



Containerized Test Automation

Sven Hettwer
Senior Software Engineer

2019-04-24

Agenda

- Testing of microservices
- CI/CD on container platforms
- Integration testing with Citrus
- Demo
- Summary



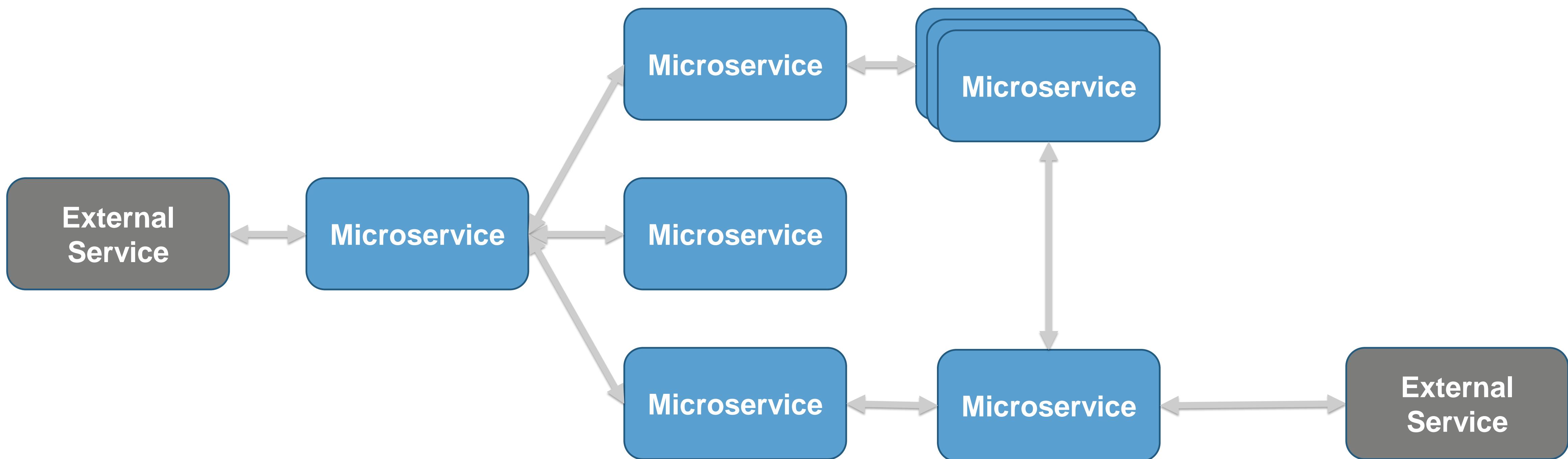
Agenda

- Testing of microservices
- CI/CD on container platforms
- Integration testing with Citrus
- Demo
- Summary



Testing of microservices

- Testing of microservices is... different
- Microservice architectures ease and complicate testing
- Different testing challenges compared to monoliths
- Different tech stack



Testing of microservices – The good parts

- Isolated functionality
- Less functionality in a single service compared to monoliths
- Easy to start and deploy
- Message interfaces between services
- Decoupled services connected via network



Testing of microservices – The bad parts

- Message interfaces between services
- Decoupled services connected via network
- A lot of third party systems
- Various message transports

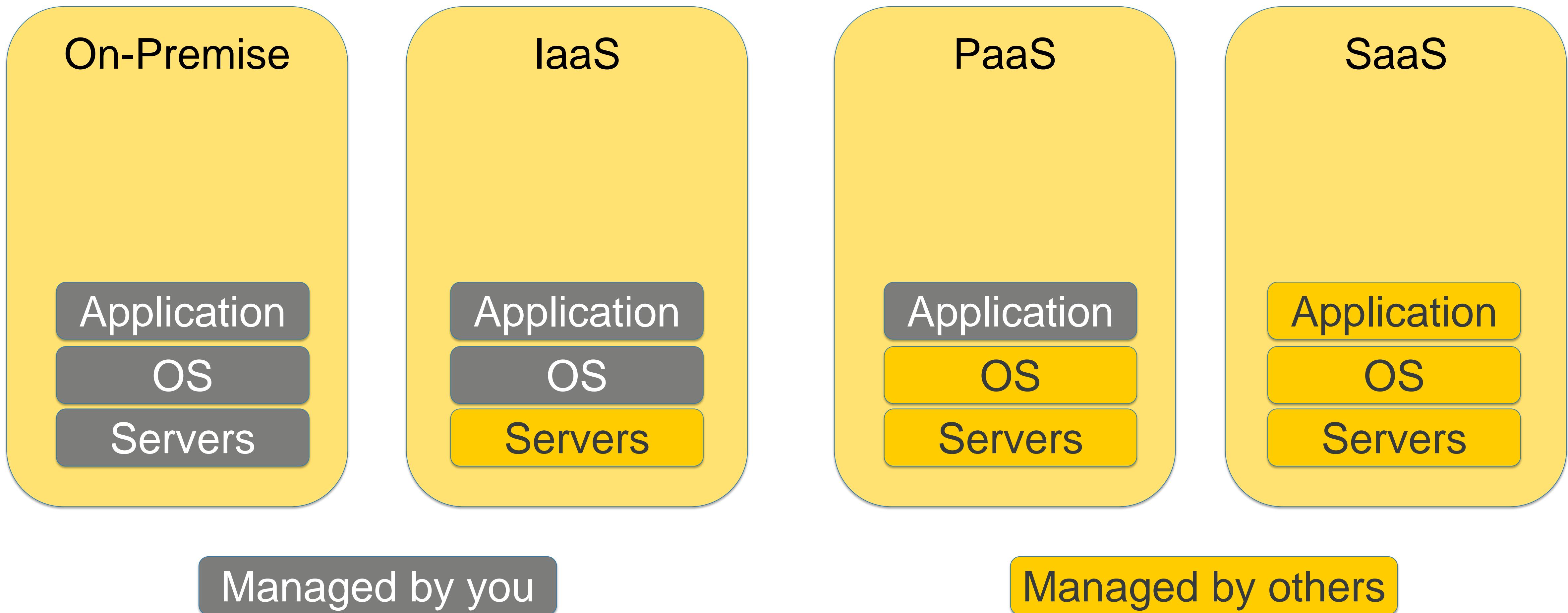


Agenda

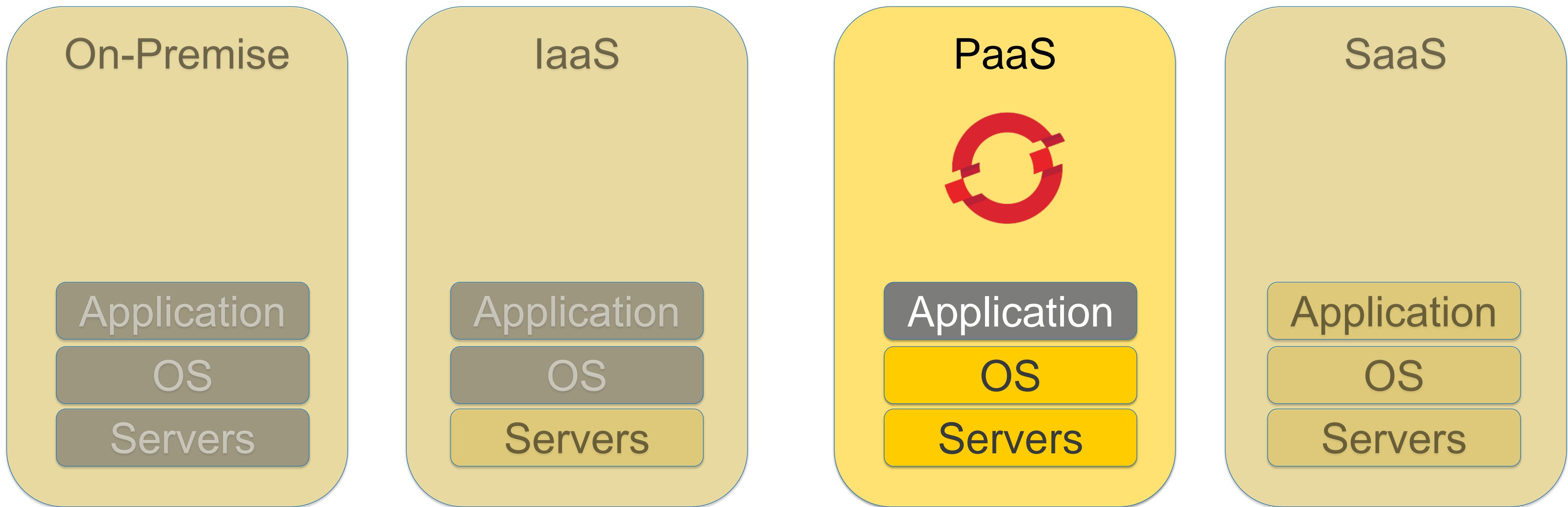
- Testing of microservices
- CI/CD on container platforms
- Integration testing with Citrus
- Demo
- Summary



CI/CD on container platforms – Container Platforms



CI/CD on container platforms – Container Platforms

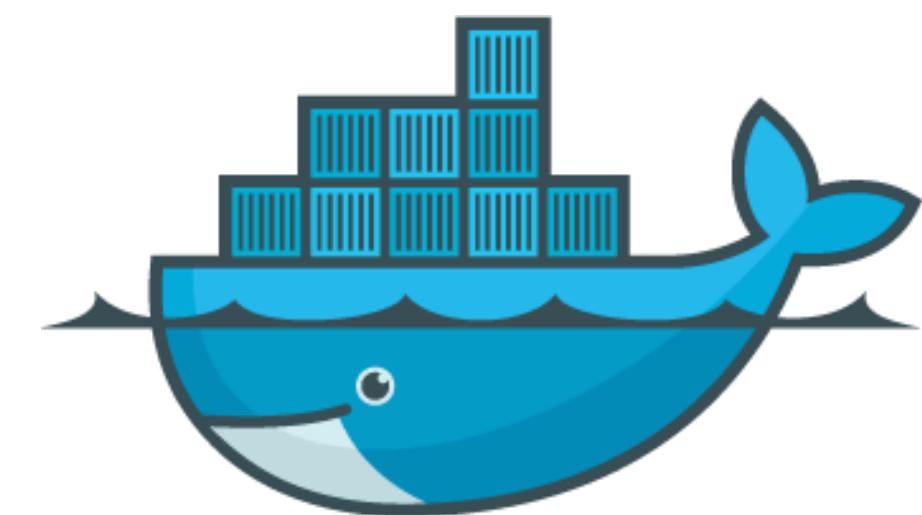
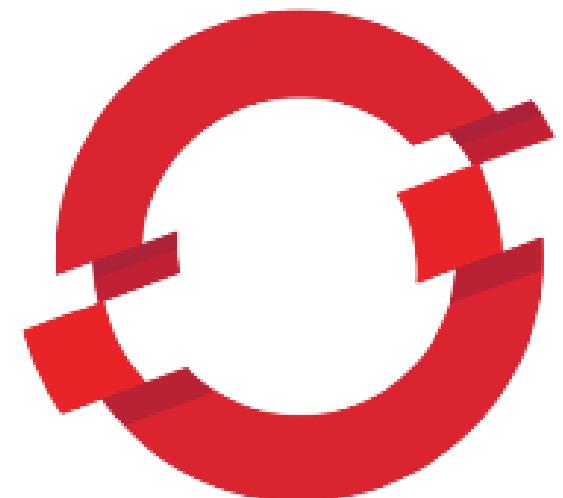


Managed by you

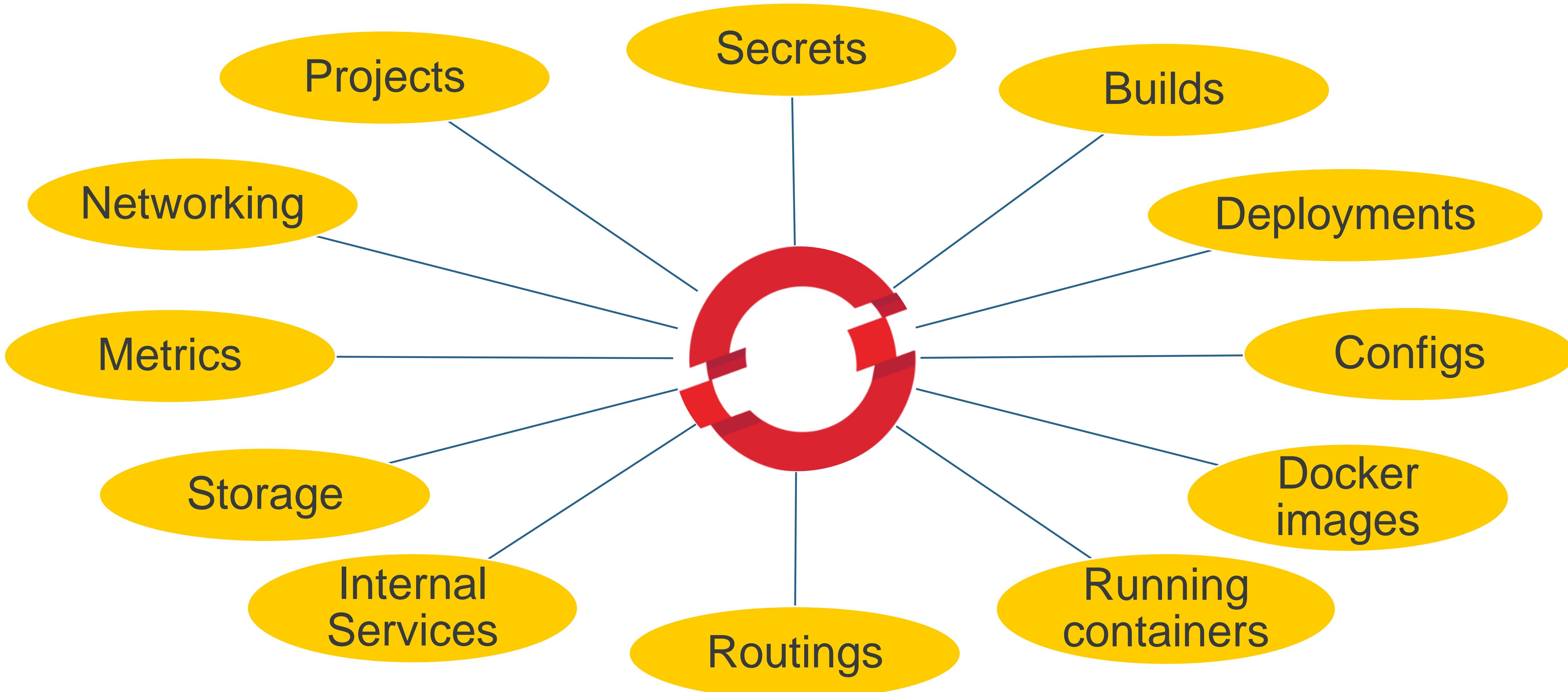
Managed by others

CI/CD on container platforms – Container Platforms

- Developed and maintained by RedHat since 2011
- Open source container platform OKD (Apache Licence 2.0)
- Professional support options
- Public OpenShift cloud available
- Based on Kubernetes
- Uses Docker containers
- Additional platform specific features

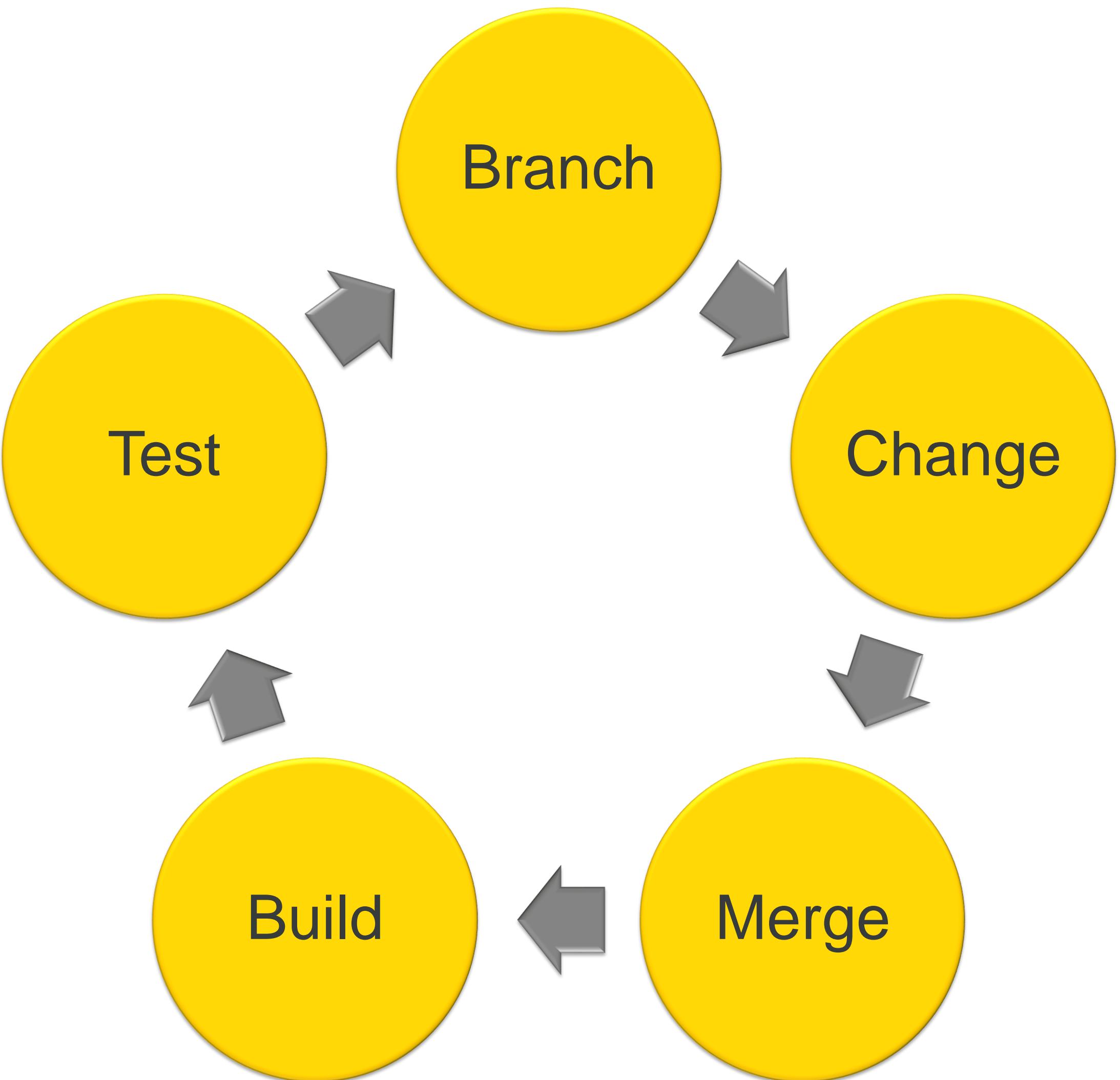


CI/CD on container platforms – Container Platforms



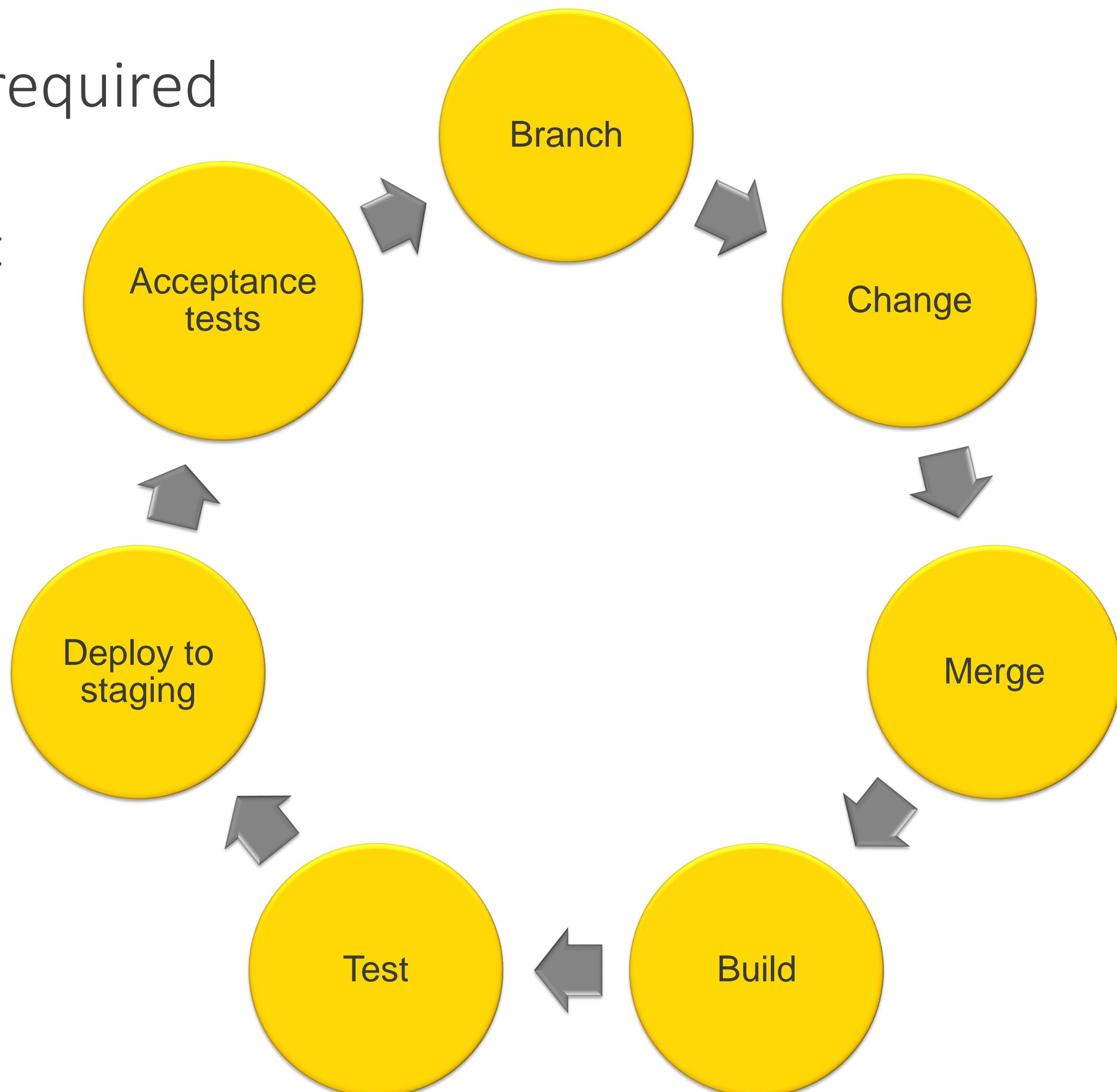
CI/CD on container platforms – CI

- Proposed by Grady Booch in 1991
- Adopted in extreme programming
- Merge your code early and often
- Build your code automated after change
- Test your code automated after change
- Goal
 - Early feedback on changes
 - Reduce merge conflicts



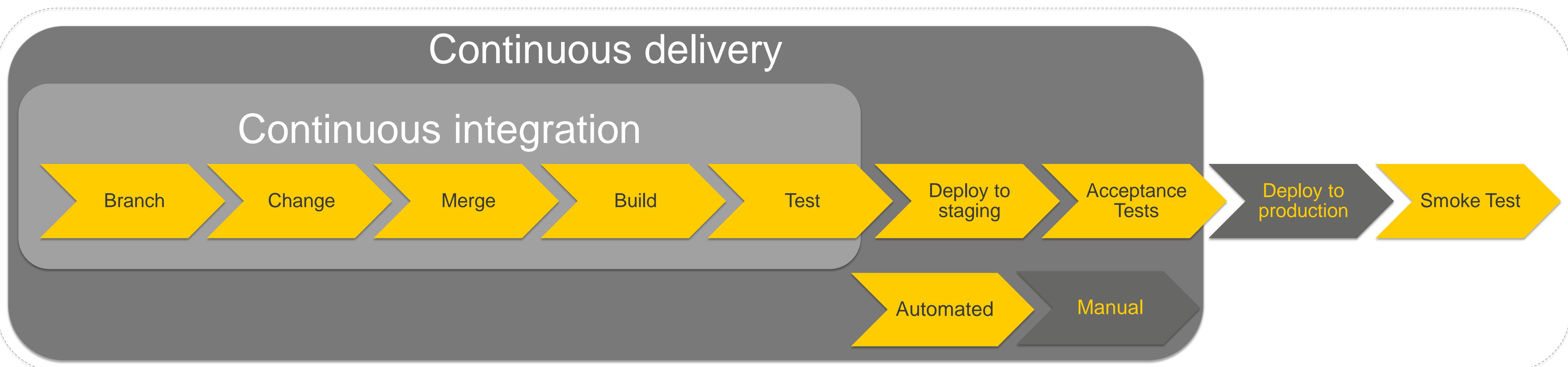
CI/CD on container platforms – CD

- Release your software whenever it's required
- Extends continuous integration by
 - Deployment into a staging environment
 - Acceptance tests



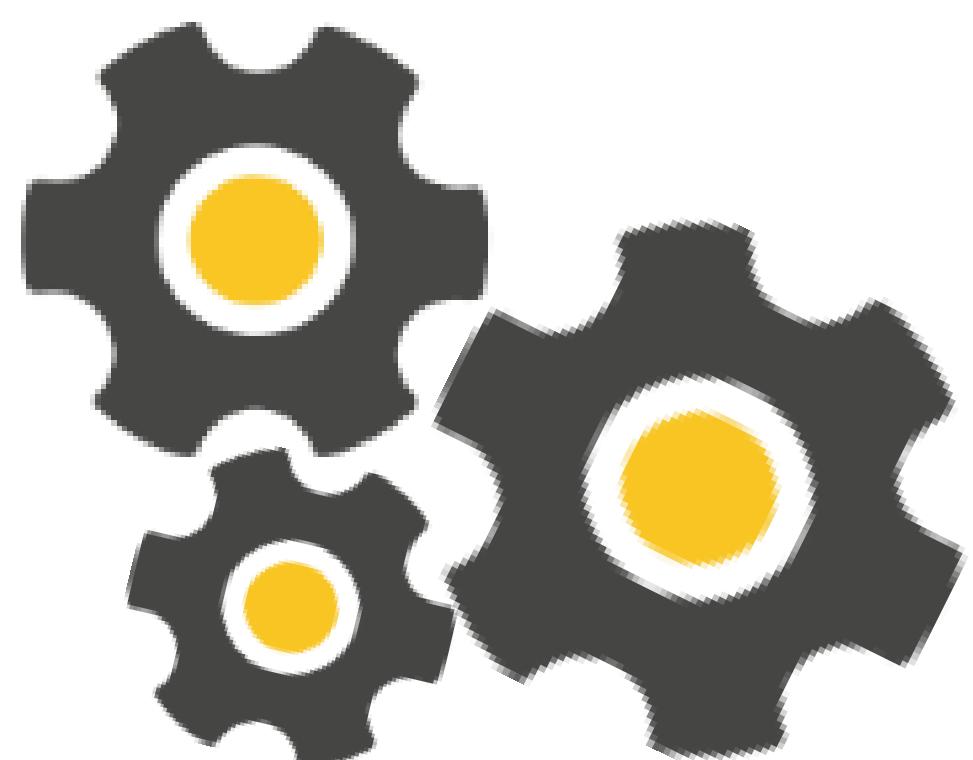
CI/CD on container platforms – CI/CD pipelines

- Automate everything from code change to pre production
- Increase visibility of issues while building, testing, deploying your product
- Allows fast feedback loops
- Empowers you to deliver continuously
- Enables continuous deployment

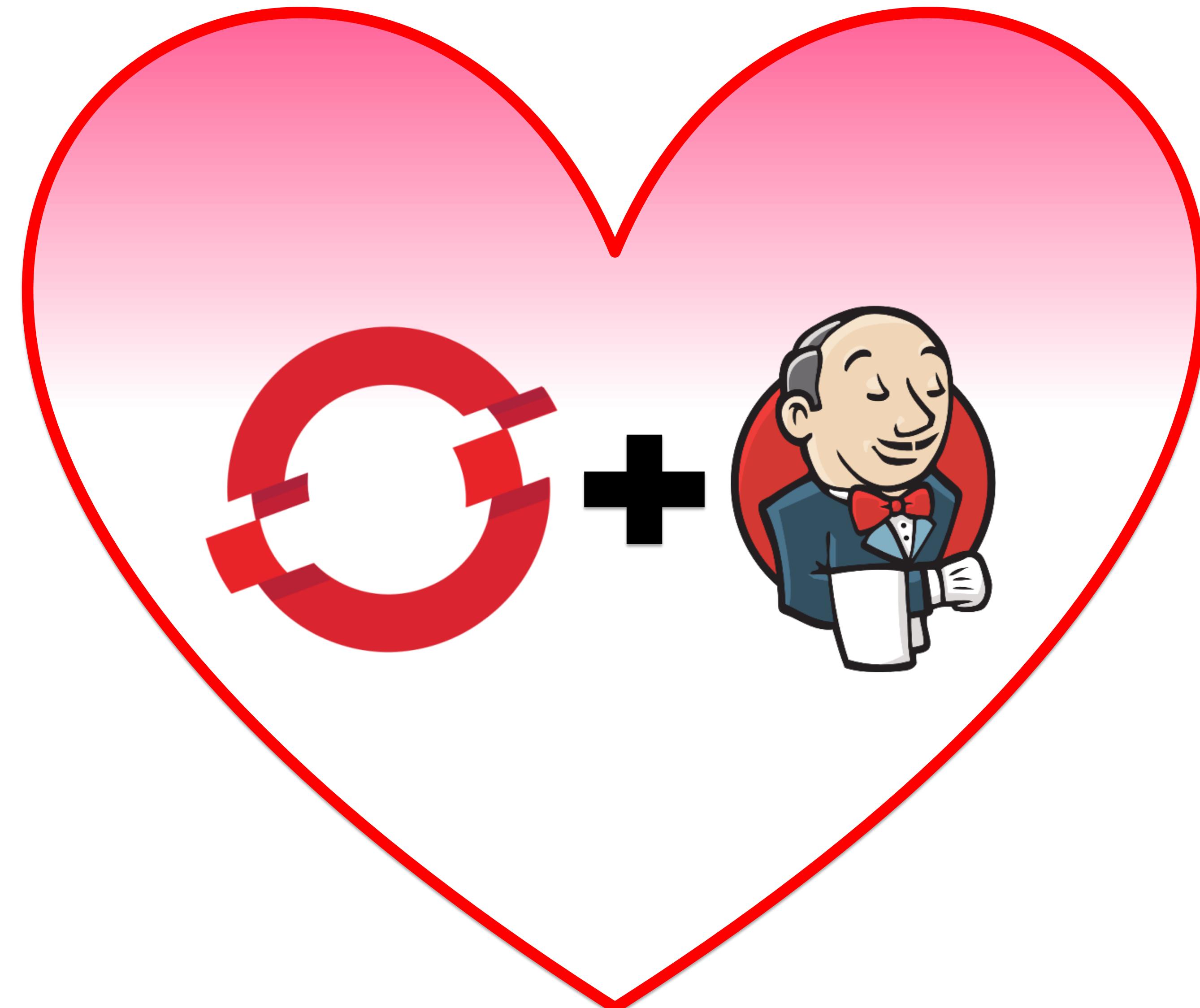


CI/CD on container platforms – CI/CD pipelines

- Modern CI/CD life cycles have to be enabled by software
 - Configuration as code
- Various software solutions on the market
 - Travis CI
 - GitLab CI
 - OpenShift with Jenkins
 - etc.
- Provide a configurable platform to specify build pipelines

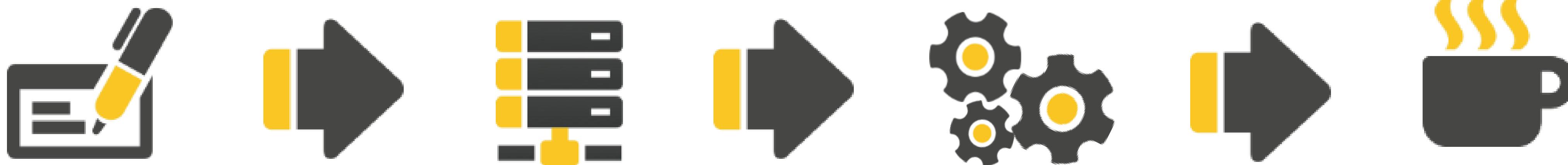


CI/CD on container platforms – CI/CD pipelines



CI/CD on container platforms – CI/CD pipelines

- Define your individual pipeline
- Bind it to your source control
- Deploy the pipeline to your Jenkins
- Get some coffee



CI/CD on container platforms – Build configs

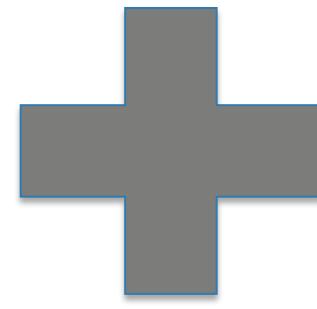
- Build configs specify how to build software
- YAML or JSON format
- Different strategies for various use cases
 - jenkinsPipelineStrategy
 - sourceStrategy
 - dockerStrategy
 - customStrategy

```
apiVersion: v1
kind: BuildConfig
metadata:
  labels:
    build: ${APPLICATION_NAME}-pipeline
    component: backend
    app: ${APPLICATION_NAME}
  name: ${APPLICATION_NAME}-pipeline
spec:
  failedBuildsHistoryLimit: 5
  runPolicy: Serial
  source:
    git:
      uri: ${INFRASTRUCTURE_REPOSITORY_URL}
      sourceSecret:
        name: gitlab-ssh
      type: Git
  strategy:
    jenkinsPipelineStrategy:
      jenkinsfilePath: infra/jenkins/Jenkinsfile
    type: Source
```

CI/CD on container platforms – Jenkins

- We need a Jenkins file to define the pipeline
- We need a jenkinsPipelineStrategy build config
- Build a Jenkins containing the Jenkins file
- Jenkins and build configuration stored in the git repository

```
node{  
    checkout scm  
}
```



```
- apiVersion: v1  
kind: BuildConfig  
metadata:  
  labels:  
    build: ${APPLICATION_NAME}-pipeline  
    component: backend  
    app: ${APPLICATION_NAME}  
  name: ${APPLICATION_NAME}-pipeline  
spec:  
  failedBuildsHistoryLimit: 5  
  runPolicy: Serial  
  source:  
    git:  
      uri: ${INFRASTRUCTURE_REPOSITORY_URL}  
    sourceSecret:  
      name: gitlab-ssh  
    type: Git  
  strategy:  
    jenkinsPipelineStrategy:  
      jenkinsfilePath: infra/jenkins/Jenkinsfile  
    type: Source
```



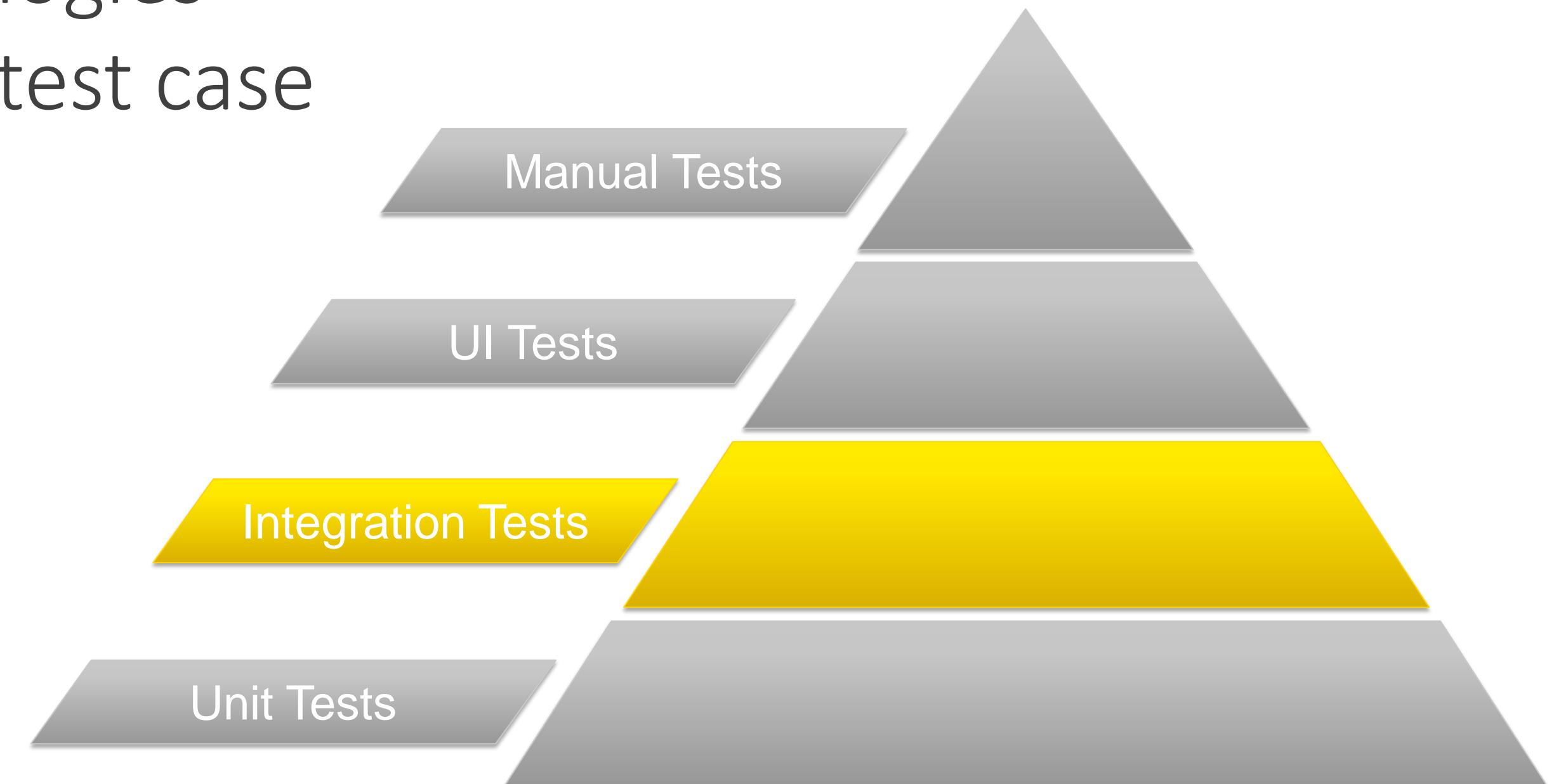
Agenda

- Testing of microservices
- CI/CD on container platforms
- Integration testing with Citrus
- Demo
- Summary



Integration testing with CITRUS

- Open source framework
- Focus on automated integration testing
- No mocks – real messages
- Powerful message validation capabilities
- Supports a vast amount of technologies
- Transports combinable in a single test case



Feature overview



REST

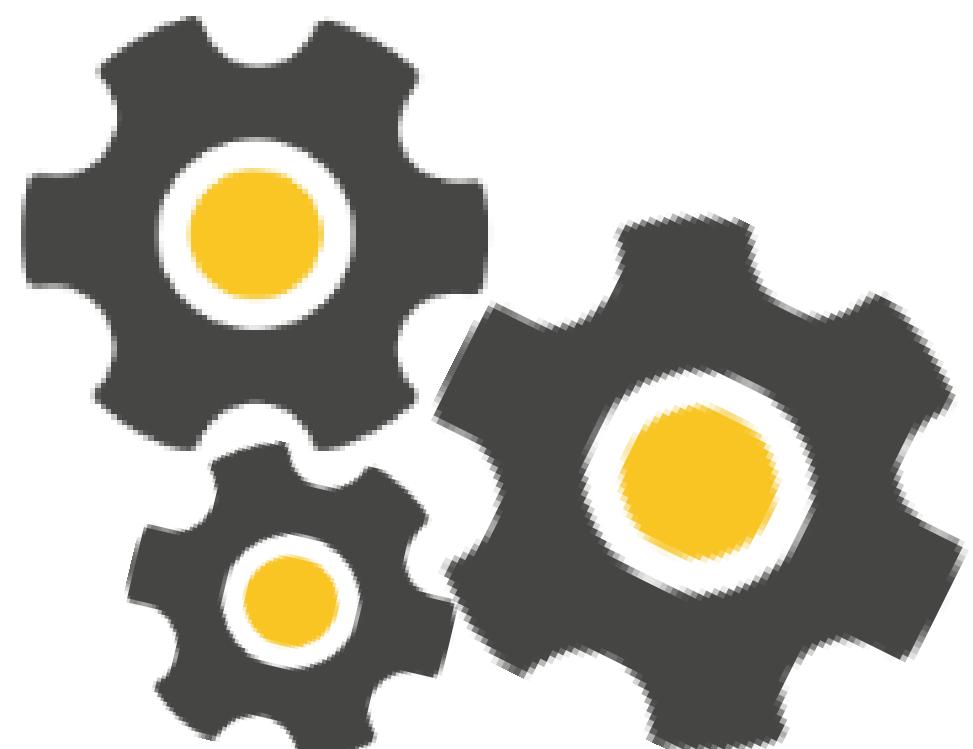


Feature overview

Endpoint	Description
citrus-http	HTTP client and server
citrus-kafka	Kafka client and server
citrus-jms	JMS consumer and producer
citrus-ws	SOAP WebServices client and server
citrus-mail	Mail client and server
citrus-camel	Apache Camel components
citrus-selenium	Selenium browser
citrus-jdbc	JDBC server simulation including JDBC driver
citrus-ftp	FTP client and server
citrus-vertx	Vert.x consumer and producer
citrus-ssh	SSH client and server
...	...

Integration testing with CITRUS

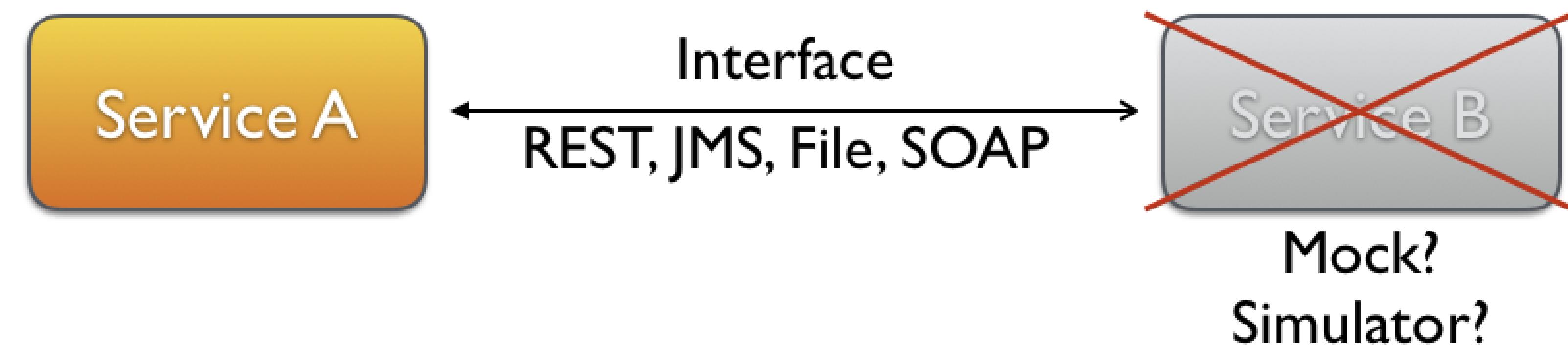
- Rich Java-DSL to write tests
- Integrates with JUnit and TestNG
- Integrates with common build tools
 - Maven
 - Gradle
 - Ant
- Therefore tests are easily executable with Jenkins



Integration testing with CITRUS



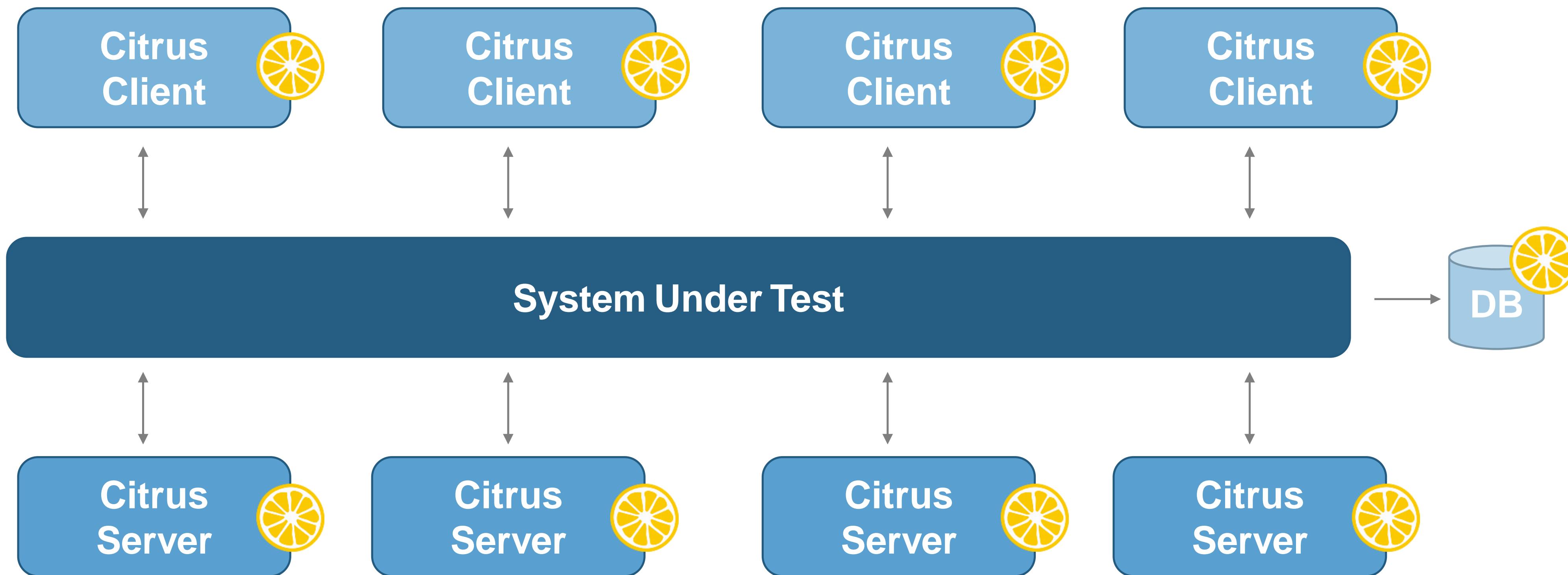
Integration testing with CITRUS



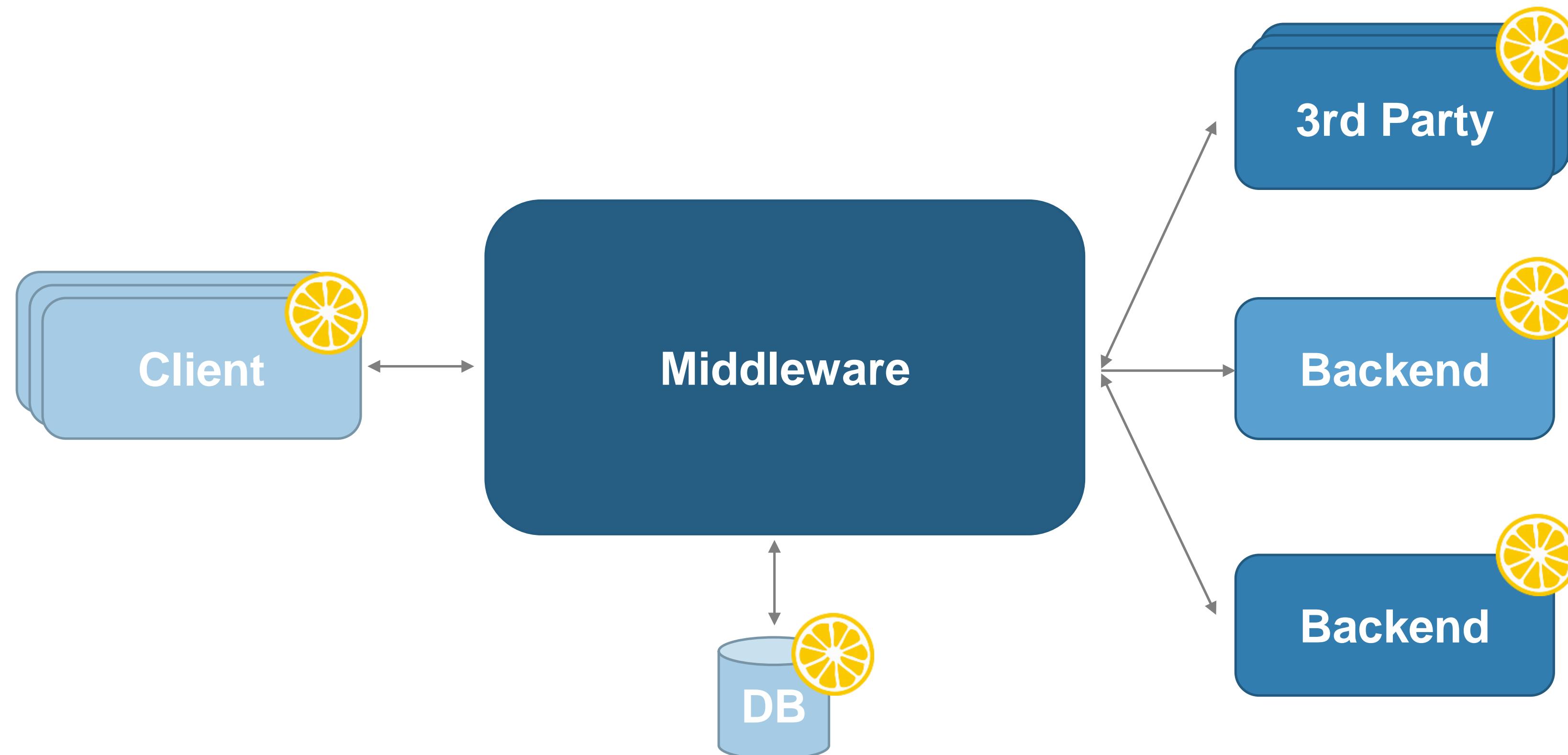
Integration testing with CITRUS



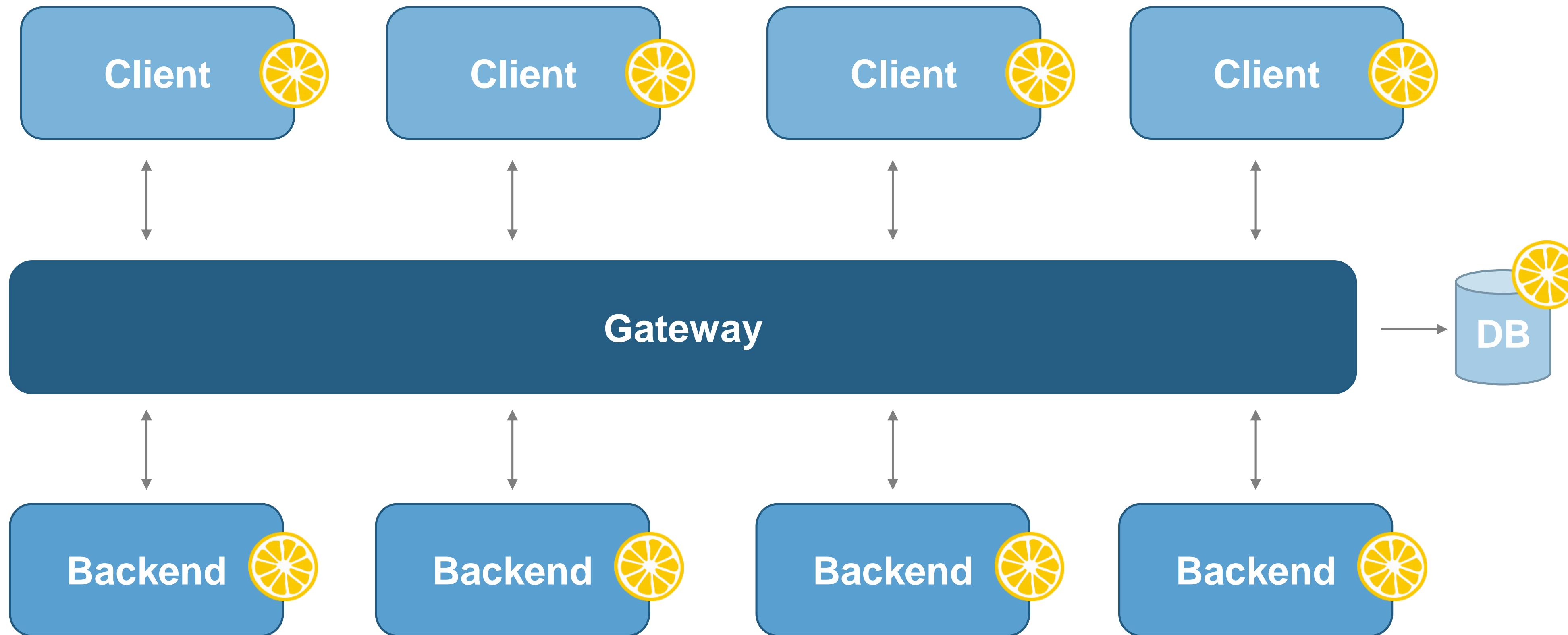
Integration testing with CITRUS



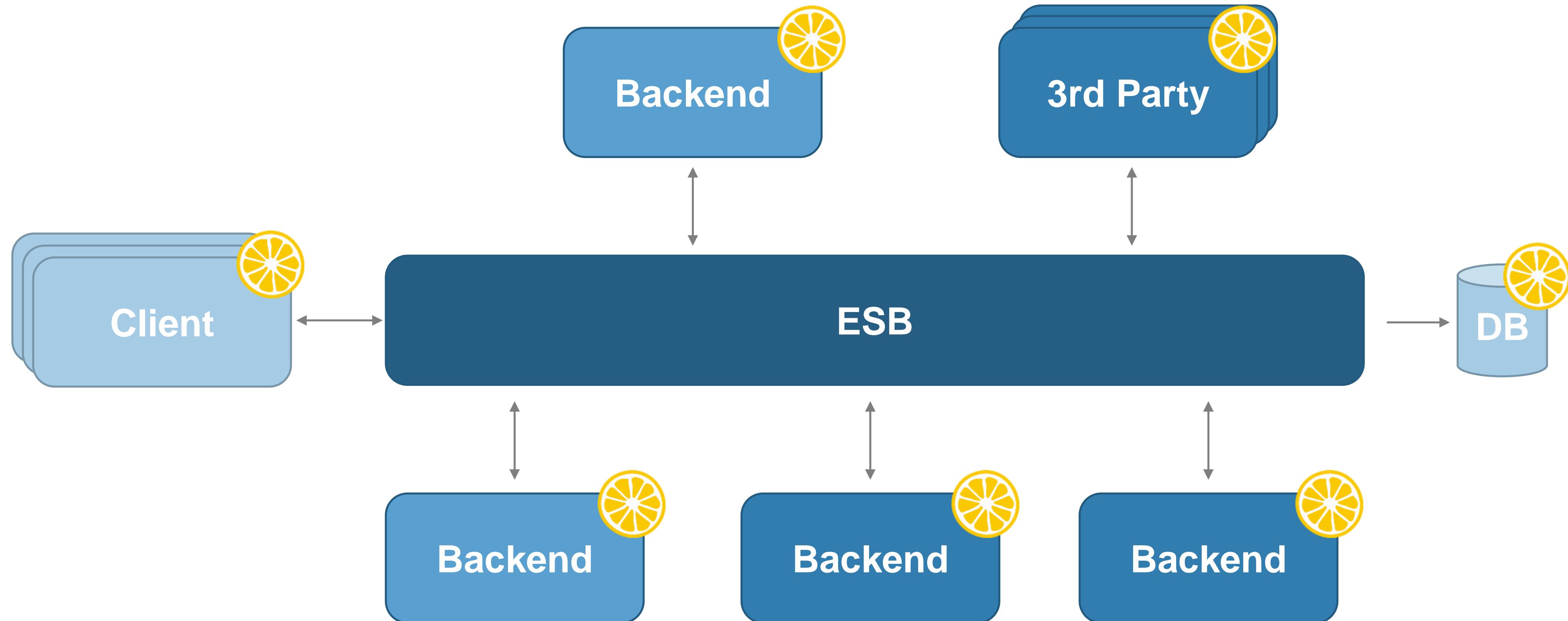
Integration testing with CITRUS



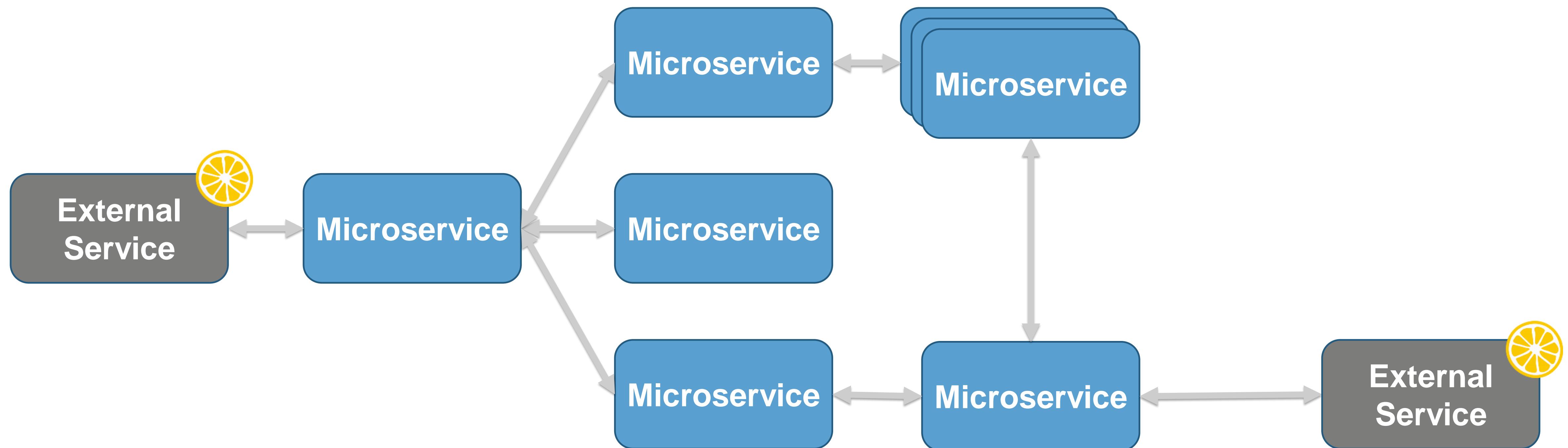
Integration testing with CITRUS



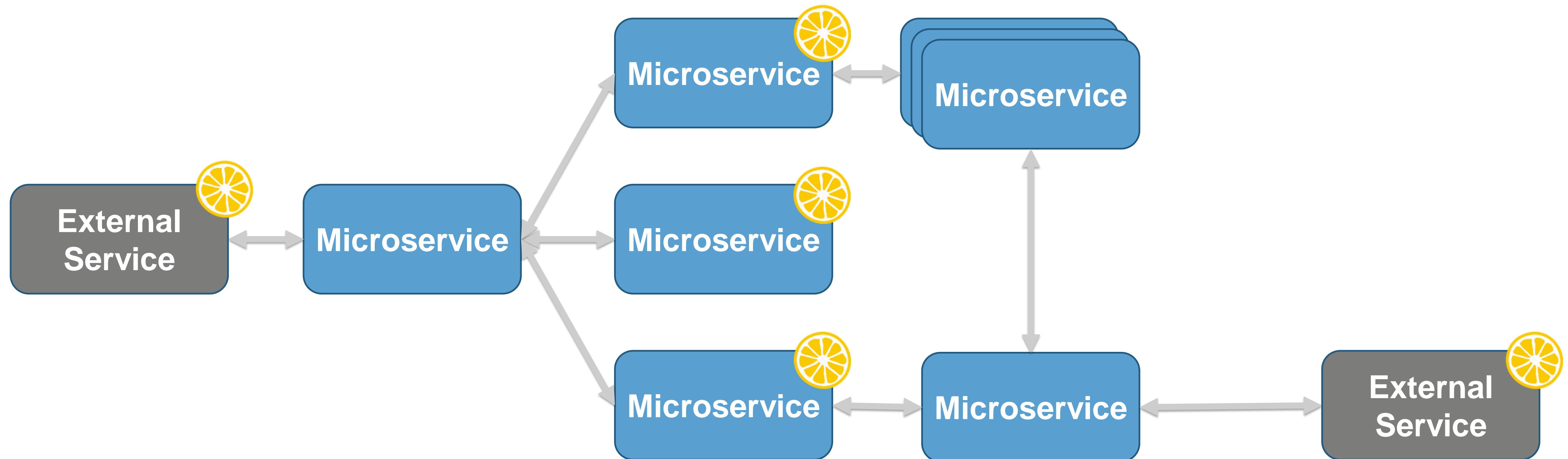
Integration testing with CITRUS



Integration testing with CITRUS

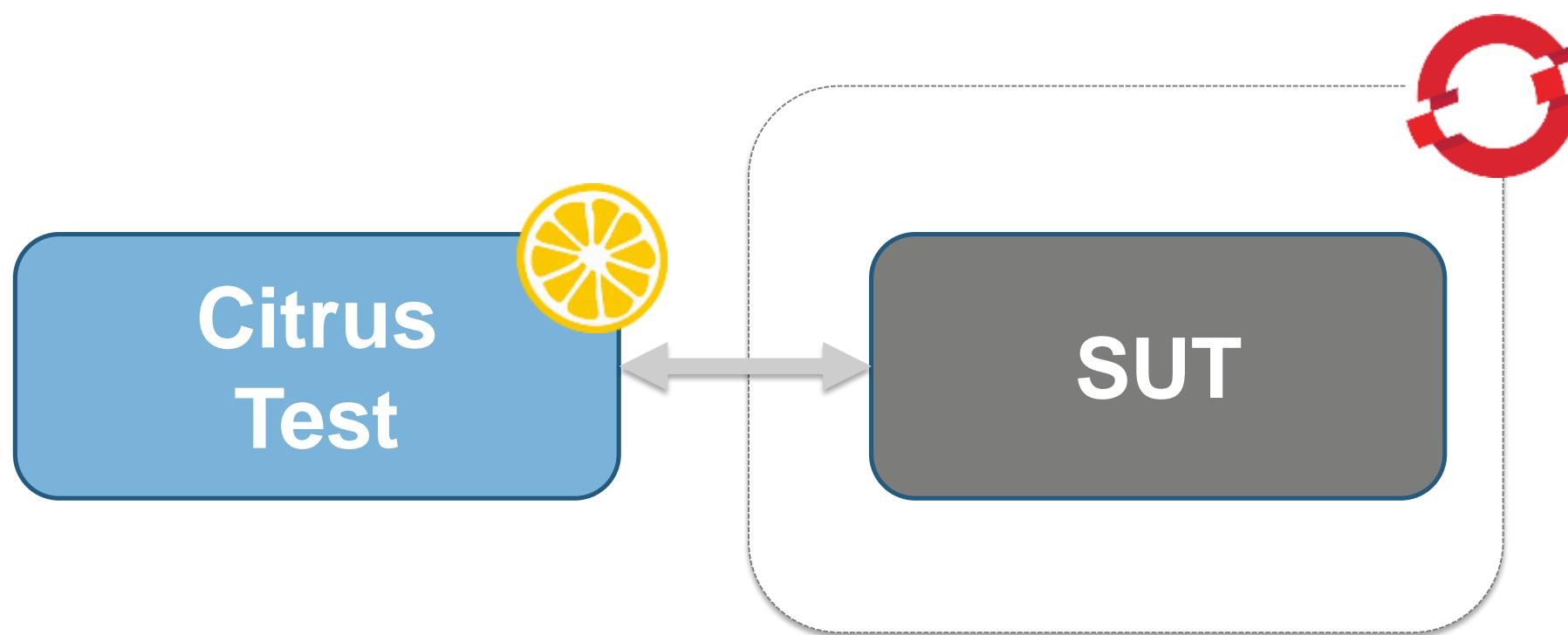


Integration testing with CITRUS



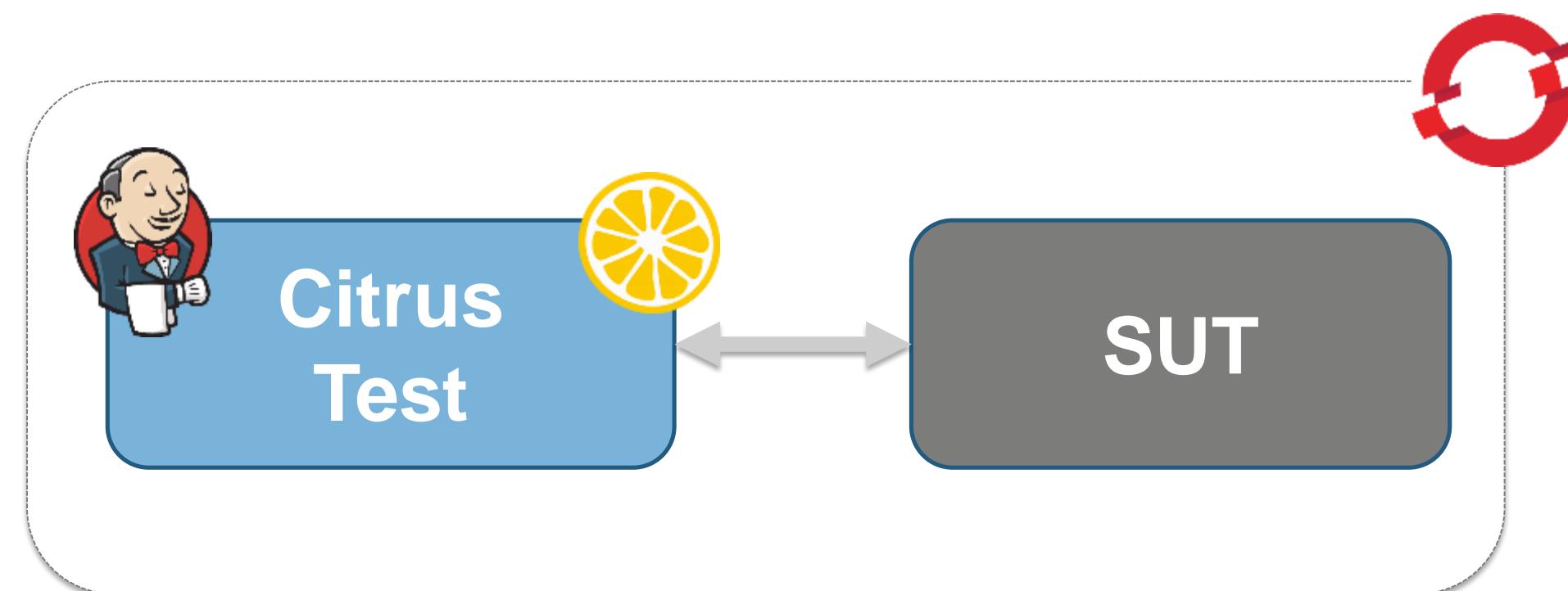
Integration testing with CITRUS

Direct test execution



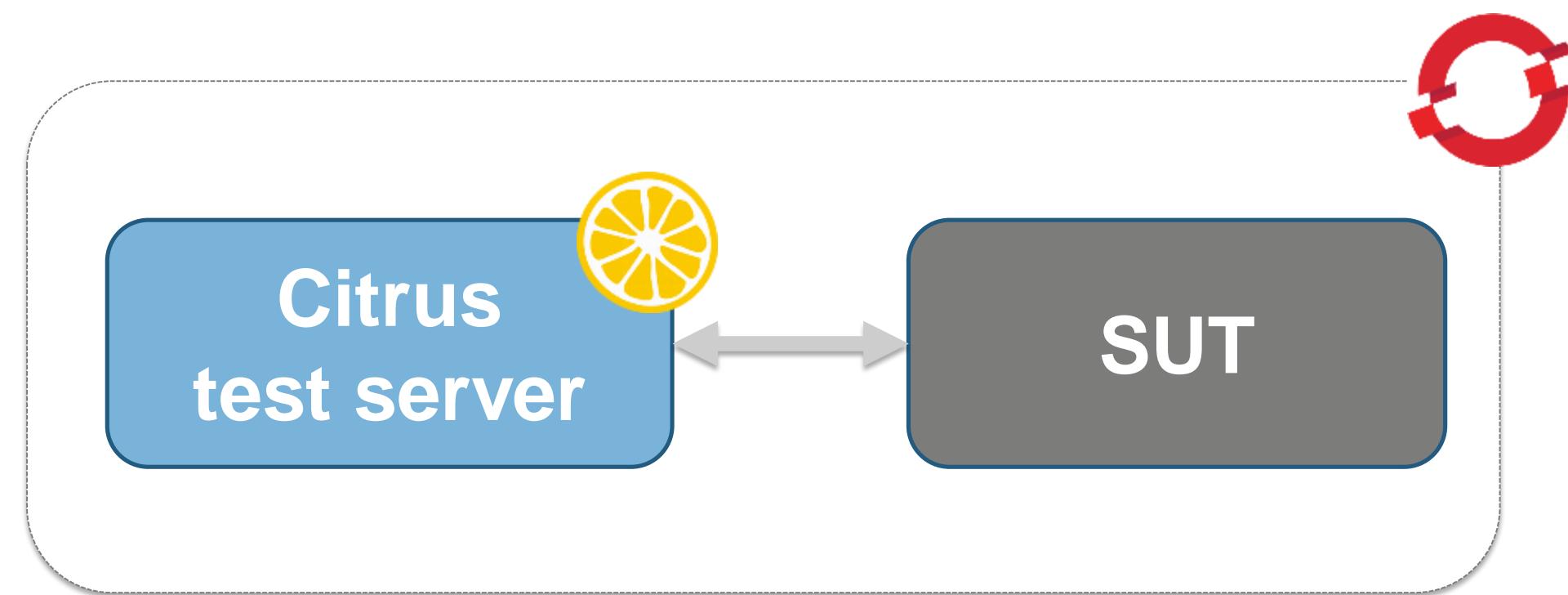
Integration testing with CITRUS

From a Jenkins slave



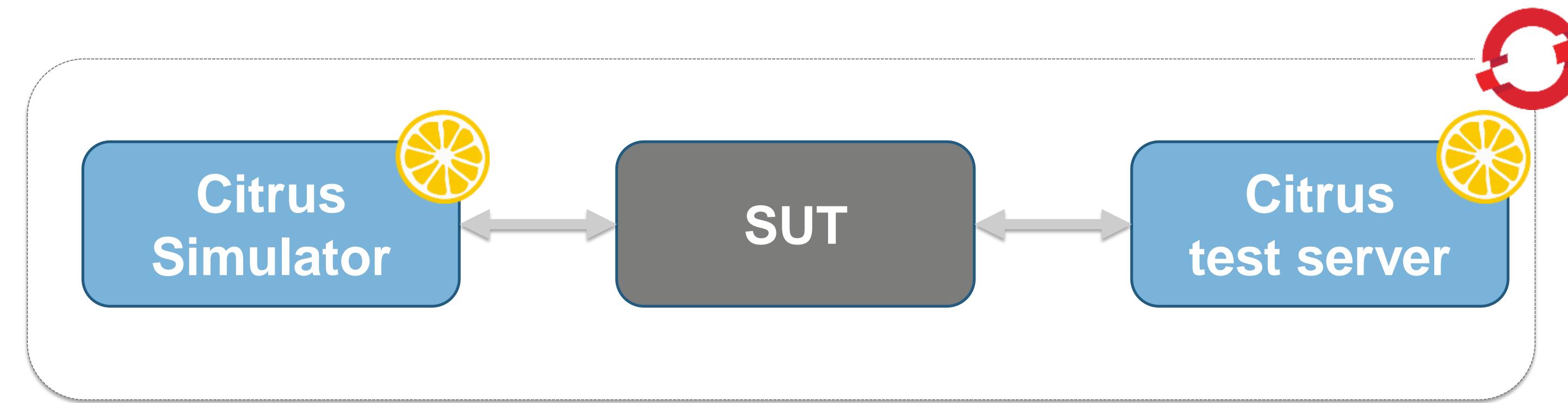
Integration testing with CITRUS

From a dedicated test server



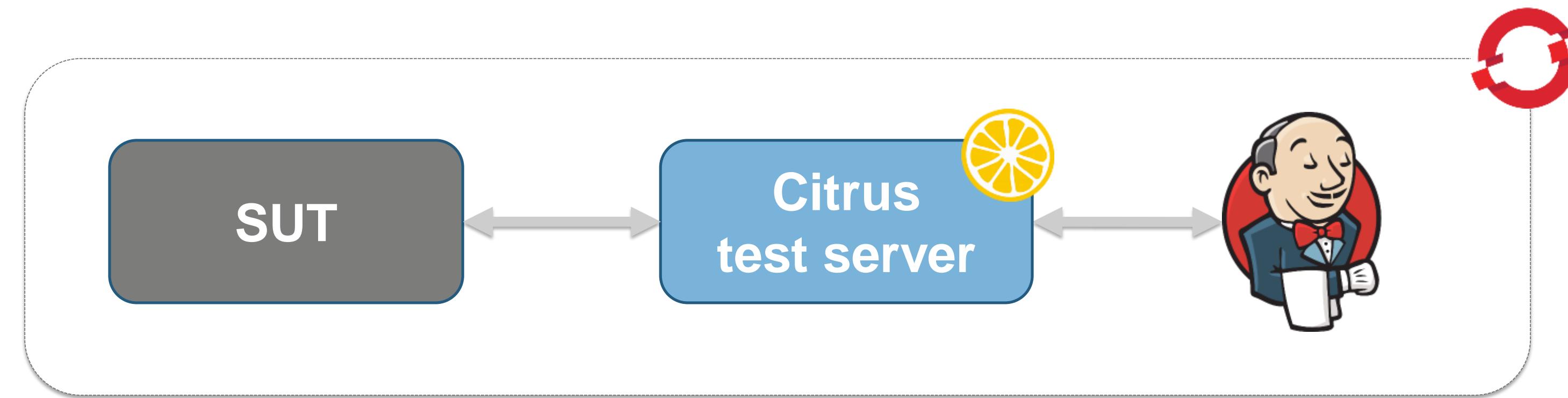
Integration testing with CITRUS

In combination with a standalone Simulator



Integration testing with CITRUS

With Jenkins controlling your test server



Agenda

- Testing of microservices
- CI/CD on container platforms
- Integration testing with Citrus
- Demo
- Summary



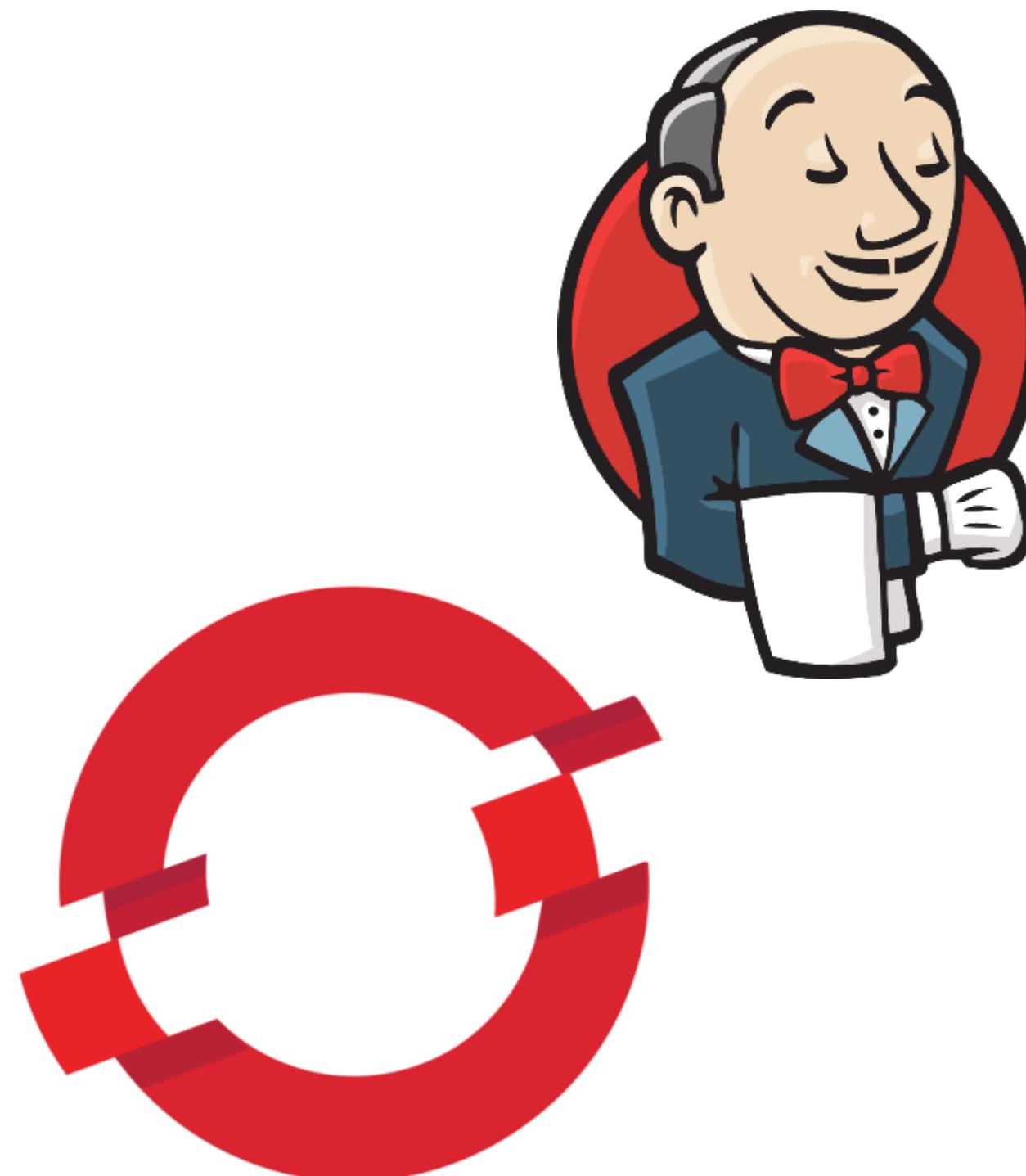
Agenda

- Testing of microservices
- CI/CD on container platforms
- Integration testing with Citrus
- Demo
- Summary



Summary

- Testing of microservices is different
- Modern container platforms can support you
 - Simplifies CI/CD
 - Simplifies testing
- Citrus for integration testing
 - Supports a vast amount of technologies
 - Flexible test execution
 - Transports combinable in a single test case





Questions?



Sven Hettwer
Senior Software Engineer

Kanzlerstraße 8
D-40472 Düsseldorf

 @SvenHettwer

 <https://github.com/svettwer>

 Sven.Hettwer@consol.de

 +49-211-339903-86



Thank you!