Quality Assurance In Microservice Architectures

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Outline

- What is Quality Assurance?
- QA is easy, isn't it?
- QA on Development stage.
- QA on Deployment stage.
- QA after Release.
- Conclusion.

Introduction

Definition

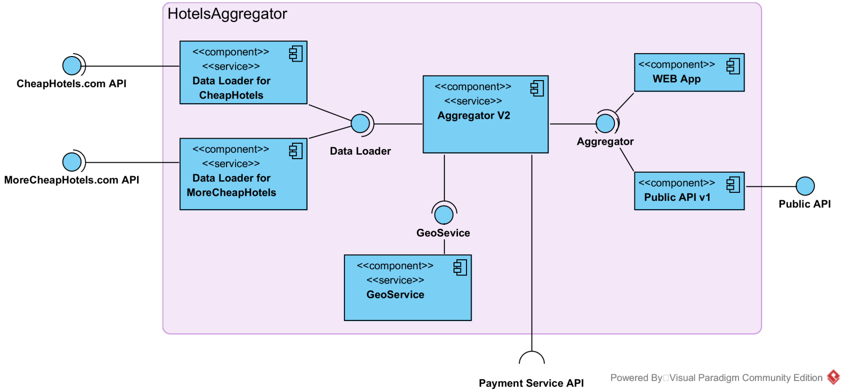
Quality Assurance refers to planned and systematic production processes that provide confidence in a product's suitability for its intended purposes.

- QA must prevent bugs and failures, not identify them.
- QA is wasteful on the last stages of development cycle.

Introduction
Challenges

- unpredictable timely availability for testing
- hard to perform exhaustive integration testing
- separated logs and data storages
- hard to maintain proper configuration of testing environments
- ***but (!)*** easy to organize low-level testing and catch most of the bugs early

Introduction
Case Study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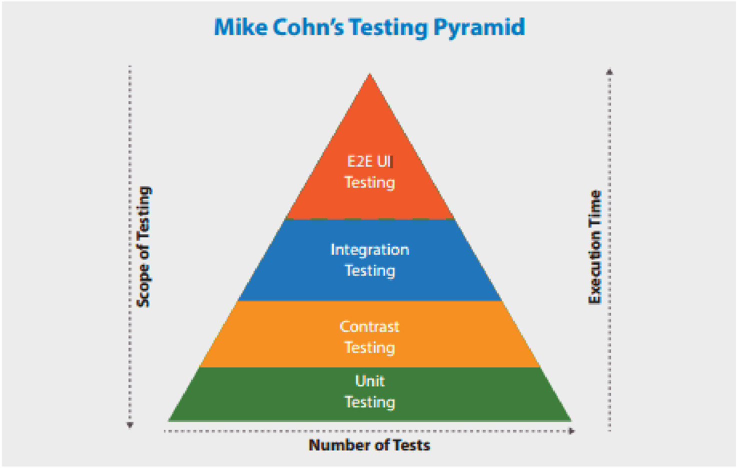
Test Pyramid
A balanced test portfolio

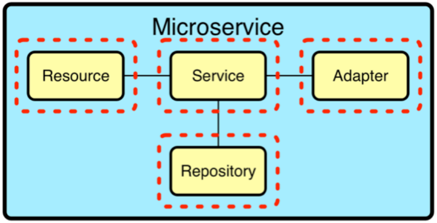
Mike Cohen’s Test Pyramid



Types of Tests
Applying the layers in a microservice

Unit Tests

- Coverage limited to individual components
- Useful in services, resources, repositories, and adapters
- "every build should run the tests, and a failed test should fail the build"
- "Solitary Unit Test and Sociable Unit Test"
- "Also a relevant design tool when combined with TDD"



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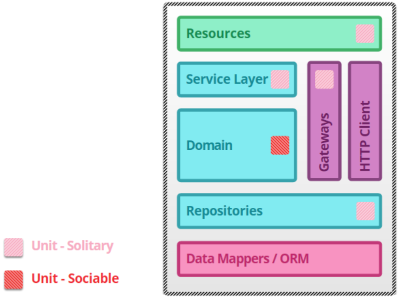
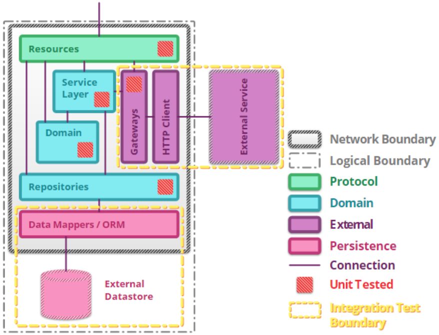


Types of Tests

Integration,Component and Contract Testing

Integration Tests

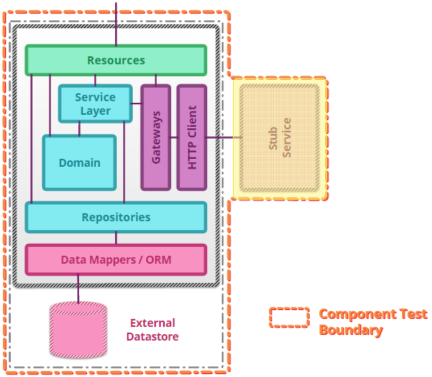
- Covers communication paths and interactions between components to detect interface defects.
- Gateway Integration and Persistence Integration



Types of Tests
Integration,Component and Contract Testing

Integration Tests

- A component is any well-encapsulated, coherent and independently replaceable part of a larger system.
- Isolation of the service is achieved by replacing external collaborators with test doubles



Types of Tests

Integration,Component and Contract Testing

Contract Tests

- Verifies that the contract expected by a consuming service is met.
- Integration Contract Testing and Consumer Driver Contract Testing.
- The Overall Service contract is the sum of individual contract tests.

Types of Tests

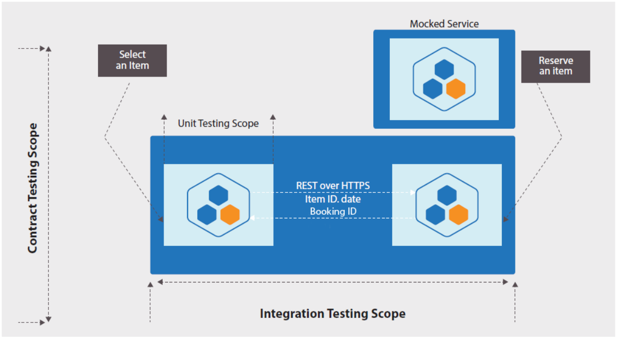
Non Functional Tests

Non Functional Tests validate the quality characteristics of the component.

- Performance Tests.
- Tests for Scalability.
- Resiliency Tests.
- Security Tests.

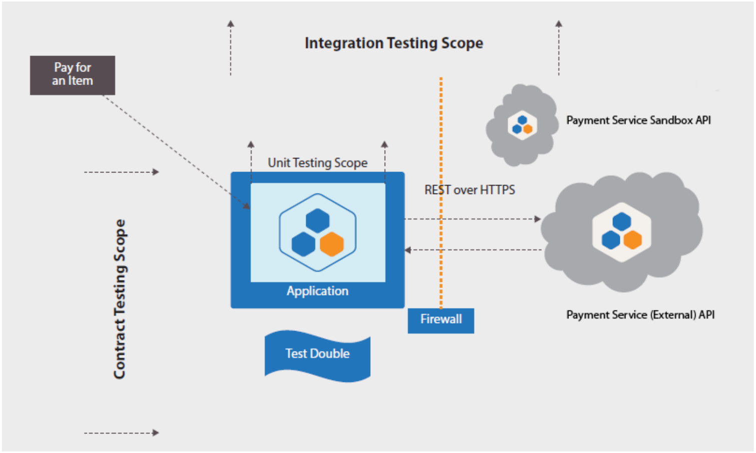
Testing between Microservices internal to an application or residing within the same application

Tasks like Selecting a Hotel and Booking a Hotel.



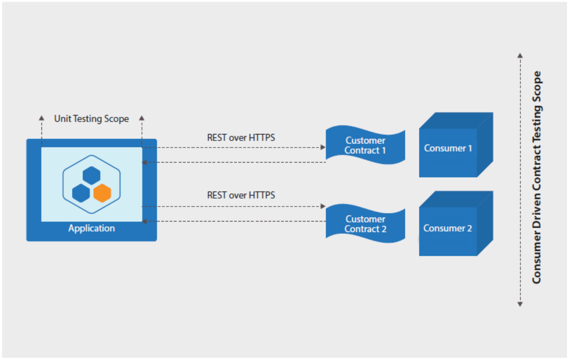
Testing between an internal microservice and an external API

Interaction with a Payment API



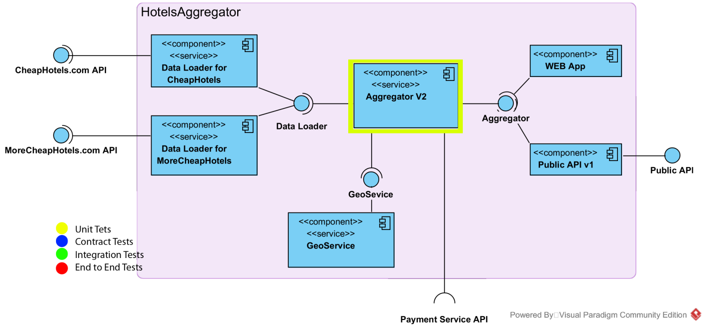
Microservice exposed to public domain

A publicly exposed application which is accessed by a Web API



Test Boundaries

Test boundaries for the example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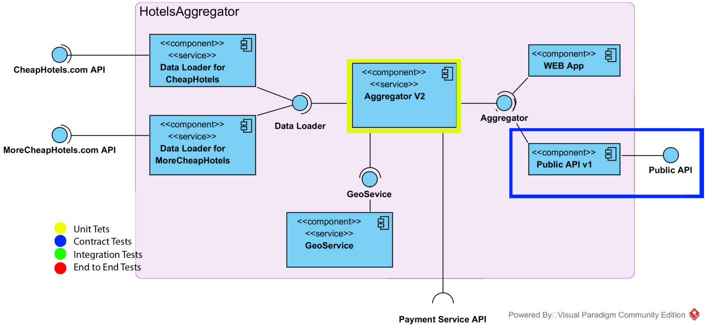
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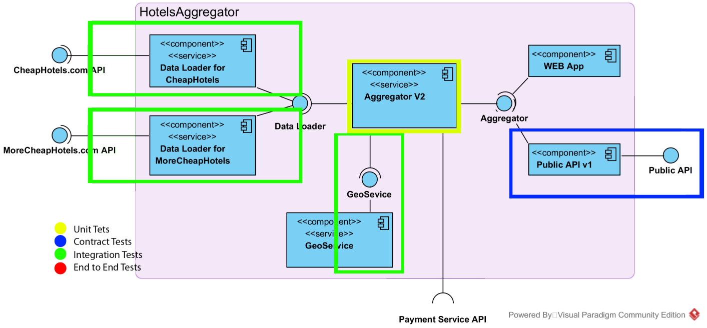
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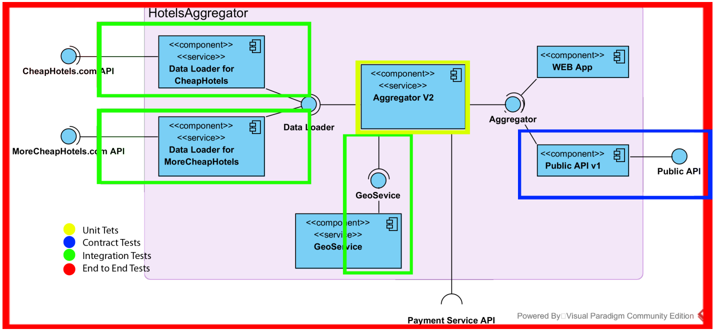
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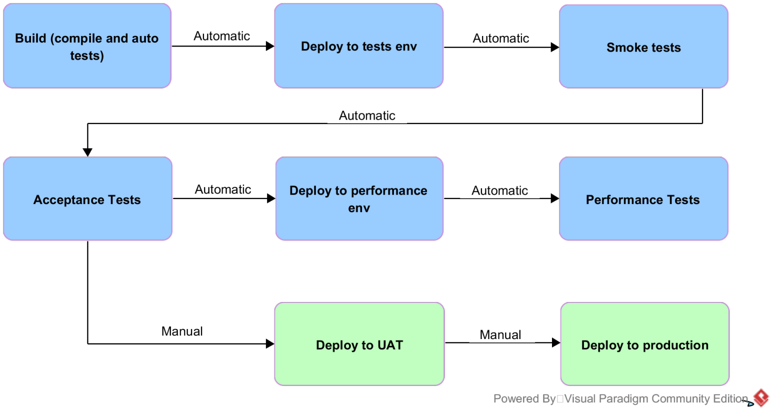
Deployment

Rapid Application Delivery

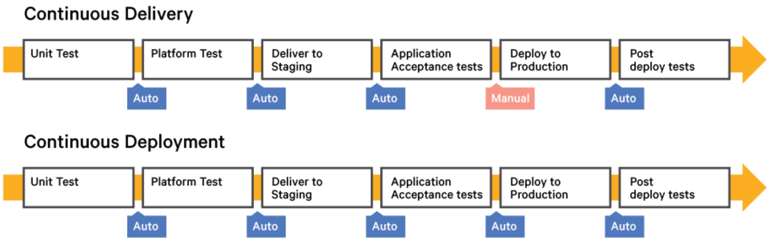
- RAD is a prerequisite for microservices []
- Exhaustive tests could be slow.
- Remedy: Deployment Pipeline.

Deployment

Deployment Pipeline



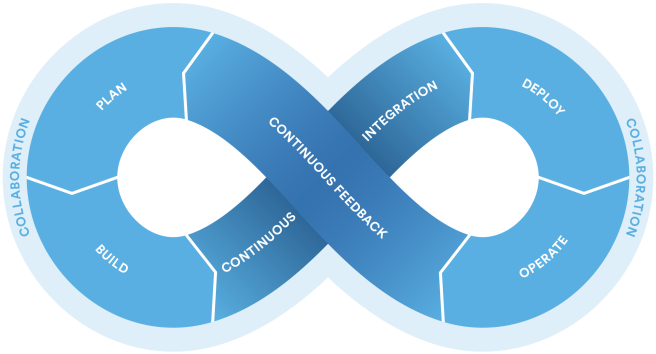
Deployment
Continuous Deployment and Delivery



Deployment
DevOps Culture

DevOps Culture:

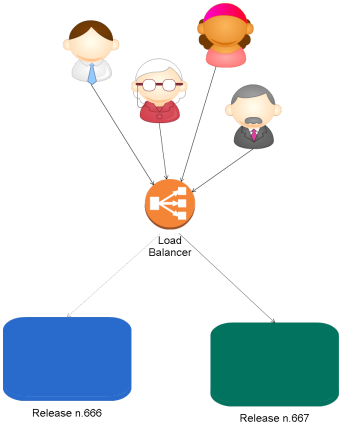
- Aim: break silos between development and later stages
- Requirements: shared responsibility and autonomy of teams



After Deployment

Smart releasing strategies

- Smoke Test Suites
- Blue/Green Deployment
- Canary releasing



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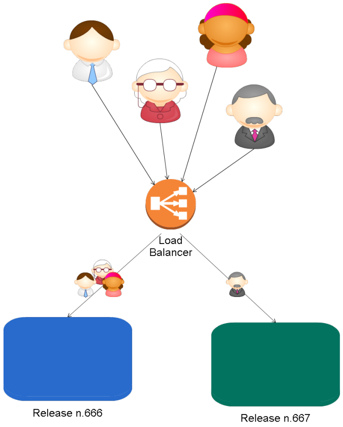
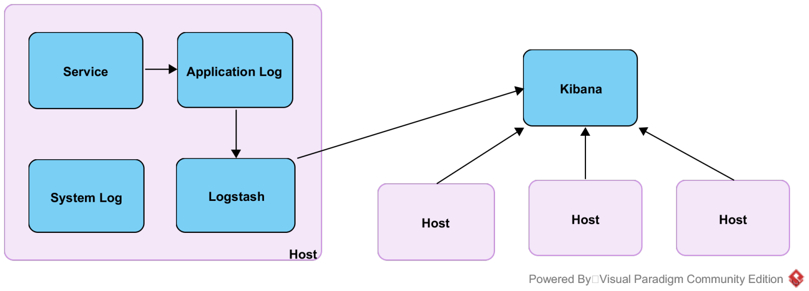


After Deployment
Logging



After Deployment

Monitoring

Tools

- xUnit framework
- stubbing and mocking (on the example of Mockito)
- smart stubbing with Mountebank
- testing of data passing between services (on the example of SOAP UI)
- consumer driven testing (on the example of Pact)
- End-to-End Testing (BDD Tools, JBehave, Cucumber)

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