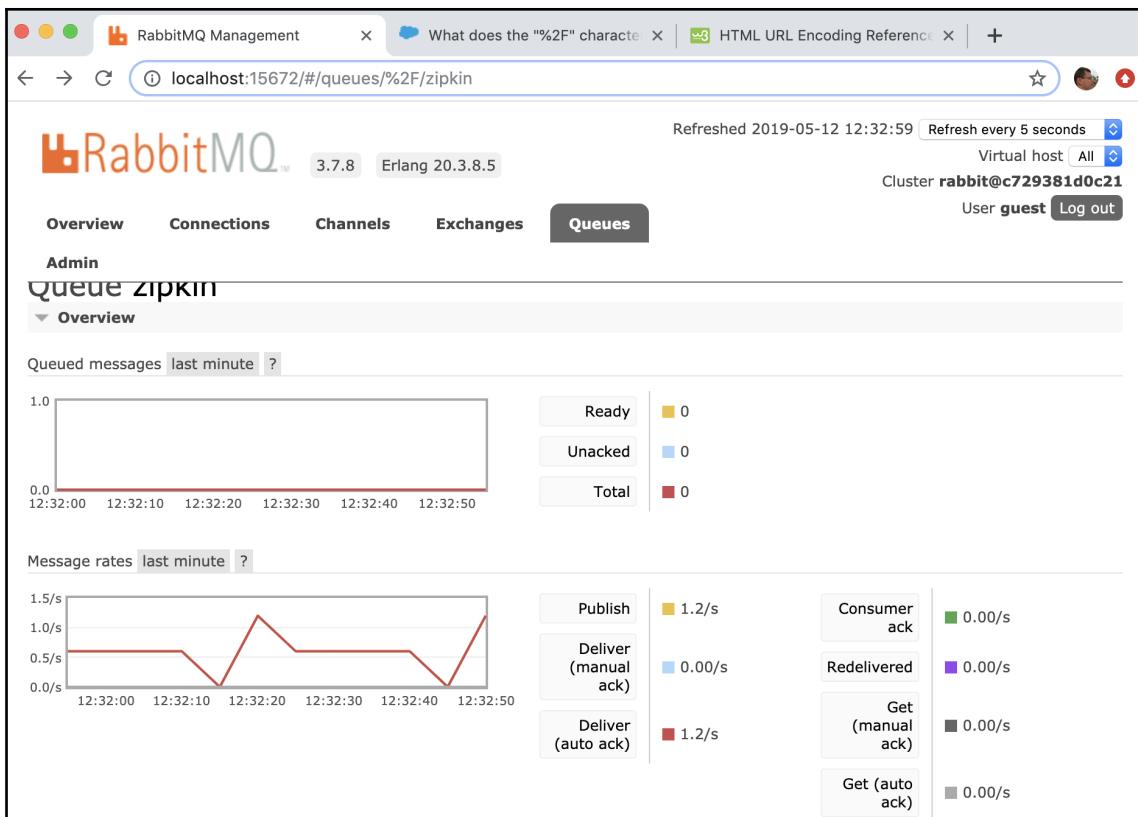
The main search area includes fields for "Service Name" (set to "gateway"), "Span Name" (set to "all"), and "Lookback" (set to "1 hour"). Below this is an "Annotation Query" field containing the placeholder text "For example: http.path=/foo/bar/ and cluster=foo and cache.miss". To the right of the query are filters for "Duration (μs) >= Ex: 100ms or 5s", "Limit 10", and "Sort Newest First".

A large blue button labeled "Find Traces" is prominently displayed. Below it, a message says "Showing: 10 of 10" and "Services: gateway". A "JSON" download icon is also present.

The results section displays three horizontal bars representing different traces:

- 61.527ms 9 spans**
gateway 68%
gateway x2 41.989ms | product-composite x4 24.302ms | broker x6 20.211ms | review x1 20.211ms | product x1 17.331ms
recommendation x1 6.804ms
less than a minute ago
- 60.621ms 10 spans**
gateway 100%
gateway x2 60.621ms | product-composite x4 40.590ms | product x1 26.979ms | review x2 16.431ms | recommendation x1 15.952ms
3 minutes ago
- 48.413ms 10 spans**
gateway 100%
localhost:9411/zipkin/traces/124a1235c1b8caebs
is | review x2 20.169ms | product x1 14.399ms | recommendation x1 13.139ms
16 minutes ago

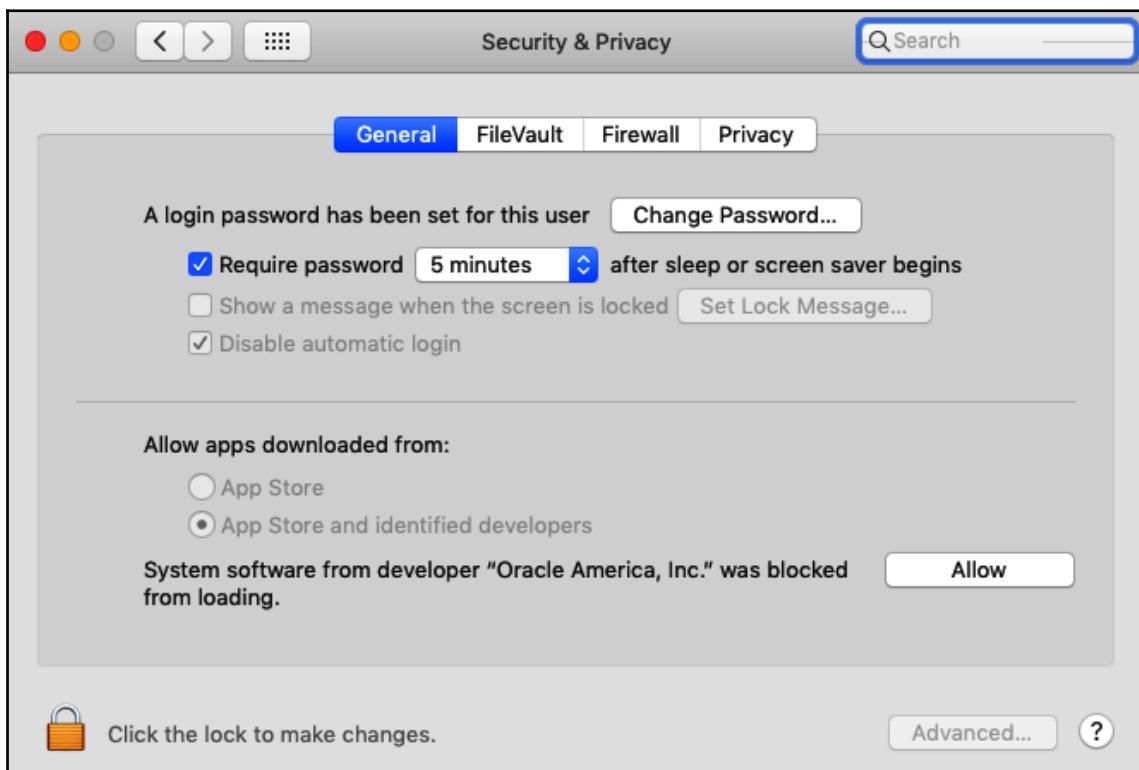




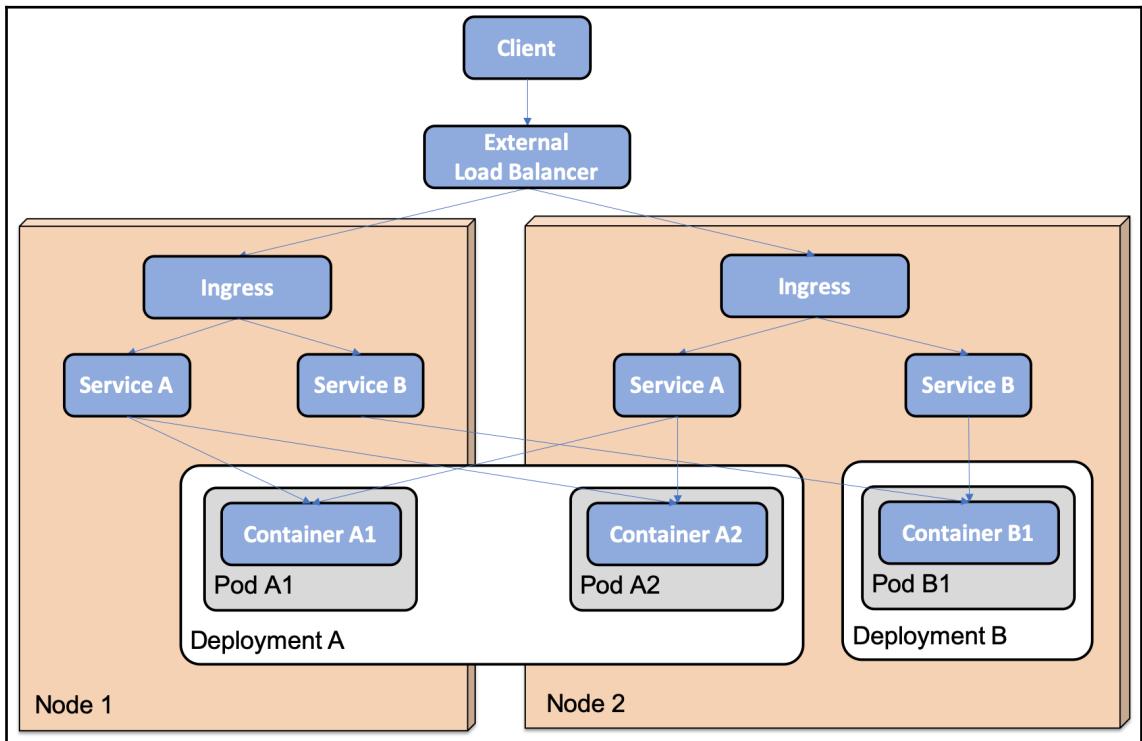
```
2. bash
$ docker-compose exec kafka /opt/kafka/bin/kafka-topics.sh --zookeeper zookeeper --list
__consumer_offsets
error.products.productsGroup
error.recommendations.recommendationsGroup
error.reviews.reviewsGroup
products
recommendations
reviews
zipkin
$
```

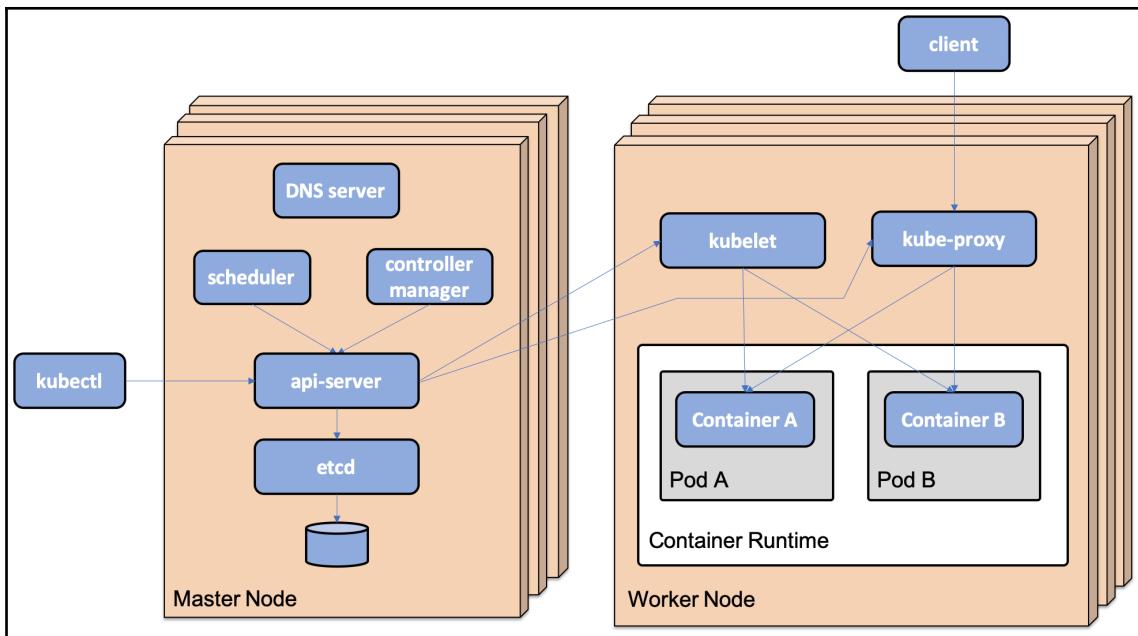
```
2. bash
$ docker-compose exec kafka /opt/kafka/bin/kafka-console-consumer.sh --bootstrap-server localhost:9092 --topic zipkin --from-beginning --timeout-ms 1000
[{"traceId": "87e49c2ca633a83", "id": "87e49c2ca633a83", "kind": "SERVER", "name": "put", "timestamp": "1557657577350749", "duration": 432812, "localEndpoint": {"service Name": "eureka-server", "ipv4": "192.168.192.3"}, "remoteEndpoint": {"ipV4": "192.168.192.7", "port": 38956}, "tags": {"error": "404", "http.method": "PUT", "http.path": "/eureka/apps/GATEWAY/2a0a7b03f032.gateway:8443", "http.status_code": "404"}}, {"traceId": "54f10f2c563ce308", "id": "54f10f2c563ce308", "kind": "SERVER", "name": "get", "timestamp": "1557657577352296", "duration": 494911, "localEndpoint": {"serviceName": "eureka-server", "ipV4": "192.168.192.3"}, "remoteEndpoint": {"ipV4": "192.168.192.7", "port": 38958}, "tags": {"http.method": "GET", "http.path": "/eureka/apps/"}}], {"traceId": "ba52a603ef2def98", "id": "ba52a603ef2def98", "kind": "SERVER", "name": "get", "timestamp": "155765757733640", "duration": 514823, "localEndpoint": {"serviceName": "eureka-server", "ipV4": "192.168.192.3"}, "remoteEndpoint": {"ipV4": "192.168.192.15", "port": 41358}, "tags": {"http.method": "GET", "http.path": "/eureka/apps/"}}], {"traceId": "20a3b95d4be04bc4", "id": "20a3b95d4be04bc4", "kind": "SERVER", "name": "get", "timestamp": "1557657577622946", "duration": 208980, "localEndpoint": {"serviceName": "eureka-server", "ipV4": "192.168.192.13", "port": 36566}, "tags": {"http.method": "GET", "http.path": "/eureka/apps/"}}], {"traceId": "ef73ef97be3758bc", "id": "ef73ef97be3758bc", "kind": "SERVER", "name": "get", "timestamp": "155765757735869", "duration": 504535, "localEndpoint": {"serviceName": "eureka-server", "ipV4": "192.168.192.12", "port": 38070}, "tags": {"http.method": "GET", "http.path": "/eureka/apps/"}}], {"traceId": "bb0a245c5c10805", "id": "bb0a245c5c10805", "kind": "SERVER", "name": "get", "timestamp": "1557657577349693", "duration": 498702, "localEndpoint": {"serviceName": "eureka-server", "ipV4": "192.168.192.8", "port": 41876}, "tags": {"http.method": "GET", "http.path": "/eureka/apps/"}}], {"traceId": "add4c15c9896e13a", "id": "add4c15c9896e13a", "kind": "SERVER", "name": "get", "timestamp": "155765757794841", "duration": 13210, "localEndpoint": {"serviceName": "eureka-server", "ipV4": "192.168.192.3"}, "remoteEndpoint": {"ipV4": "192.168.192.14", "port": 46750}, "tags": {"http.method": "GET", "http.path": "/eureka/apps/"}}]
```

Chapter 15: Introduction to Kubernetes



```
3. bash
$ kubectl version --client --short
Client Version: v1.15.0
$ minikube version
minikube version: v1.2.0
$ vboxmanage --version
6.0.6r130049
$ |
```





```
8. bash
$ kubectl config get-contexts
CURRENT   NAME          CLUSTER          AUTHINFO          NAMESPACE
*   handson-spring-boot-cloud   handson-spring-boot-cloud   handson-spring-boot-cloud   first-attempts
*   minikube                   minikube           minikube
```

```
8. bash
$ kubectl get nodes
NAME      STATUS    ROLES   AGE     VERSION
minikube  Ready     master   3m10s   v1.14.1
$
```

```
8. bash
$ kubectl get pods --namespace=kube-system
NAME                           READY   STATUS    RESTARTS   AGE
coredns-fb8b8dccf-2fbkp        1/1    Running   0          3m4s
coredns-fb8b8dccf-chctl       1/1    Running   0          3m4s
default-http-backend-6864bbb7db-wdb62  1/1    Running   0          3m4s
etcd-minikube                  1/1    Running   0          2m12s
kube-addon-manager-minikube   1/1    Running   0          2m1s
kube-apiserver-minikube      1/1    Running   0          2m11s
kube-controller-manager-minikube  1/1    Running   0          119s
kube-proxy-dmhsh              1/1    Running   0          3m5s
kube-scheduler-minikube      1/1    Running   0          118s
nginx-ingress-controller-586cdc477c-rctnr  1/1    Running   0          3m3s
storage-provisioner           1/1    Running   0          3m4s
$ █
```

```
8. bash
$ kubectl get all
NAME                           READY   STATUS    RESTARTS   AGE
pod/nginx-deploy-59b8c5f7cd-mt6pg  1/1    Running   0          8s

NAME                         READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/nginx-deploy  1/1     1           1           8s

NAME                           DESIRED  CURRENT  READY   AGE
replicaset.apps/nginx-deploy-59b8c5f7cd  1        1        1        8s
$ █
```

```
8. bash
$ kubectl get all
NAME                                READY   STATUS    RESTARTS   AGE
pod/nginx-deploy-59b8c5f7cd-mt6pg   1/1     Running   0          46s
pod/nginx-deploy-59b8c5f7cd-pmns9   1/1     Running   0          12s
pod/nginx-deploy-59b8c5f7cd-vtstj   1/1     Running   0          12s

NAME                               READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/nginx-deploy      3/3     3           3           46s

NAME                               DESIRED  CURRENT  READY   AGE
replicaset.apps/nginx-deploy-59b8c5f7cd  3        3         3       46s
$
```

```
8. bash
$ kubectl get svc
NAME      TYPE      CLUSTER-IP      EXTERNAL-IP      PORT(S)      AGE
nginx-service   NodePort   10.111.232.48   <none>        80:30080/TCP   56m
$
```

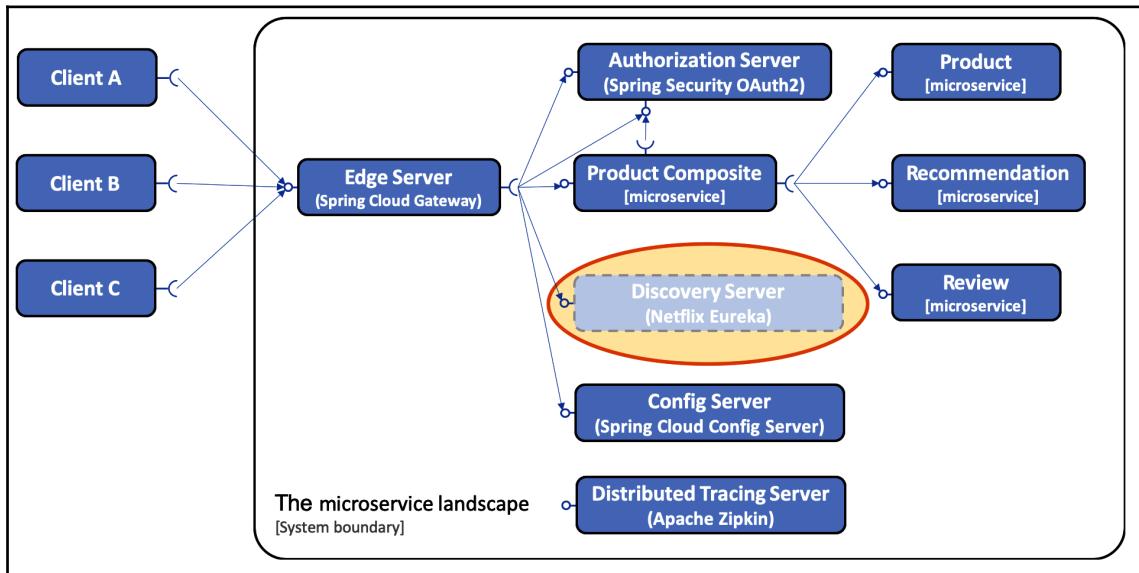


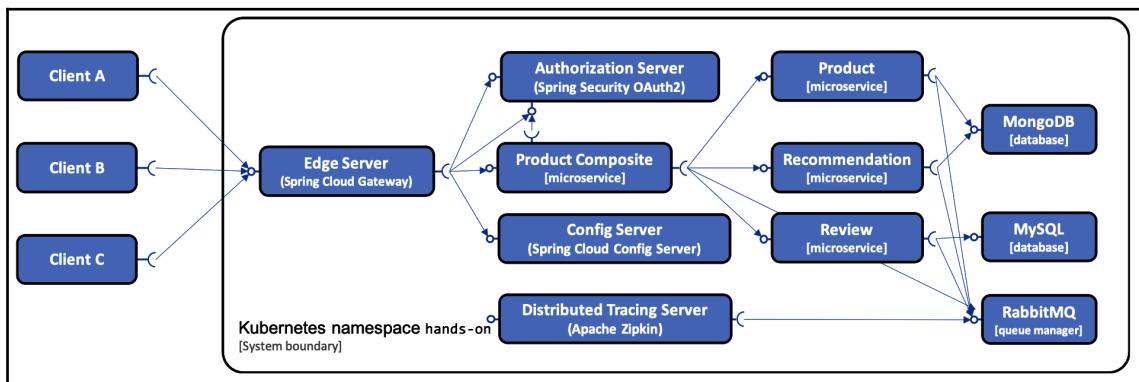
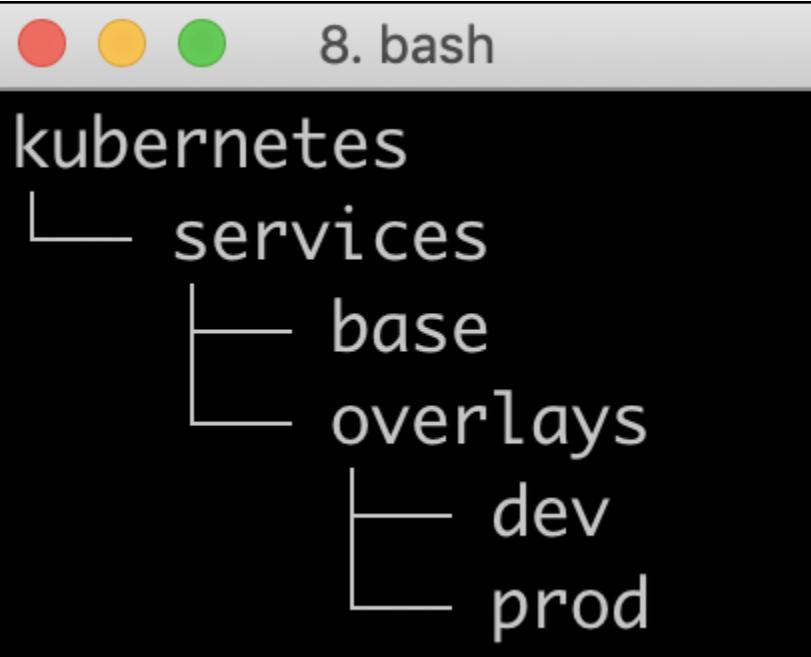
The screenshot shows a web browser window with the following details:

- Title Bar:** Welcome to nginx!
- Address Bar:** Not Secure | 192.168.99.116:30080
- Content Area:**
 - # Welcome to nginx!
 - If you see this page, the nginx web server is successfully installed and working. Further configuration is required.
 - For online documentation and support please refer to nginx.org. Commercial support is available at nginx.com.
 - Thank you for using nginx.*

```
8. bash
$ cat run-curl.txt
$ kubectl run -i --rm --restart=Never curl-client --image=tutum/curl:alpine --command -- curl -s 'http://nginx-service:80'
...
<h1>Welcome to nginx!</h1>
...
pod "curl-client" deleted
$
```

Chapter 16: Deploying Our Microservices to Kubernetes







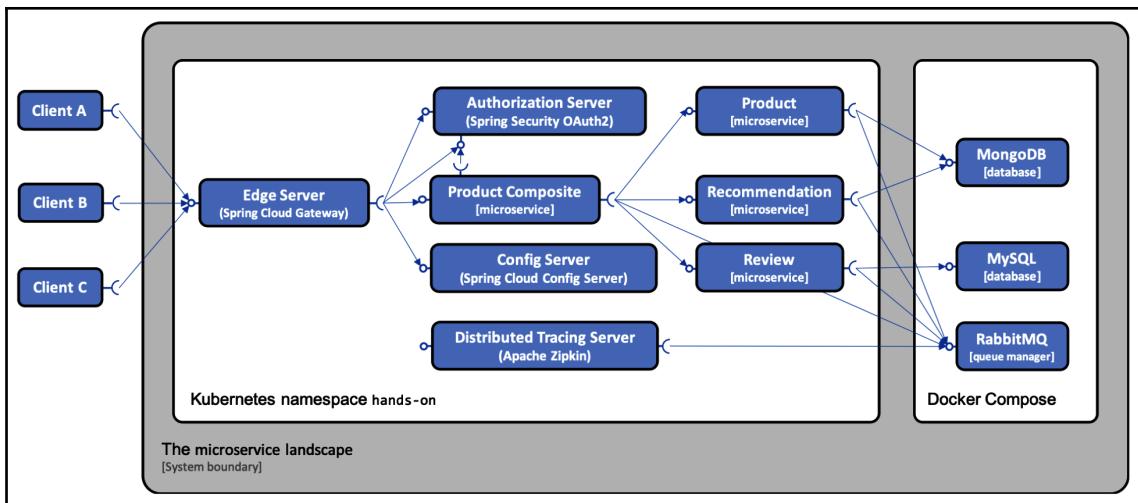
8. bash

```
$ kubectl get pods -o json | jq .items[].spec.containers[].image
"hands-on/auth-server"
"hands-on/config-server"
"hands-on/gateway"
"mongo:3.6.9"
"mysql:5.7"
"hands-on/product-service"
"hands-on/product-composite-service"
"rabbitmq:3-management"
"hands-on/recommendation-service"
"hands-on/review-service"
"openzipkin/zipkin:2.12.9"
$ █
```



3. bash

```
$ HOST=$(minikube ip) PORT=31443 ./test-em-all.bash
Start Tests: Sat Jun 29 08:29:05 CEST 2019
HOST=192.168.99.116
PORT=31443
Wait for: curl -k https://192.168.99.116:31443/actuator/health... DONE, continues...
Test OK (HTTP Code: 200)
...
Start Circuit Breaker tests!
Restarting alpine-client...
Error from server (NotFound): pods "alpine-client" not found
pod/alpine-client created
Waiting for alpine-client to be ready...
pod/alpine-client condition met
Test OK (actual value: CLOSED)
...
Test OK (actual value: HALF_OPEN_TO_CLOSED)
pod "alpine-client" deleted
End, all tests OK: Sat Jun 29 08:29:33 CEST 2019
$ █
```



```
8. bash
$ kubectl get pods -o json | jq '.items[].spec.containers[].image'
"hands-on/auth-server:v1"
"hands-on/config-server:v1"
"hands-on/gateway:v1"
"hands-on/product-composite-service:v1"
"hands-on/product-service:v1"
"hands-on/recommendation-service:v1"
"hands-on/review-service:v1"
"openzipkin/zipkin:2.12.9"
$
```

```
8. bash
$ kubectl get pod -l app=product -o jsonpath='{.items[*].spec.containers[*].image} '
hands-on/product-service:v1 $
```

```
8. bash
$ siege https://$(minikube ip):31443/actuator/health -d1 -c1
...
HTTP/1.1 200      0.03 secs:    920 bytes ==> GET  /actuator/health
HTTP/1.1 200      0.02 secs:    920 bytes ==> GET  /actuator/health
HTTP/1.1 200      0.02 secs:    920 bytes ==> GET  /actuator/health
HTTP/1.1 200      0.03 secs:    920 bytes ==> GET  /actuator/health
```

```
8. bash
$ kubectl get pods -l app=product -w
NAME          READY   STATUS    RESTARTS   AGE
product-5d45f8bcd-ffrdh  1/1     Running   0          20s
product-d4f789cc-t8mcl   0/1     Pending   0          0s
product-d4f789cc-t8mcl   0/1     Pending   0          0s
product-d4f789cc-t8mcl   0/1     ContainerCreating 0          0s
product-d4f789cc-t8mcl   0/1     Running   0          2s
product-d4f789cc-t8mcl   1/1     Running   0          16s
product-5d45f8bcd-ffrdh  1/1     Terminating   0          2m5s
product-5d45f8bcd-ffrdh  0/1     Terminating   0          2m10s
product-5d45f8bcd-ffrdh  0/1     Terminating   0          2m17s
product-5d45f8bcd-ffrdh  0/1     Terminating   0          2m17s
```

```
8. bash
HTTP/1.1 200      0.02 secs:    920 bytes ==> GET  /actuator/health
HTTP/1.1 503       0.03 secs:    1068 bytes ==> GET  /actuator/health
HTTP/1.1 503       0.03 secs:    1068 bytes ==> GET  /actuator/health
HTTP/1.1 200      0.03 secs:    920 bytes ==> GET  /actuator/health
```

```
8. bash
$ kubectl get pod -l app=product -o jsonpath='{.items[*].spec.containers[*].image} '
hands-on/product-service:v2 $
```

```
8. bash
$ kubectl rollout history deployment product
deployment.extensions/product
REVISION  CHANGE-CAUSE
1          <none>
2          <none>
3          <none>

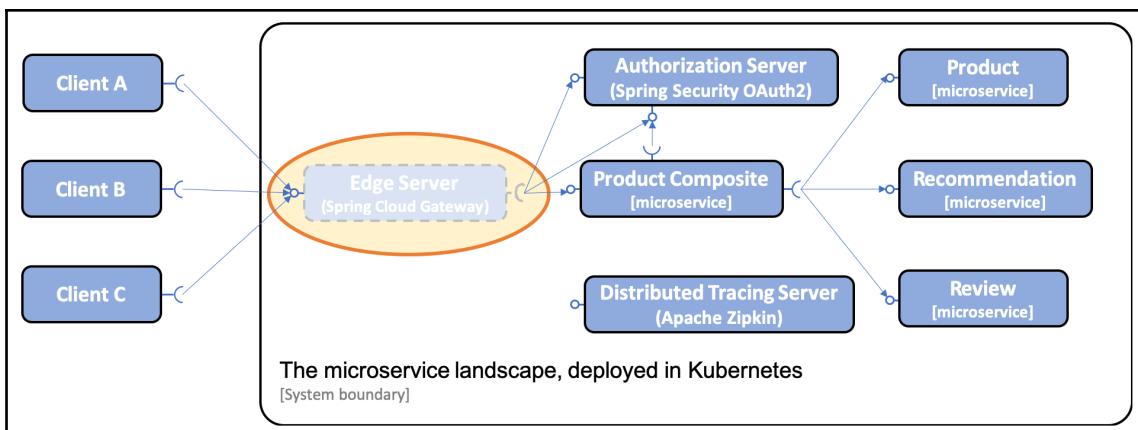
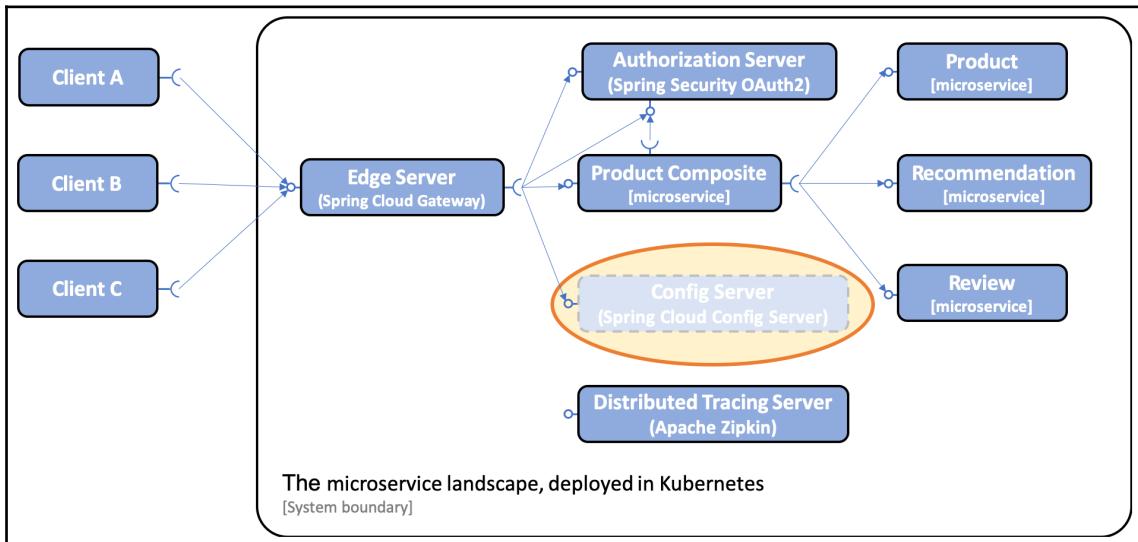
$
```

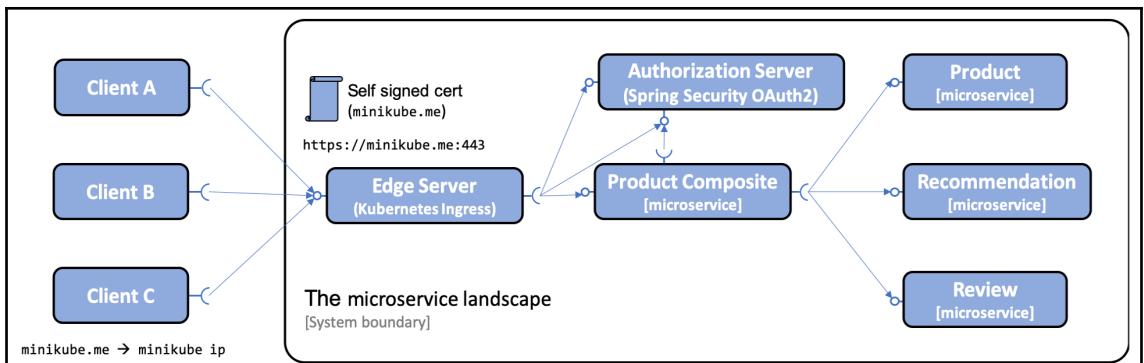
```
8. bash
$ kubectl rollout history deployment product --revision=2
deployment.extensions/product with revision #2
Pod Template:
  Labels:      app=product
                pod-template-hash=d4f789cc
  Containers:
    pro:
      Image:      hands-on/product-service:v2
...
$
```

```
8. bash
$ kubectl rollout undo deployment product --to-revision=2
deployment.extensions/product rolled back
$
```

		8. bash		
product-7549b597b-m2dtn	0/1	Terminating	0	7m40s
product-7549b597b-m2dtn	0/1	Terminating	0	7m40s
product-7549b597b-m2dtn	0/1	Terminating	0	7m43s
product-7549b597b-m2dtn	0/1	Terminating	0	7m43s

Chapter 17: Implementing Kubernetes Features as an Alternative





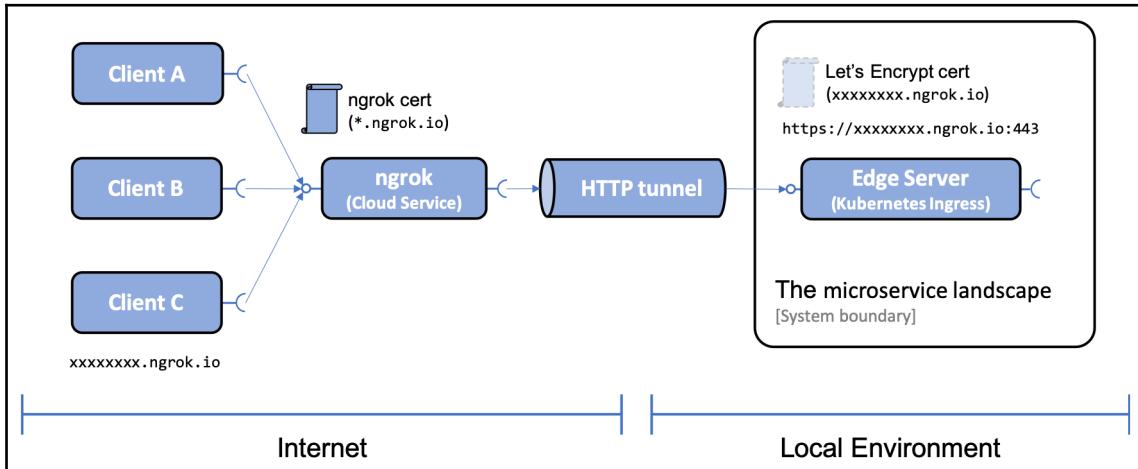
3. bash

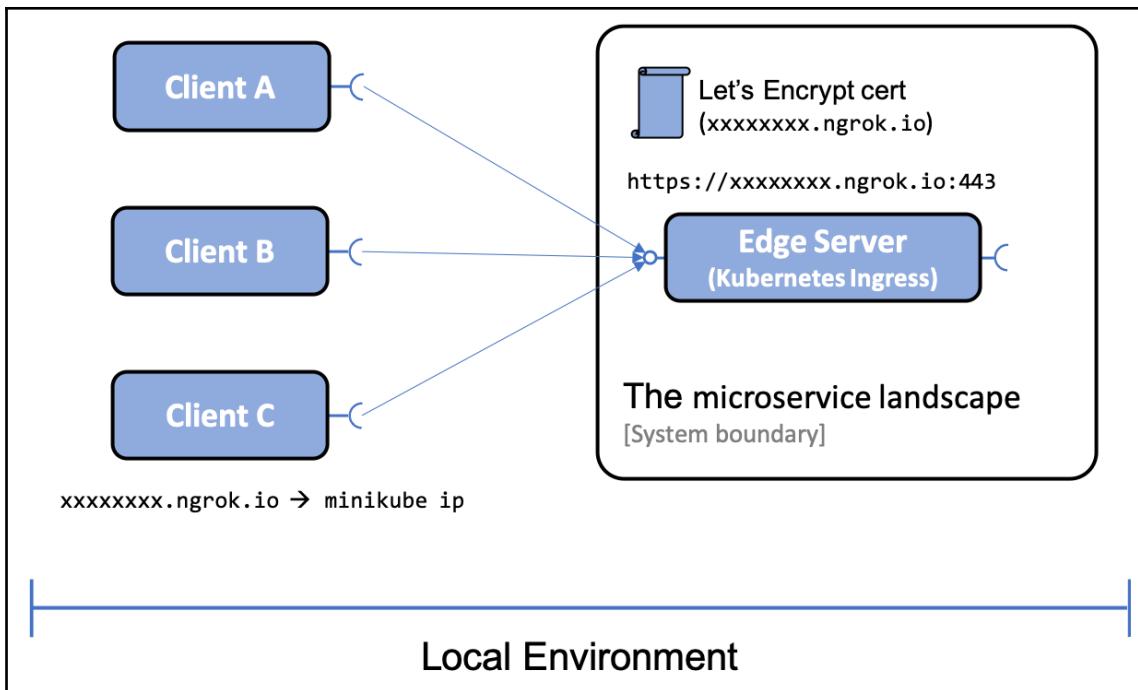
```
$ cat /etc/hosts
...
192.168.99.121 minikube.me
$
```

3. bash

```
$ HOST=minikube.me PORT=443 ./test-em-all.bash
Start Tests: Wed Jul 10 13:05:51 CEST 2019
HOST=minikube.me
PORT=443
Wait for: curl -k https://minikube.me:443/actuator/health... DONE, continues...
Test OK (HTTP Code: 200)
...
End, all tests OK: Wed Jul 10 13:06:33 CEST 2019
$
```

```
4. bash
$ kubectl wait --timeout=600s --for=condition=ready pod --all -n cert-manager
pod/cert-manager-5d5cc69d6-5f9wb condition met
pod/cert-manager-cainjector-7688bf9689-9md7k condition met
pod/cert-manager-webhook-dfcbcc64b-vh5qh condition met
$
```





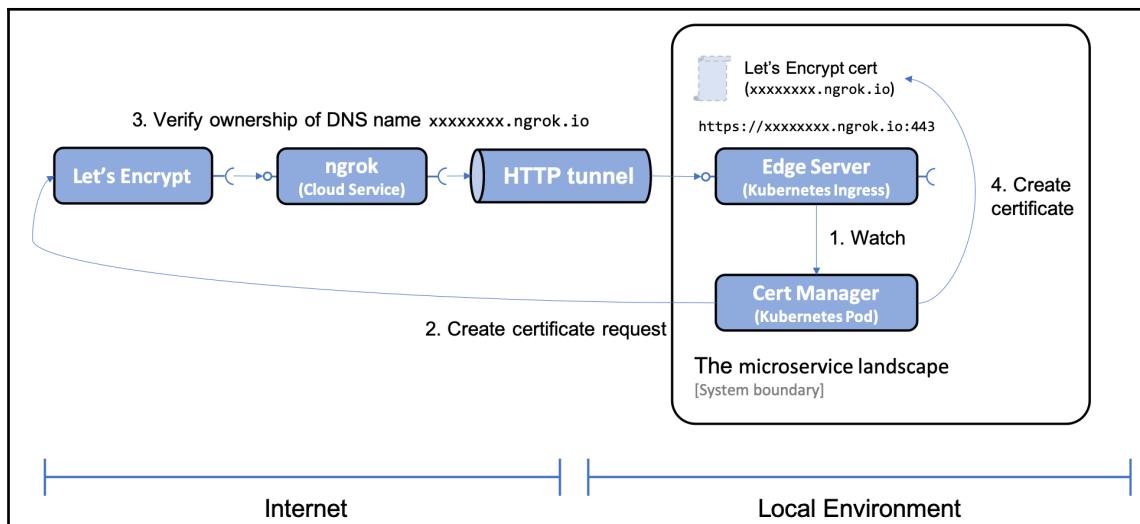
```

ngrok by @inconshreveable          3. bash
(Ctrl+C to quit)

Session Status          online
Account                 Magnus Larsson (Plan: Free)
Version                2.3.30
Region                 United States (us)
Web Interface          http://127.0.0.1:4040
Forwarding             http://6cc09528.ngrok.io -> https://minikube.me:443
Forwarding             https://6cc09528.ngrok.io -> https://minikube.me:443

Connections            ttl     opn      rt1      rt5      p50      p90
                        0       0       0.00    0.00    0.00    0.00

```

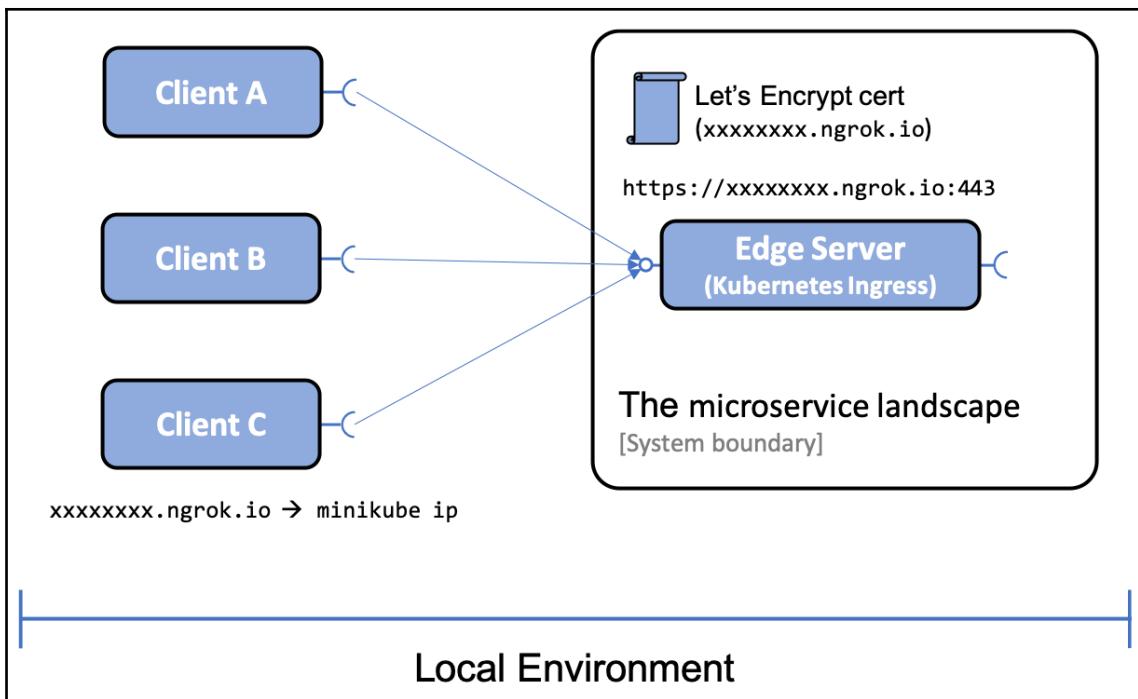


3. bash

```
HTTP Requests
-----
GET /.well-known/acme-challenge/FtYgFcTeAekq1NGt06 200 OK
```

3. bash

```
$ kubectl get cert -w
NAME                    READY   SECRET          AGE
tls-ngrok-letsencrypt-certificate  False   tls-ngrok-letsencrypt-certificate  1s
tls-ngrok-letsencrypt-certificate  True    tls-ngrok-letsencrypt-certificate  44s
```



3. bash

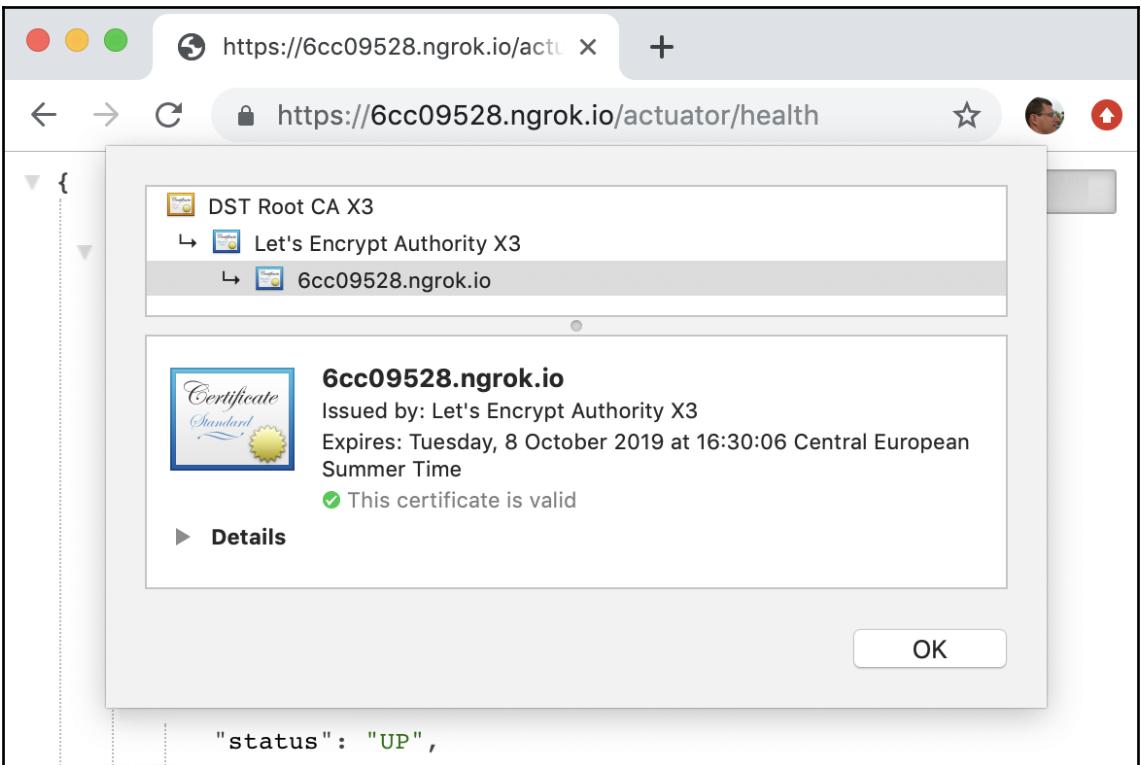
```
$ cat /etc/hosts
...
192.168.99.121 minikube.me 6cc09528.ngrok.io
$
```

3. bash

```
$ keytool -printcert -sslserver $NGROK_HOST:443 | grep -E "Owner:|Issuer:"
Owner: CN=6cc09528.ngrok.io
Issuer: CN=Fake LE Intermediate X1
Owner: CN=Fake LE Intermediate X1
Issuer: CN=Fake LE Root X1
$
```

```
3. bash
End, all tests OK: Wed Jul 10 13:06:33 CEST 2019
$
```

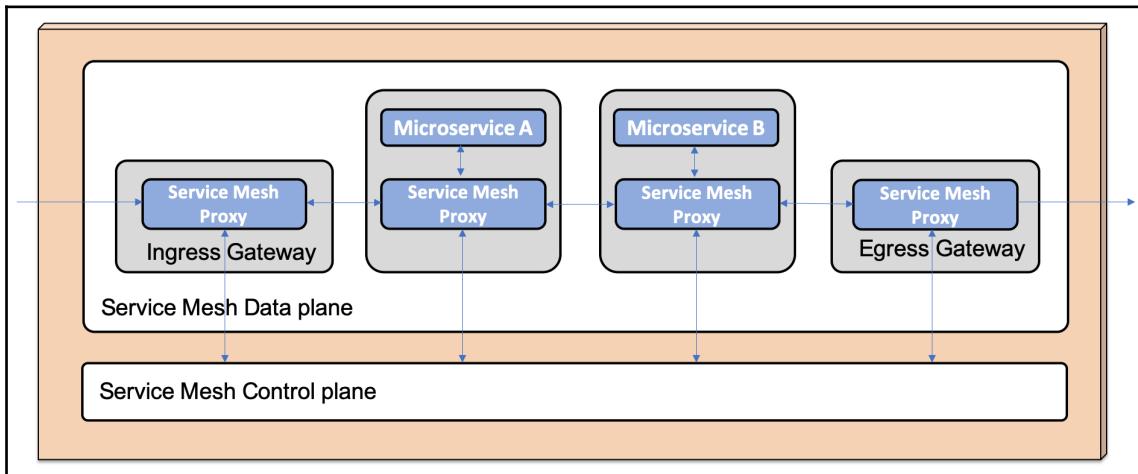
```
3. bash
$ keytool -printcert -sslserver $NGROK_HOST:443 | grep -E "Owner:|Issuer:"
Owner: CN=6cc09528.ngrok.io
Issuer: CN=Let's Encrypt Authority X3, O=Let's Encrypt, C=US
Owner: CN=Let's Encrypt Authority X3, O=Let's Encrypt, C=US
Issuer: CN=DST Root CA X3, O=Digital Signature Trust Co.
$
```

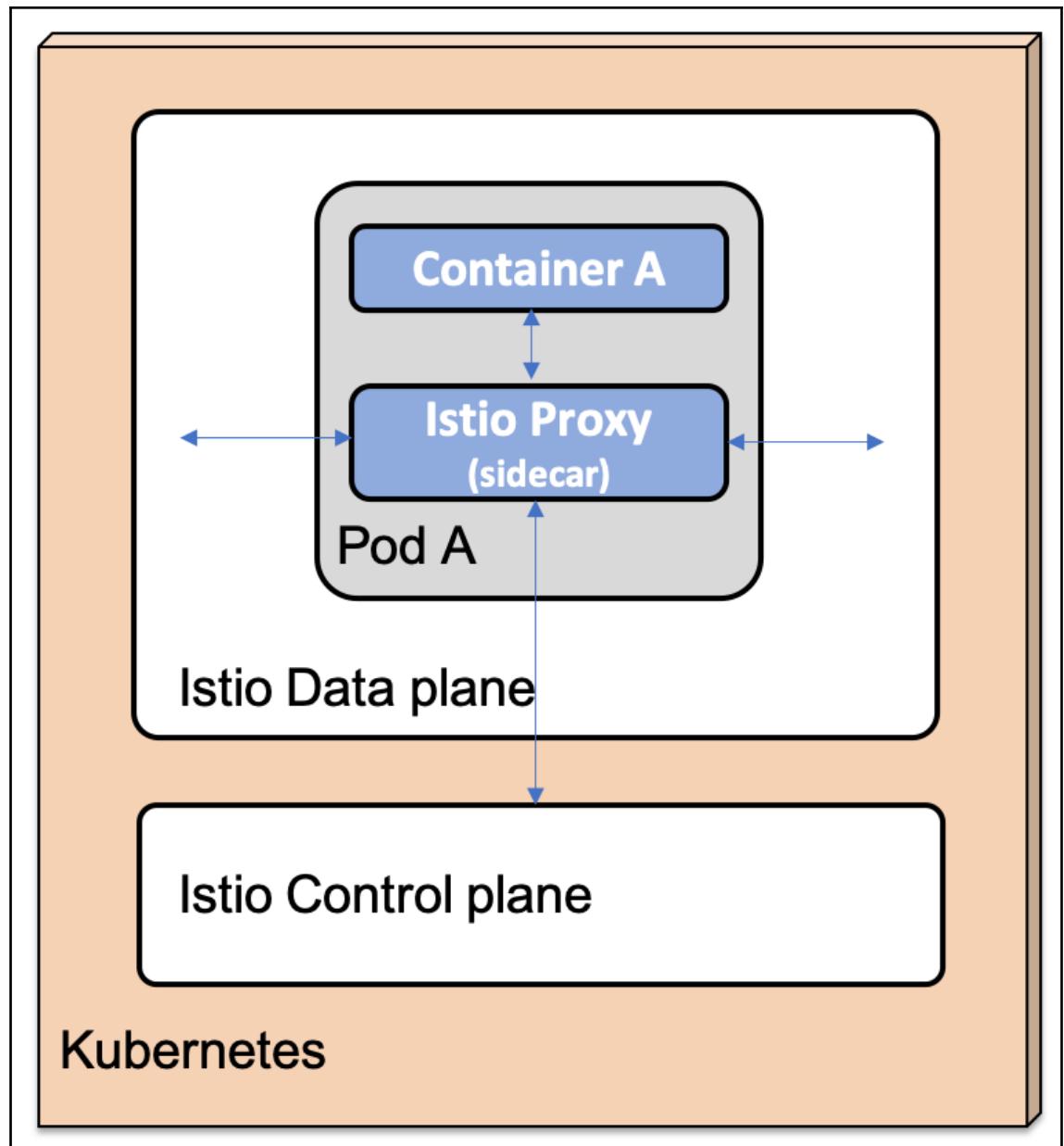


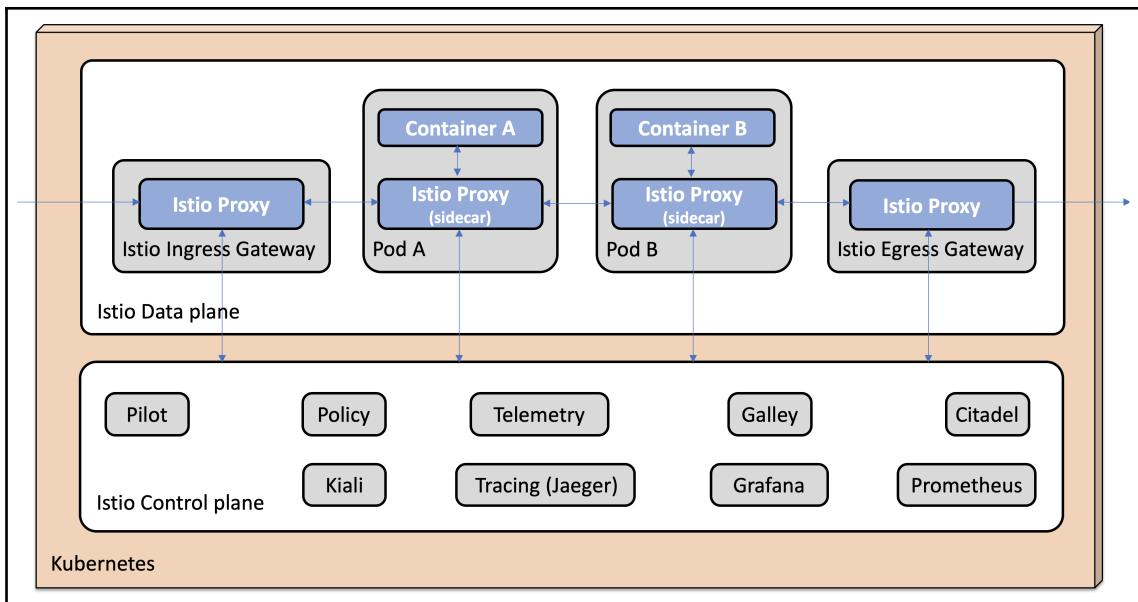
```
3. bash
End, all tests OK: Wed Jul 10 13:06:33 CEST 2019
$ |
```

```
3. bash
$ COMPOSE_FILE=docker-compose.yml ./test-em-all.bash start stop
Start Tests: Sat Jul 13 16:40:19 CEST 2019
HOST=localhost
PORT=8443
Restarting the test environment...
$ docker-compose down --remove-orphans
$ docker-compose up -d
Creating network "my-network" with the default driver
Creating book-source-code_mongodb_1      ... done
...
Creating book-source-code_product-composite_1 ... done
Wait for: curl -k https://localhost:8443/actuator/health... , retry #1 ... DONE, continues...
Test OK (HTTP Code: 200)
...
End, all tests OK: Sat Jul 13 16:42:05 CEST 2019
Stopping the test environment...
$ docker-compose down --remove-orphans
Stopping book-source-code_product-composite_1 ... done
...
Removing book-source-code_mongodb_1          ... done
Removing network my-network
$ |
```

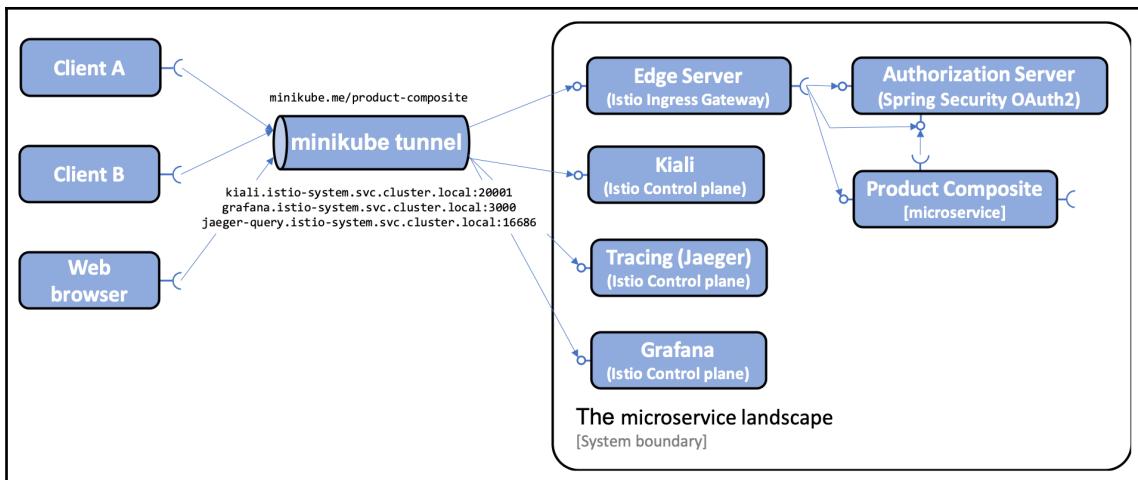
Chapter 18: Using a Service Mesh to Improve Observability and Management







```
4. bash
$ minikube status
host: Running
kubelet: Running
apiserver: Running
kubectl: Correctly Configured: pointing to minikube-vm at 192.168.99.125
$
```



6. bash

```
$ cat /etc/hosts
...
10.102.72.36 minikube.me
$
```



5. bash

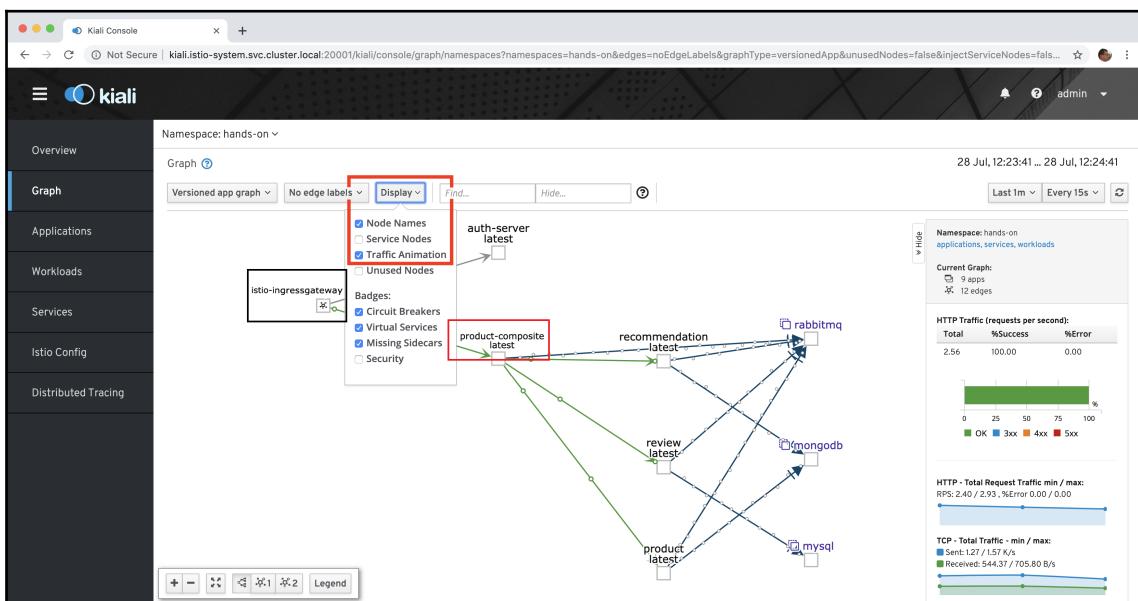
```
kubernetes/services/
└── base
    ├── deployments
    ├── istio
    │   └── services
    ├── overlays
    │   ├── dev
    │   └── prod
    │       ├── istio
    │       ├── v1
    │       └── v2
```

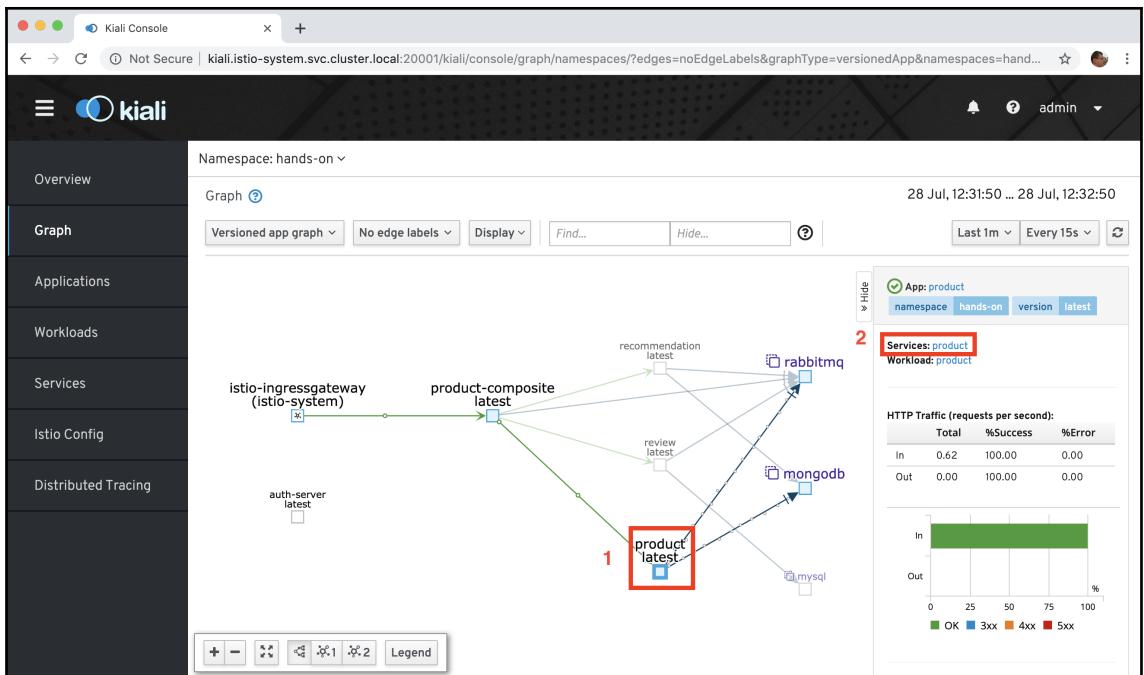
```
4. bash
$ kubectl get pods
NAME                               READY   STATUS    RESTARTS   AGE
auth-server-78c9b85c9b-9sjs4        2/2     Running   0          8m4s
mongodb-75d7df8bd7-7s9f6          1/1     Running   0          9m33s
mysql-754d8f7584-26lxd           1/1     Running   0          9m33s
product-8695c57758-64q7x          2/2     Running   0          8m4s
product-composite-74f4dc9b4f-vkvbd 2/2     Running   0          8m4s
rabbitmq-855fb78bcc-5mcq7         1/1     Running   0          9m33s
recommendation-7bc5446b4c-btpqx   2/2     Running   0          8m4s
review-546bb44f8d-hpll7          2/2     Running   0          8m4s$
$
```

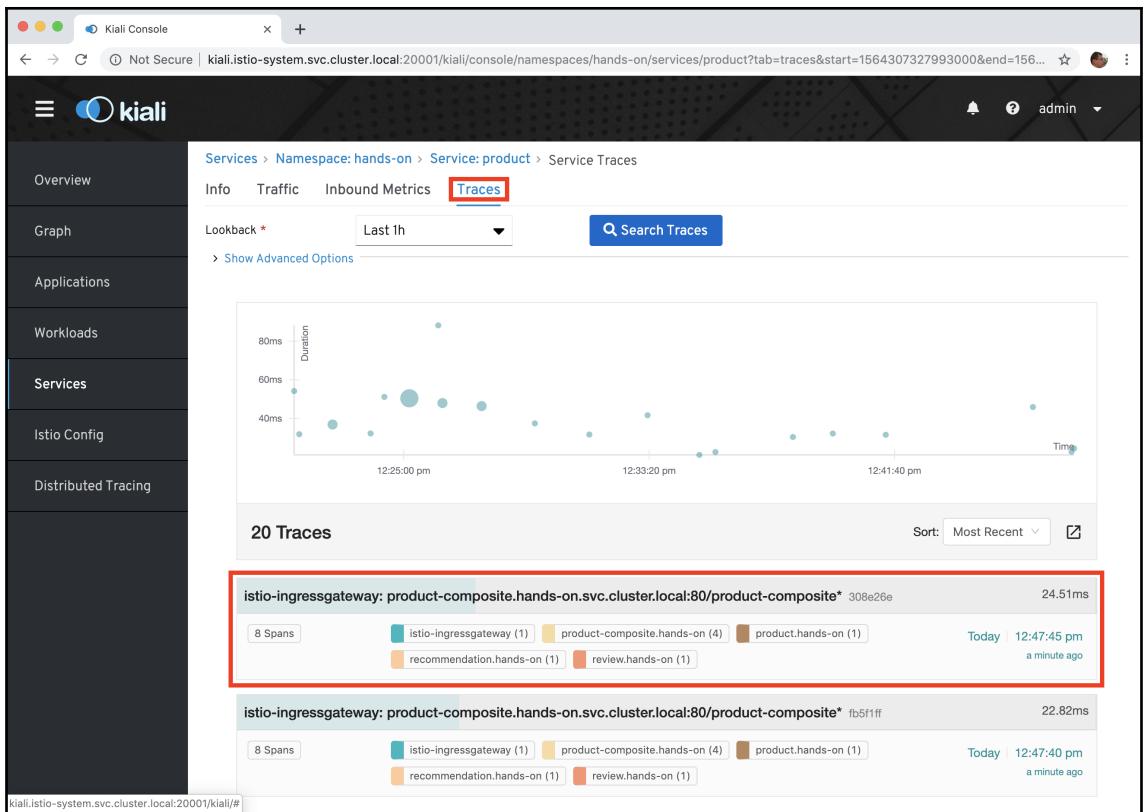
```
4. bash
$ ./test-em-all.bash
...
Wait for: curl -k http://product-composite.hands-on.svc.cluster.local:4004/actuator/health...
DONE, continues...
Test OK (HTTP Code: 200)
...
End, all tests OK: Sun Jul 28 11:47:44 CEST 2019
$
```

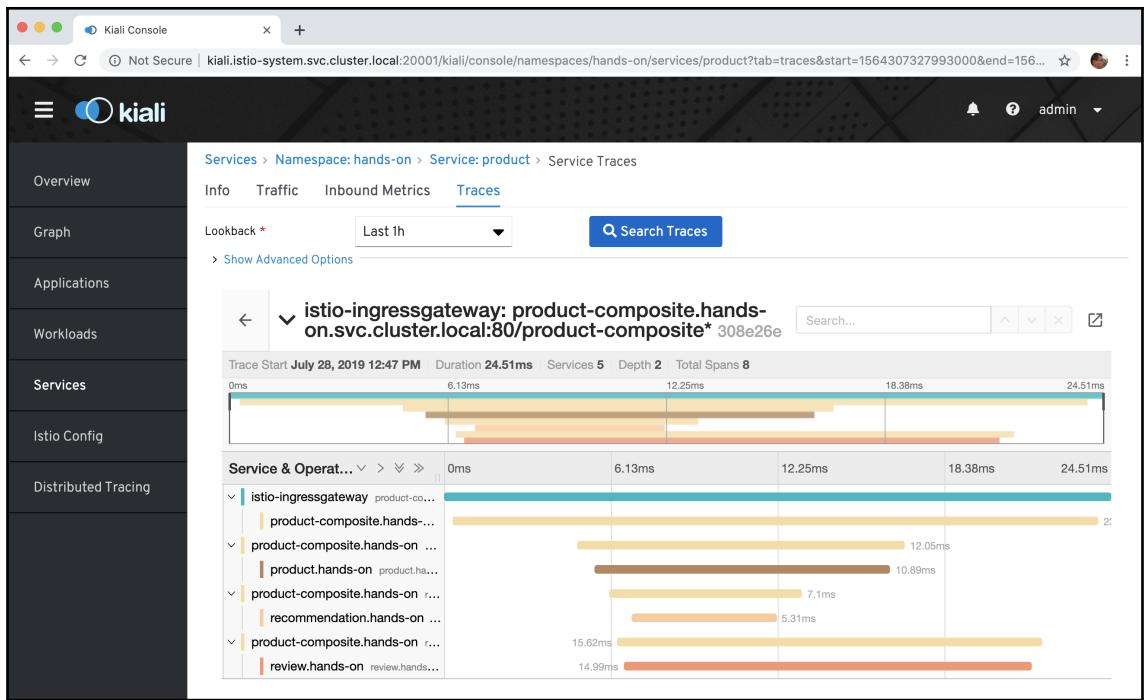
```
4. bash
$ siege https://minikube.me/product-composite/2 -H "Authorization: Bearer $ACCESS_TOKEN" -c1 -d1
...
The server is now under siege...
HTTP/1.1 200      0.08 secs:      772 bytes ==> GET  /product-composite/2
HTTP/1.1 200      0.03 secs:      772 bytes ==> GET  /product-composite/2
HTTP/1.1 200      0.05 secs:      772 bytes ==> GET  /product-composite/2
```

The screenshot shows the Kiali Console Overview page. On the left, a sidebar menu includes 'Overview' (highlighted with a red box), 'Graph', 'Applications', 'Workloads', 'Services', 'Istio Config', and 'Distributed Tracing'. The main area displays three namespaces: 'default' (0 Applications, No traffic), 'hands-on' (8 Applications, 2 issues, No traffic), and 'istio-system' (12 Applications, Traffic last 1m). Each namespace has a set of icons below it.









```
6. bash
...
volumeMounts:
- mountPath: /etc/istio/ingressgateway-certs
  name: ingressgateway-certs
...
volumes:
- name: ingressgateway-certs
  secret:
    optional: true
    secretName: istio-ingressgateway-certs
...

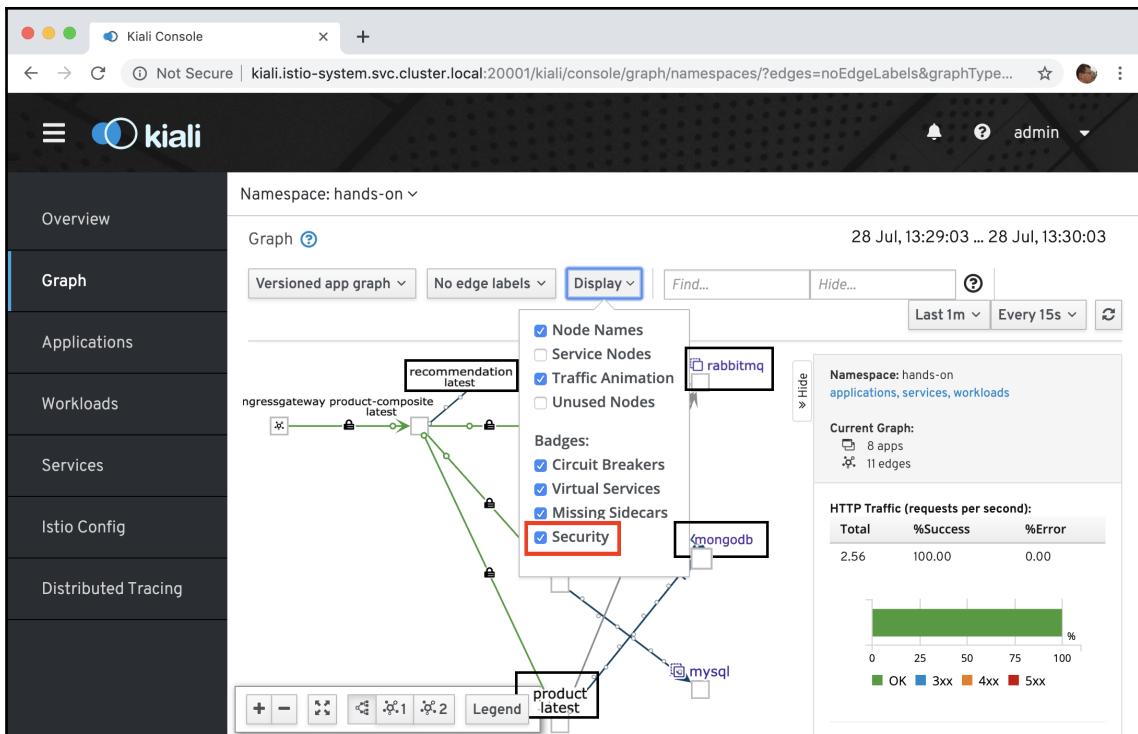
```

```
4. bash
$ keytool -printcert -sslserver minikube.me:443 | grep -E "Owner:|Issuer:"
Owner: O=minikube.me, CN=minikube.me
Issuer: O=minikube.me, CN=minikube.me
$ █
```

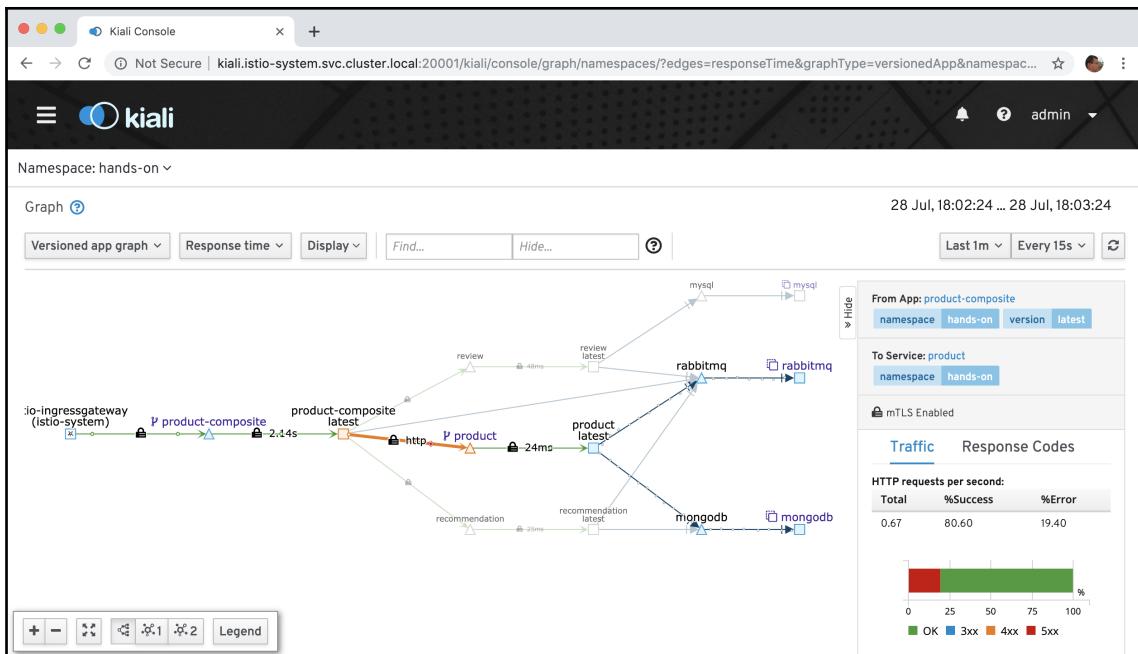


6. bash

```
$ kubectl get meshpolicy default -o yaml
apiVersion: authentication.istio.io/v1alpha1
kind: MeshPolicy
...
  name: default
spec:
  peers:
    - mtls:
        mode: PERMISSIVE
$ █
```

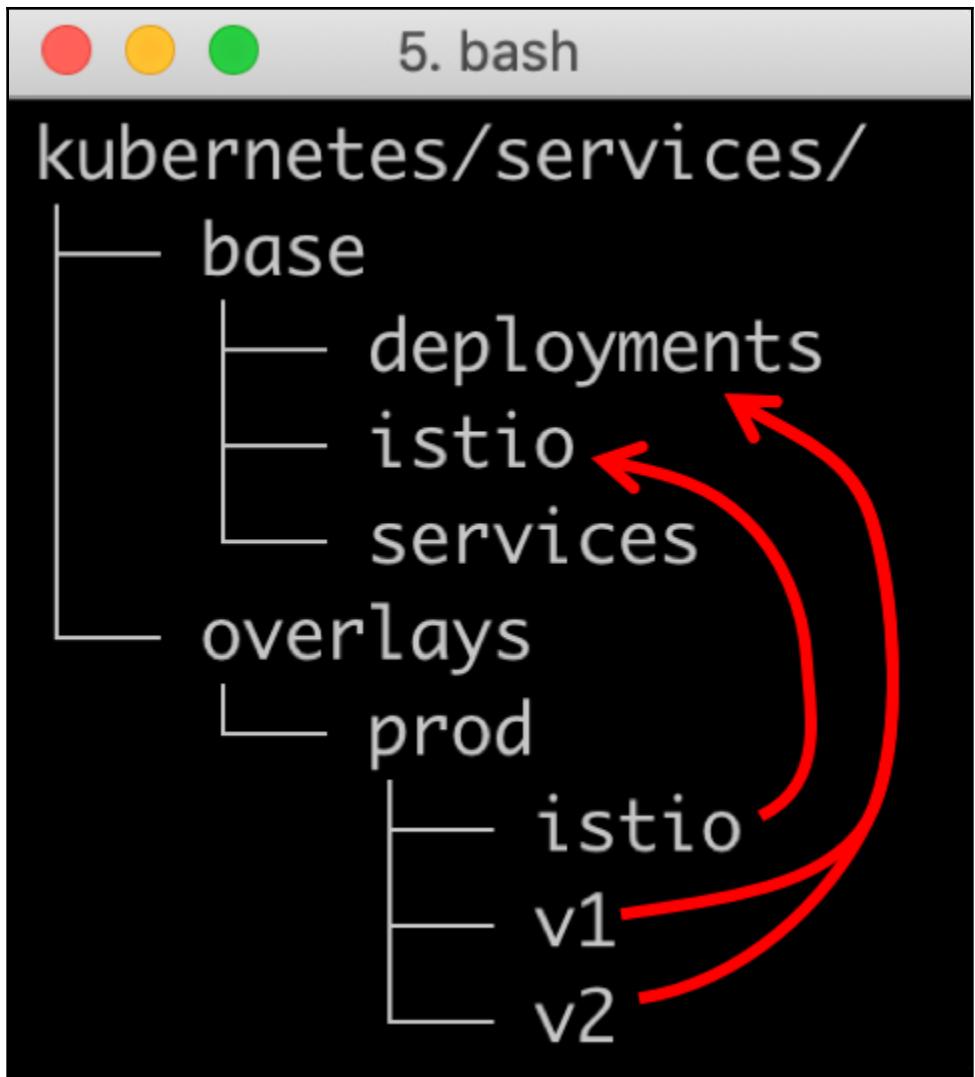


```
4. bash
HTTP/1.1 200 0.03 secs: 772 bytes ==> GET /product-composite/2
HTTP/1.1 200 1.08 secs: 772 bytes ==> GET /product-composite/2
HTTP/1.1 200 0.03 secs: 772 bytes ==> GET /product-composite/2
HTTP/1.1 200 0.05 secs: 772 bytes ==> GET /product-composite/2
HTTP/1.1 200 1.03 secs: 772 bytes ==> GET /product-composite/2
HTTP/1.1 200 0.06 secs: 772 bytes ==> GET /product-composite/2
```



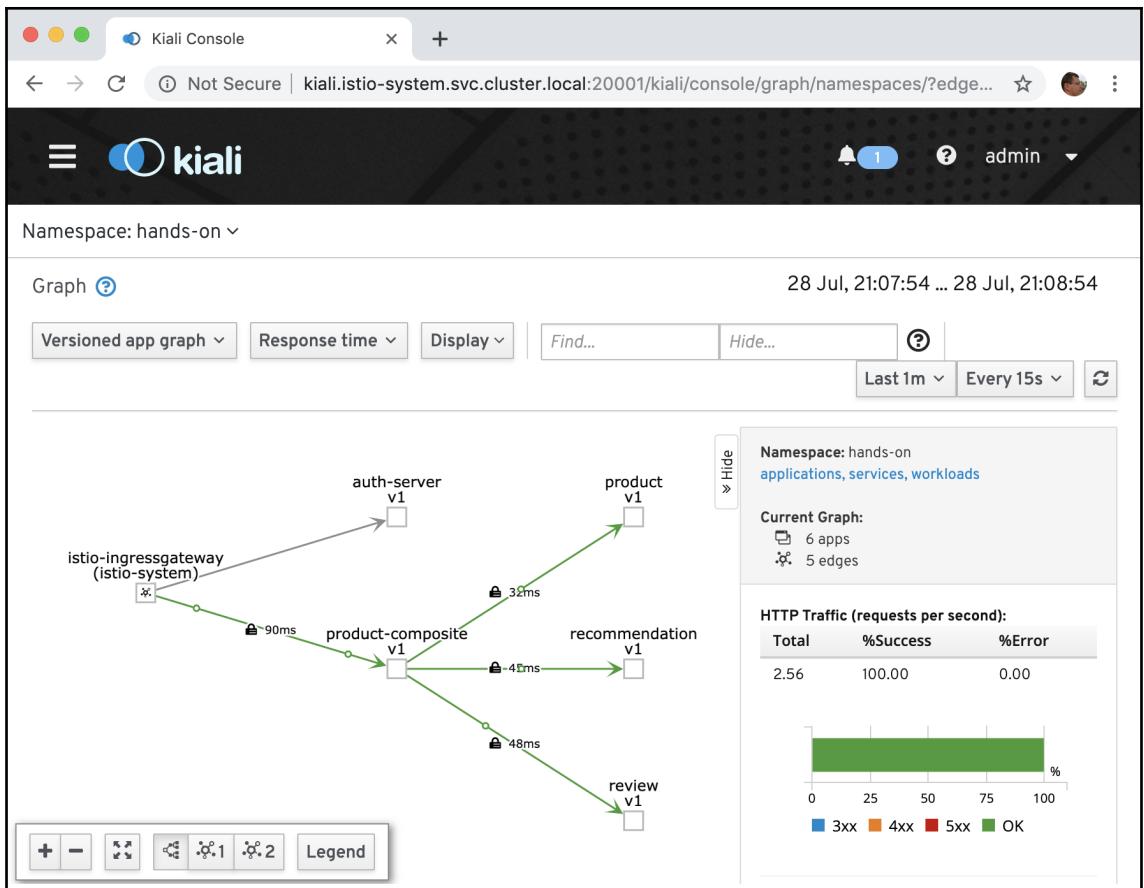
6. bash

```
{"productId":2,"name":"Fallback product2"...
real      0m0.083
```



```
4. bash
$ ./kubernetes/scripts/deploy-prod-env.bash
...
+ kubectl wait --timeout=120s --for=condition=Ready pod --all
pod/auth-server-v1-5f75968f7f-v7j8p condition met
pod/auth-server-v2-97b4b5cb4-lcvx4 condition met
pod/product-composite-v1-7f87fd87cb-2vmjl condition met
pod/product-composite-v2-99855f749-lz44j condition met
pod/product-v1-b8d48477c-qvl9f condition met
pod/product-v2-657cd6749d-xdh9c condition met
pod/recommendation-v1-545fb976cd-jfq9w condition met
pod/recommendation-v2-66d475fbf7-swdhs condition met
pod/review-v1-868c87cc95-ww2hv condition met
pod/review-v2-f4c97c748-2mlwm condition met
$ █
```

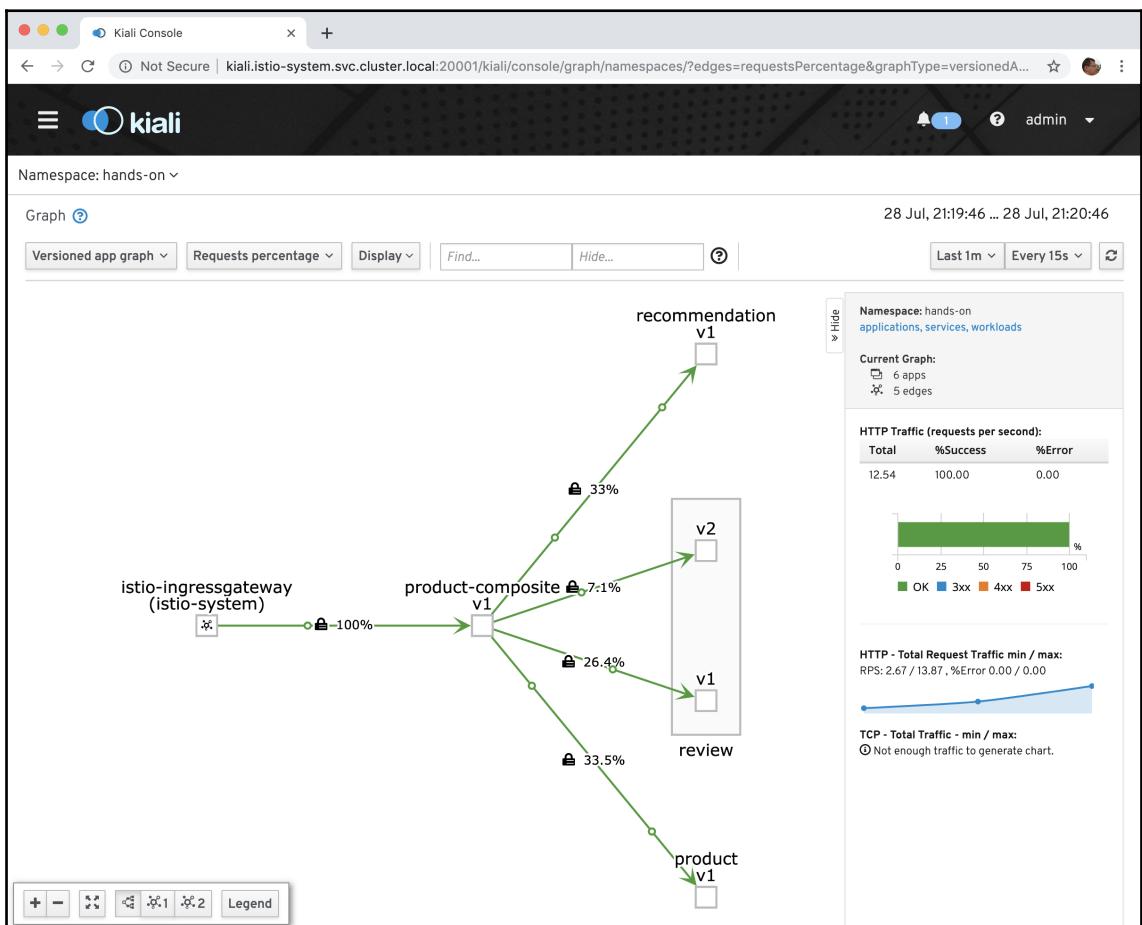
```
4. bash
$ SKIP_CB_TESTS=true ./test-em-all.bash
...
Wait for: curl -k http://product-composite.hands-on.svc.cluster.local:4004/actuator/health...
DONE, continues...
Test OK (HTTP Code: 200)
...
End, all tests OK: Mon Aug 5 09:19:37 CEST 2019
$ █
```

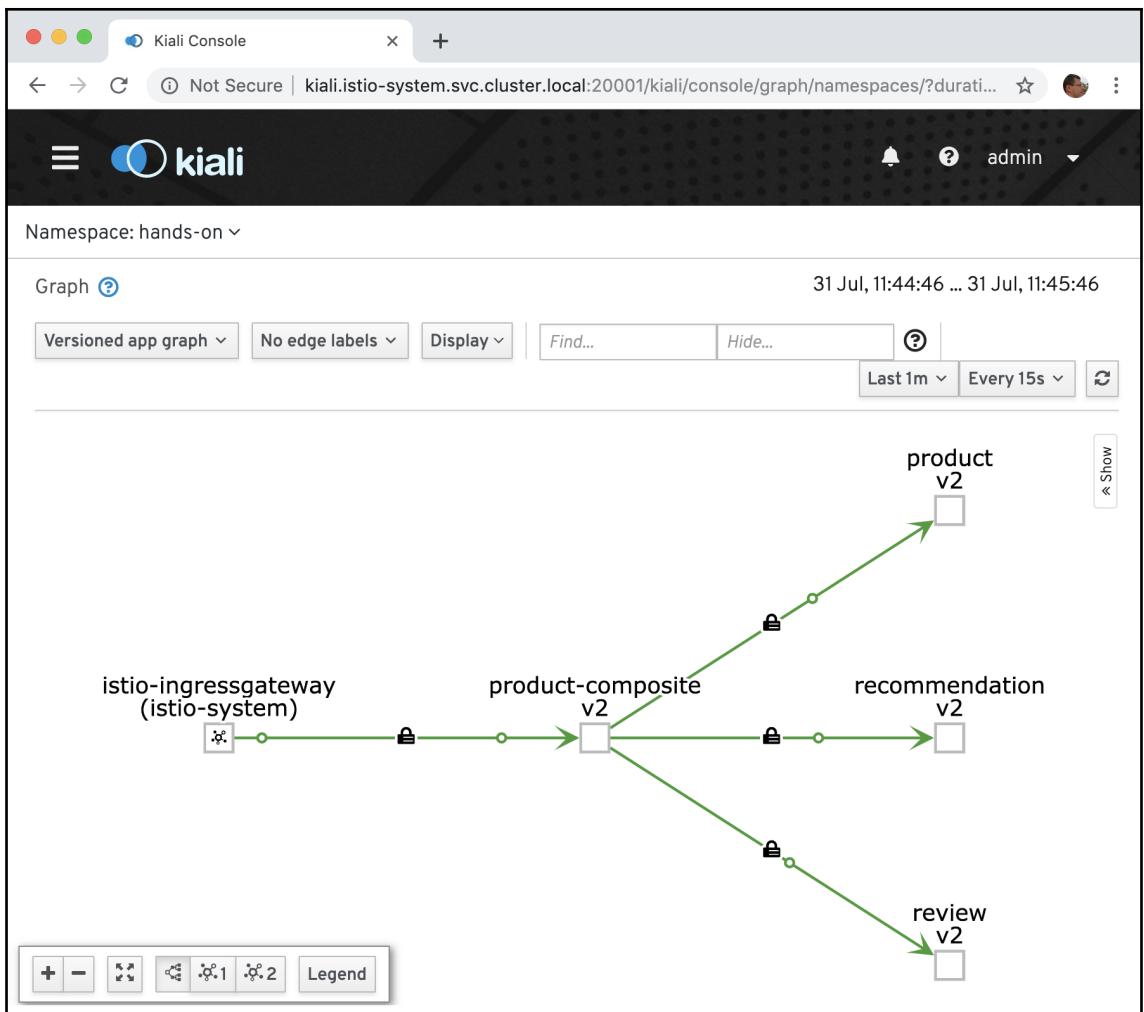


4. bash

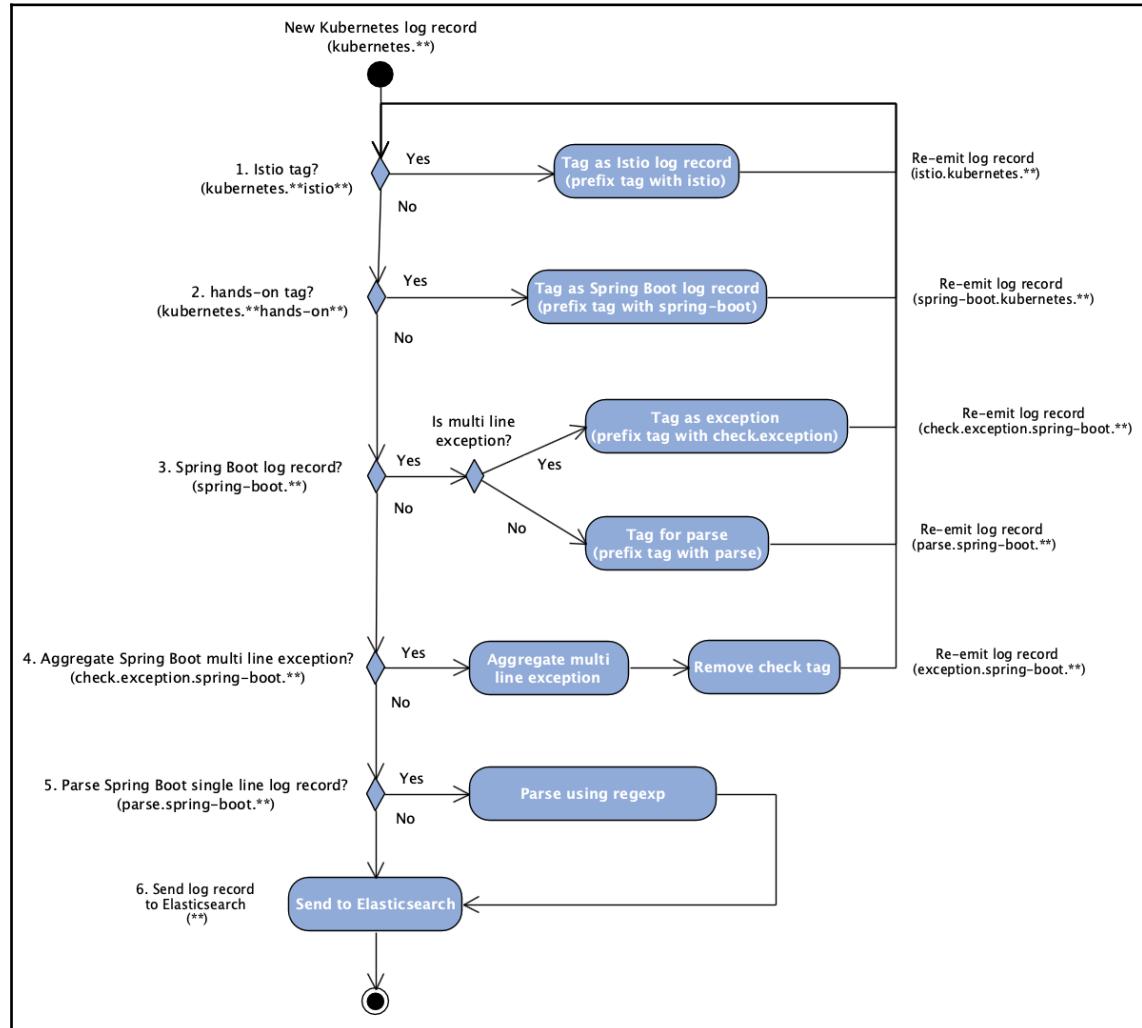
```
$ curl -ks https://minikube.me/product-composite/2 -H "Authorization: Bearer $ACCESS_TOKEN" | jq .serviceAddresses
{
  "cmp": "product-composite-v1-7f87fd87cb-2vmjl/172.17.0.25:80",
  "pro": "product-v1-b8d48477c-qvl9f/172.17.0.27:80",
  "rev": "review-v1-868c87cc95-wu2hv/172.17.0.29:80",
  "rec": "recommendation-v1-545fb976cd-jfq9w/172.17.0.28:80"
}
```

```
4. bash
$ curl -ks https://minikube.me/product-composite/2 \
-H "Authorization: Bearer $ACCESS_TOKEN" -H "X-group: test" | jq .serviceAddresses
{
  "cmp": "product-composite-v1-7f87fd87cb-2vmjl/172.17.0.25:80",
  "pro": "product-v2-657cd6749d-xdh9c/172.17.0.32:80",
  "rev": "review-v2-f4c97c748-2mlwm/172.17.0.33:80",
  "rec": "recommendation-v2-66d475fb7-swdhs/172.17.0.34:80"
}
$
```



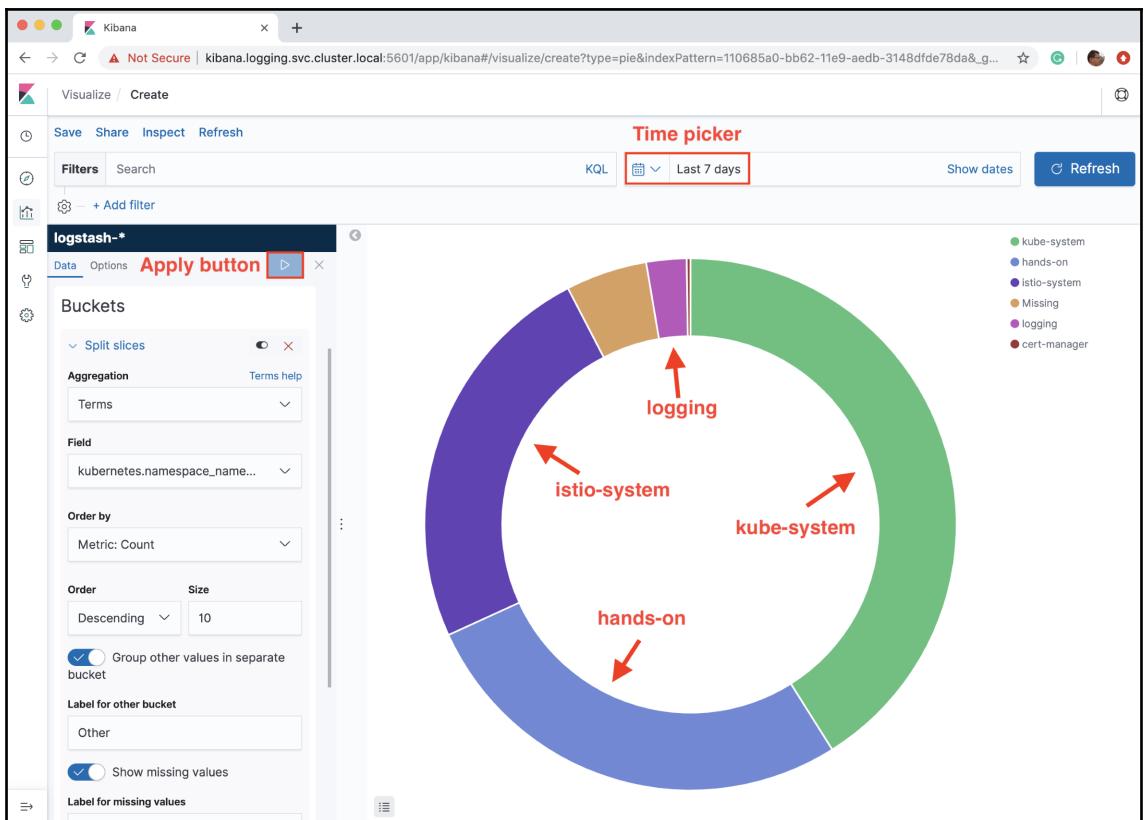


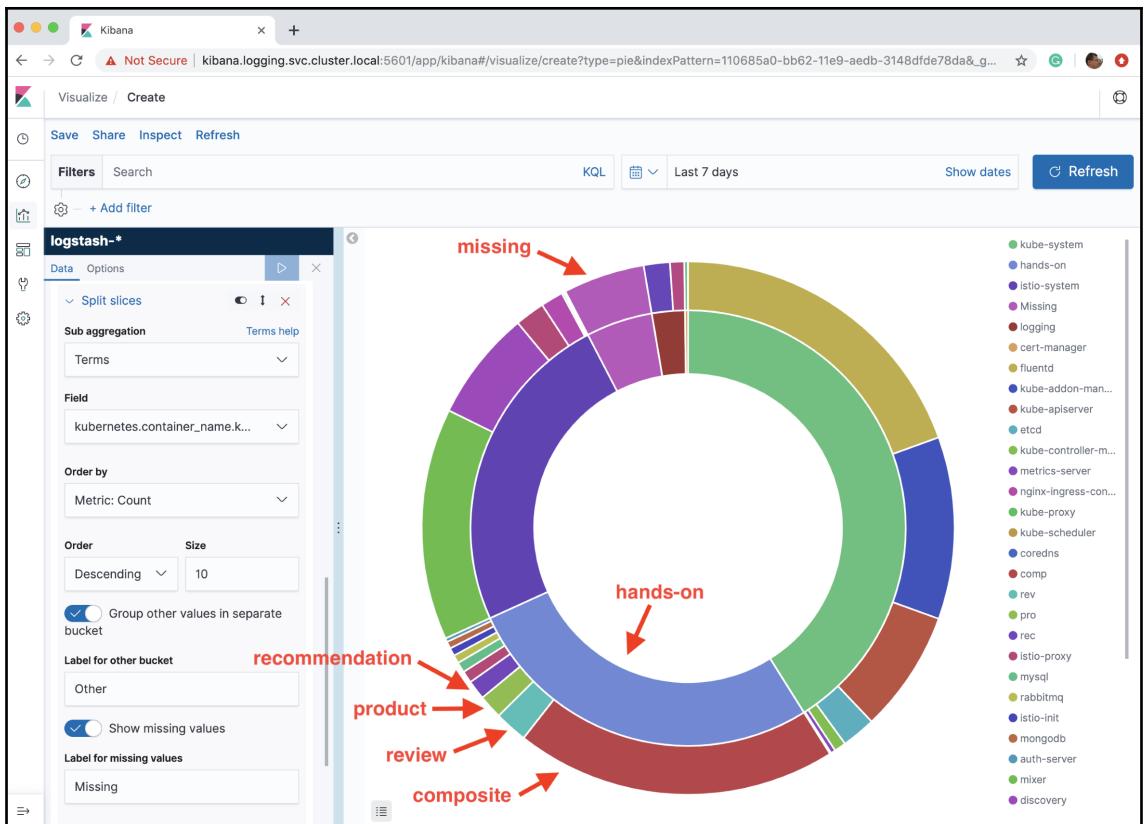
Chapter 19: Centralized Logging with the EFK Stack



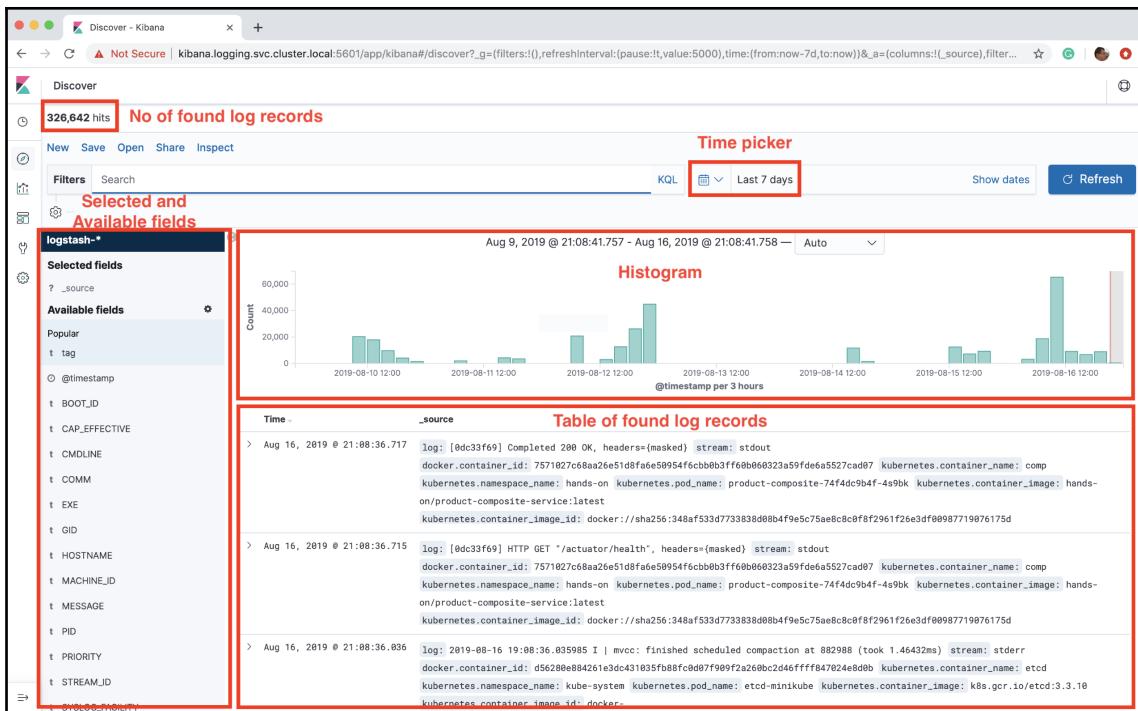
```
4. bash
$ ./test-em-all.bash
...
Wait for: curl -k http://product-composite.hands-on.svc.cluster.local:4004/actuator/health...
DONE, continues...
Test OK (HTTP Code: 200)
...
End, all tests OK: Sun Jul 28 11:47:44 CEST 2019
$
```

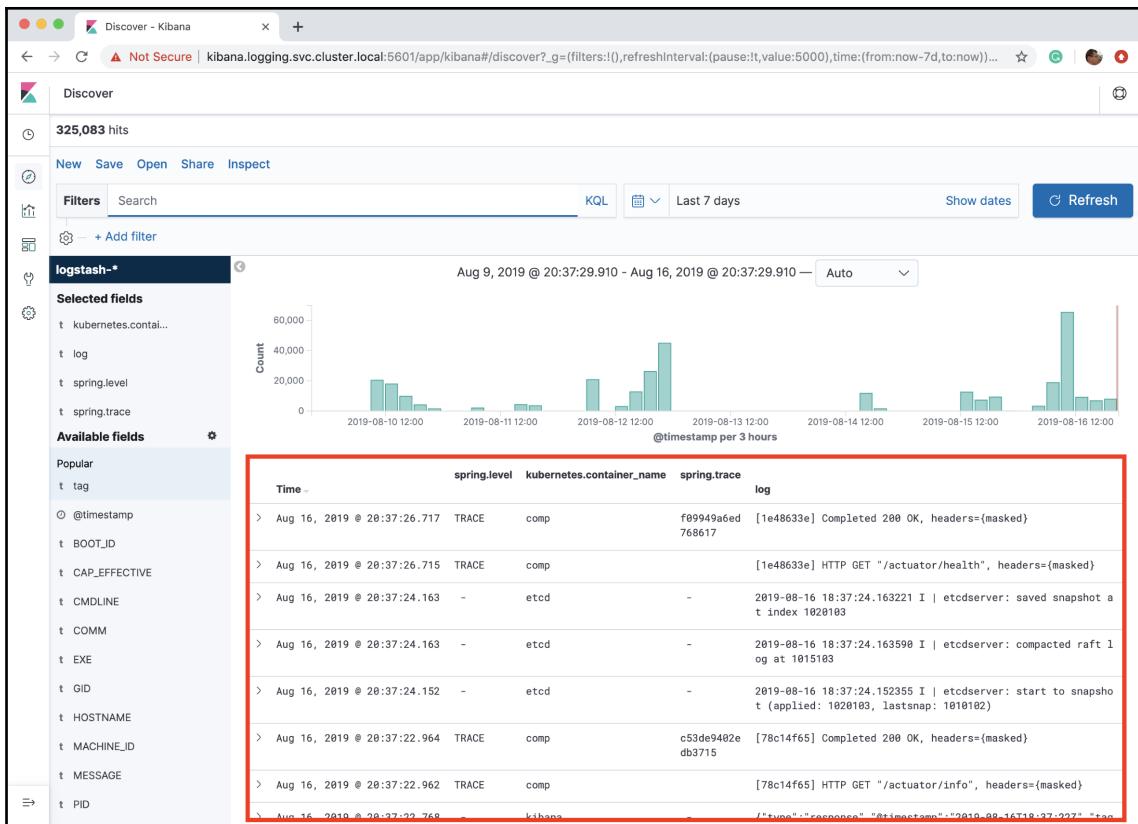
```
4. bash
$ curl http://elasticsearch.logging.svc.cluster.local:9200/_all/_count
{"count":144750,"_shards":{"total":7,"successful":7,"skipped":0,"failed":0}}
```

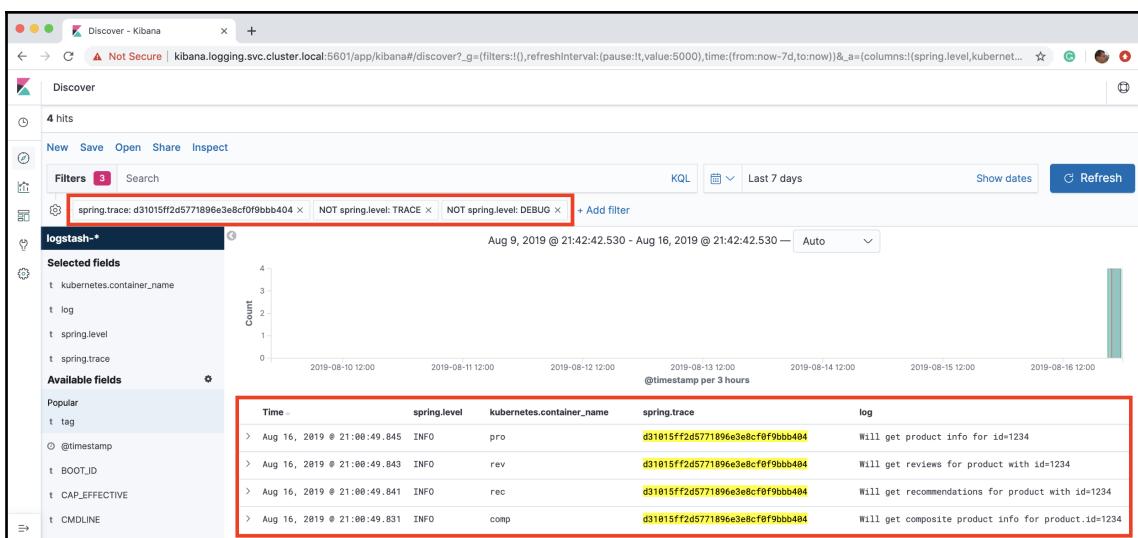
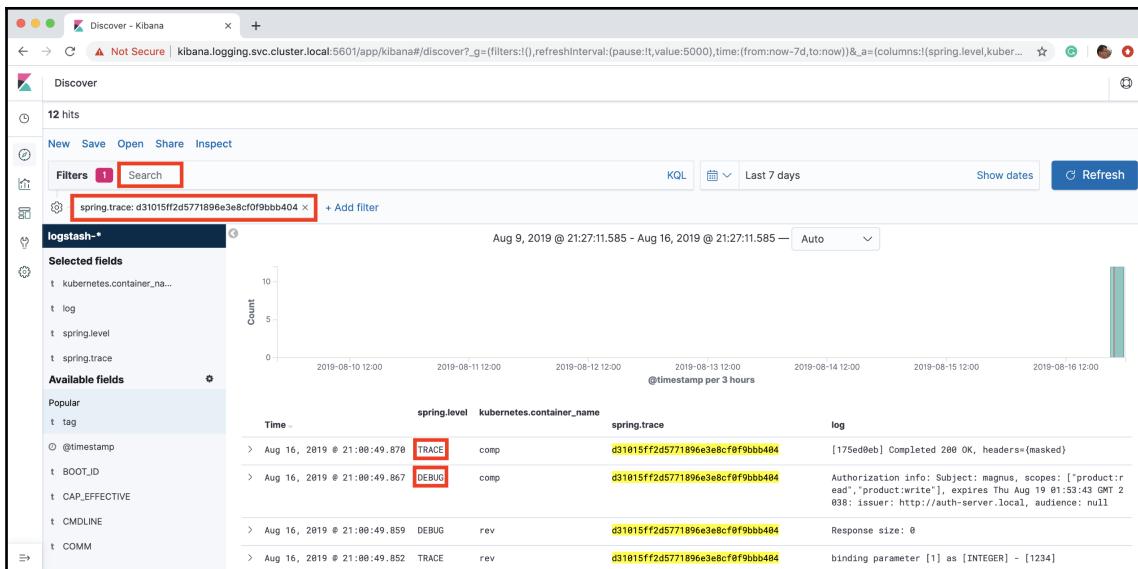




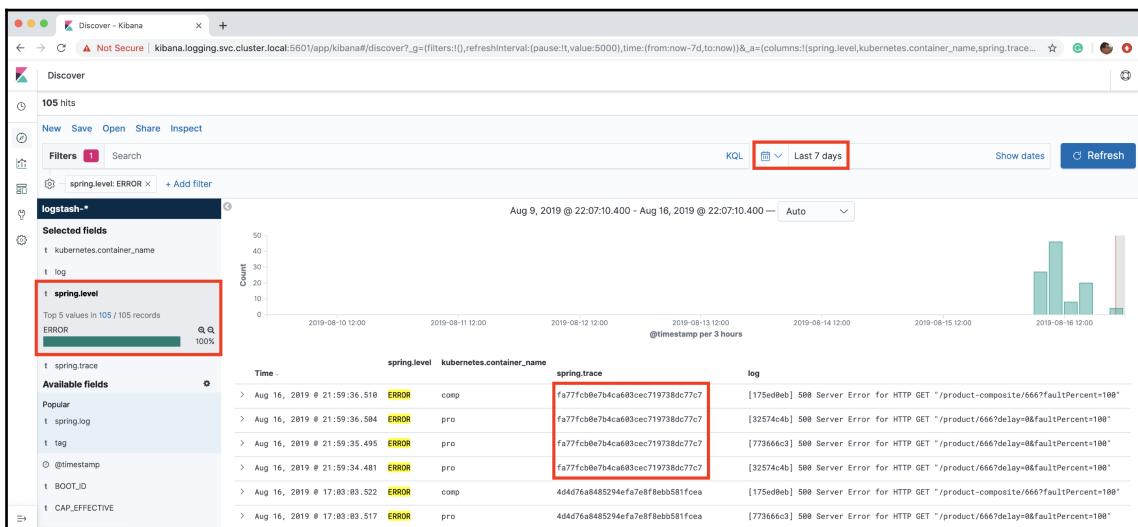
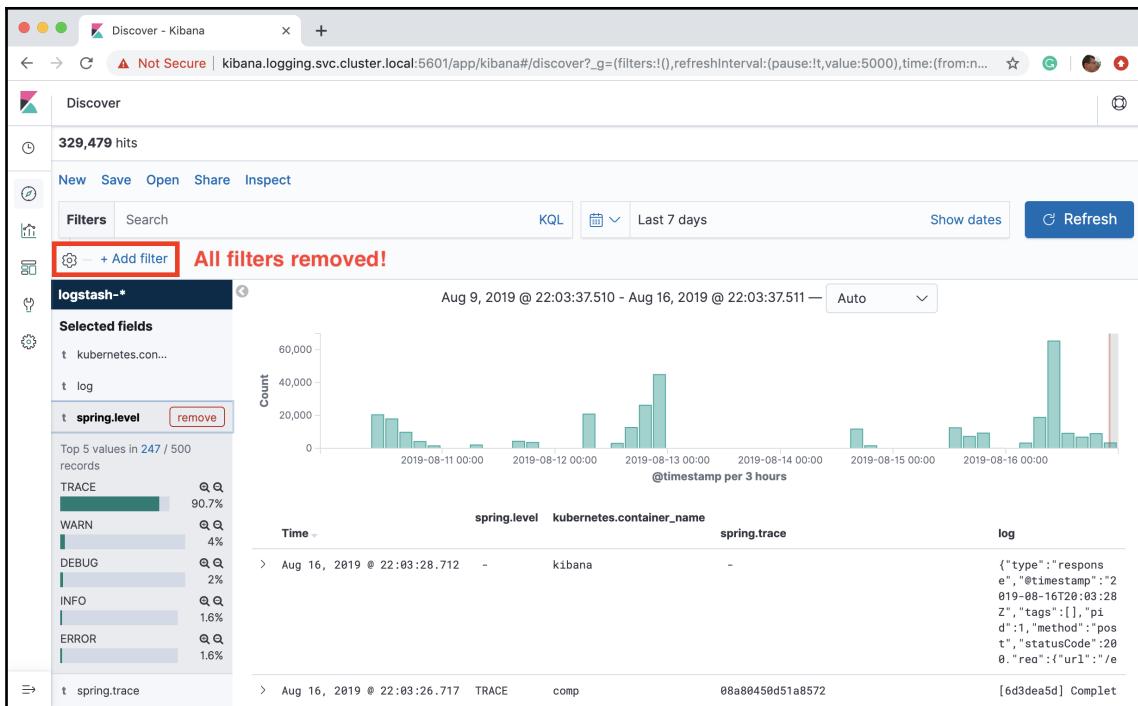
```
4. bash
$ curl -H "Authorization: Bearer $ACCESS_TOKEN" -k 'https://minikube.me/product-composite/1234'
{"productId":1234,"name":"product name 1234","weight":1234,"recommendations":[],"reviews":[],"serviceAddresses":{"cmp":"product-composite-74f4dc9b4f-4s9bk/172.17.0.39:80","pro":"product-8695c57758-ttmsg/172.17.0.40:80","rev":"","rec":""}}
```







```
4. bash
$ curl -H "Authorization: Bearer $ACCESS_TOKEN" -k https://minikube.me/product-composite/666?faultPercent=100
{"timestamp":"2019-08-16T19:59:36.509+0000","path":"/product-composite/666","status":500,"error":"Internal Server Error","message":"500 Internal Server Error"}
```



Kibana Discover - Kibana

Discover

Time -

	spring.level	kubernetes.container_name	spring.trace	log
> Aug 16, 2019 @ 21:59:36.511	TRACE	comp	fa77fc00e7b4ca603cec719738dc77c7	[175ed9eb] Completed 500 INTERNAL_SERVER_ERROR, headers=[masked]
> Aug 16, 2019 @ 21:59:36.518	ERROR	comp	fa77fc00e7b4ca603cec719738dc77c7	[175ed9eb] 500 Server Error for HTTP GET "/product/composite/666?delay=0&faultPercent=100"
> Aug 16, 2019 @ 21:59:36.588	WARN	comp	fa77fc00e7b4ca603cec719738dc77c7	getCompositeProduct failed: org.springframework.web.reactive.function.client.WebClientResponseException\$InternalServerError: 500 Internal Server Error
> Aug 16, 2019 @ 21:59:36.587	WARN	comp	fa77fc00e7b4ca603cec719738dc77c7	Got a unexpected HTTP error: 500 INTERNAL_SERVER_ERROR, will rethrow it
> Aug 16, 2019 @ 21:59:36.587	WARN	comp	fa77fc00e7b4ca603cec719738dc77c7	Error body: {"timestamp":"2019-08-16T19:59:36.580+0000","path":"/product/666?delay=0&faultPercent=100","status":500,"error":"Internal Server Error","message":"Something went wrong."}
> Aug 16, 2019 @ 21:59:36.584	ERROR	pro	fa77fc00e7b4ca603cec719738dc77c7	[32574c4b] 500 Server Error for HTTP GET "/product/666?delay=0&faultPercent=100"
> Aug 16, 2019 @ 21:59:36.582	WARN	pro	fa77fc00e7b4ca603cec719738dc77c7	Bad luck, an error occurred, 100 >= 53

Available fields

- t spring.trace
- t Available fields
- t Popular
- t spring.log
- t tag
- @timestamp
- t BOOT_ID
- t CAP_EFFECTIVE
- t CMDLINE
- t COMM
- t EXE
- t GID

Expanded document

Table JSON

View surrounding documents | View single document

Kibana

Discover | Context of logstash-*@QwDnGwBo8TdMfqKoTAJ

spring_trace:fa77fc00e7b4ca603cec719738dc77c7 + Add filter

Load 5 more 5 newer documents

Time	spring.level	kubernetes.container_name	spring.trace	log
> Aug 16, 2019 @ 21:59:36.507	WARN	comp	fa77fc00e7b4ca603cec719738dc77c7	Got a unexpected HTTP error: 500 INTERNAL_SERVER_ERROR, will rethrow it
> Aug 16, 2019 @ 21:59:36.505	-	pro	-	-
> Aug 16, 2019 @ 21:59:36.504	-	pro	-	java.lang.RuntimeException: Something went wrong... at se.magnus.microservices.core.product.services.ProductServiceImpl.throwErrorBadLuck(ProductServiceImpl.java:96) ~[classes/:na] at se.magnus.microservices.core.product.services.ProductServiceImpl.getProduct(ProductServiceImpl.java:64) ~[classes/:na] at dk.intertech.reflect.CachedMethod.invoke(CachedMethod.java:105) ~[na:nar] at java.base/jdk.internal.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAccessorImpl.java:43) ~[na:nar] at java.base/java.lang.reflect.Method.invoke(Method.java:567) ~[na:nar]
> Aug 16, 2019 @ 21:59:36.504	-	pro	-	-
> Aug 16, 2019 @ 21:59:36.504	ERROR	pro	fa77fc00e7b4ca603cec719738dc77c7	[32574c4b] 500 Server Error for HTTP GET "/product/666?delay=0&faultPercent=100"
> Aug 16, 2019 @ 21:59:36.502	WARN	pro	fa77fc00e7b4ca603cec719738dc77c7	Bad luck, an error occurred, 100 >= 53
> Aug 16, 2019 @ 21:59:35.498	WARN	comp	fa77fc00e7b4ca603cec719738dc77c7	Error body: {"timestamp":"2019-08-16T19:59:35.493+0000","path":"/product/666","status":500,"error":"Internal Server Error","message":"Something went wrong."}

Filters 2 Search KQL Last 30 days

NOT kubernetes.namespace_name: hands-on × spring.level: ERROR × + Add filter

No results match your search criteria

Discover - Kibana

Not Secure | kibana.logging.svc.cluster.local:5601/app/kibana#/discover?_g=(filters:!(),refreshInterval:(pause:!,value:10),searchTerms:()),_indexPattern=logstash-2019.08.25,_sourceType=logs

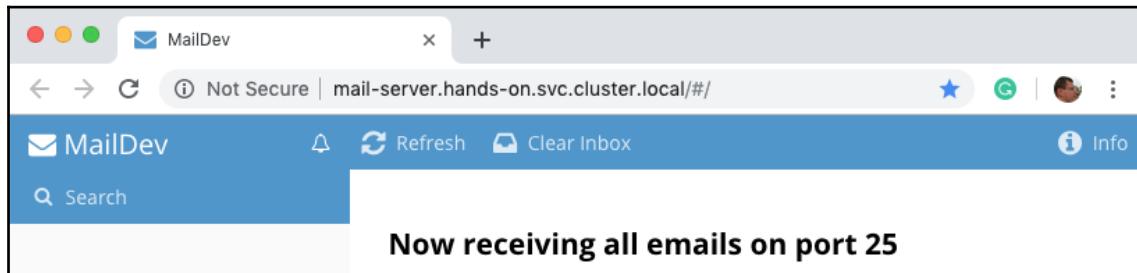
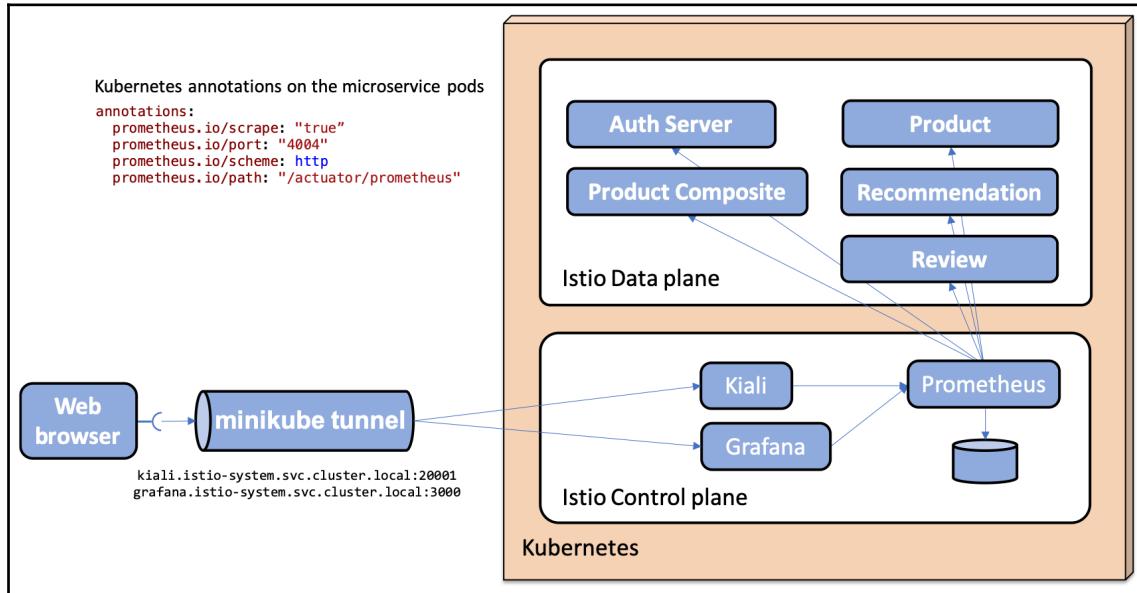
Discover

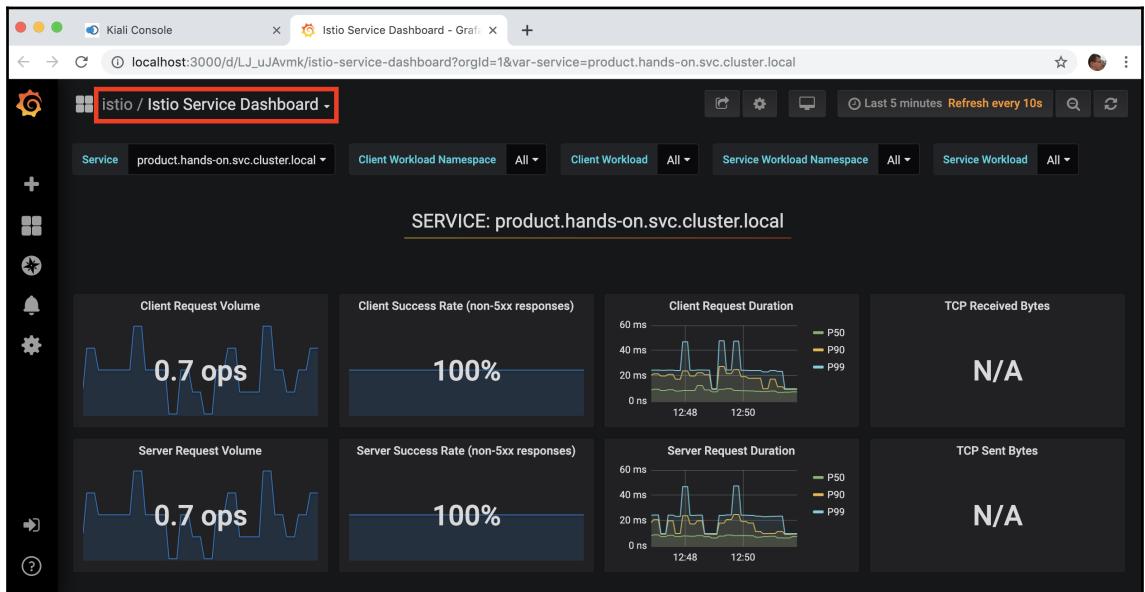
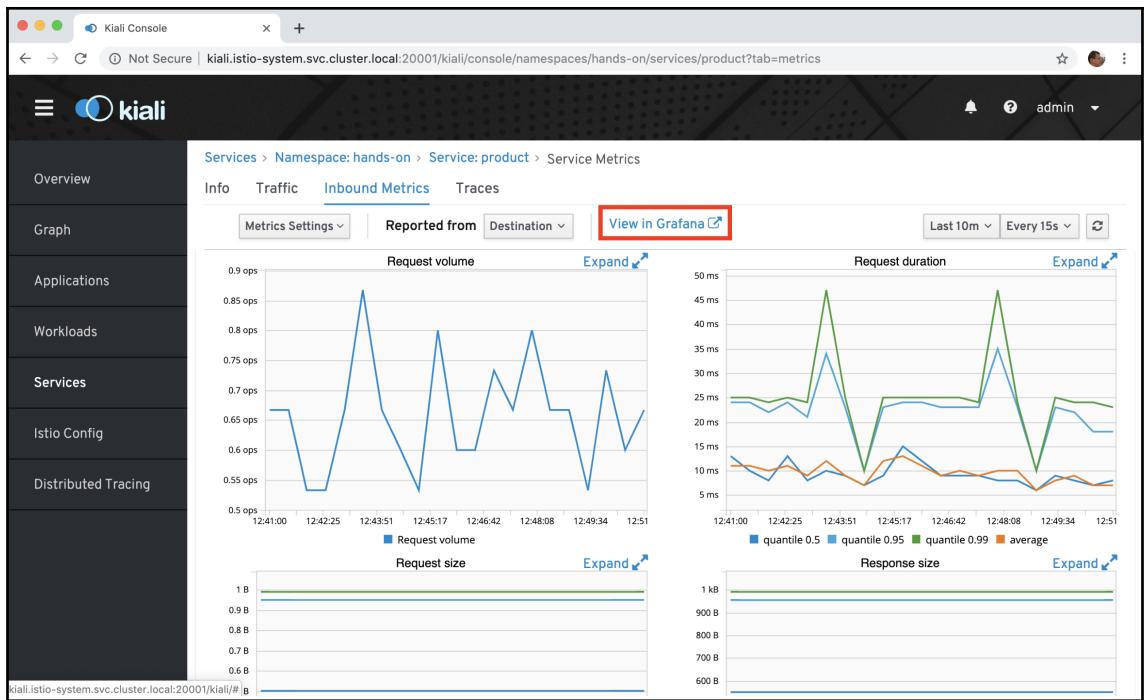
Table JSON

∅ @timestamp	Aug 25, 2019 @ 21:04:09.588
t _id	XxggymwBo8TdMbqKHGR5
t _index	logstash-2019.08.25
# _score	-
t _type	_doc
t docker.container_id	87b693a1c656bf695fe4f77c940ff91ae0c64b0f00f877a7834bf9da497e8741
t kubernetes.container_image	hands-on/product-composite-service:latest
t kubernetes.container_image_id	docker://sha256:9a05238d81dba529fb18afc6d5194256b46ed056dc3d2a8bc6ef5b1129f40cee
t kubernetes.container_name	comp
t kubernetes.host	minikube
t kubernetes.labels.app	product-composite
t kubernetes.labels.pod-template-hash	6548f697f9
t kubernetes.labels.version	latest
t kubernetes.master_url	https://10.96.0.1:443/api
t kubernetes.namespace_id	ca12e9f8-b064-4d89-b234-138a92ff93c1
t kubernetes.namespace_name	hands-on
t kubernetes.pod_id	964e8bde-831e-4fd9-99fb-86d802796299
t kubernetes.pod_name	product-composite-6548f697f9-6t5hs
t log	Will get composite product info for product.id=2
t spring.class	s.m.m.c.p.s.ProductCompositeServiceImpl
t spring.level	INFO
t spring.pid	1
t spring.service	product-composite
t spring.span	a7a9ceb9c3f3700c
t spring.thread	or-http-epoll-1
t spring.trace	b1abc90adc29a79e8f5c58c28196741c
t stream	stdout
t tag	parse.spring-boot.kubernetes.var.log.containers.product-composite-6548f697f9-6t5hs_hands-on_comp-87b693a1c656bf695fe4f77c940ff91ae0c64b0f00f877a7834bf9da497e8741.log

Time	log
Aug 25, 2019 @ 18:35:33.255	onError(se.magnus.util.exceptions.InvalidInputException: Invalid productId: -1)
Expanded document	View surrounding documents View single document
Table	JSON
⌚ @timestamp	Aug 25, 2019 @ 18:35:33.255
t _id	FheiYWwBo8TdMbqKDumU
t _index	logstash-2019.08.25

Chapter 20: Monitoring Microservices





Kiali Console × Istio Mesh Dashboard - Grafan × +

localhost:3000/d/dvEKoQHZz/istio-mesh-dashboard?orgId=1

Istio / Istio Mesh Dashboard ▾

Last 5 minutes Refresh every 5s

Global Request Volume: 10 ops

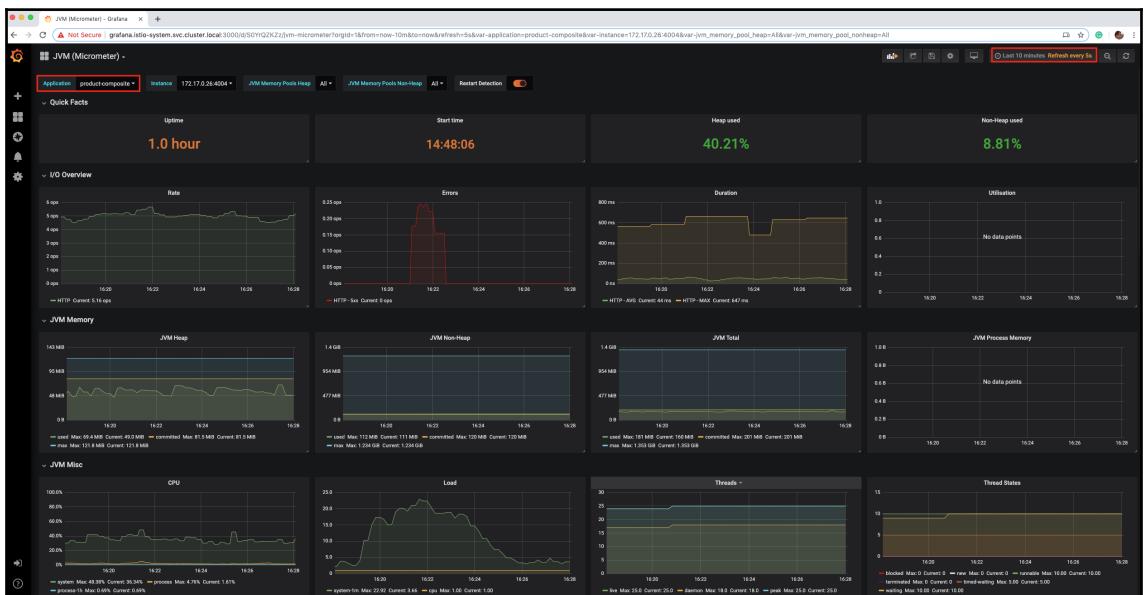
Global Success Rate (non-5xx response...): 100%

4xx: N/A

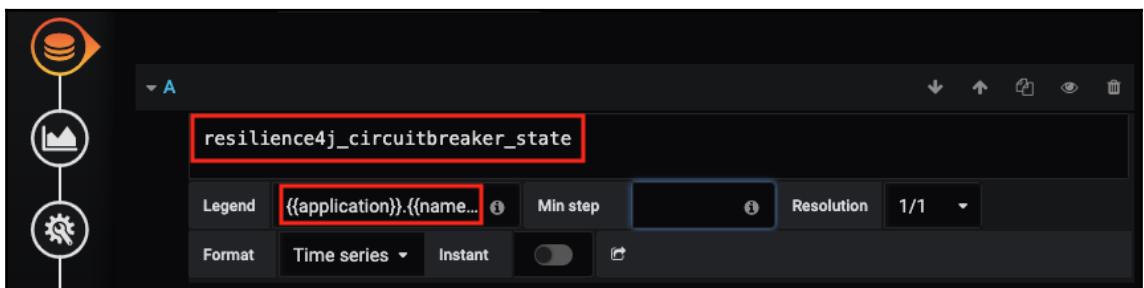
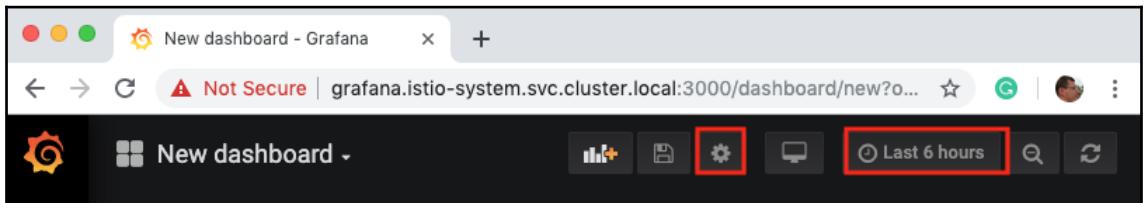
5xx: N/A

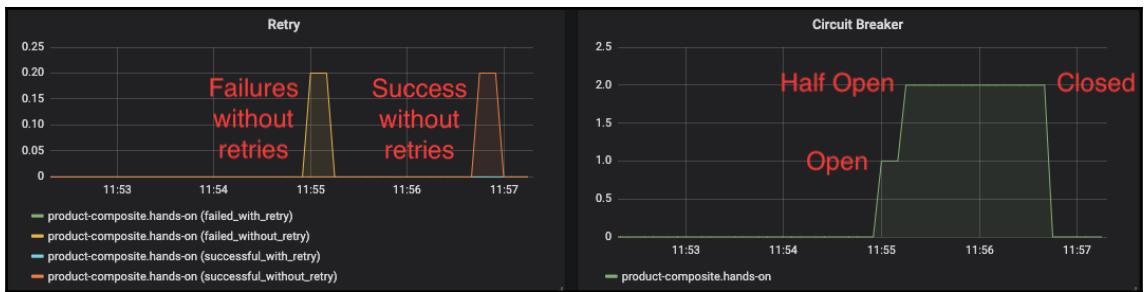
HTTP/GRPC Workloads

Service	Workload	Requests	P50 Latency	P90 Latency	P99 Latency	Success Rate
review.hands-on.svc.cluster.local	review.hands-on	0.71 ops	18.08 ms	30.00 ms	48.00 ms	100.00%
recommendation.hands-on.svc.cluster.local	recommendation.hands-on	0.71 ops	8.08 ms	18.40 ms	42.00 ms	100.00%
product.hands-on.svc.cluster.local	product.hands-on	0.71 ops	7.75 ms	19.50 ms	42.00 ms	100.00%
product-composite.hands-on.svc.cluster.local	product-composite.hands-on	0.71 ops	24.12 ms	47.69 ms	92.00 ms	100.00%
istio-telemetry.istio-system.svc.cluster.local	istio-telemetry.istio-system	7.40 ops	2.87 ms	9.85 ms	79.19 ms	100.00%
istio-policy.istio-system.svc.cluster.local	istio-policy.istio-system	0.16 ops	2.50 ms	4.50 ms	4.95 ms	100.00%
auth-server.hands-on.svc.cluster.local	auth-server.hands-on	0 ops	Nan.00 year	Nan.00 year	Nan.00 year	Nan.00%



```
4.bash
$ curl http://product-composite.hands-on.svc.cluster.local:4004/actuator/prometheus -s
...
resilience4j_retry_calls{application="product-composite",kind="successful_with_retry",name="product",} 0.0
resilience4j_retry_calls{application="product-composite",kind="failed_with_retry",name="product",} 0.0
resilience4j_retry_calls{application="product-composite",kind="successful_without_retry",name="product",} 5610.0
resilience4j_retry_calls{application="product-composite",kind="failed_without_retry",name="product",} 75.0
...
resilience4j_circuitbreaker_state{application="product-composite",name="product",} 0.0
...
$
```





Edit Notification Channel

Name	mail
Type	Email
Send on all alerts	i <input checked="" type="checkbox"/>
Include image	i <input checked="" type="checkbox"/>
Disable Resolve Message	i <input type="checkbox"/>
Send reminders	i <input type="checkbox"/>

Email addresses

magnus@minikube.me

You can enter multiple email addresses using a ";" separator

Save **Send Test** **Back**

MailDev

Not Secure | mail-server.hands-on.svc.cluster.local/#/email/NZULxrT8

MailDev

Search

[Alerting] Test notification
magnus@minikube.me 8/27/19 10:57 AM

[Alerting] Test notification

Someone is testing the alert notification within grafana.

Rule

Name	Circuit Breaker alert	Evaluate every	10s	For	0	
------	-----------------------	----------------	-----	-----	---	--

Conditions

WHEN max 0 OF query (A, 1m, now) IS ABOVE 0.5

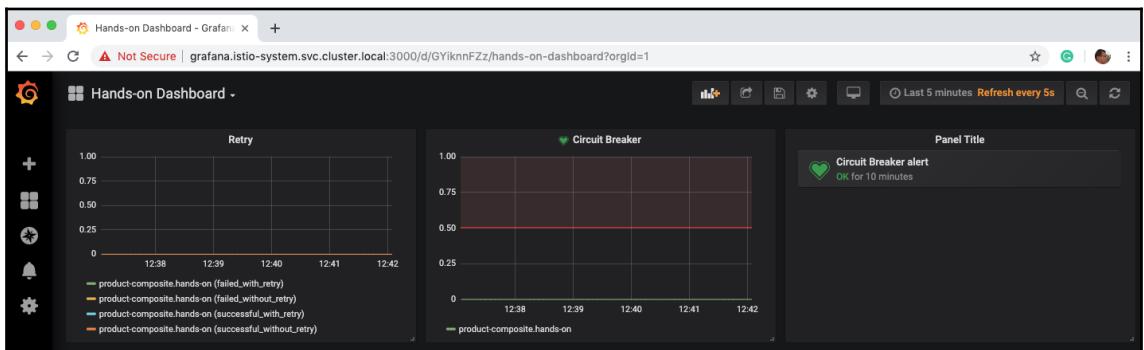
+

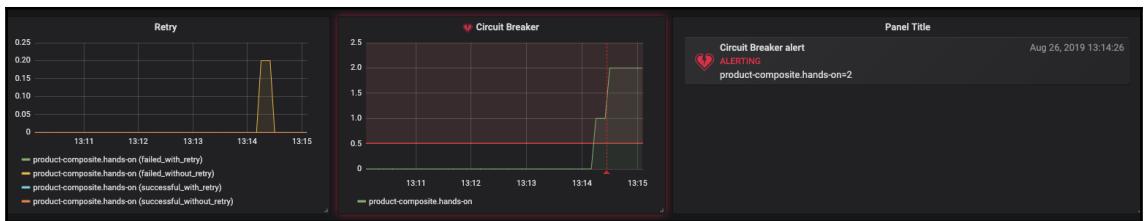
Visualization Alert List ▾

Options

Show	Recent state changes
Max items	10

Alerts from this dashboard





MailDev

Not Secure | mail-server.hands-on.svc.cluster.local/#/email/Dx4fOtaH

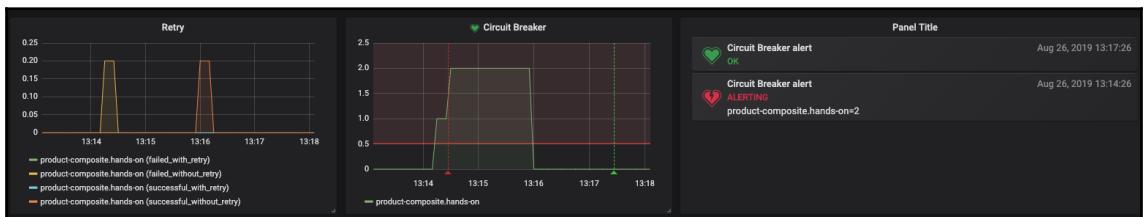
MailDev

Search

[Alerting] Circuit Breaker alert 🚨
magnus@minikube.me 8/27/19 11:18 AM

[Alerting] Circuit Breaker alert

Display Viewport Attachments Delete Relay to Download EML



MailDev

Not Secure | mail-server.hands-on.svc.cluster.local/#/email/1ZSgxBtV

MailDev

Search

[OK] Circuit Breaker alert 🚨
magnus@minikube.me 8/27/19 11:20 AM

[OK] Circuit Breaker alert

Display Viewport Attachments Delete Relay to Download EML

