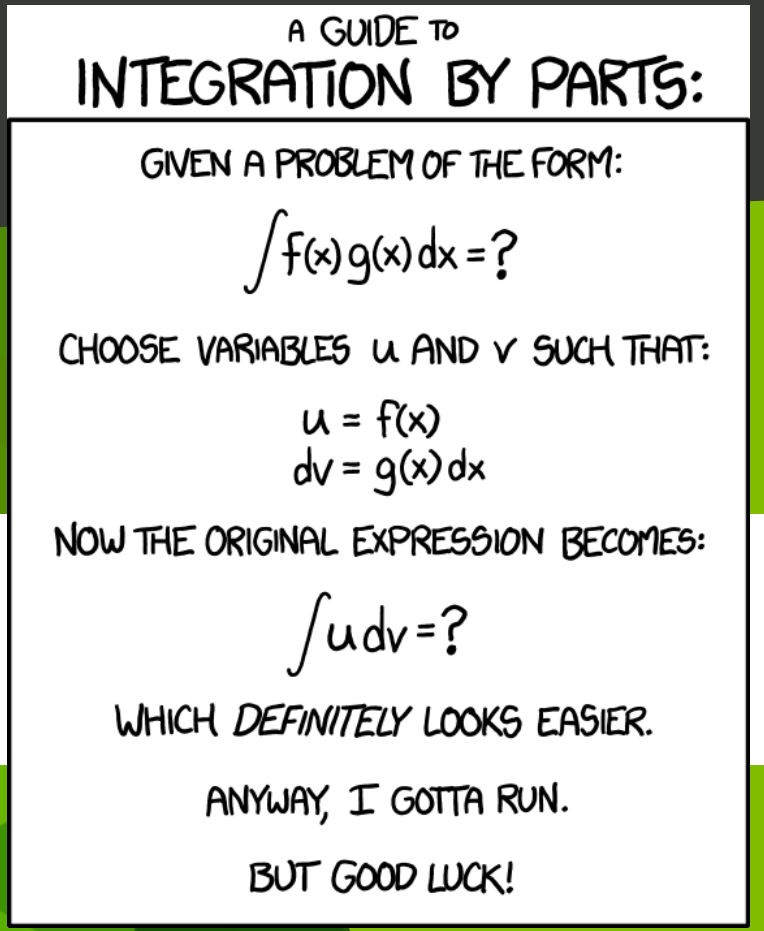
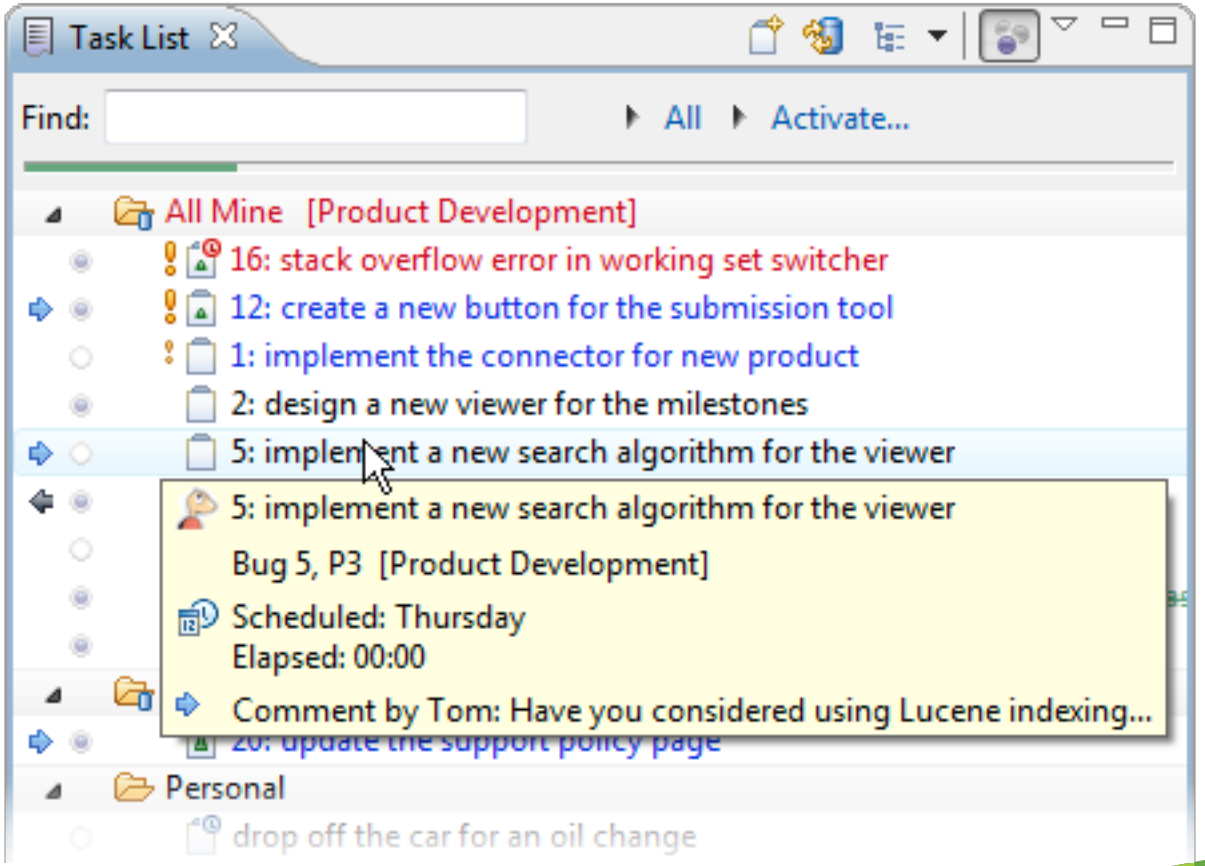
TASKTOP

Integration is hard,
Integration tests even more so

@bmuskalla





© Tasktop 2019

© Tasktop 2019

© Tasktop 2019

© Tasktop 2019

© Tasktop 2019

Integration Landscape

View your organization's integration landscape to get an overview of artifact types flowing between your repositories via integrations.

Back to Collections

Landscape | List

+ New Integration

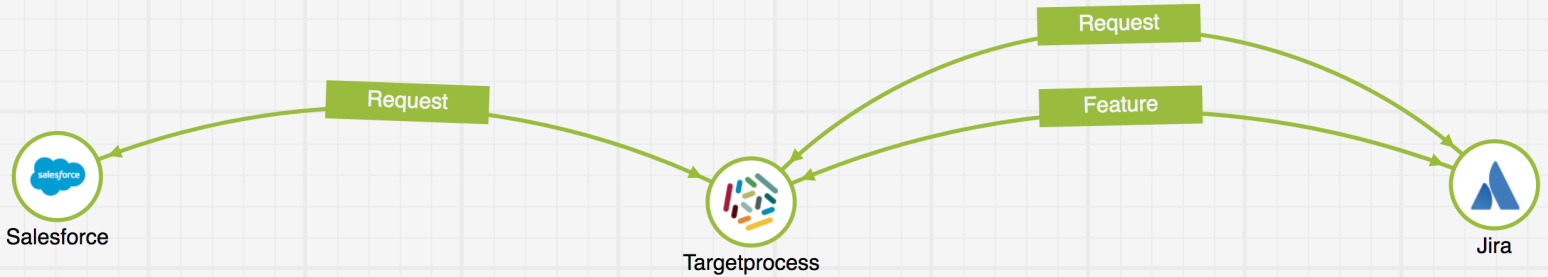
Filter | Reset Filter

Repository

Model

Display Settings | Show All Models | Show All Artifact Types

Reset Layout



	Atlassian JIRA
	IBM Doors
	Tricentis Tosca

© Tasktop 2019

	Atlassian JIRA	API
	IBM Doors	API
	Tricentis Tosca	API

© Tasktop 2019

	Atlassian JIRA	- Issue* - Sub-Task*
	IBM Doors	- Object
	Tricentis Tosca	- Defect* - Requirement - Test Case* - ...

* I'm a different API

© Tasktop 2019

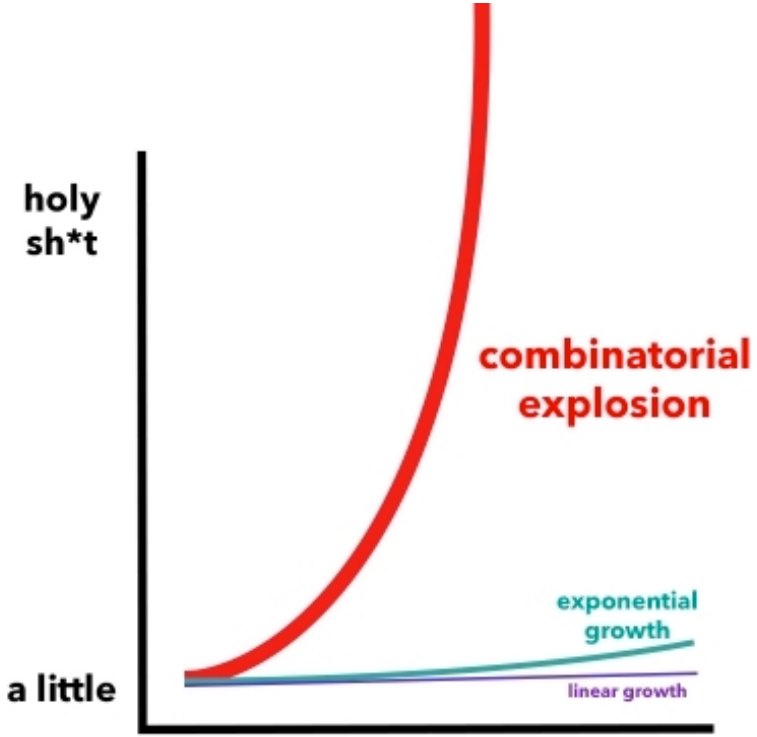
	Atlassian JIRA	- Issue - Sub-Task *6.4*	- Issue - Sub-Task *7.0*	- Issue - Sub-Task *SaaS*	*24 more…*
	IBM Doors	- Object *9.1*	- Object *9.2*	- Object *9.3*	*21 more…*
	Tricentis Tosca	- Defect - Requirement - Test Case - … *8.2.2*	- Defect - Requirement - Test Case - … 	- Defect - Requirement - Test Case - … *11.3*	*.. 16 more..*

© Tasktop 2019

Curse of Dimensionality

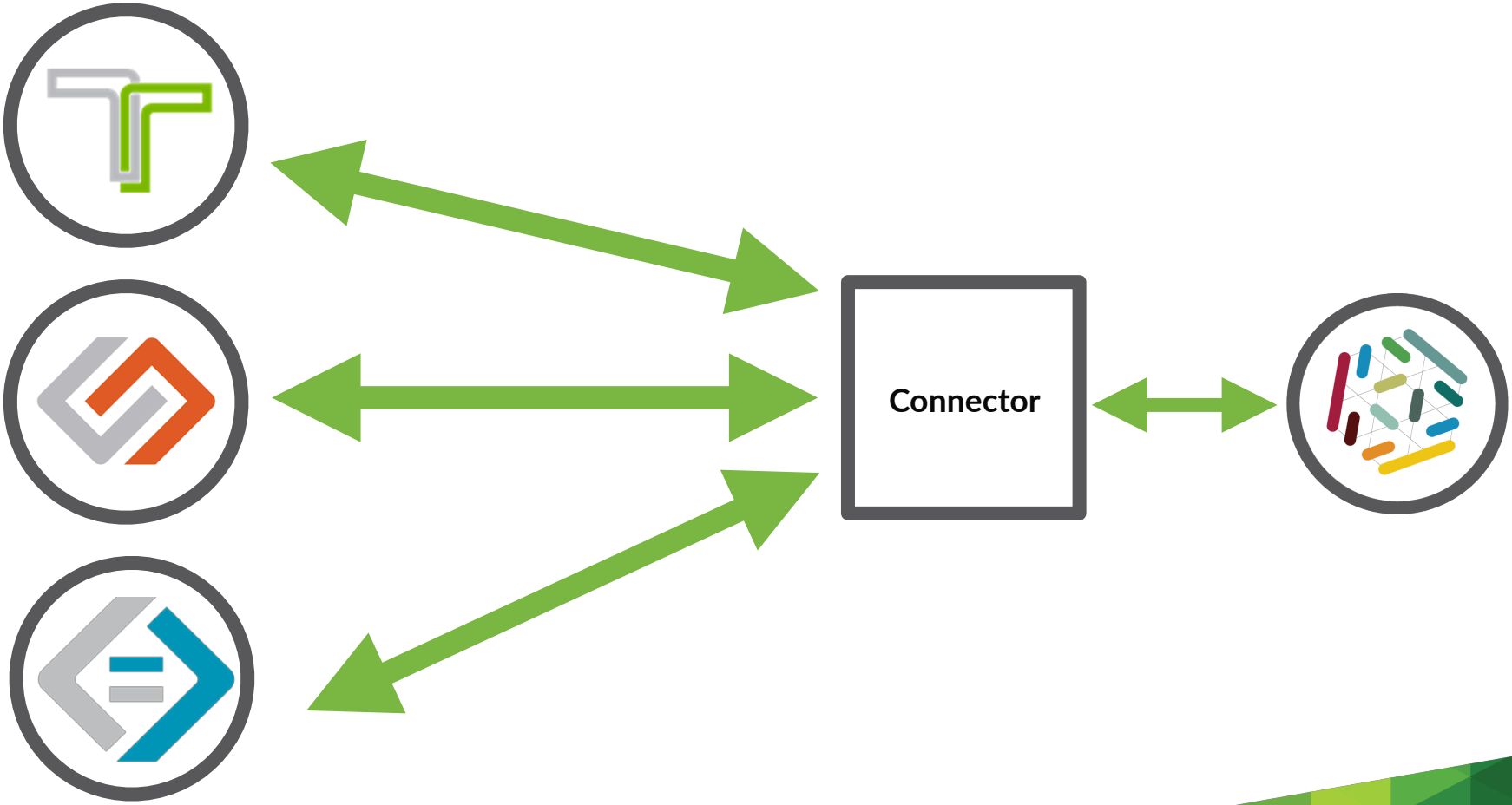
- Product use cases
- Repository Version
- Artifact Type (Defect, Requirement, …)
- Global repository settings (Streams enabled, …)
- Markup languages (Confluence, HTML, Markdown, …)
- Authentication methods (Credentials, Tokens, SSO, …)

© Tasktop 2018



© Tasktop 2019

Source: http://www.torbair.com/blog/2015/12/26/4mvxoio4tc8j28reqsbz449tlab4ss



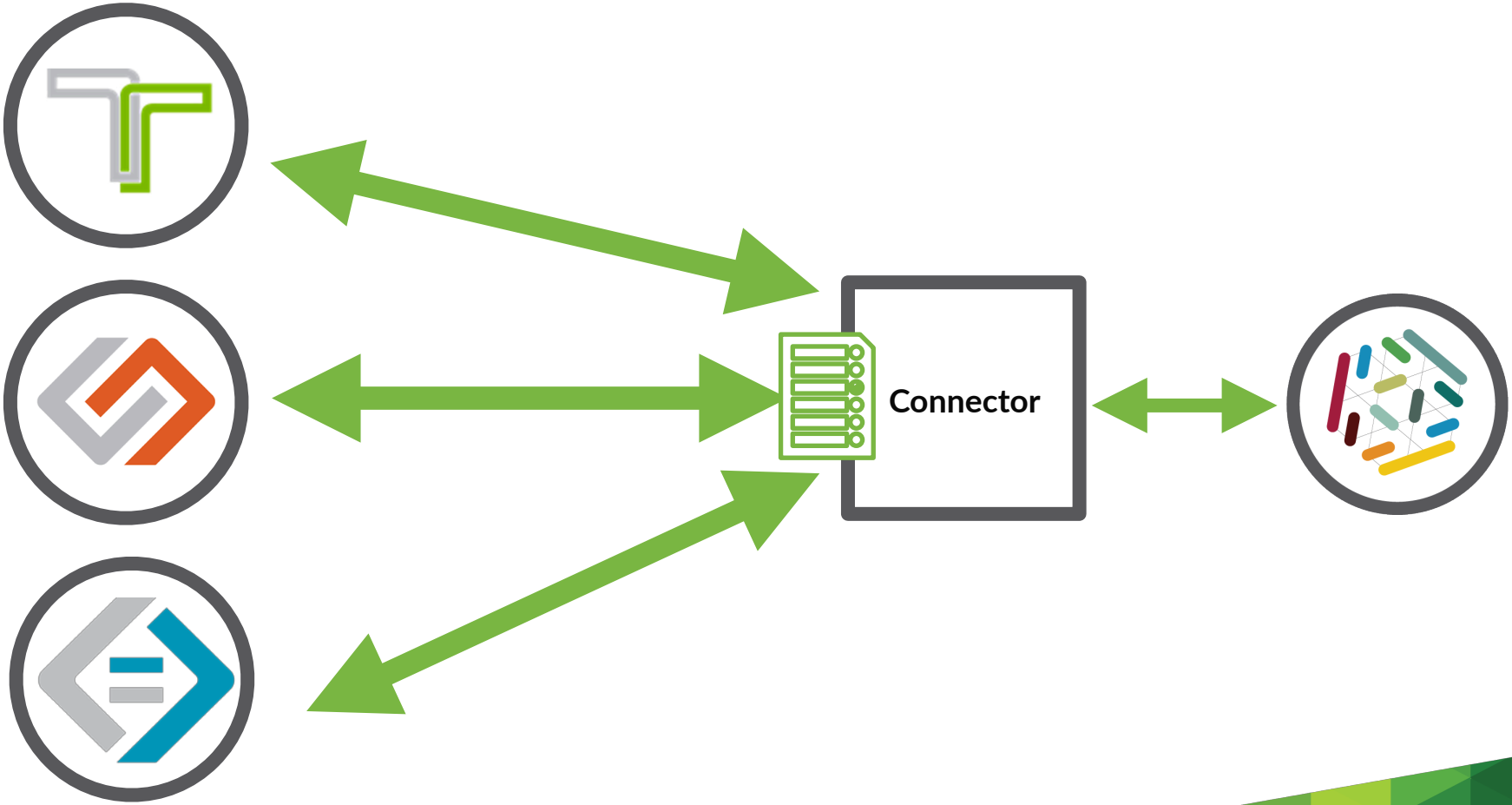
© Tasktop 2019

Consumer Driven Contract

© Tasktop 2019

```
7     Connector client can create, retrieve, update and delete an artifact
7.1   Connector client can create an artifact
7.2   Connector client can retrieve an artifact
7.3   Connector client can update an existing artifact
7.3.1 Connector client can update an artifact and report success
7.3.2 Connector client can update more than one attribute in a
        single operation
7.3.3 Connector client receives error when attempting to update an artifact
        that does not or no longer exists
7.3.4 Connector client receives meaningful feedback when the artifact
        update operation fails
```

© Tasktop 2019



© Tasktop 2019

TCK [tiː-siː-keɪ]

A **Technology Compatibility Kit (TCK)** is a suite of tests that at least nominally checks a particular alleged implementation of a Java Specification Request (JSR) for compliance.

© Tasktop 2019

TCK [tiː-siː-keɪ]

A **Technology Compatibility Kit (TCK)** is a suite of tests that at least nominally checks a particular alleged implementation of a Java Specification Request (JSR) for compliance.

Connector

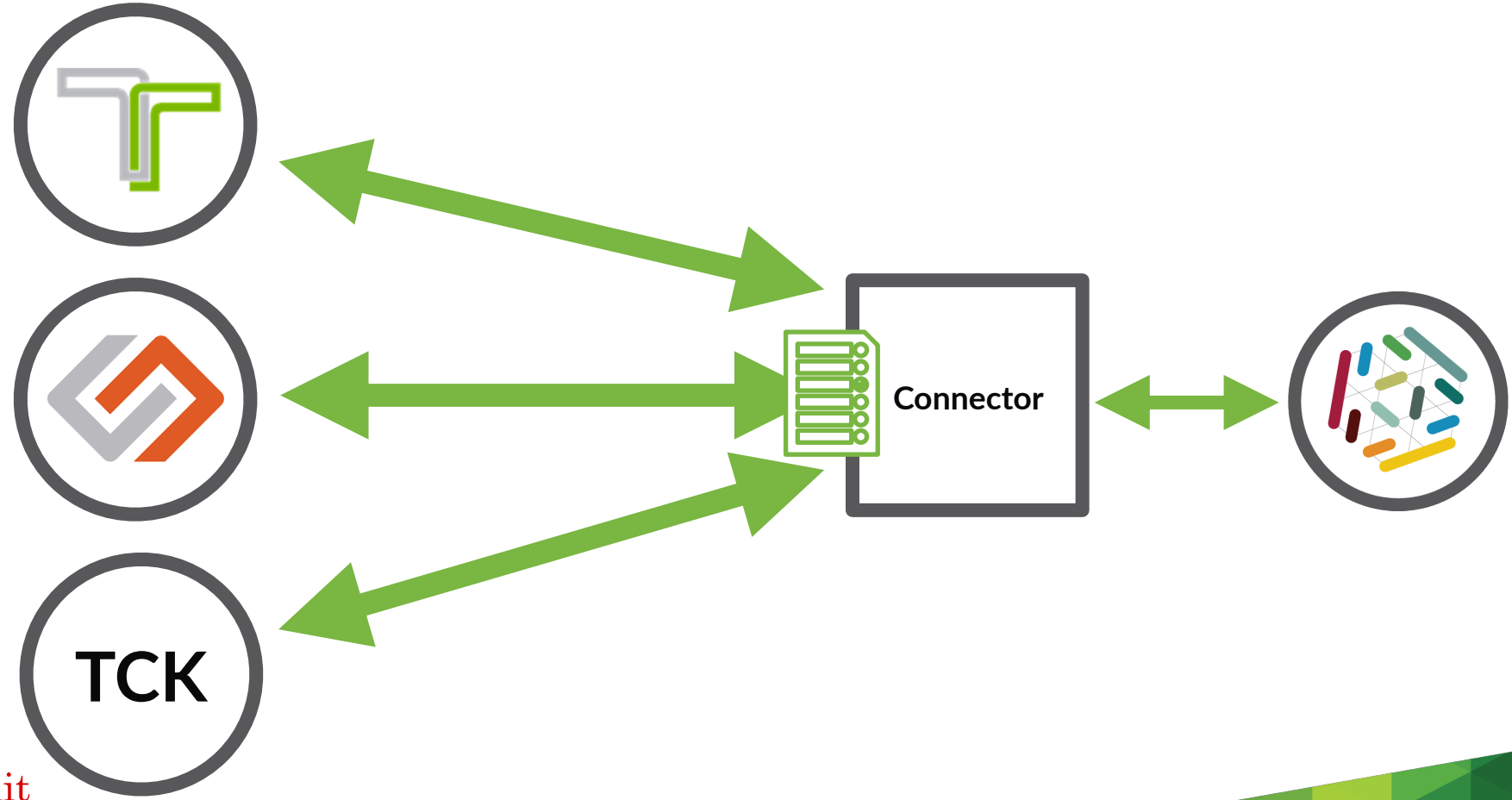
© Tasktop 2019

TCK [tiː-siː-keɪ]

A **Technology Compatibility Kit (TCK)** is a suite of tests that at least nominally checks a particular alleged implementation of a Java Specification Request (JSR) for compliance.

Connector

© Tasktop 2019

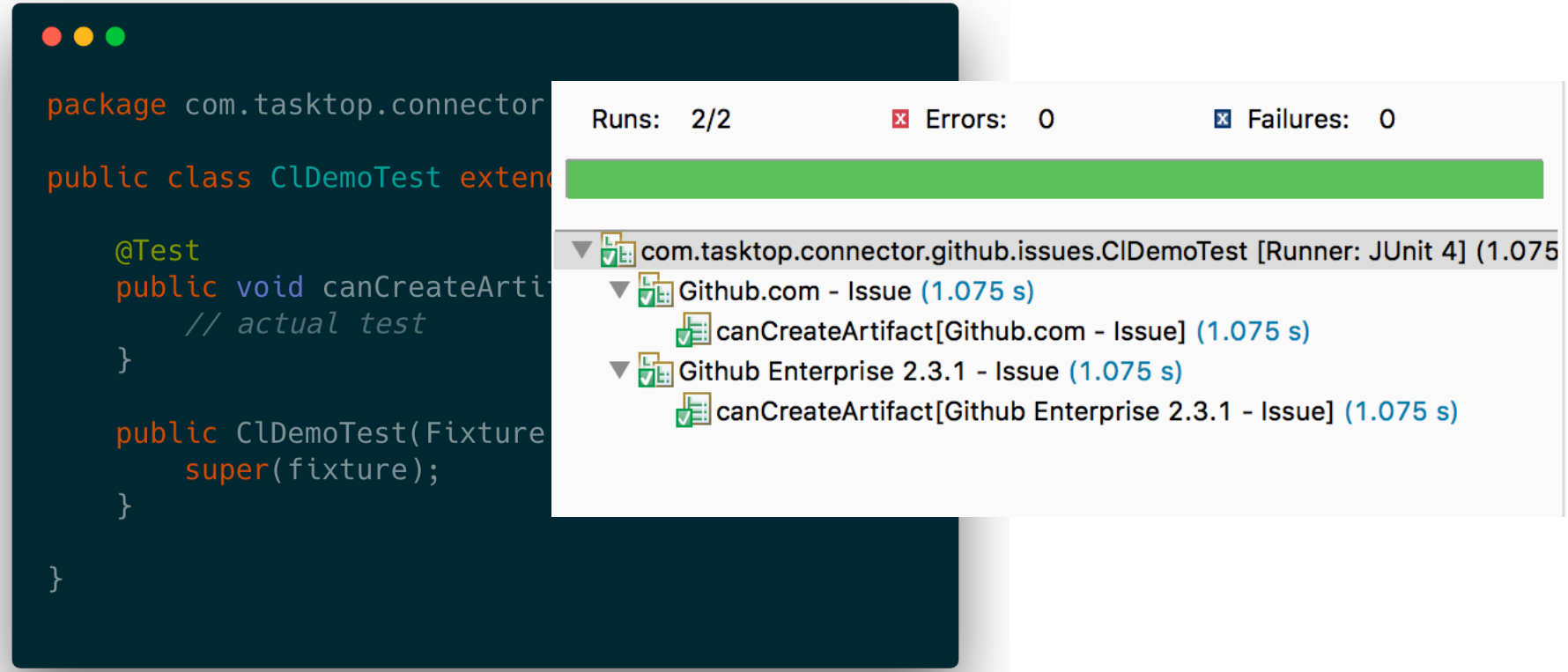


JUnit

© Tasktop 2019

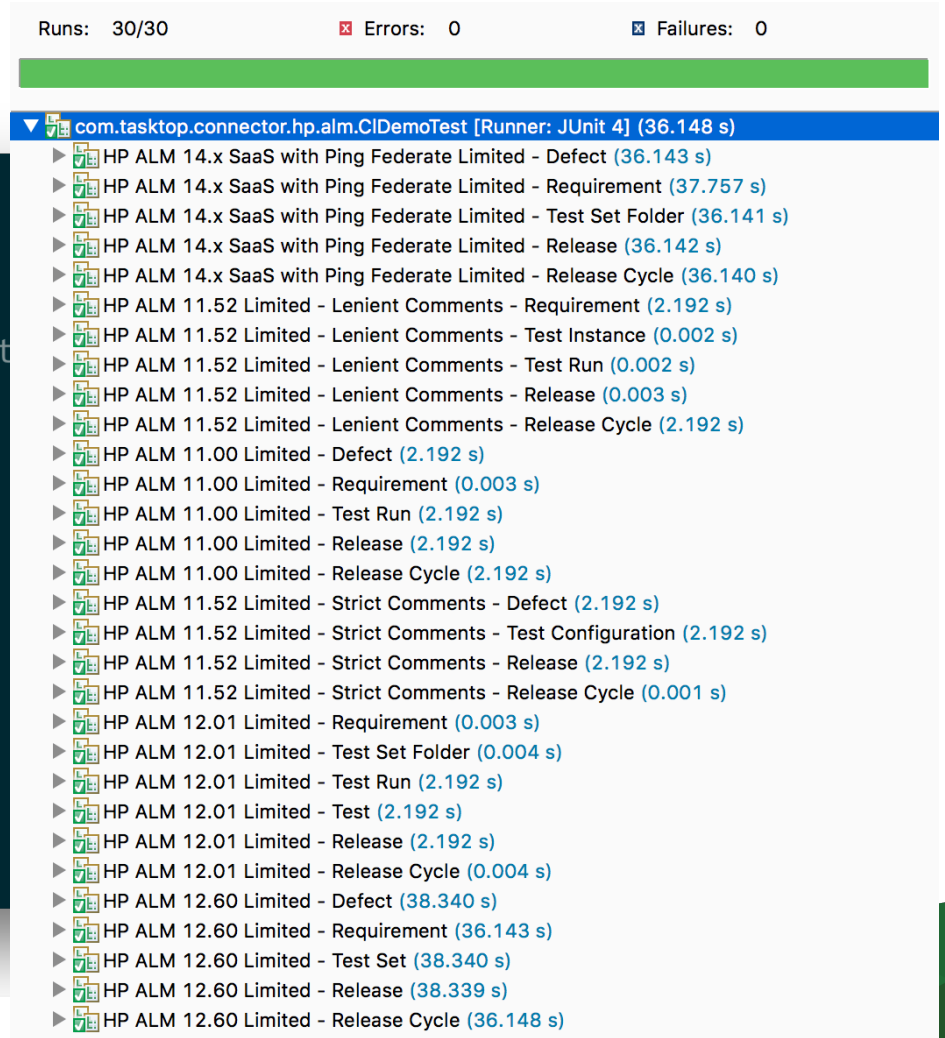
```java
package com.tasktop.connector.github.issues;

public class ClDemoTest extends ConnectorTestCase {

    @Test
    public void canCreateArtifact() {
        // actual test
    }

    public ClDemoTest(Fixture fixture) {
        super(fixture);
    }

}
```

© Tasktop 2019



© Tasktop 2019

```
package com.tasktop.connector.github.issues;

public class ClDemoTest extends ConnectorTest

    @Test
    public void canCreateArtifact() {
        // actual test
    }

    public ClDemoTest(Fixture fixture) {
        super(fixture);
    }

}
```



© Tasktop 2019

Testing against 58 tools in > 350 versions

© Tasktop 2019

471.000 TCK tests

per day

© Tasktop 2019

```java
@Test
@Validates(value = "7.1.1")
public void createArtifactWithSummary() {
    Artifact artifact = fixture().createArtifact();

    artifact.setSummary("some string");
    fixture().updateArtifact(artifact);

    assertThat(artifact.getSummary()).isEqualTo("some string");
}
```

© Tasktop 2019

© Tasktop 2019

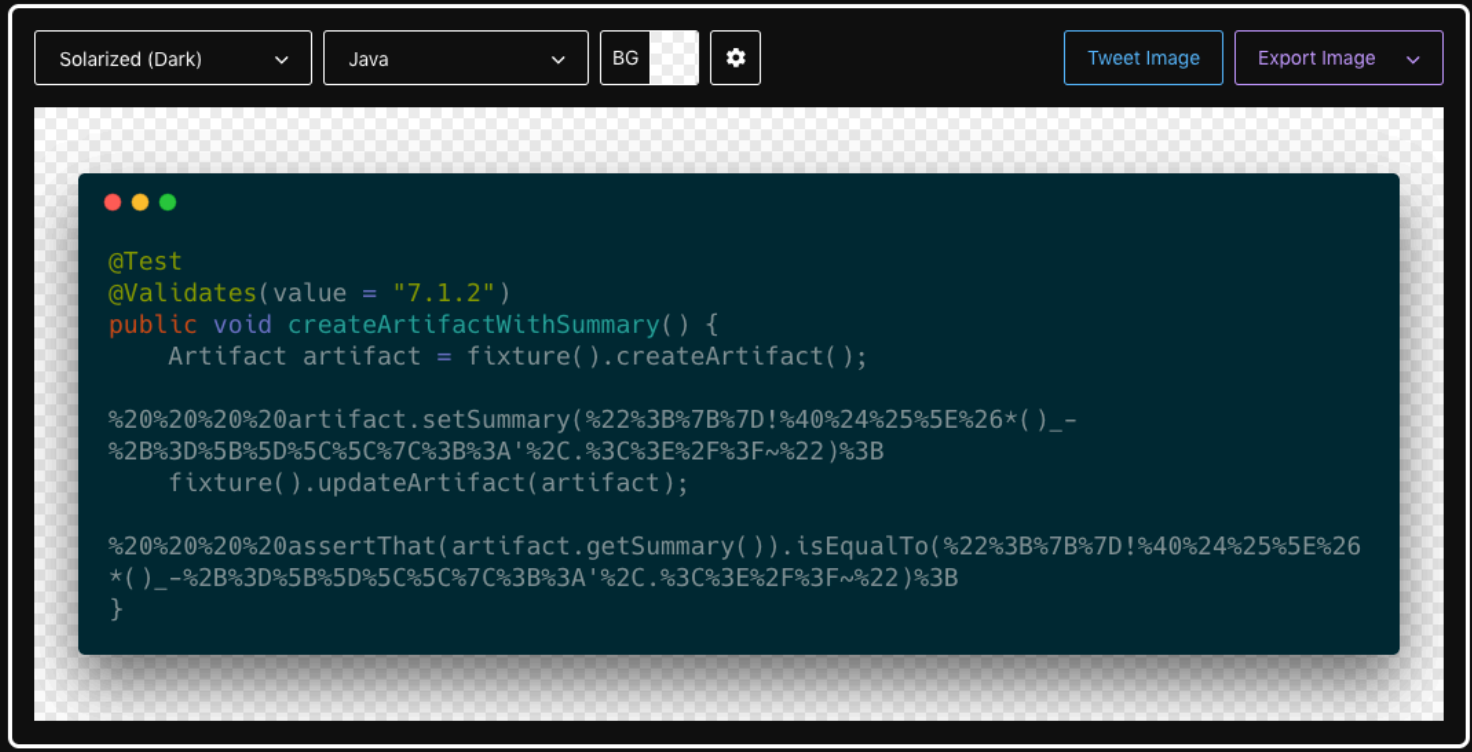
One @Test to catch them all

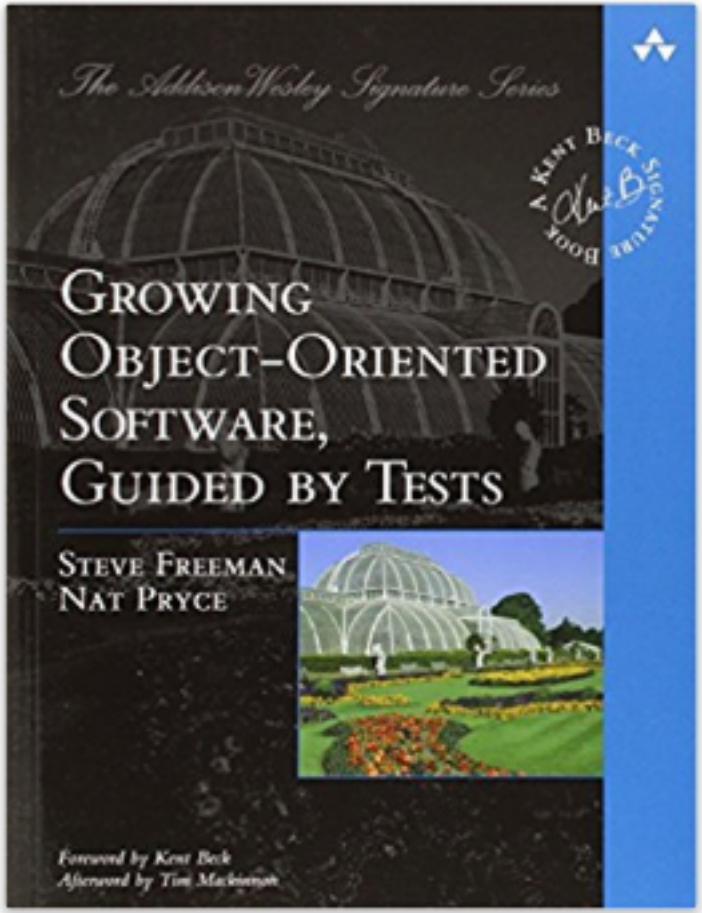
```java
@Test
@Validates(value = "7.1.2")
public void createArtifactWithSummary() {
    Artifact artifact = fixture().createArtifact();

    artifact.setSummary(";{}!@$%^&*()_-+=[]|;:',.<>/?~");
    fixture().updateArtifact(artifact);

    assertThat(artifact.getSummary()).isEqualTo(";{}!@$%^&*()_-+=[]|;:',.<>/?~");
}
```

© Tasktop 2019

carbon

Create and share beautiful images of your source code.
Start typing or drop a file into the text area to get started.



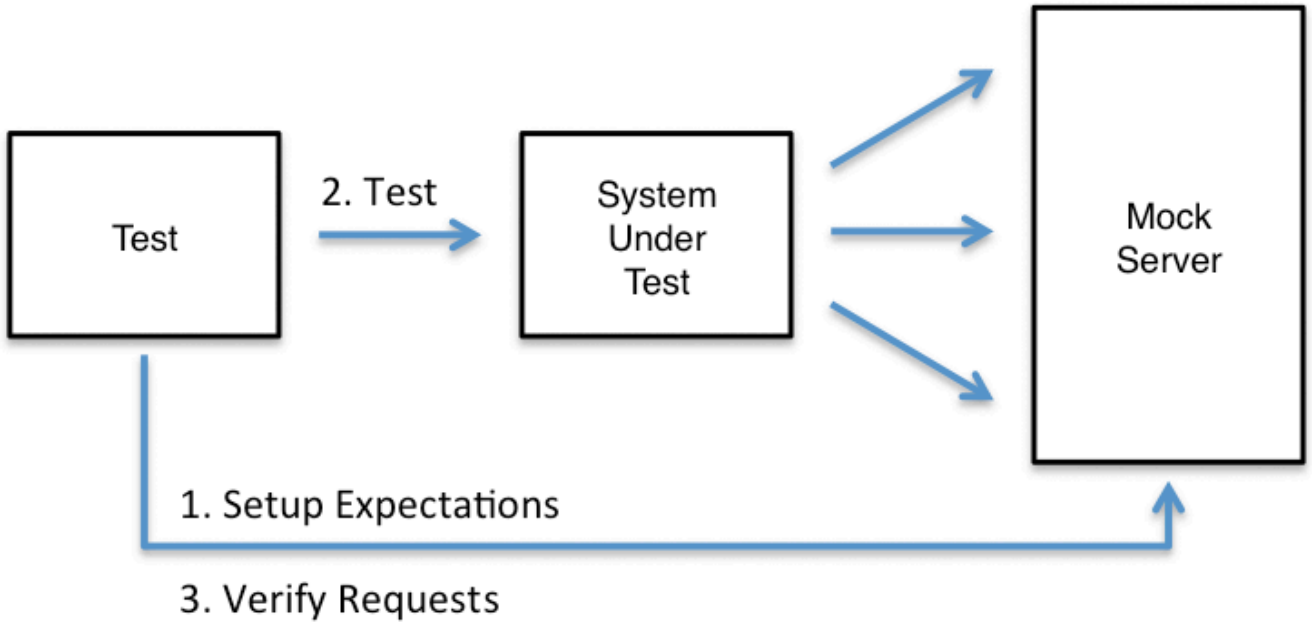


© Tasktop 2019

TASKTOP

To Mock or Not To Mock

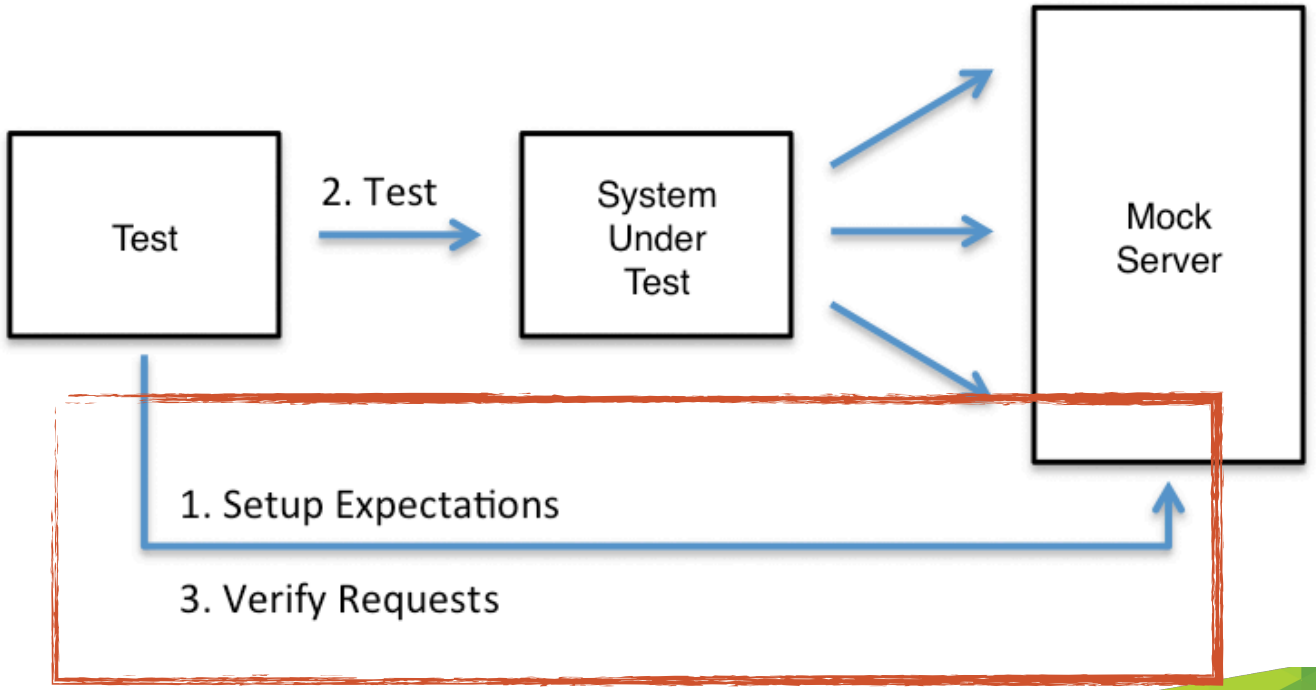
Mocking



© Tasktop 2019

Source: http://www.mock-server.com/

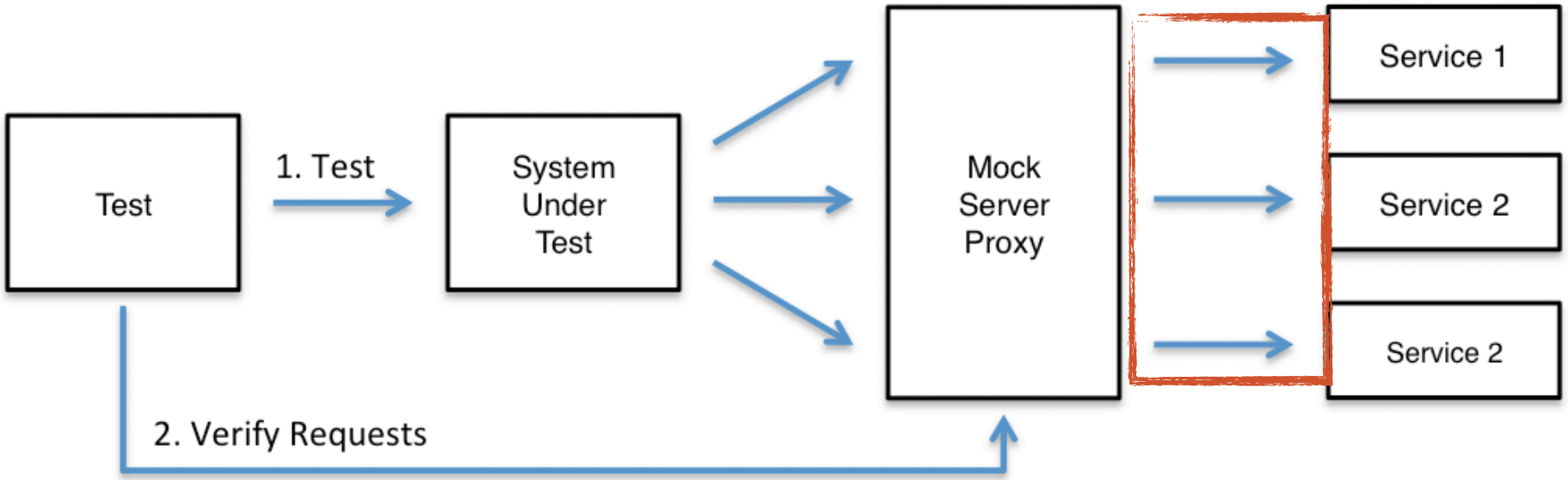
Mocking



© Tasktop 2019

Source: http://www.mock-server.com/

Mocking with Web Proxy



© Tasktop 2019

Source: http://www.mock-server.com/

Integration Tests

	Duration	Comprehensive	Catches API Changes	API Independence	Maintenance
Using real server					
Against Custom Mock server					
Against Proxy Mock Server					

© Tasktop 2017

TASKTOP

Integration Tests

	Duration	Comprehensive	Catches API Changes	API Independence	Maintenance
Using real server					
Against Custom Mock server					
Against Proxy Mock Server					

© Tasktop 2017

TASKTOP

Integration Tests

	Duration	Comprehensive	Catches API Changes	API Independence	Maintenance
Using real server					
Against Custom Mock server					
Against Proxy Mock Server					

© Tasktop 2017

TASKTOP

Integration Tests

	Duration	Comprehensive	Catches API Changes	API Independence	Maintenance
Using real server					
Against Custom Mock server					
Against Proxy Mock Server					

© Tasktop 2017

TASKTOP

Integration Tests

	Duration	Comprehensive	Catches API Changes	API Independence	Maintenance
Using real server					
Against Custom Mock server					
Against Proxy Mock Server					

© Tasktop 2017

TASKTOP

Integration Tests

	Duration	Comprehensive	Catches API Changes	API Independence	Maintenance
Using real server					
Against Custom Mock server					
Against Proxy Mock Server					

© Tasktop 2017

TASKTOP

Integration Tests

	Duration	Comprehensive	Catches API Changes	API Independence	Maintenance
Using real server	✗	✓	✓	✓	✓
Against Custom Mock server	✓	✓	✗	✗	✗
Against Proxy Mock Server	✓	✓	✓	✗	✓

© Tasktop 2017

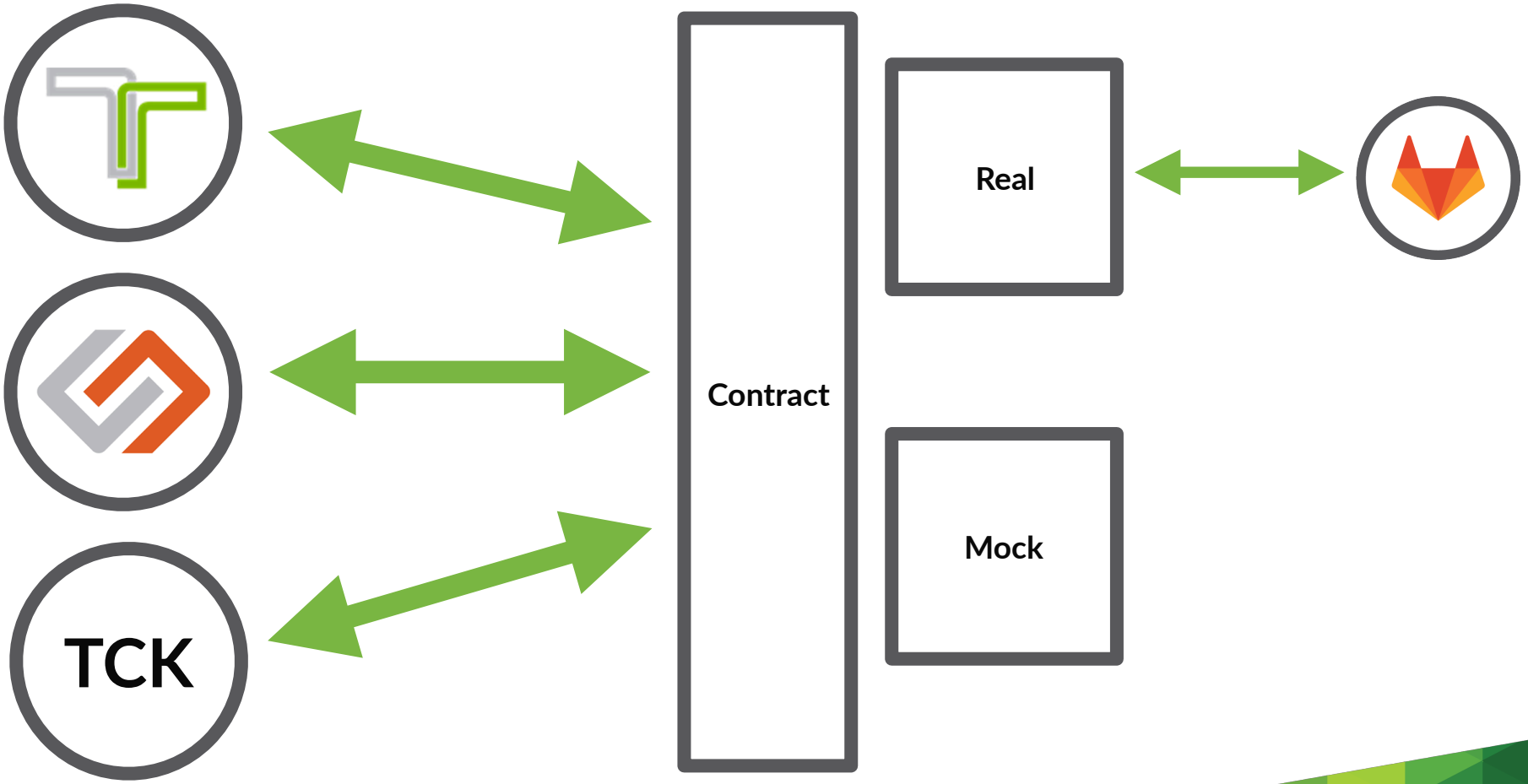
TASKTOP

Integration Tests

	Duration	Comprehensive	Catches API Changes	API Independence	Maintenance
Using real server	✗	✓	✓	✓	✓
Against Custom Mock server	✓	✓	✗	✗	✗
Against Proxy Mock Server	✓	✓	✓	✗	✓

© Tasktop 2017

TASKTOP



© Tasktop 2019

TASKTOP

Duration

Measure

- CPU
- Lock Contention

© Tasktop 2019

Measure

- CPU
- Lock Contention
- Network median/max
- Domain events

© Tasktop 2019

Test Duration & Metrics

HTTP endpoints, aggregated (JIRA OnDemand)

Show 10 entries Search:

# of requests	Method	Request	min (ms)	median (ms)	max (ms)	avg (ms)	total (s)
3342	GET	/rest/api/2/issue/[0-9]?expand=editmeta,schema,names	49	435	1,160	444	1,485
1569	DELETE	/rest/api/2/issue/[0-9]	46	630	1,710	630	989
1545	POST	/rest/api/2/issue	257	582	1,809	631	976
846	POST	/rest/api/2/issue/[0-9]/worklog	159	301	796	312	264
659	PUT	/rest/api/2/issue/[0-9]	57	432	1,135	444	292
651	GET	/rest/api/2/issue/[0-9]/remotelink	61	104	286	107	69
593	GET	/rest/api/2/issue/[0-9]/watchers	64	115	433	118	70
560	GET	/rest/api/2/project/TCKII	64	119	449	122	68
474	GET	/rest/api/latest/serverInfo	0	2	990	66	31
396	POST	/rest/api/2/issueLink	63	167	450	171	67

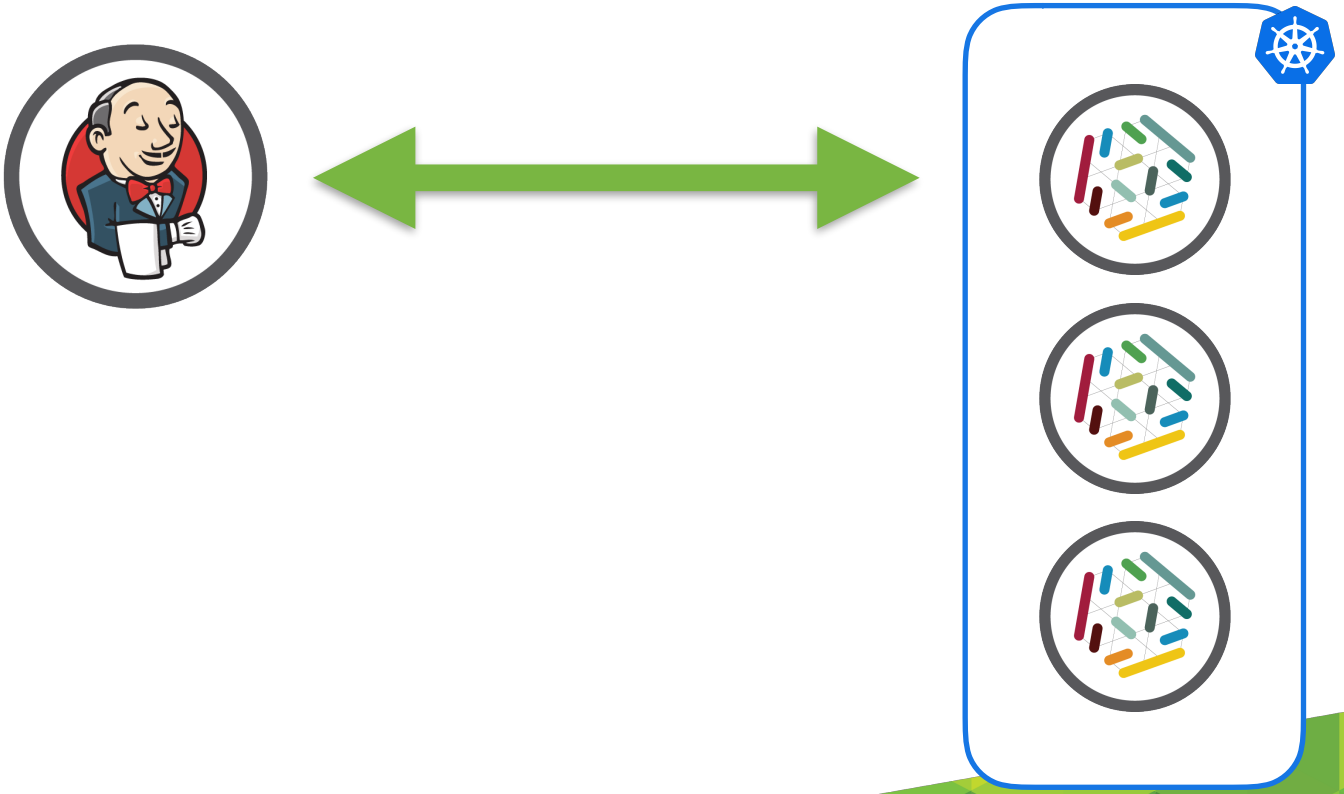
Showing 1 to 10 of 2,390 entries Previous 1 2 3 4 5 … 239 Next

© Tasktop 2019

Lessons learned: Sharding

© Tasktop 2019

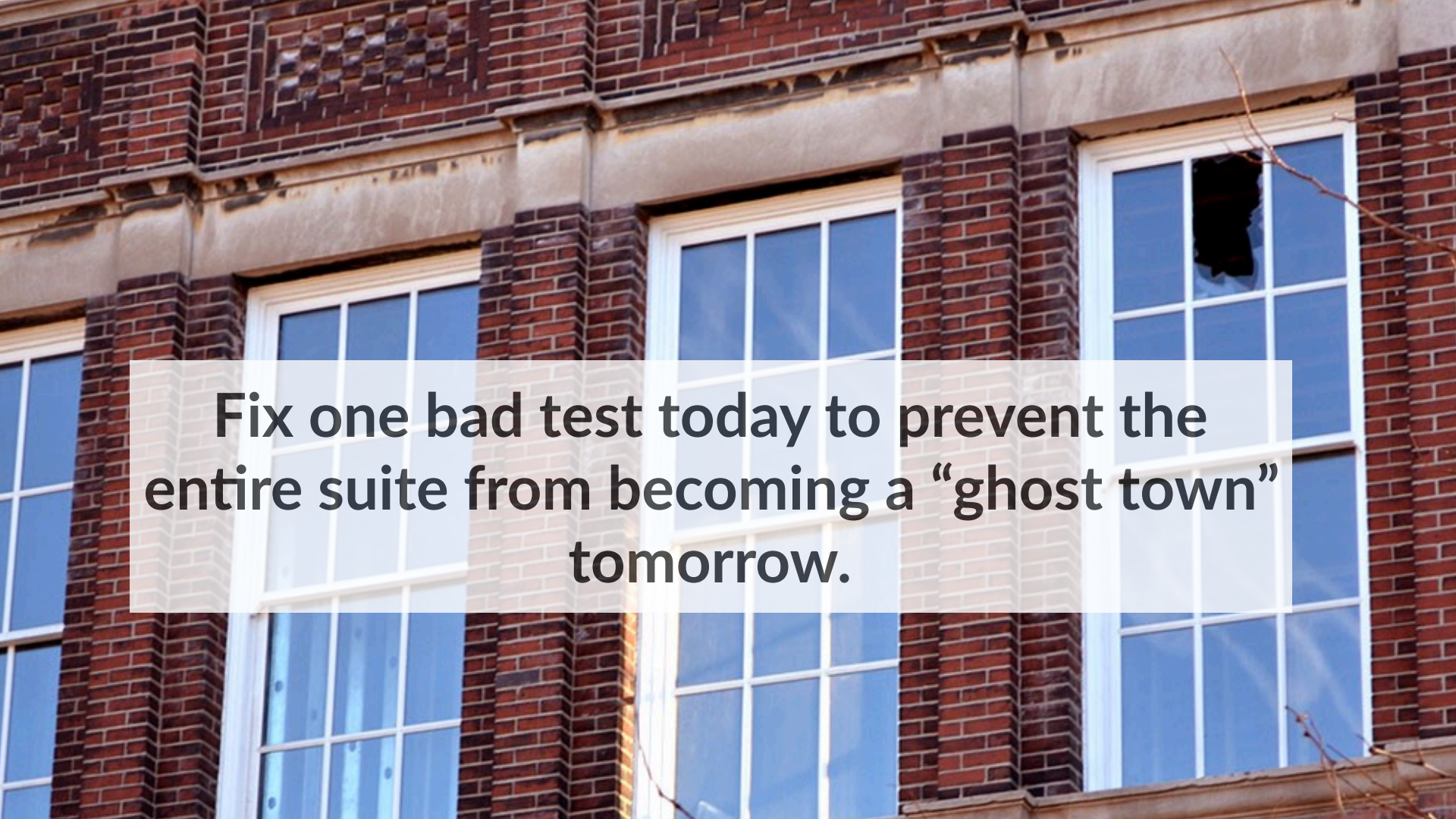
Lessons learned: Sharding



© Tasktop 2019

TASKTOP

Flakiness


Fix one bad test today to prevent the entire suite from becoming a “ghost town” tomorrow.

Failed

com.tasktop.internal.artifacts.tck.tests.epic51.US_51_RetrieveUpdateMultiSelectAttributesTest.optionsAreInExpectedOrderForFieldsInArtifactSchema[CA Agile Central On Demand 2.0 - Portfolio Item Theme, ACs=51.1.8]

Failing for the past 2 builds (Since #2535)

Took 11 ms.

add description

Failed 2 times in the last 30 runs. Flakiness: 3%, Stability: 93%

Test Stability Plugin: https://wiki.jenkins.io/display/JENKINS/Test+stability+plugi

© Tasktop 2019

Flaky Test != Flaky Test

© Tasktop 2019

Flaky Test != Flaky Test

Bad test?

Flaky connection?

Server-side race conditions?

© Tasktop 2019

Flaky Test != Flaky Test

Bad test?

Flaky connection?

Server-side race conditions?

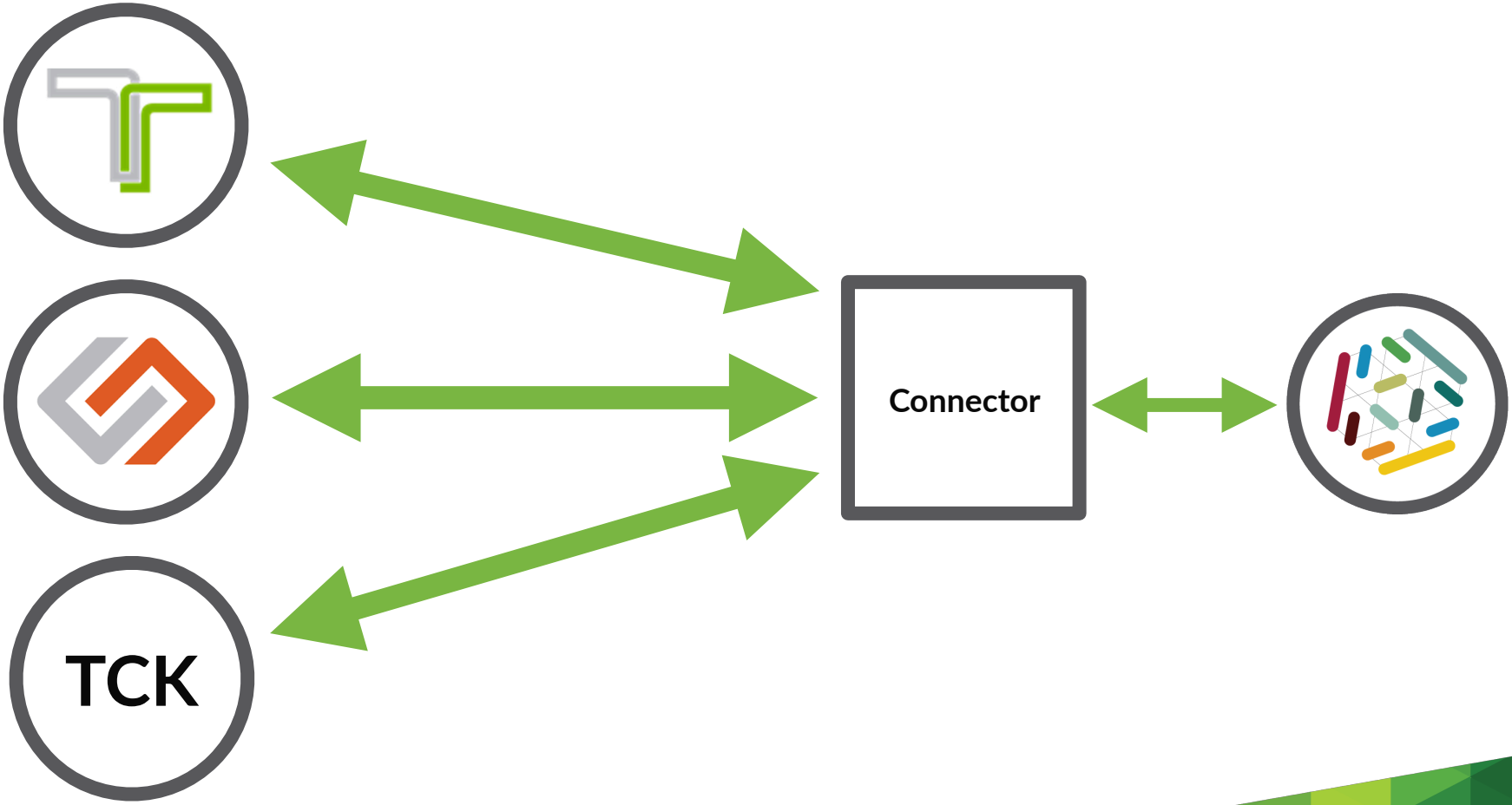
Glitch in the matrix?

© Tasktop 2019

Flaky Test != Flaky Test

Flaky Test == Real Problem

© Tasktop 2019



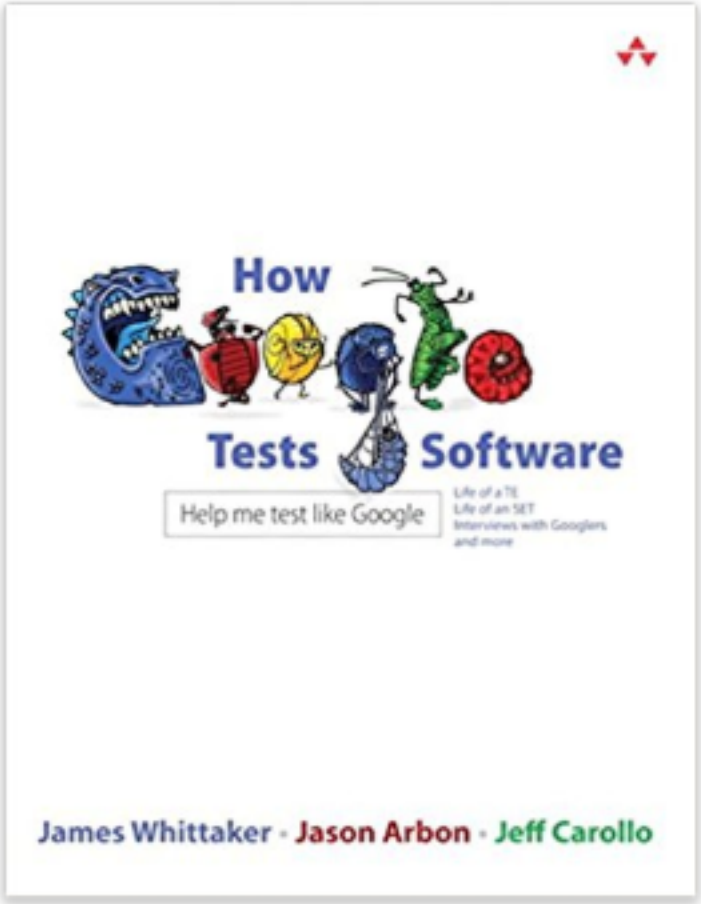
© Tasktop 2019

Flaky Test != Flaky Test

Flaky Test == Real Problem

Test behaviour == Production

© Tasktop 2019



© Tasktop 2019

Quarantine
vs
Data Gathering

© Tasktop 2019

Retry strategies

Common Network IO errors (Broken pipe, Paket Loss, …)	
Known Transport Exceptions (e.g. HTTP 509: Bandwidth Limit exceeded)	
Test timed out	
Assertion Errors/Unknown Cause	

© Tasktop 2019

Retry approaches

- JUnit4: easy to implement
  - Or use `@Retry` kevinmost/junit-retry-rule
  - Per Test
- JUnit5 has built-in support: `@RepeatedTest`
  - Per Test? Github #1558
- Maven Surefire/Failsafe
  - `test.rerunFailingTestsCount` (JUnit4 only today)
  - JUnit5 support in discussion
  - Global

© Tasktop 2019

“What the **** just happened”
Logger

© Tasktop 2019

WT*JH Logger

- Capturing by default
- Custom appender using evicting queue
- Triggered by test failure
- Capture server logs if possible as well
  - `container.followOutput(Slf4jLogConsumer);`

© Tasktop 2019

Lessons learned

Treat flaky tests like red tests

© Tasktop 2019

Measure your tests, not only your product

© Tasktop 2019

Be pragmatic; if you want to test the interaction with a 3rd party system, test the interaction with the 3rd party system

© Tasktop 2019

andrena
OBJECTS

Bitte geben Sie uns jetzt Ihr Feedback!

Integration ist schwer, Integrationstests umso mehr

Benjamin Muskalla

@bmuskalla

Nächste Vorträge in diesem Raum

15:45 Java 9 ist tot, lang lebe Java 11, *Falk Sippach, Steffen Schäfer*

16:45 Ein Plädoyer für Empathie gegenüber Fachexpert*innen, *Michael Plöd*

© Tasktop 2019

© Tasktop 2019

1:08 PM **Benjamin Muskalla** joined #cl-demo along with jarvis-bot.

1:10 PM **Benjamin Muskalla** @jarvis-bot Does JIRA support attachments?

© Tasktop 2019

1:08 PM **Benjamin Muskalla** joined #cl-demo along with jarvis-bot.

1:10 PM **Benjamin Muskalla** @jarvis-bot Does JIRA support attachments?

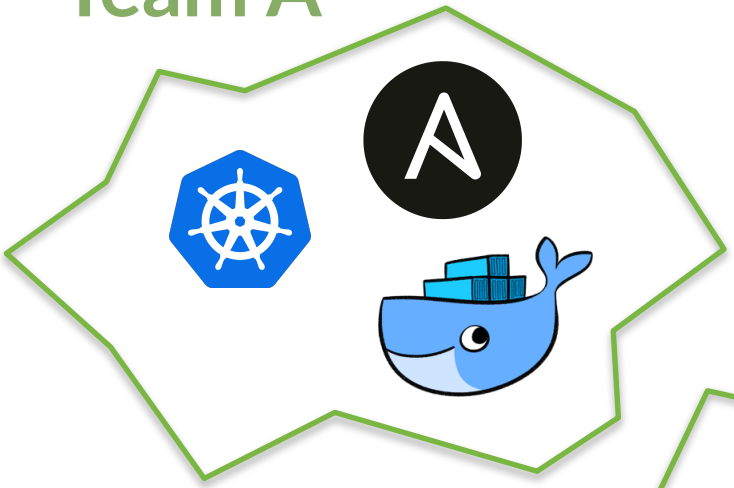
1:10 PM **jarvis-bot** APP

> **Atlassian Jira (REST) (SDK) 19.1 - Attachments are supported**
> Limitations include:
>
> Change detection - Connector cannot detect that an artifact has changed when one or more of its attachments have changed
> * Extra HTTP requests are required per search result to detect attachment changes. We chose to avoid this performance hit
> * Affects types: [Test Execution (Zephyr)]
>
> Impersonation - Connector cannot impersonate another user to create an attachment
> * By design, Zephyr does not support setting the creator when uploading an attachment
> * Affects types: [Test Execution (Zephyr)]
>
> Impersonation - Connector cannot create an attachment with a specified author
> Show more

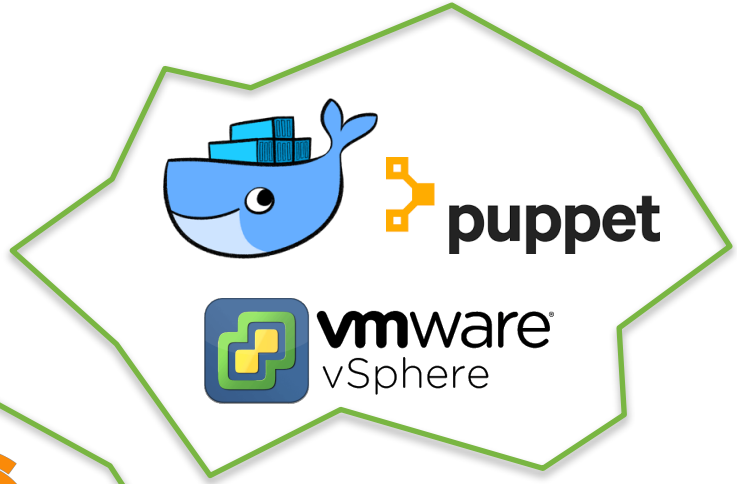
© Tasktop 2019

Infrastructure

Team A



Team B



Team C

© Tasktop 2019

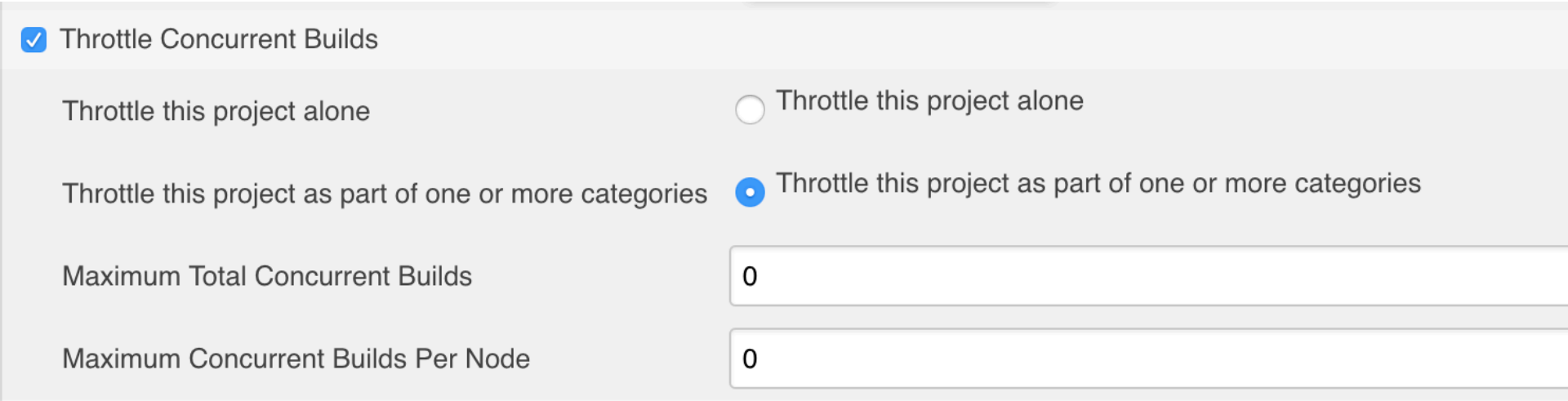
Test Isolation

- Switching default timezone
- Erroneous Authentication attempts

© Tasktop 2019

Isolation (cont'd)

- Legacy single-threaded servers



Throttle Concurrent Builds Plugin: https://wiki.jenkins.io/display/JENKINS/Throttle+Concurrent+Builds+Plugin

© Taskton 2019

```
RuleChain.outerRule(new TestTimeRule()
                    .around(new RunInIsolationRule())
                    .around(new FailEarlyRule()
                    .around(new RetryRule()
                    .around(new TimeoutWithThreadDump()
                    .around(new FixtureCleanupRule())
                    .around(new FlakyTestRule())
                    .around(new TraceLoggingRule());
```

© Tasktop 2019