Serverless Architecture

CSSE6400

Richard Thomas

May 23, 2022

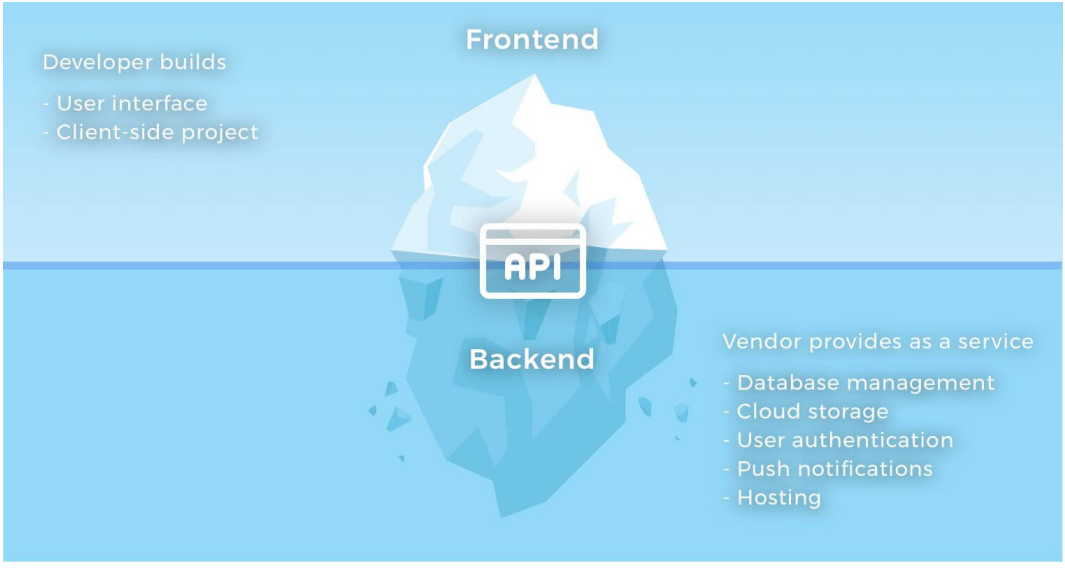
Oxymoron 1. Serverless

Logic running on someone else's server.

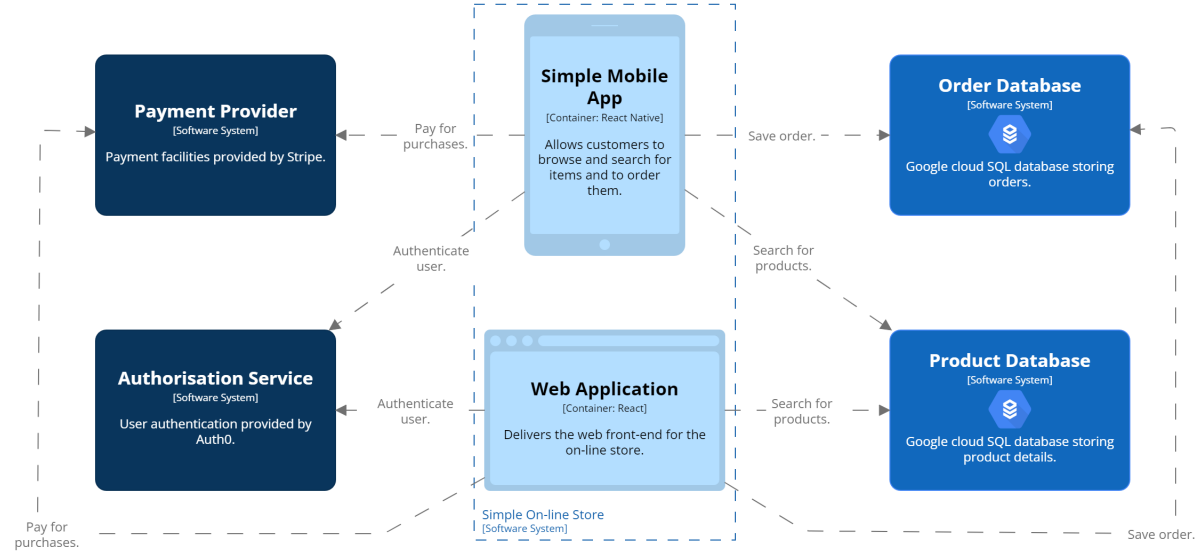
Definition 1. Backend as a Service (BaaS)

Cloud-hosted applications or services that deliver functionality used by an application front-end.

BaaS Iceberg [1]



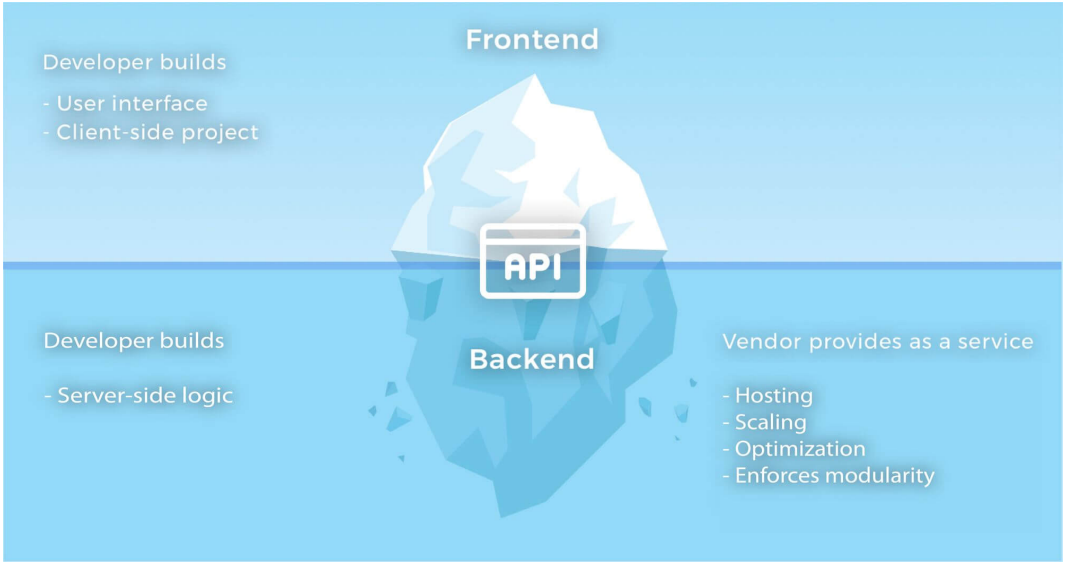
BaaS Example



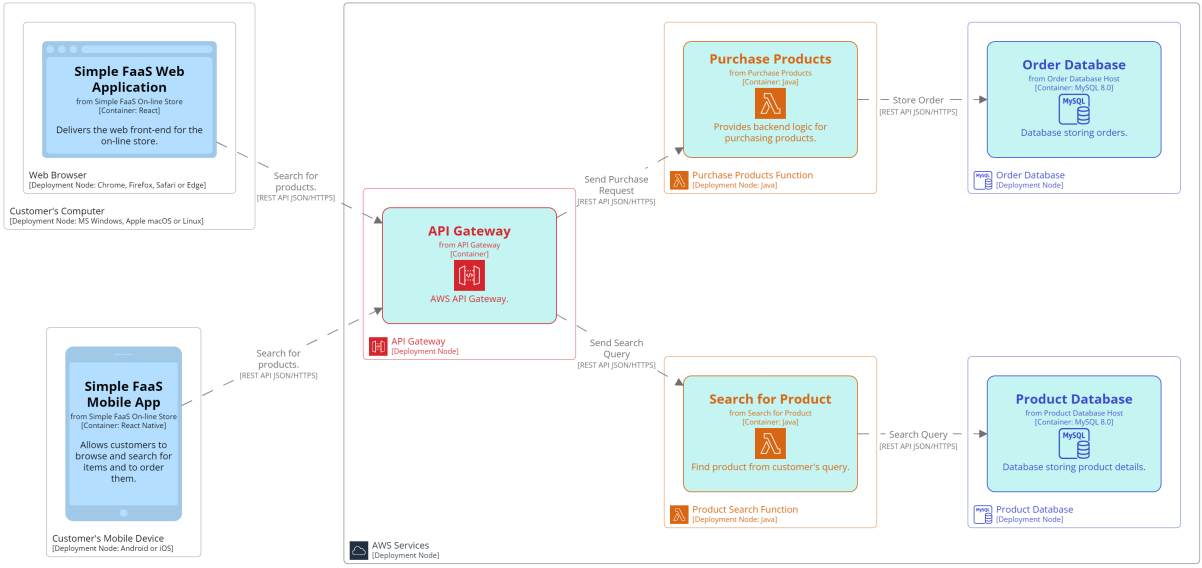
Definition 2. Functions as a Service (FaaS)

Application logic that is triggered by an event and runs in a transient, stateless compute node.

FaaS Iceberg [1]



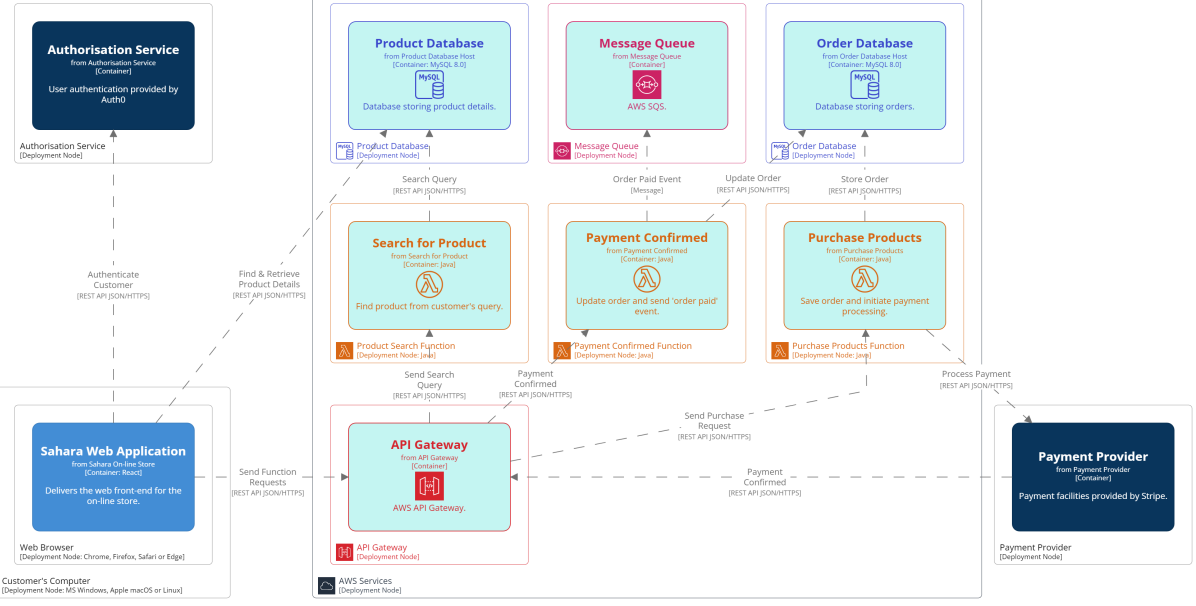
FaaS Example



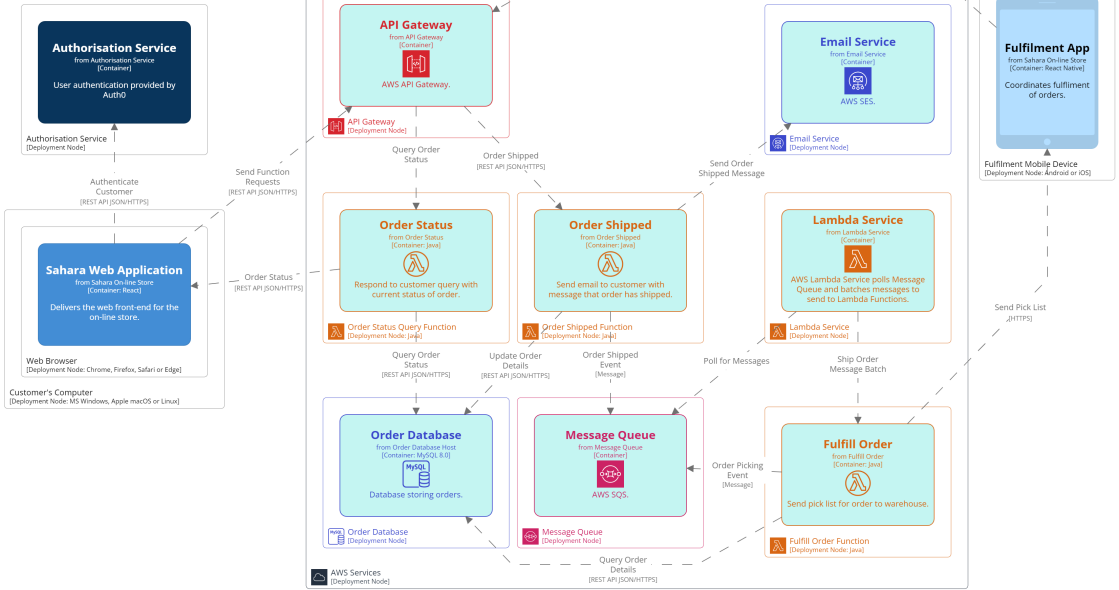
Definition 3. Serverless Architecture

Software system delivering functionality through BaaS or FaaS.

Sahara Browse & Order



Sahara Fulfilment



Serverless Benefits

- Automatic scaling
  - Multiple instances of function

Serverless Benefits

- Automatic scaling
  - Multiple instances of function
- Reduced cost for dynamic loads
  - No server idle time

Serverless Benefits

- Automatic scaling
  - Multiple instances of function
- Reduced cost for dynamic loads
  - No server idle time
- Reduced server management

Serverless Benefits

- Automatic scaling
  - Multiple instances of function
- Reduced cost for dynamic loads
  - No server idle time
- Reduced server management
- Easier to run closer to client
  - Launch in same zone as client

BaaS Tradeoffs

- Front-end accesses database directly
  - Front-end needs to sanitise inputs
  - Easy to spoof messages from front-end
    - Hope DB provider is secure

BaaS Tradeoffs

- Front-end accesses database directly
  - Front-end needs to sanitise inputs
  - Easy to spoof messages from front-end
    - Hope DB provider is secure
- Application logic is in front-end
  - Less modularisation
  - Duplication of logic with multiple front-ends
    - Web, mobile, …

BaaS Tradeoffs

- Front-end accesses database directly
  - Front-end needs to sanitise inputs
  - Easy to spoof messages from front-end
    - Hope DB provider is secure
- Application logic is in front-end
  - Less modularisation
  - Duplication of logic with multiple front-ends
    - Web, mobile, …
- No control over server optimisation

FaaS Tradeoffs

- No server state
  - All state needs to be saved (e.g. Redis, S3, …)
    - Not just persistent state

FaaS Tradeoffs

- No server state
  - All state needs to be saved (e.g. Redis, S3, …)
    - Not just persistent state
- Execution duration
  - Can't be long running process
    - AWS Lambda is up to 15 minutes

FaaS Tradeoffs

- No server state
  - All state needs to be saved (e.g. Redis, S3, …)
    - Not just persistent state
- Execution duration
  - Can't be long running process
    - AWS Lambda is up to 15 minutes
- Startup latency
  - Functions take time to start
    - Some languages worse than others (e.g. Java)

FaaS Tradeoffs

- No server state
  - All state needs to be saved (e.g. Redis, S3, …)
    - Not just persistent state
- Execution duration
  - Can't be long running process
    - AWS Lambda is up to 15 minutes
- Startup latency
  - Functions take time to start
    - Some languages worse than others (e.g. Java)
- Proliferation of functions
  - Loss of encapsulation

Question

When is serverless appropriate?

Question

When is serverless appropriate?

Answer

- Rich client apps with common backend
  - BaaS

Question

When is serverless appropriate?

Answer

- Rich client apps with common backend
  - BaaS
- High latency processing
  - Within function duration constraints

Question

When is serverless appropriate?

Answer

- Rich client apps with common backend
  - BaaS
- High latency processing
  - Within function duration constraints
- Apps with variable load
  - Take advantage of auto-scaling

Question

When is serverless *not* appropriate?

Question

When is serverless *not* appropriate?

Answer

- Quick response required
  - Can't wait for FaaS to start

Question

When is serverless *not* appropriate?

Answer

- Quick response required
  - Can't wait for FaaS to start
- Compute intensive processing

Question

When is serverless *not* appropriate?

Answer

- Quick response required
  - Can't wait for FaaS to start
- Compute intensive processing
- Apps with steady load
  - Server-based approaches are cheaper

Self-Study Exercise

- Redesign your scalability assignment to be serverless.
  - What parts of your design would benefit from being serverless?
- Implement your revised design.

Pros & Cons

- Extensibility 
- Reliability 
- Interoperability 
- Scalability 
- Deployability 
- Modularity 
- Testability 
- Security 
- Simplicity 

References

[1] Pavlo Brunko.
Serverless architecture: When to use this approach and what benefits it gives.
https://apiko.com/blog/serverless-architecture-benefits//, March 2019.