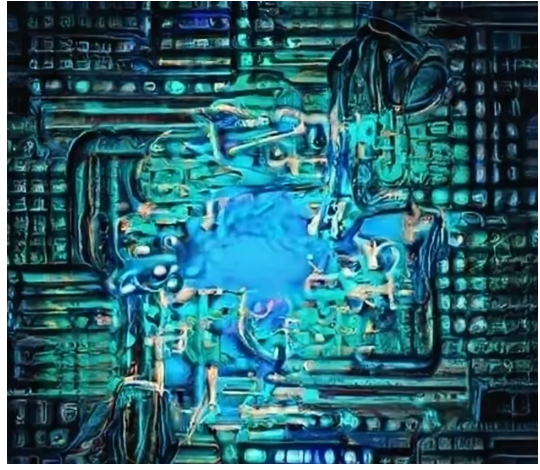
Decomposing Monoliths

CSSE6400

Richard Thomas

May 20, 2024



Question

What are the benefits of a monolith architecture?

Question

What are the benefits of a monolith architecture?

Answer

- Simple deployment

Question

What are the benefits of a monolith architecture?

Answer

- Simple deployment
- Simple communication between modules

Question

What are the benefits of a monolith architecture?

Answer

- Simple deployment
- Simple communication between modules
- Simple system testing & debugging

Question

Why do monoliths have a bad name?

Question

Why do monoliths have a bad name?

Answer

- Many legacy system nightmares were monoliths

Question

Why do monoliths have a bad name?

Answer

- Many legacy system nightmares were monoliths
- Easy to defeat modularity

Question

Why do monoliths have a bad name?

Answer

- Many legacy system nightmares were monoliths
- Easy to defeat modularity
- Cannot scale components of system

Question

Why do monoliths have a bad name?

Answer

- Many legacy system nightmares were monoliths
- Easy to defeat modularity
- Cannot scale components of system
- Monolith databases scale poorly

Question

What can be done if a monolith architecture is no longer suitable?

Question

What can be done if a monolith architecture is no longer suitable?

Answer

- Greenfields replacement

Question

What can be done if a monolith architecture is no longer suitable?

Answer

- Greenfields replacement
- Migrate to another architecture

Question

How do I migrate a monolith to a new architecture?

Question

How do I migrate a monolith to a new architecture?

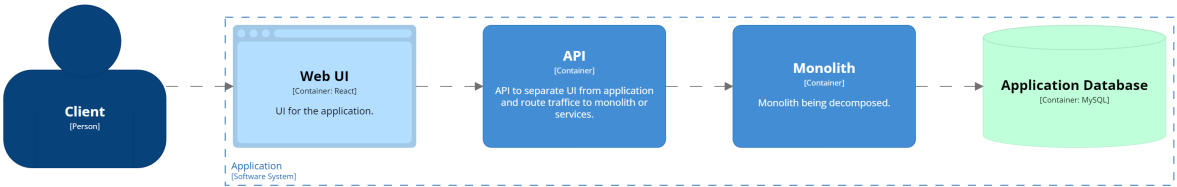
Answer

Decompose the monolith into services.

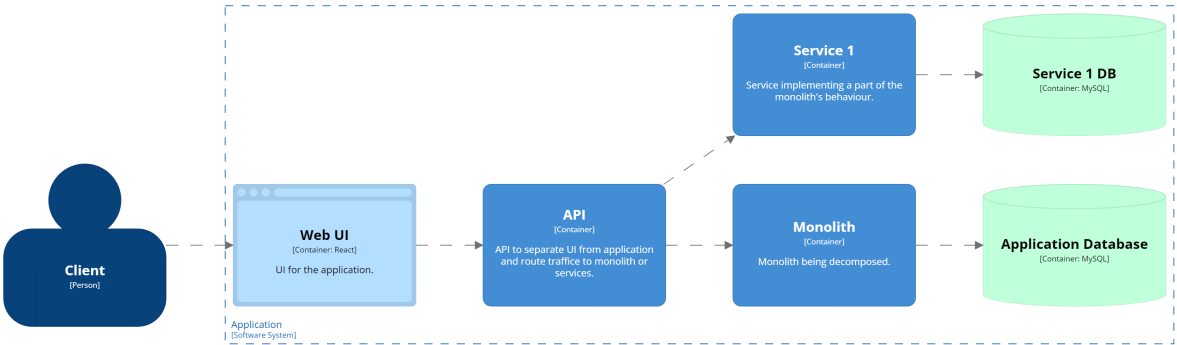
Strangler Fig Pattern

- Develop API for application's UI
- Proxy intercepts API calls
  - Proxy directs calls to application or new services
- Implement a service
  - Redirect calls to service
- Progressively replace monolith
- Shadow & Blue-Green Deployment

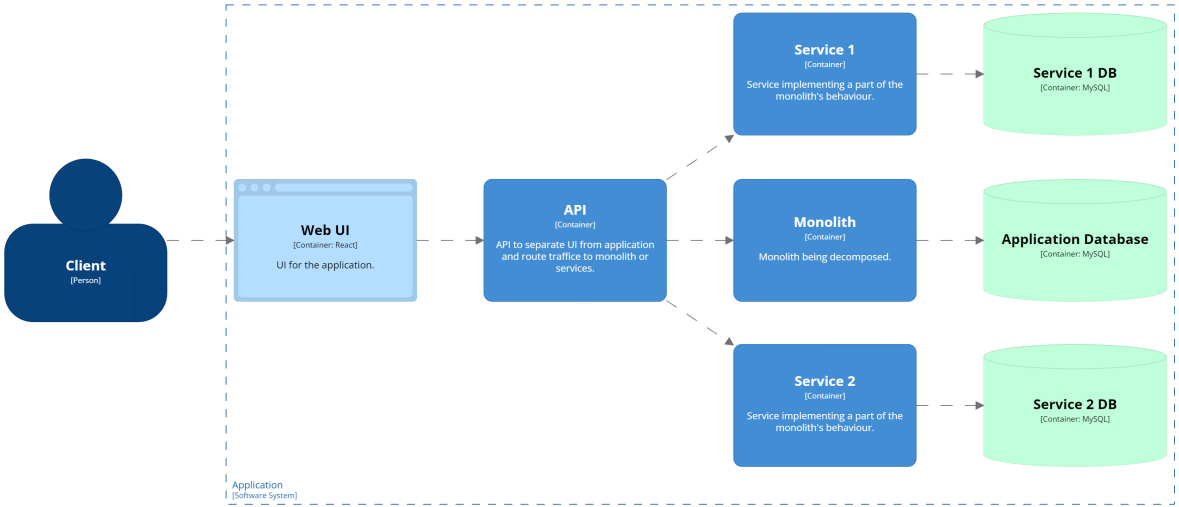
Monolith Deployment



Monolith Decompose: Step 1



Monolith Decompose: Step 2



Decomposition Process

- Identify bounded-contexts
- Simple first service
  - e.g. Authentication
- Minimise dependency from services to monolith
  - Monolith may use services

Decomposition Process

- Reduce coupling between bounded-contexts
  - e.g. Customer account management
    - Profile, Wish List, Payment Preferences – separate services
- Decouple vertically
  - Service delivers entire bounded-context
    - Data is decoupled from monolith

Decomposition Process

- Focus on pain points
  - Bottlenecks
  - Frequently changing behaviour
- Rewrite, don't reuse
  - Redesign for new infrastructure
  - Reuse complex logic
    - e.g. Discounts based on customer loyalty and behaviour, bundle offers, ...

Atomic Decomposition

- Refactor monolith
  - Use service to deliver application functionality
    - Monolith may need to invoke service
  - Remove service logic from monolith

Stepwise Decomposition

Replace application functionality one service at a time.

Definition 1. Macroservice

Separate service, but may span more than one domain or share a database with the monolith or other services.

Definition 2. Nanoservice

Service that depends on other services and cannot be deployed independently – its context is too small.