Serverless Architecture

Richard Thomas

May 23, 2022

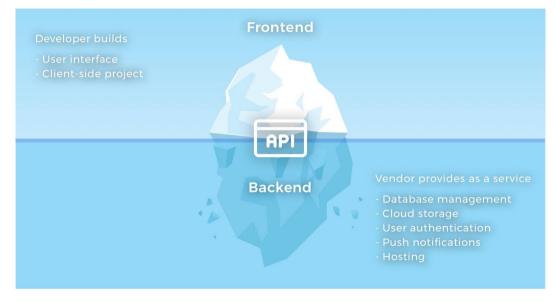
Oxymoron 1. Serverless

Logic running on someone else's server.

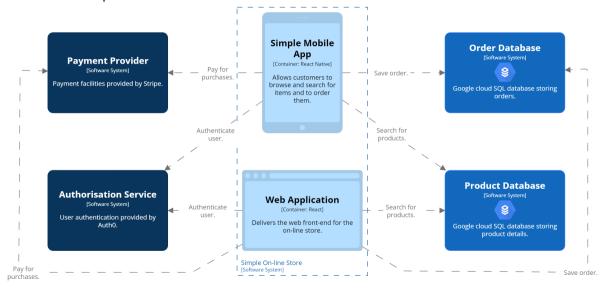
Definition 1. Backend as a Service (BaaS)

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

BaaS Iceberg [1]



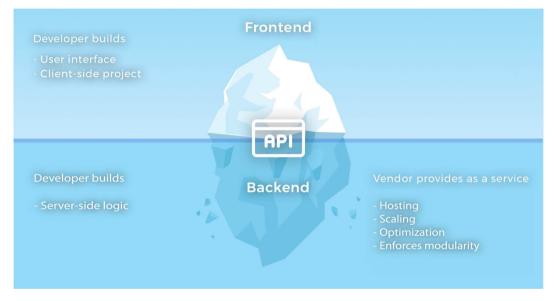
BaaS Example



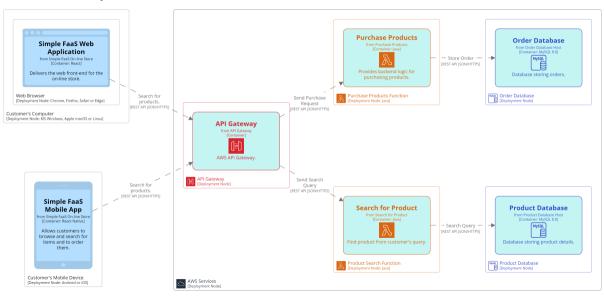
Definition 2. Functions as a Service (FaaS)

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

FaaS Iceberg [1]



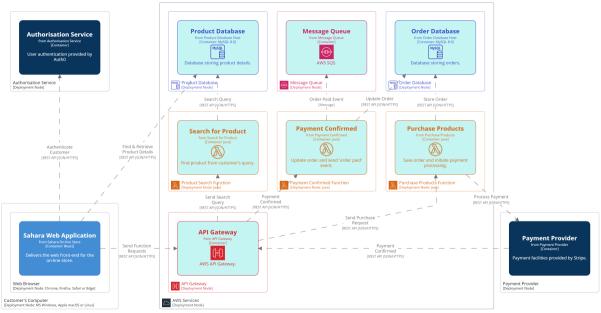
FaaS Example



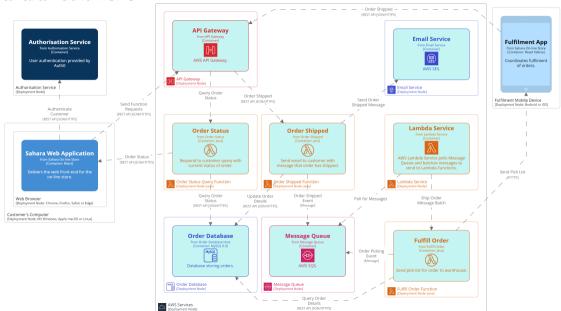
Definition 3. Serverless Architecture

Software system delivering functionality through BaaS or FaaS.

Sahara Browse & Order



Sahara Fulfilment



- Automatic scaling
 - Multiple instances of function

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

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

- 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

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

- 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, ...

- 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

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

- 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

- 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)

- 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

When is serverless appropriate?

When is serverless appropriate?

- Rich client apps with common backend
 - BaaS

When is serverless appropriate?

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

When is serverless appropriate?

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

When is serverless *not* appropriate?

When is serverless *not* appropriate?

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

When is serverless *not* appropriate?

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

When is serverless *not* appropriate?

- 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 00 **Extensibility** 00 Reliability 00 Interoperability **Scalability** 00 **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.