Quality Assurance In Microservice Architectures

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2016

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

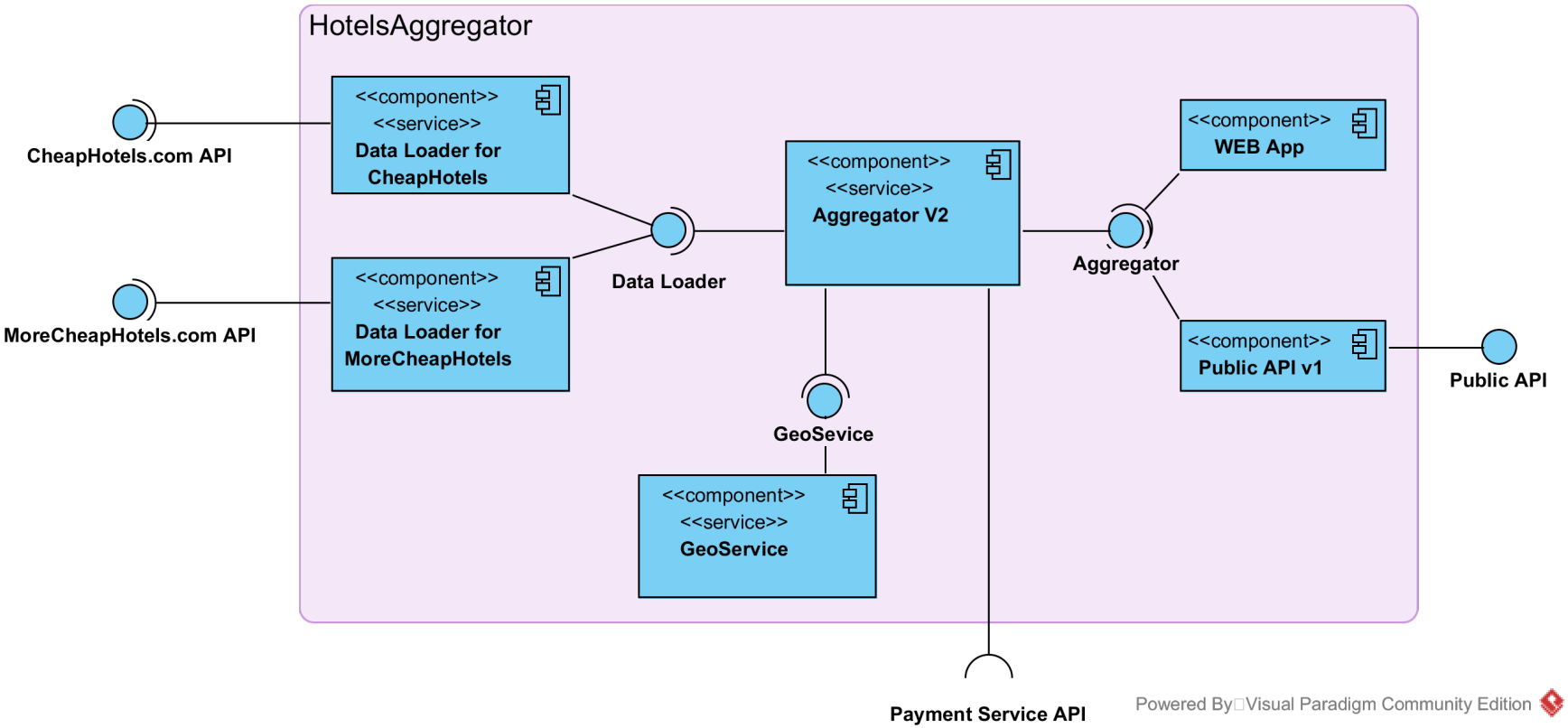
Quality Assurance refers to planned and systematic production processes that provide confidence in a product's suitability for its intended purposes.

- 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

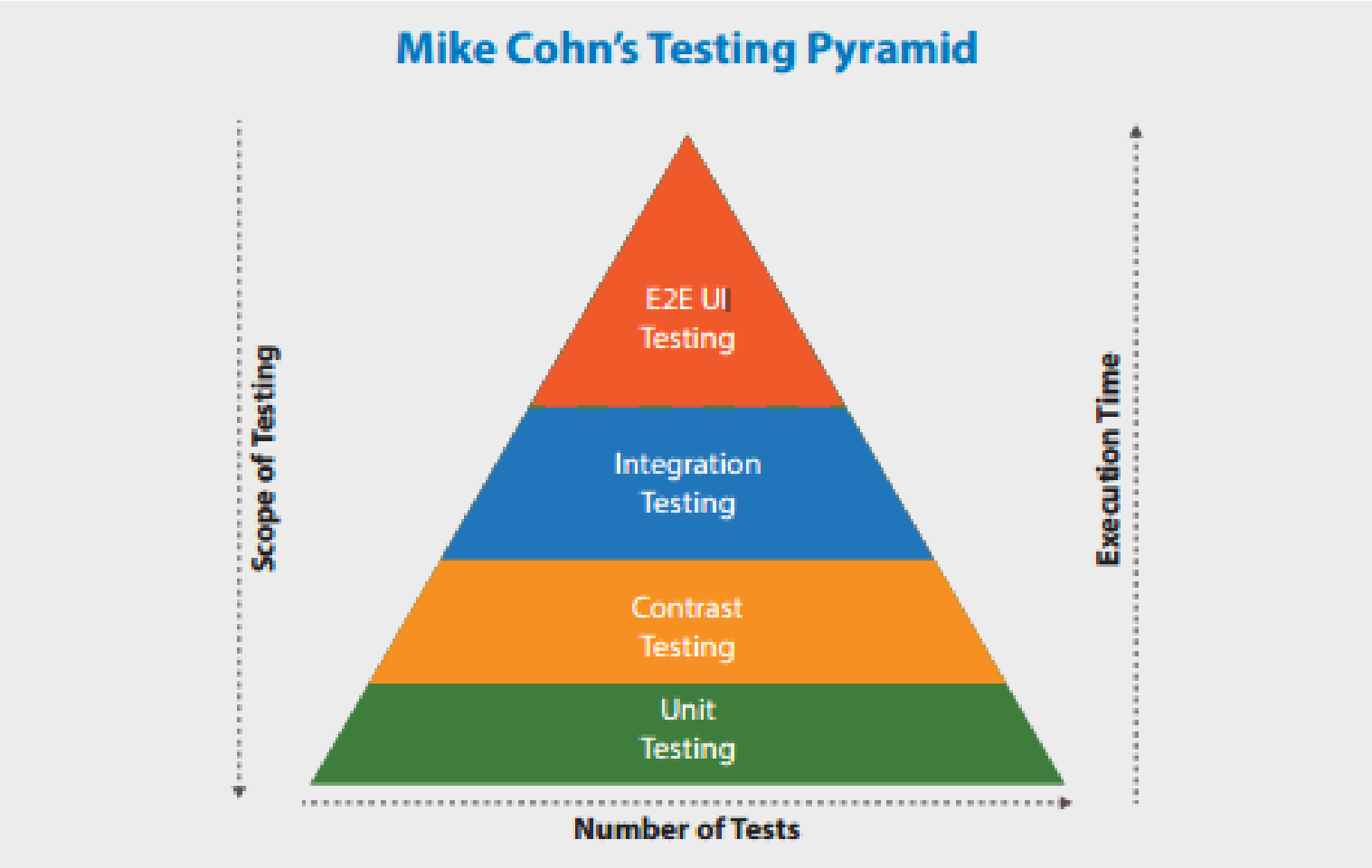
Introduction
Case Study



Test Pyramid

A balanced test portfolio

Mike Cohen's Test Pyramid

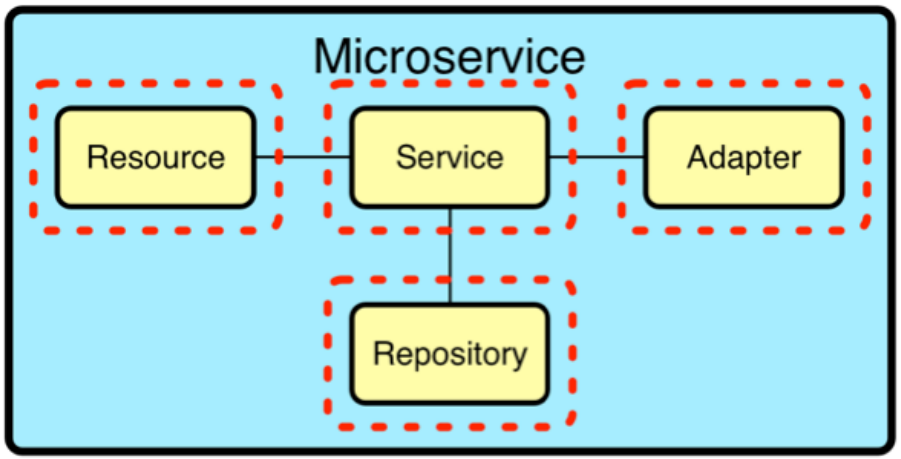


Types of Tests

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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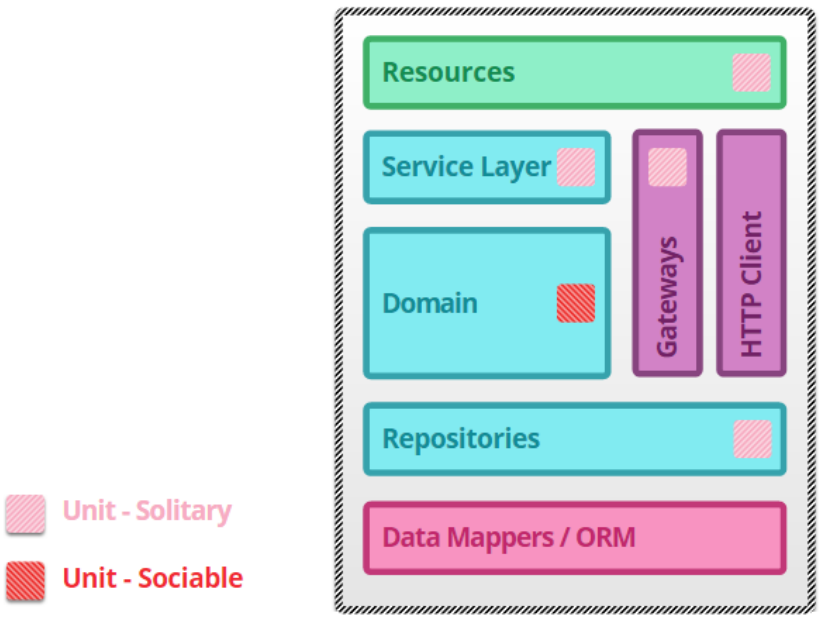
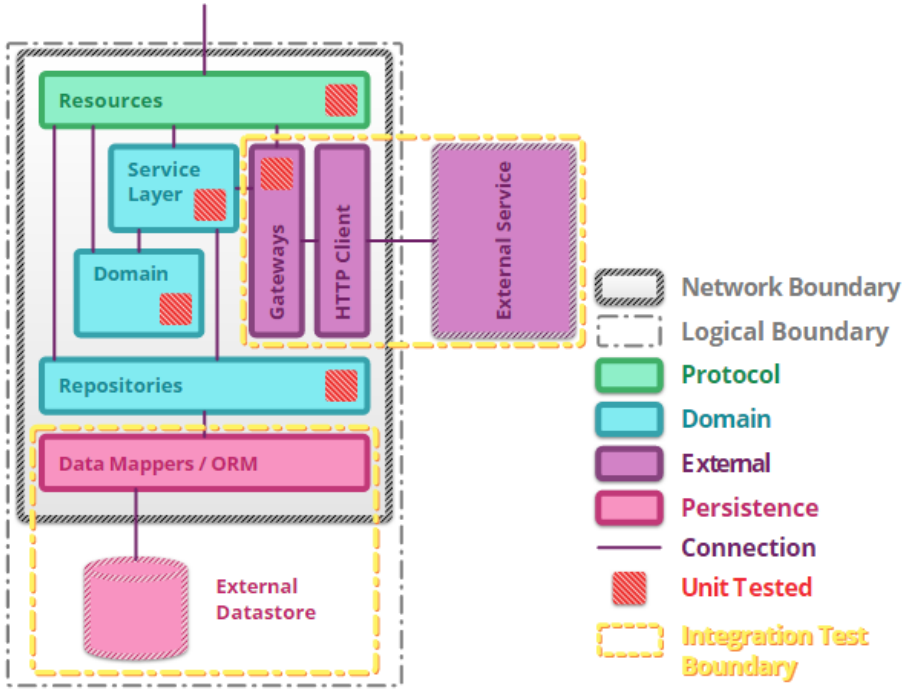


Types of Tests

Integration,Component and Contract Testing

Integration Tests

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

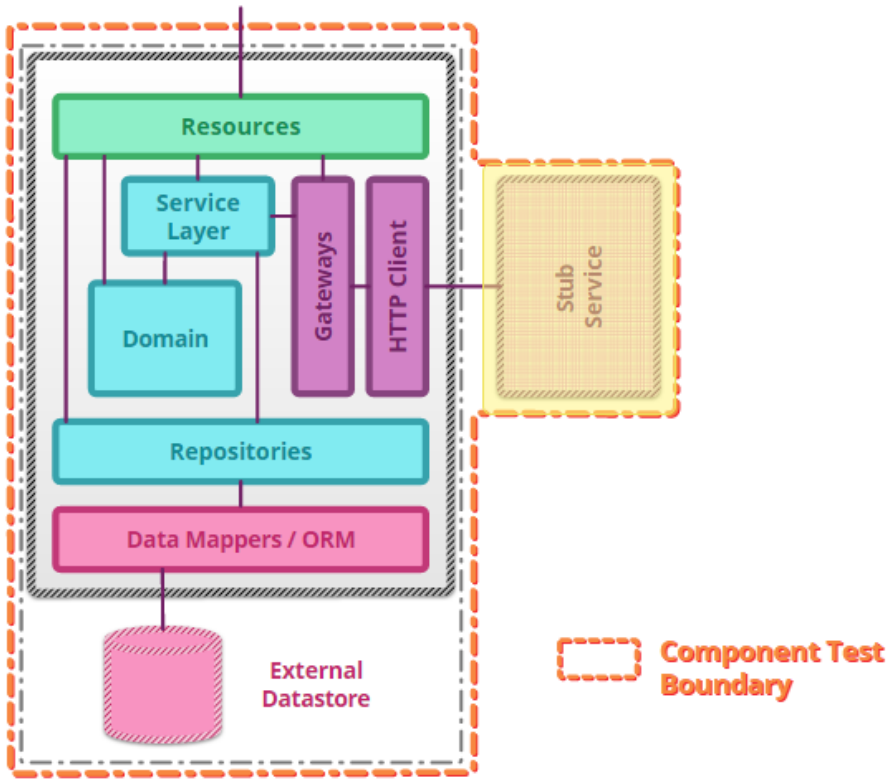


Types of Tests

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.

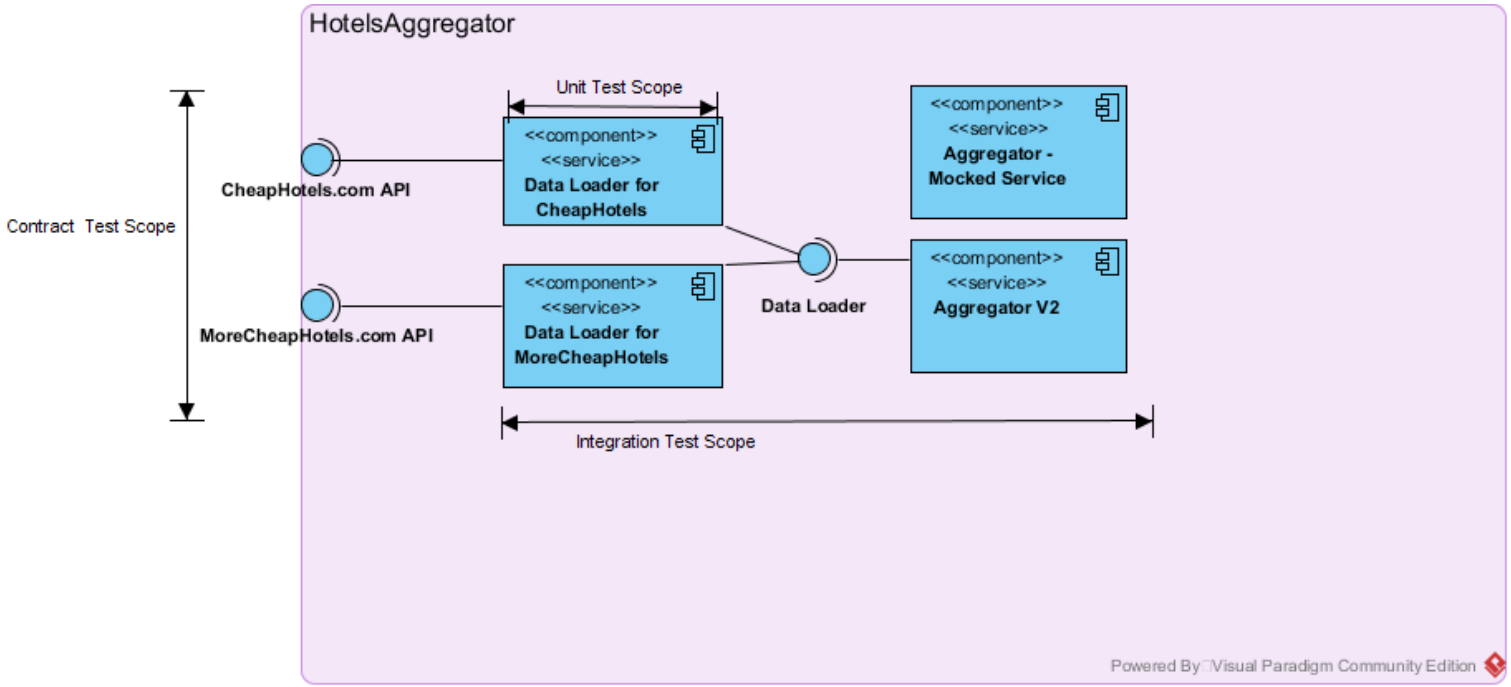
Types of Tests
Non Functional Tests

Non Functional Tests validate the quality characteristics of the component.

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

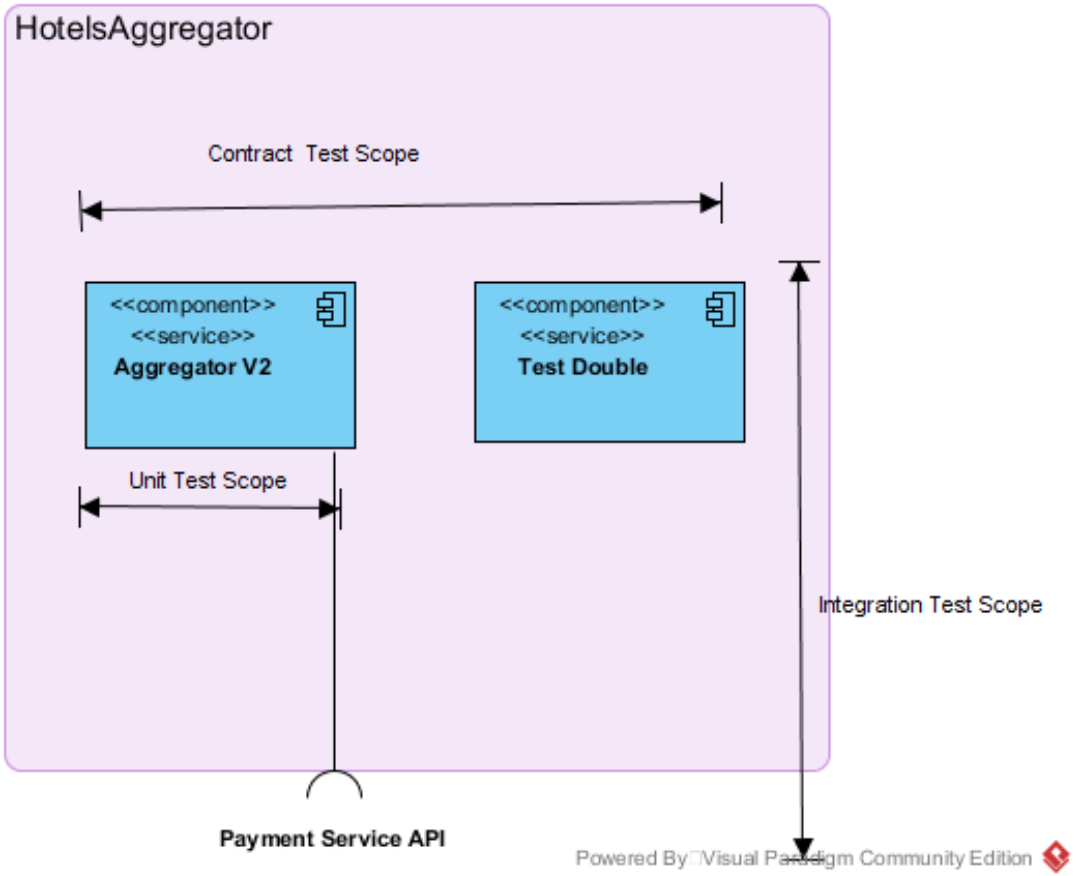
Testing between Microservices internal to an application or residing within the same application

Interaction between the Aggregator and Data Loader.



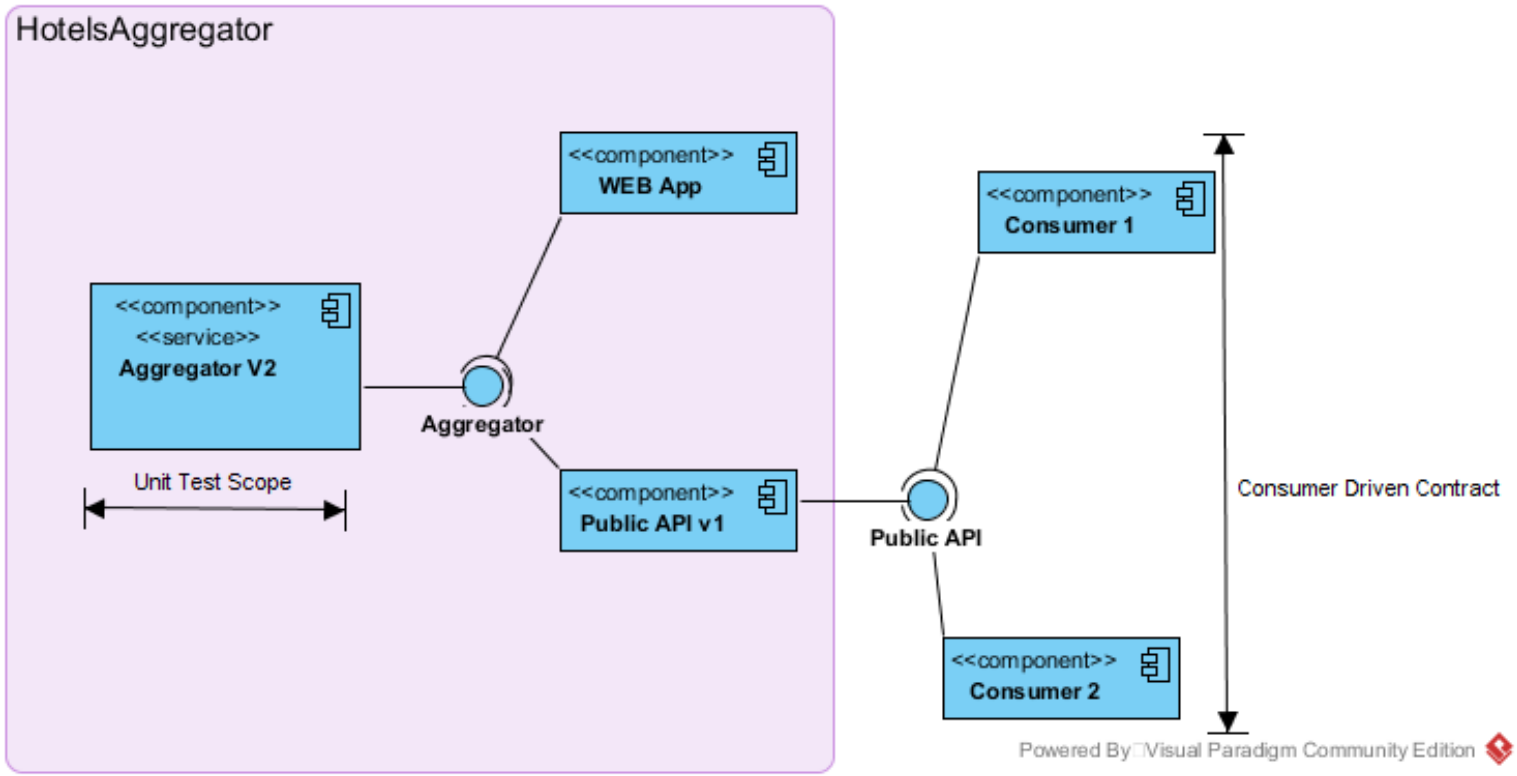
Testing between an internal microservice and an external API

Interaction with a Payment API



Microservice exposed to public domain

A publicly exposed application which is accessed by a Web API



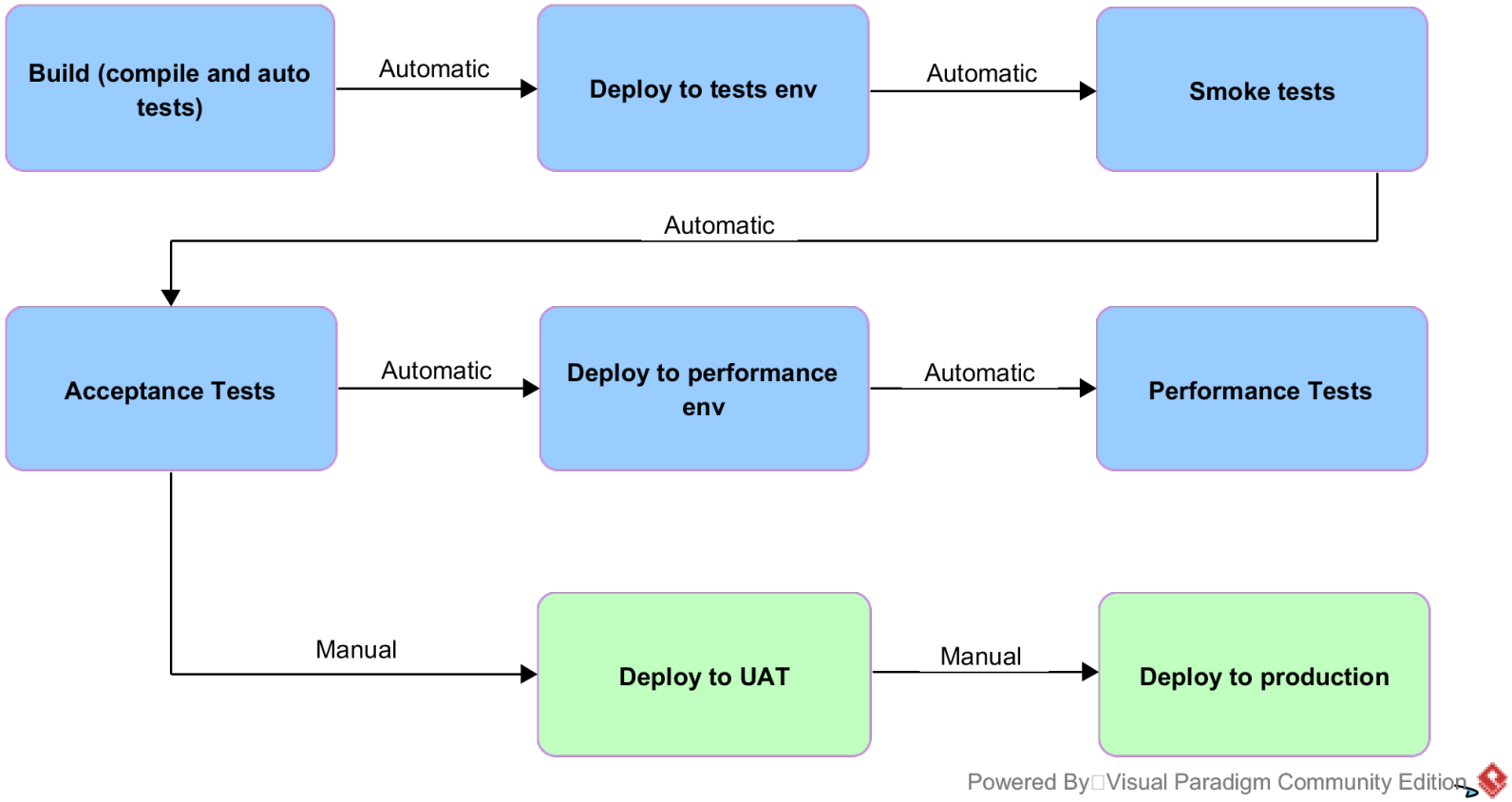
Deployment

Rapid Application Delivery

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

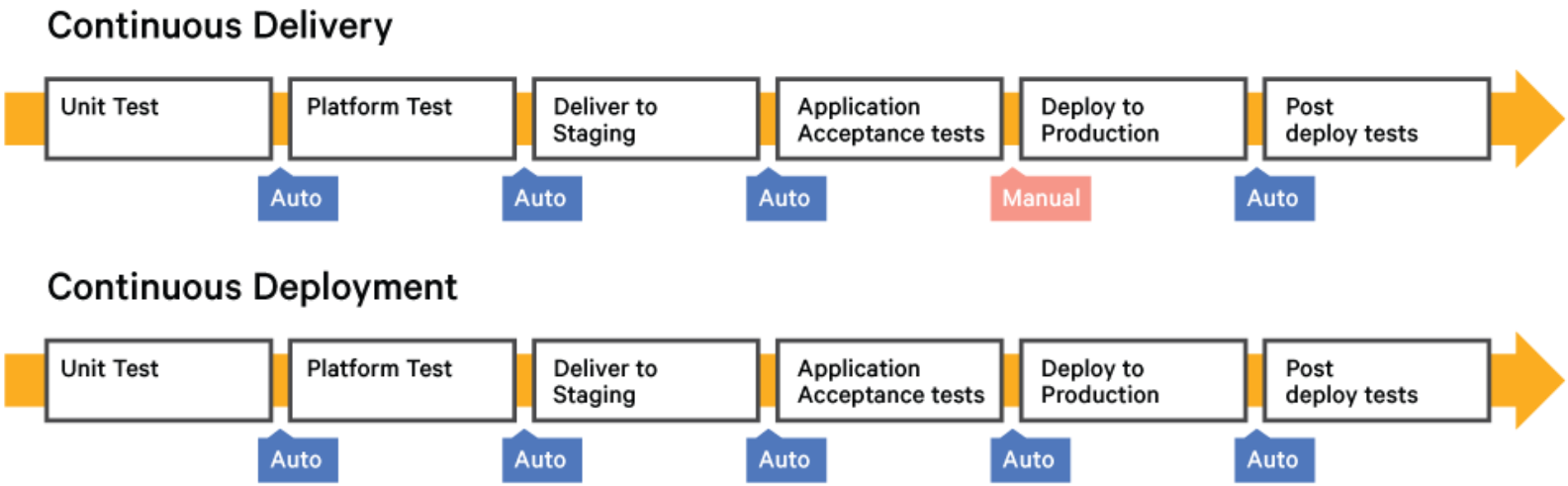
Deployment

Deployment Pipeline



Deployment

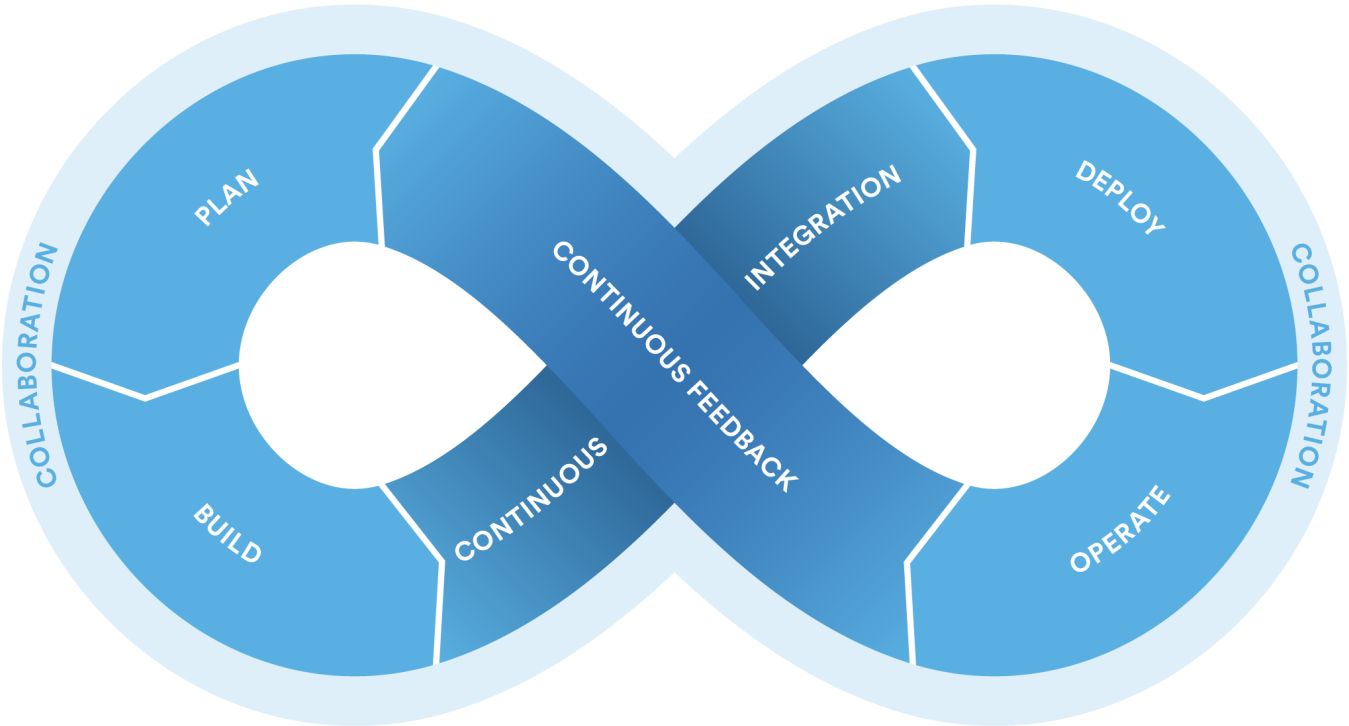
Continuous Deployment and Delivery



Deployment
DevOps Culture

DevOps Culture:

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



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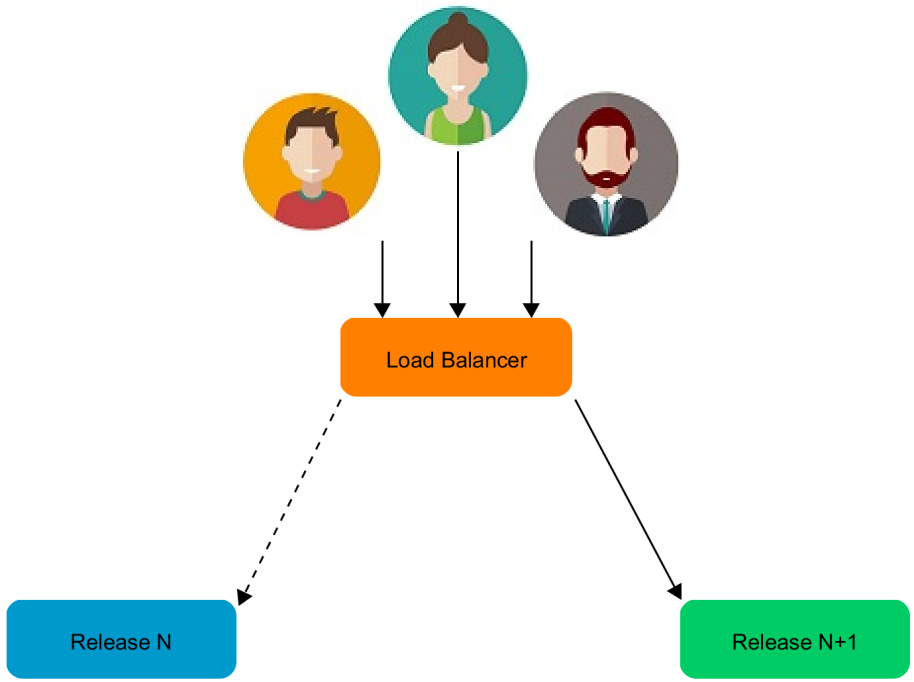
After Deployment

Smart releasing strategies

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



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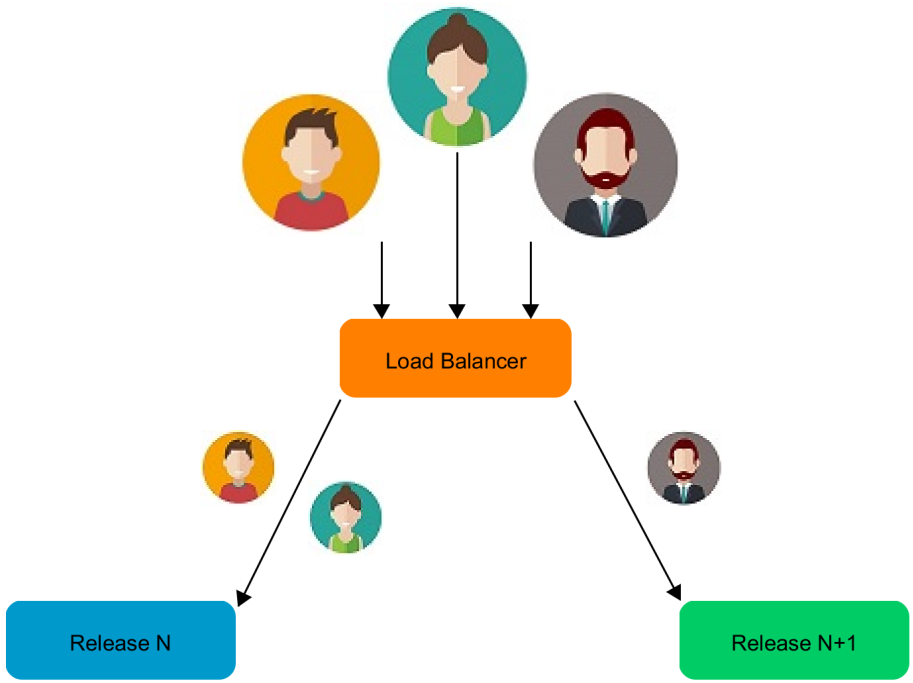
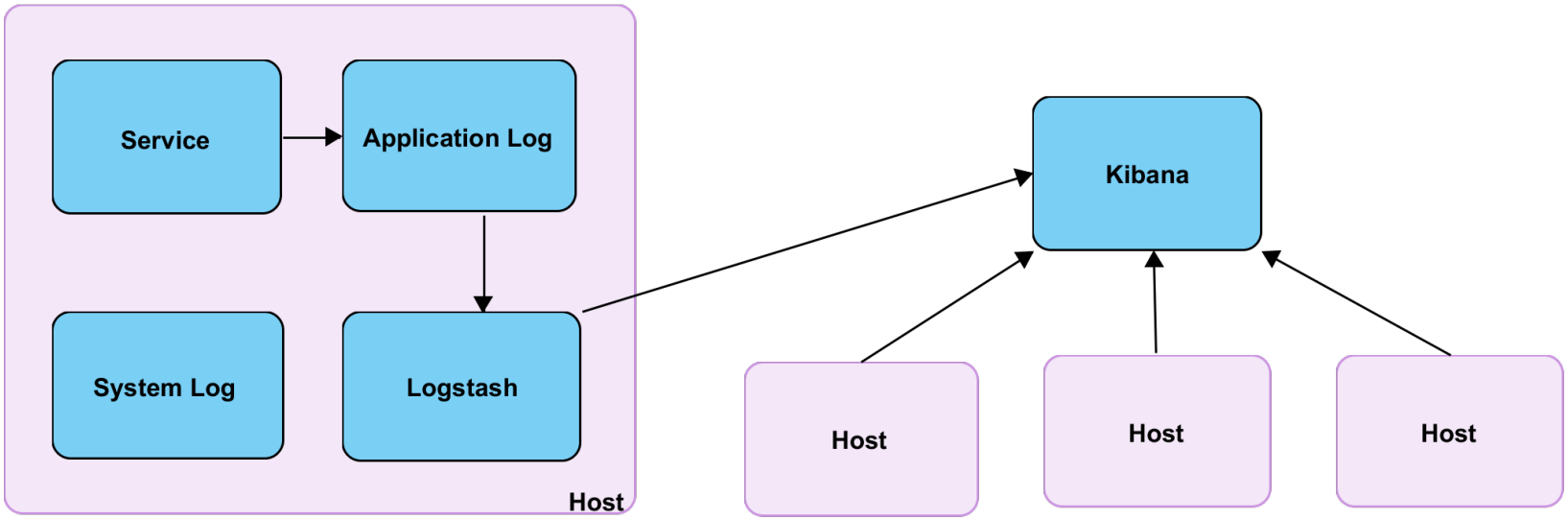


After Deployment

Logging

In microservice architectures, log aggregator is required to see an application state.
Example: use elastic stack to organize metrics.



After Deployment

Monitoring

Conclusion

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References

[1] M. Cohn. *Succeeding with Agile: Software Development Using Scrum*. Addison Wesley, 2009.

[2] S. Newman. *Building Microservices*. O'Reilly and Associates, 2015.

[3] A. Sundar. An insight into microservices testing strategies, 2016. URL https://www.infosys.com/it-services/validation-solutions/white-papers/documents/microservices-testing-strategies.pdf.

[4] S. Zorah. How to choose the right devops tools, 2016. URL http://blogs.atlassian.com/2016/03/how-to-choose-devops-tools/.