The QuoteServices App Case Study: Overview of the API Gateway Pattern

Douglas C. Schmidt
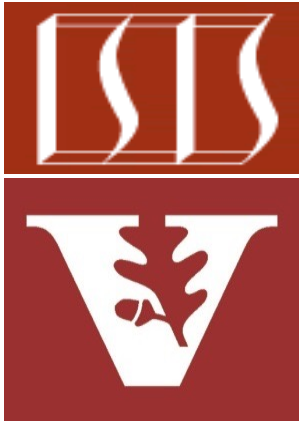**d.schmidt@vanderbilt.edu**
www.dre.vanderbilt.edu/~schmidt
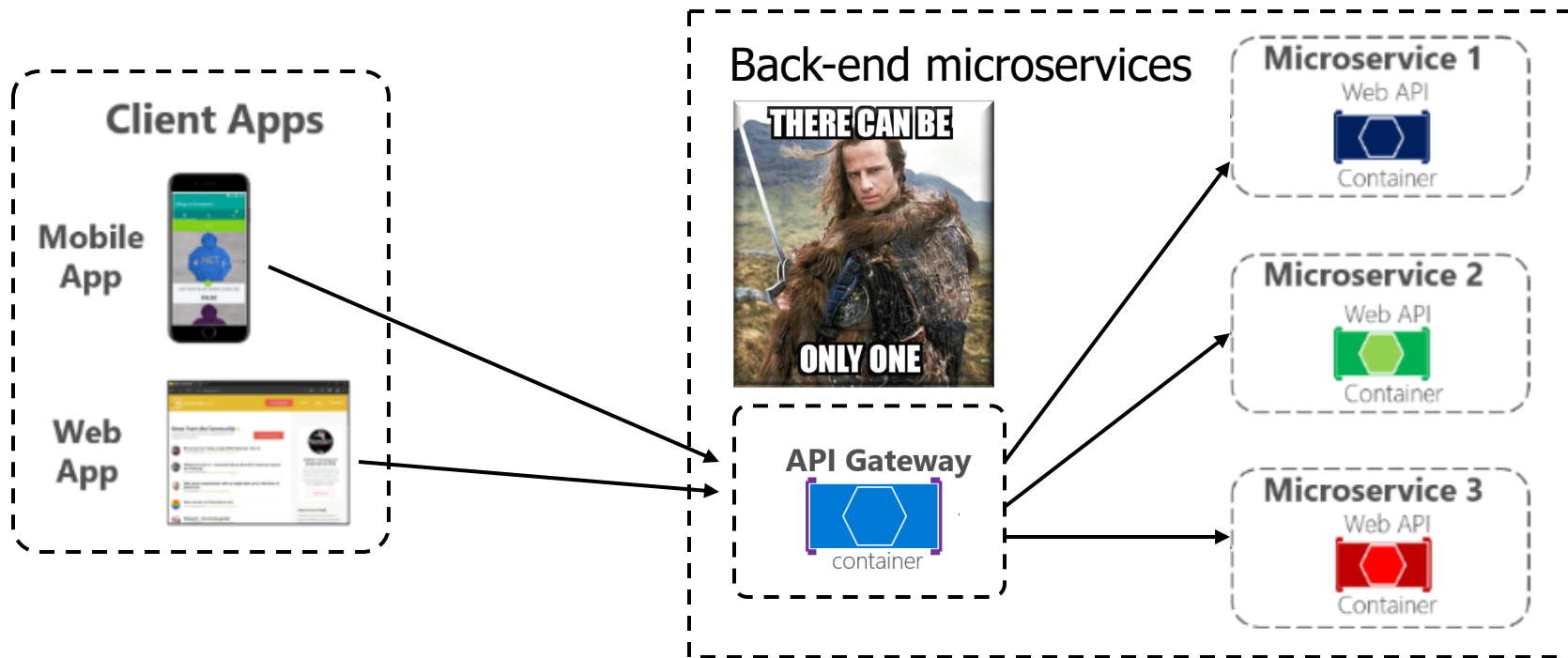
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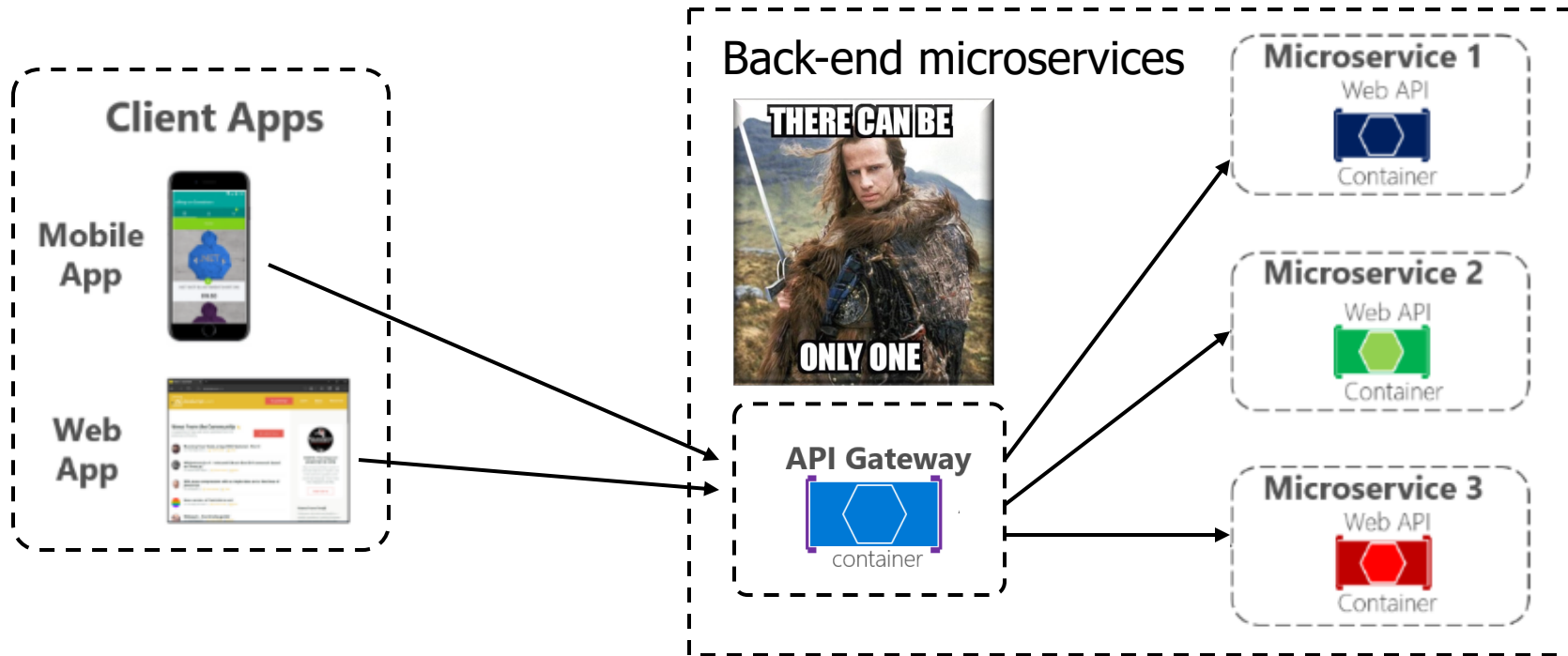
Learning Objectives in this Part of the Lesson

- Recognize the API gateway pattern & common realizations of this pattern

Overview of the API Gateway Pattern
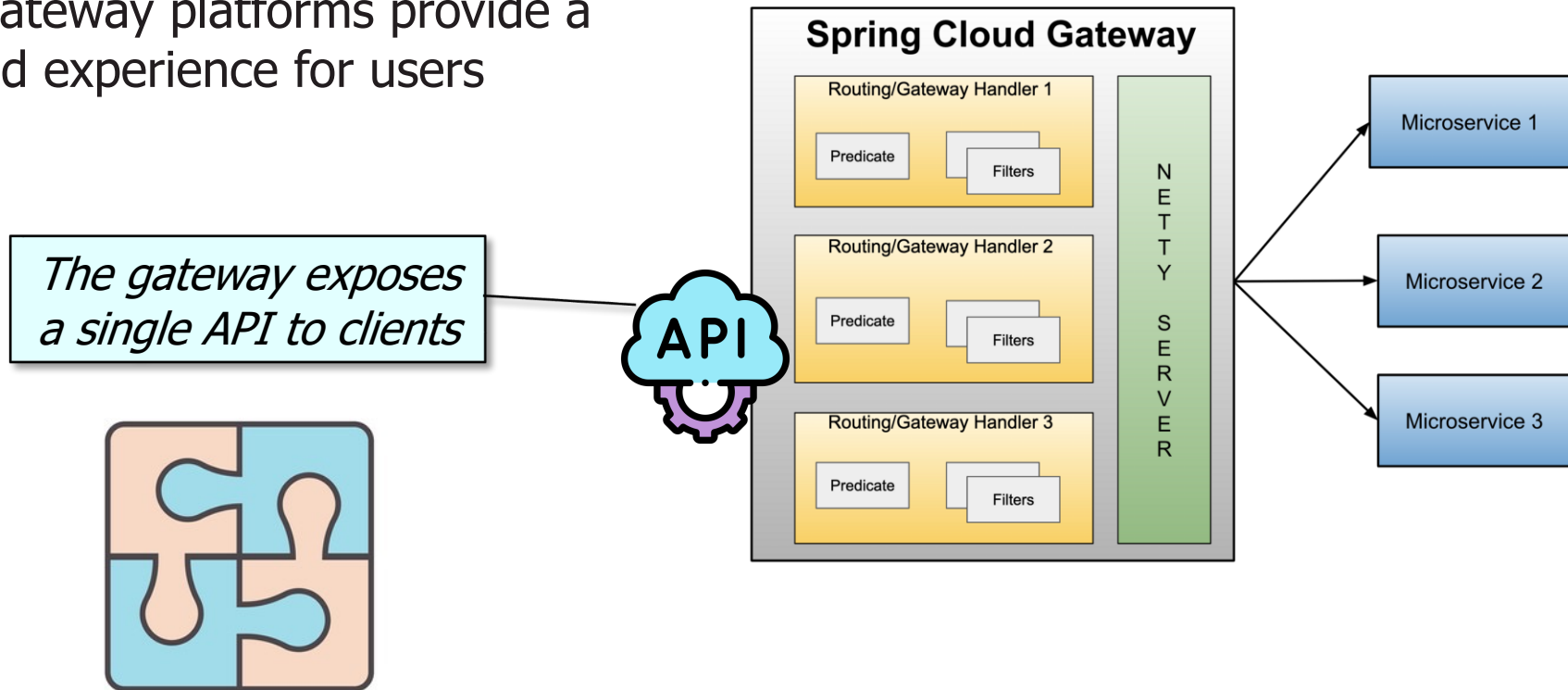
Overview of the API Gateway Pattern

- The API gateway pattern provides a single entry point for back-end APIs & their microservice implementations

Overview of the API Gateway Pattern

- API gateway platforms provide a unified experience for users

The gateway exposes a single API to clients

See blog.knoldus.com/spring-cloud-api-gateway

Overview of the API Gateway Pattern

- API gateway platforms provide a unified experience for users, i.e.
  - Takes all client API requests

Customer accessing different urls

Spring Cloud Gateway

Routing/Gateway Handler 1
Predicate
Filters

Routing/Gateway Handler 2
Predicate
Filters

Routing/Gateway Handler 3
Predicate
Filters

NETTY SERVER

Microservice 1
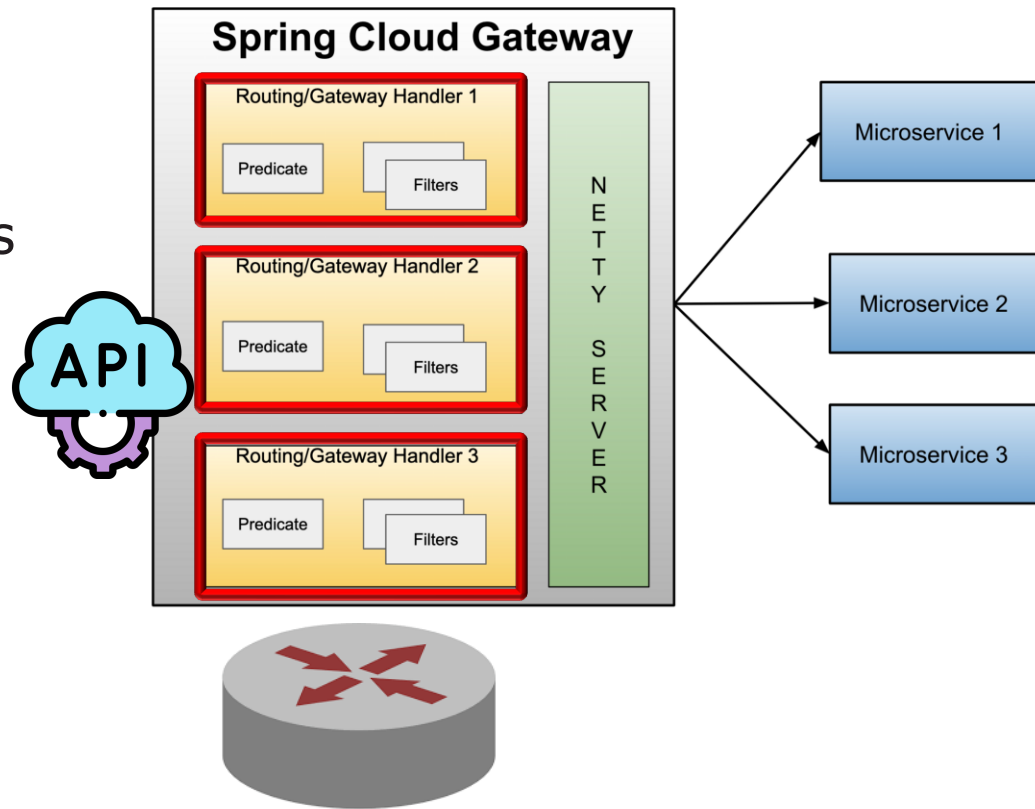
Microservice 2

Microservice 3

THERE CAN BE

ONLY ONE
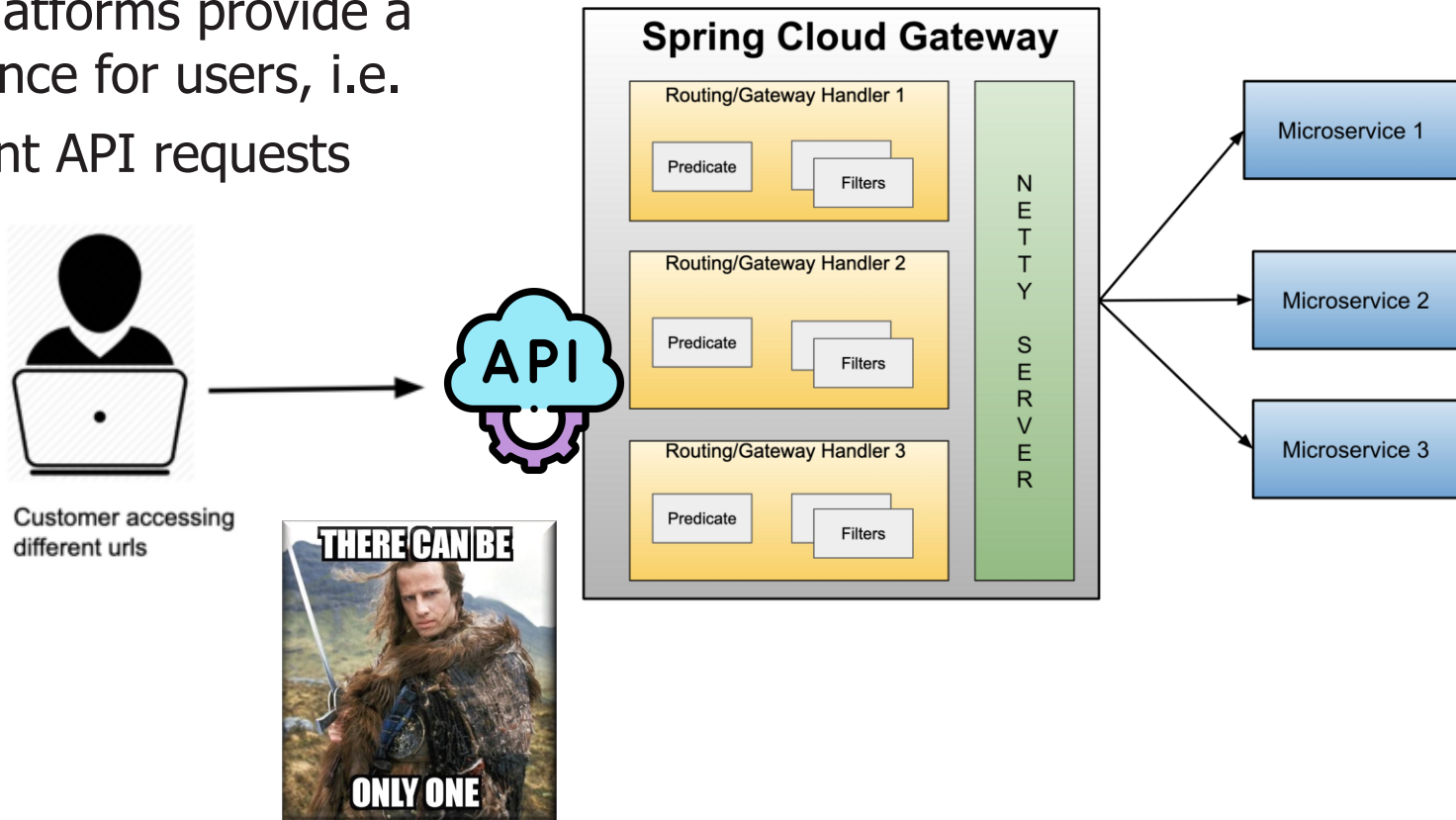
Overview of the API Gateway Pattern

- API gateway platforms provide a unified experience for users, i.e.

  - Takes all client API requests

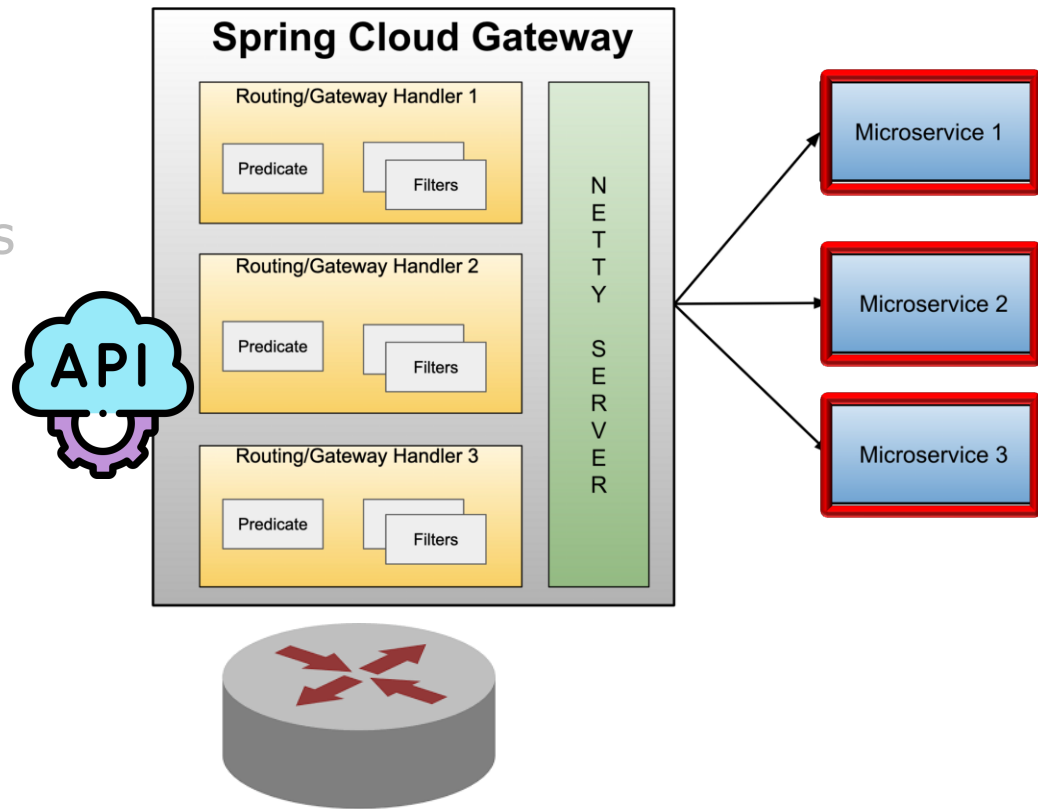 - Determines which microservices are designated by the requests

Overview of the API Gateway Pattern

- API gateway platforms provide a unified experience for users, i.e.

  - Takes all client API requests

  - Determines which microservices are designated by the requests

 - Routes requests to the designated microservices

Overview of the API Gateway Pattern

- API gateway platforms provide a unified experience for users, i.e.

  - Takes all client API requests

  - Determines which microservices are designated by the requests

  - Routes requests to the designated microservices

    - Microservices can be either external and/or internal to the system
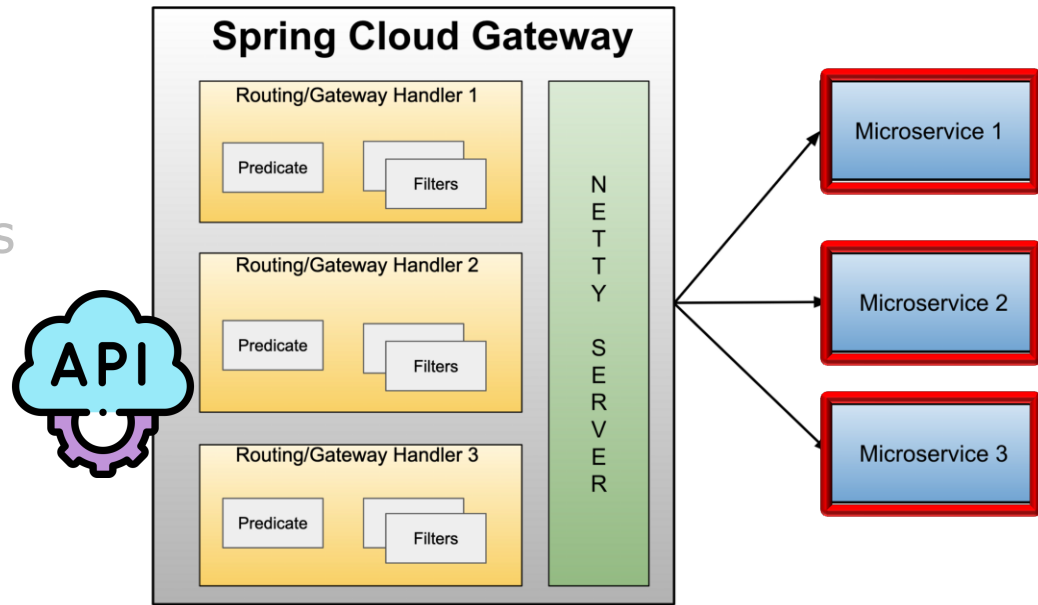
Pros & Cons of Using an API Gateway

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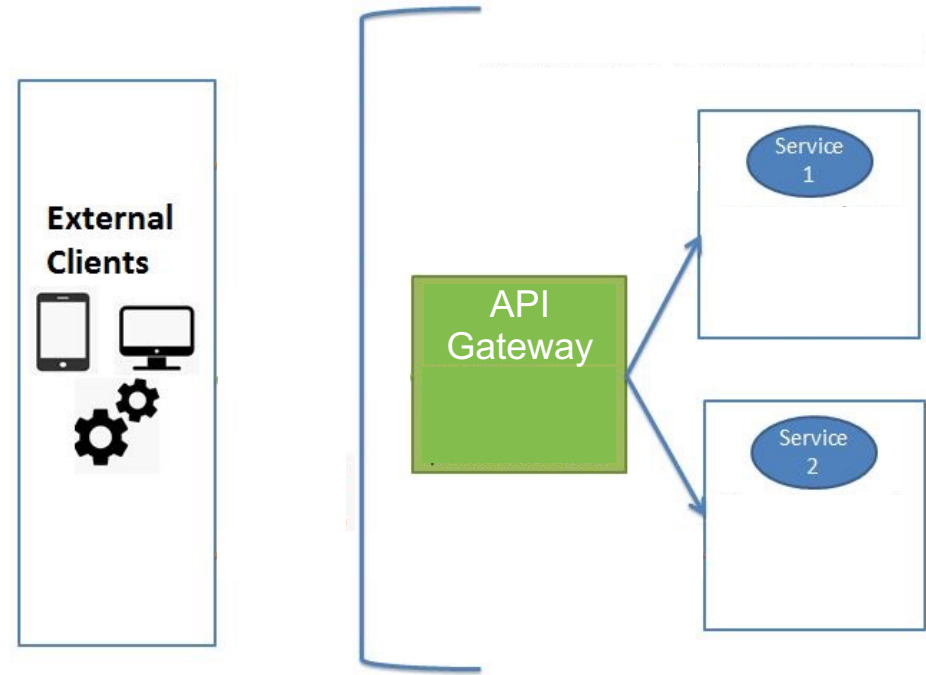
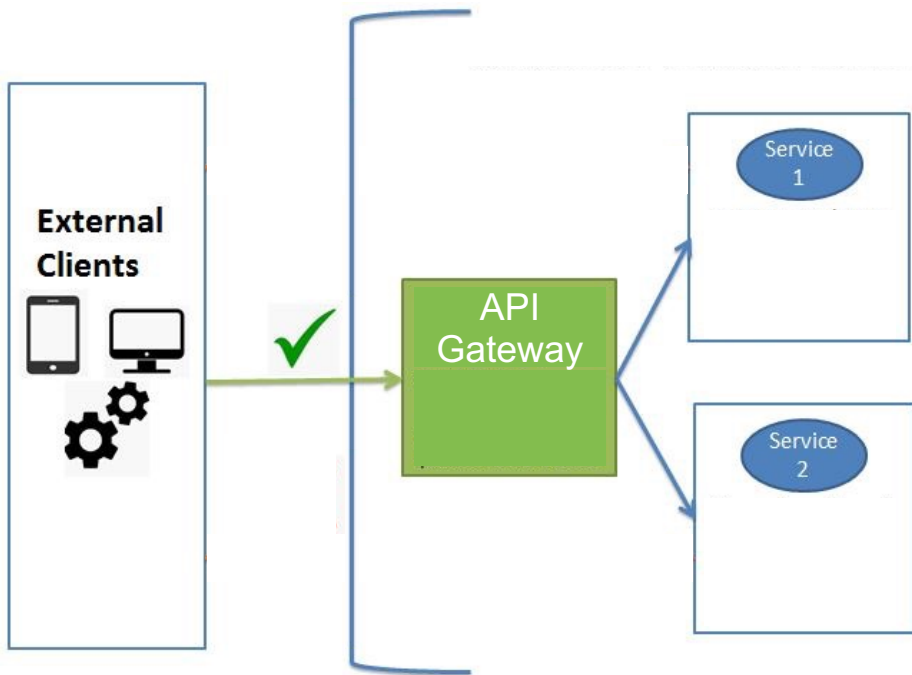- Pros of an API gateway

Pros & Cons of Using an API Gateway

- Pros of an API gateway
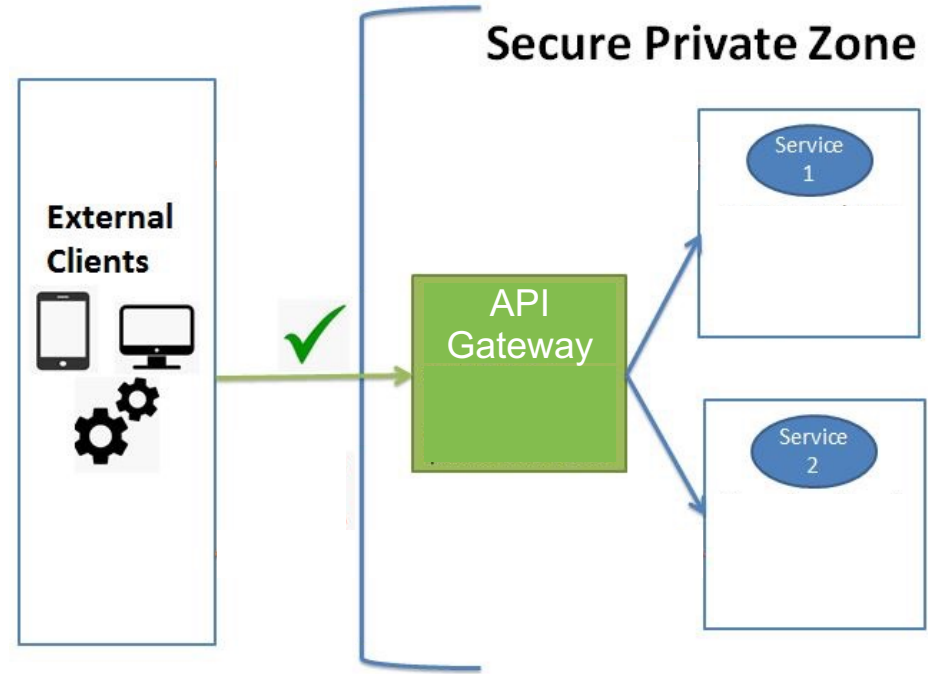
  - Simplifies client interaction

Pros & Cons of Using an API Gateway

- Pros of an API gateway

  - Simplifies client interaction

    - i.e., only a single service API is needed to access all system capabilities
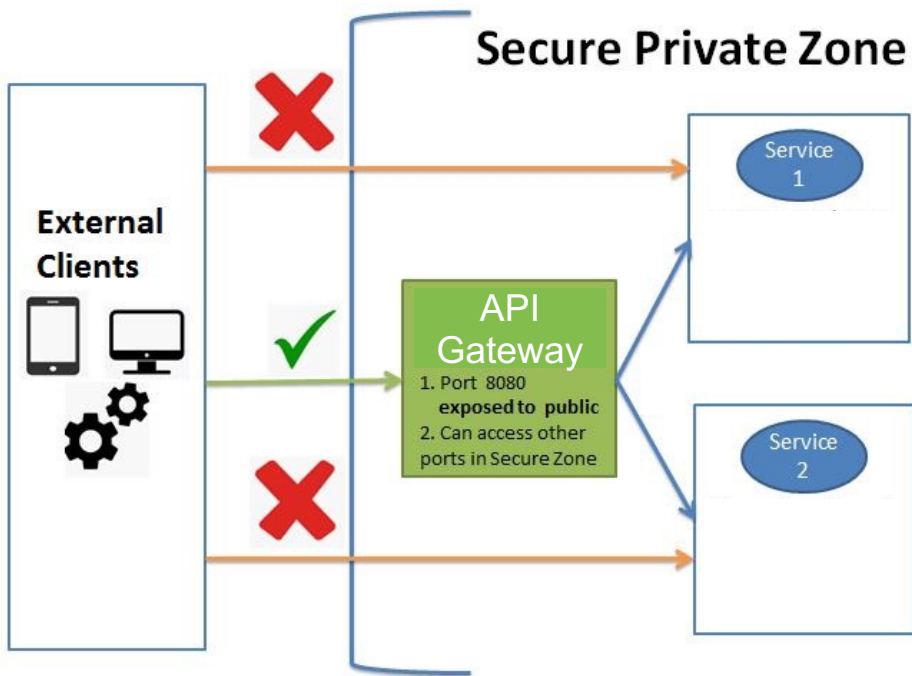

THERE CAN BE

ONLY ONE

External Clients

✓

API Gateway

Service 1

Service 2

Pros & Cons of Using an API Gateway

- Pros of an API gateway
  - Simplifies client interaction
  - It improves microservice security

Pros & Cons of Using an API Gateway

- Pros of an API gateway
  - Simplifies client interaction
  - It improves microservice security
    - Limits access of external client calls via one public port number

Secure Private Zone

External Clients

API Gateway
1. Port 8080 **exposed to public**
2. Can access other ports in Secure Zone
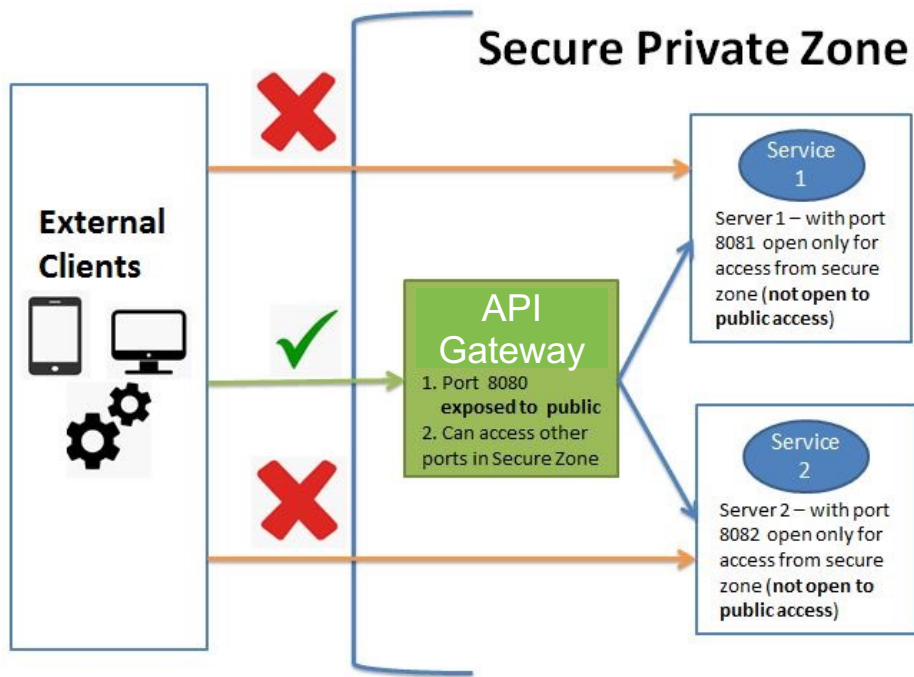
Service 1

Service 2

Pros & Cons of Using an API Gateway

- Pros of an API gateway
  - Simplifies client interaction
  - It improves microservice security
    - Limits access of external client calls via one public port number
    - Client needn't know internal system architecture
      - e.g., can't determine the location of microservice instances

Secure Private Zone

External Clients

❌ ✔ ❌

API Gateway
1. Port 8080 **exposed to public**
2. Can access other ports in Secure Zone

Service 1
Server 1 – with port 8081 open only for access from secure zone (**not open to public access**)

Service 2
Server 2 – with port 8082 open only for access from secure zone (**not open to public access**)
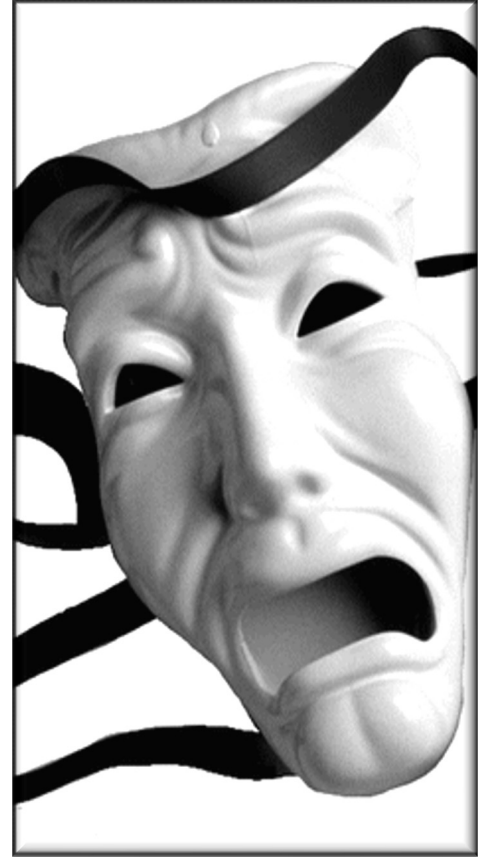
Pros & Cons of Using an API Gateway

- Pros of an API gateway

  - Simplifies client interaction

  - It improves microservice security

  - Cross-cutting concerns only need be implemented once in the API gateway since all calls will be routed through it

    - e.g., authentication, monitoring, load-balancing, & resiliency
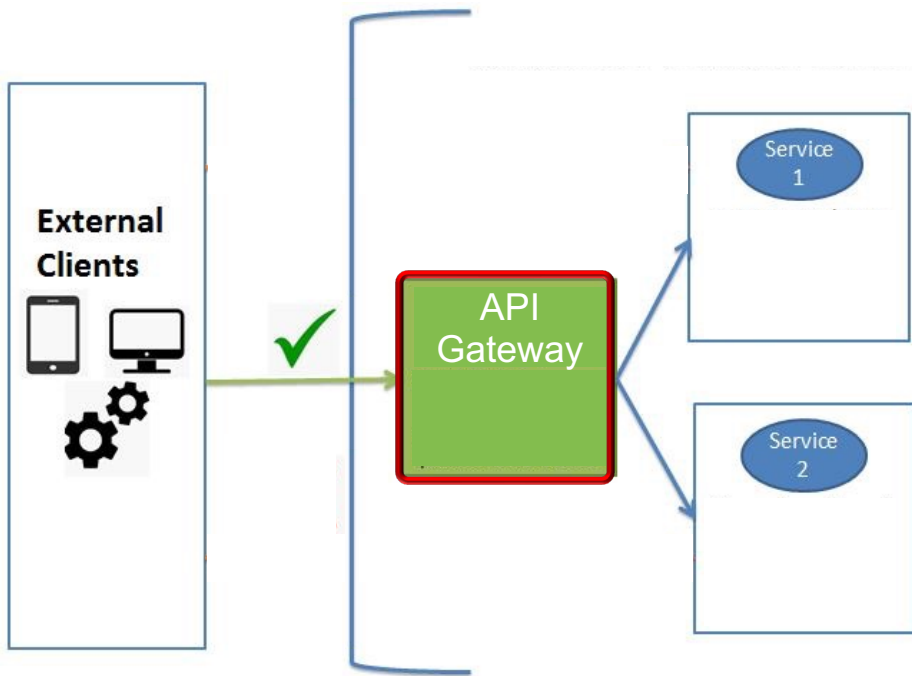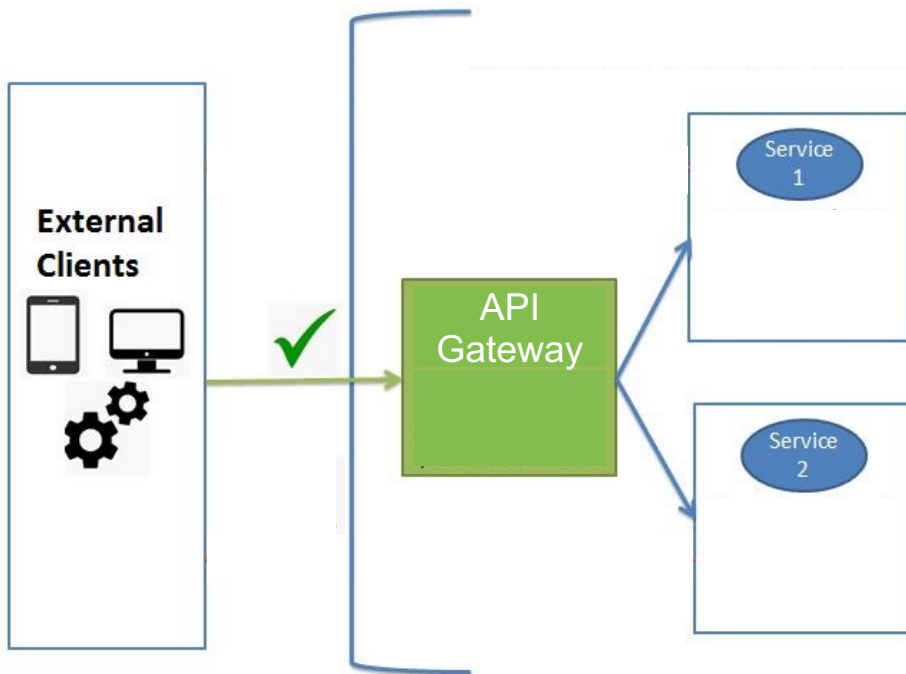

External Clients

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API Gateway

Service 1

Service 2

Pros & Cons of Using an API Gateway
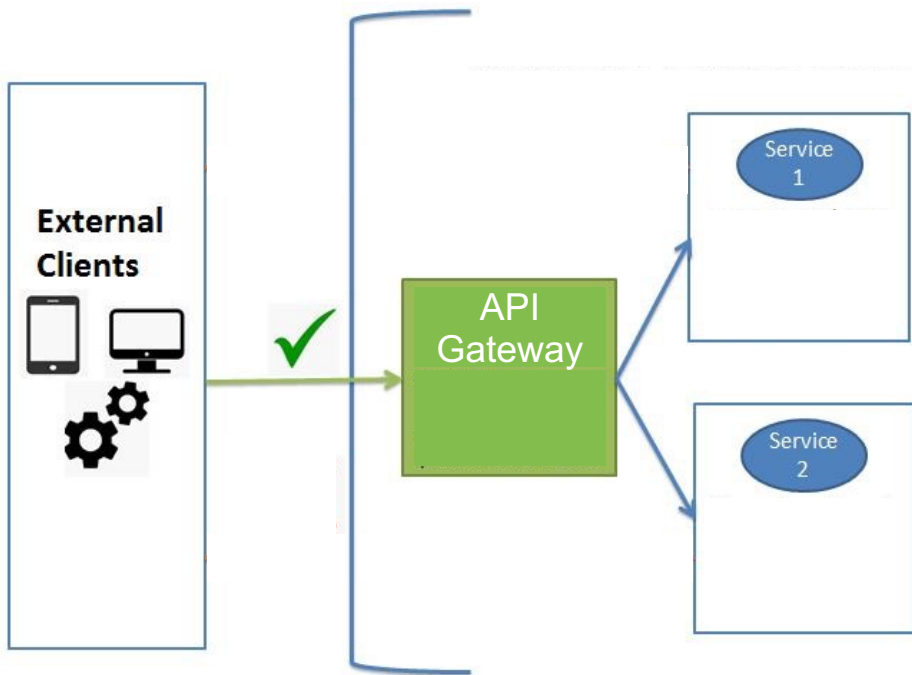
- Cons of an API gateway

Pros & Cons of Using an API Gateway

- Cons of an API gateway

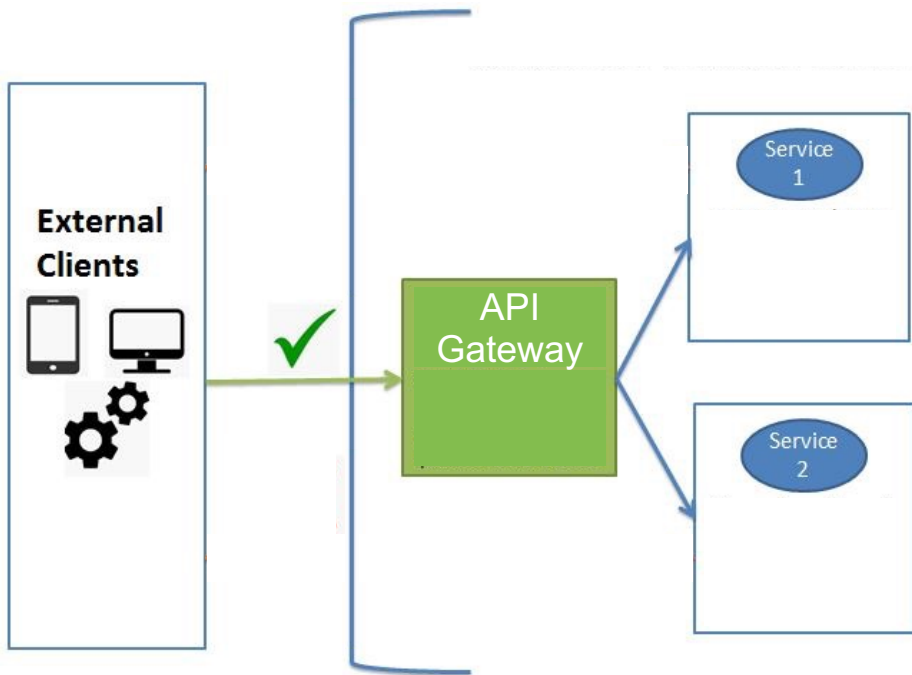 - Involves more "moving parts" & associated learning curve
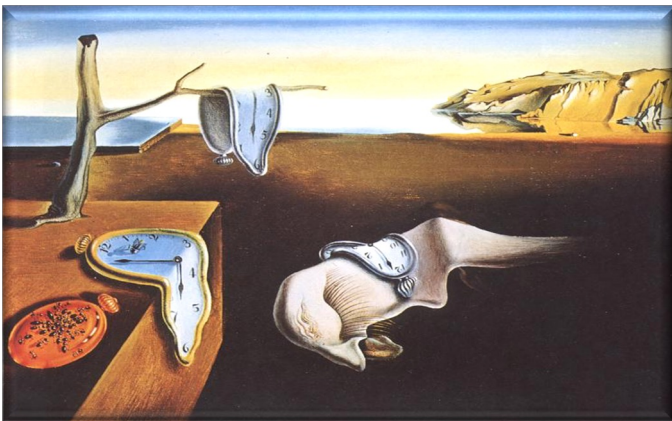
Pros & Cons of Using an API Gateway

- Cons of an API gateway

  - Involves more "moving parts" & associated learning curve

    - Requires additional deployment & orchestration mechanisms

External Clients

✔

API Gateway

Service 1

Service 2

Pros & Cons of Using an API Gateway

- Cons of an API gateway

  - Involves more "moving parts" & associated learning curve

  - Extra levels of indirection can degrade performance
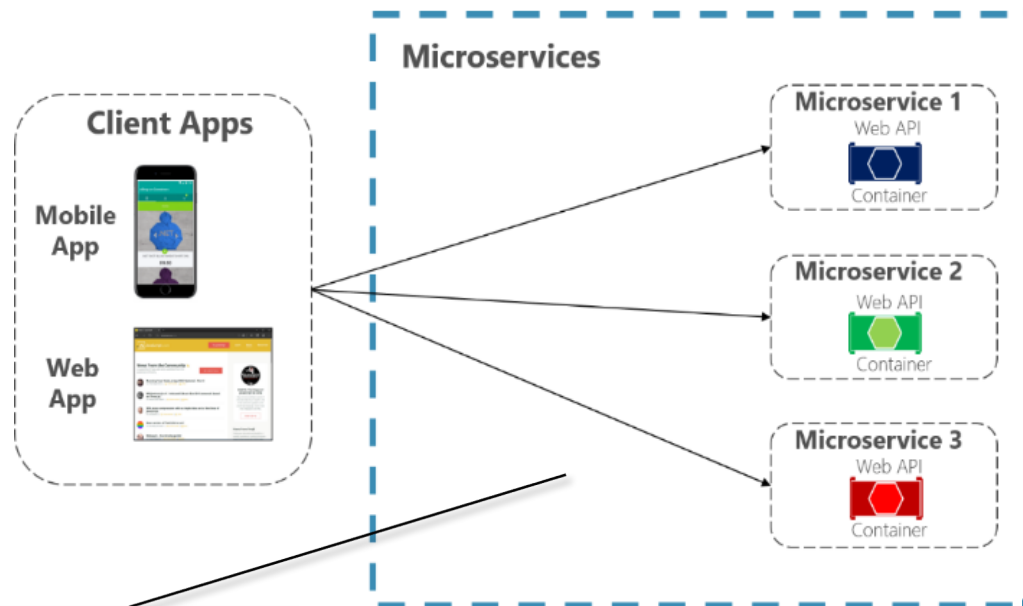
Pros & Cons of Using an API Gateway

- Cons of an API gateway
  - Involves more "moving parts" & associated learning curve

  - Extra levels of indirection can degrade performance
    - Compared with a direct-client-to-microservice model

Client Apps

Mobile App

Web App

Microservices

Microservice 1
Web API
Container

Microservice 2
Web API
Container

Microservice 3
Web API
Container

Each microservice has a public endpoint, e.g., with a different TCP port & host address

See direct-client-to-microservice-communication-versus-the-api-gateway-pattern
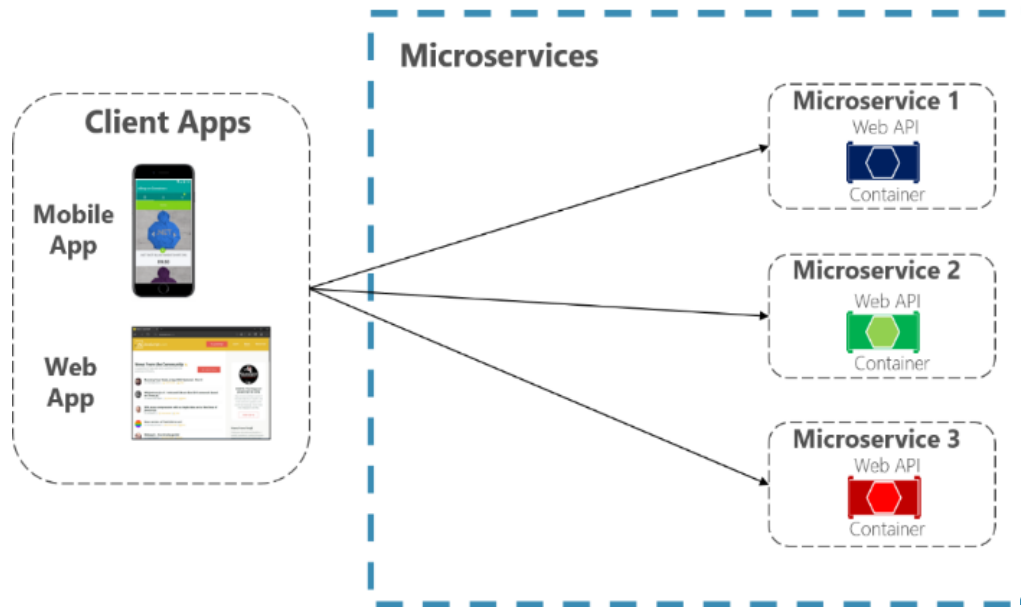
Pros & Cons of Using an API Gateway

- Cons of an API gateway
  - Involves more "moving parts" & associated learning curve
  - Extra levels of indirection can degrade performance
    - Compared with a direct-client-to-microservice model
      - However, only viable for simple/small deployments

IT'S SIMPLE

End of the QuoteServices App Case Study: Overview of the API Gateway Pattern