

Integration Tests with Containers

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Developer 🥑



Yours is without a doubt the worst code I've ever run



But it runs

UNIT TEST?



IT COMPILED: PASS

Tests

UNIT TEST

WORK

Please do not turn off
the light switch.

It also operates the
elevator.

Thank You



**But the unit tests
passed, so...**

**[https://twitter.com/Aaronius/status/
933497253347463168](https://twitter.com/Aaronius/status/933497253347463168)**













Integration Tests

Mocks

**Mockito, EasyMock,
JMock,...**

https://twitter.com/Nick_Craver/status/1159795478554402816

"But Nick, you can mock those things"

Sure. You can mock most things. But what are you testing then? The mock.

We need to see if our Redis client library works *against Redis*. That sockets work. That the data types work. When server breaks happen, we need to see and fix them.

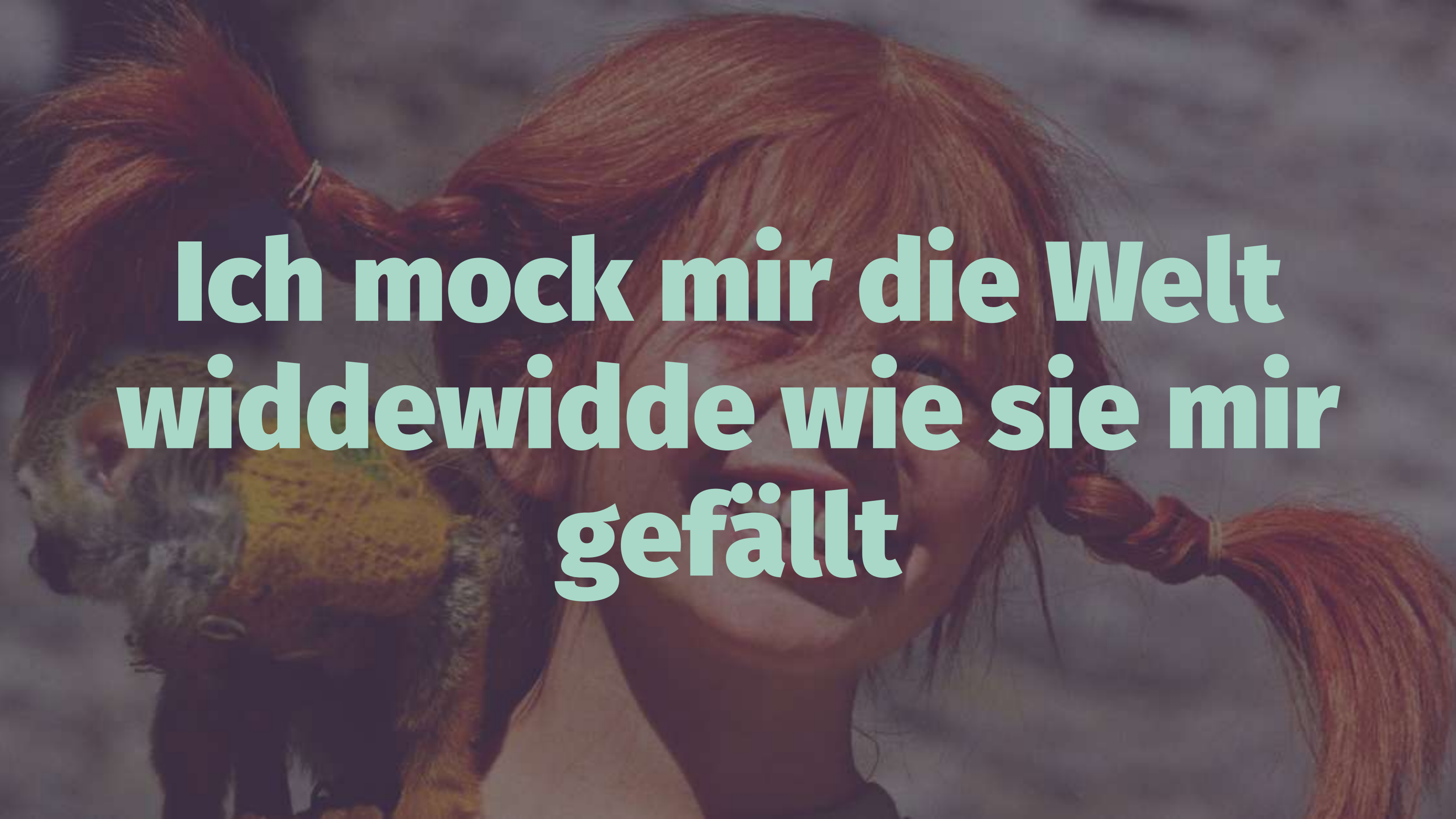
https://twitter.com/Nick_Craver/status/1159796131976679424

Let's say we are testing against Server of X, version 1. They break an API in version 2.

A mock isn't going to show you that. It'll just keep testing and working.

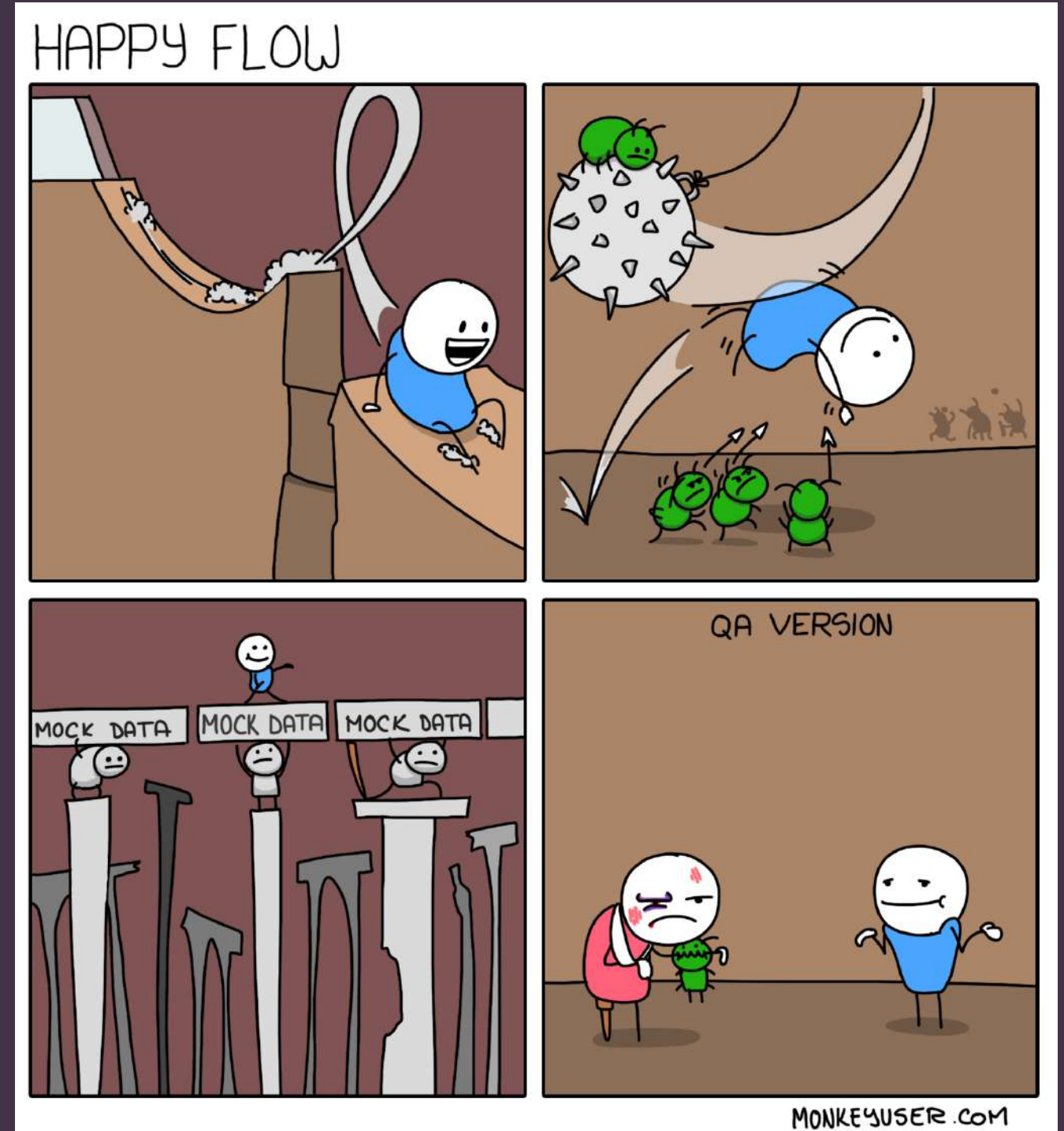
**So we need to spin up *actual* servers/
services to test against, so we know the
whole thing works. It's critical.**



A person with long, vibrant red hair styled in two pigtails is shown from the chest up. They are holding a small, grey, scruffy dog close to their face. The background is a soft, out-of-focus grey. Overlaid on the image is a large, bold, white text with a slight shadow effect.

**Ich mock mir die Welt
widdewidde wie sie mir
gefällt**

<https://www.monkeyuser.com/2018/happy-flow/>



 **Unit tests, systems not
under your control**

 **Test real datastore**

In-Memory

H2, HSQLDB, Apache Derby,...



same

Embedded Elasticsearch unsupported in 5.0+

<https://www.elastic.co/blog/elasticsearch-the-server>



Often good enough



**Test real datastore,
supported systems**

Actual Datastore

Local installation

Docker container

Cloud

Demo



"Good old approach"



**External dependency,
parallelization**

Embedded

embedded-elasticsearch

<https://github.com/allegro/embedded-elasticsearch>

Demo

Deprecated

 **IDE support,
customization, custom
lifecycle**

 **Custom integration**

More embedded datastores

[https://github.com/flapdoodle-oss/
de.flapdoodle.embed.process](https://github.com/flapdoodle-oss/de.flapdoodle.embed.process)

Build Tool

docker-maven-plugin

<http://dmp.fabric8.io>

Dockerfile or Docker assembly

```
<build>  
  <from>java:8</from>  
  <assembly>  
    <descriptor>docker-assembly.xml</descriptor>  
  </assembly>  
  <cmd>  
    <shell>java -jar /maven/service.jar</shell>  
  </cmd>  
</build>
```

Build a custom image:

`docker:build`

Run container:

`docker:start`

`docker:stop`

Demo

maven-failsafe-plugin

<https://maven.apache.org/surefire/maven-failsafe-plugin/>

 **Standard or custom
Docker image**

 **One instance for all
tests, no IDE support**



TESTCONTAINERS

Testcontainers Generic

Dependency

```
@ClassRule
public static GenericContainer redis =
    new GenericContainer("redis:6.0.0")
        .withExposedPorts(6379);
```

Docker Compose integration

```
@ClassRule
public static DockerComposeContainer environment =
    new DockerComposeContainer(new File("src/test/resources/compose.yml"))
        .withExposedService("elasticsearch_1", ELASTICSEARCH_PORT,
            Wait.forHttp("/").forStatusCode(200));
```

Demo

What's in docker ps -a

Docker for Mac API: socat

Linux: Multipurpose relay (SOcket CAT)

<https://github.com/alpine-docker/socat>

Cleanup: Moby Ryuk

<https://github.com/testcontainers/moby-ryuk>

[Ryuk] drops a Death Note, a notebook that allows the user to kill anyone simply by knowing their name and face

[https://en.wikipedia.org/wiki/Ryuk_\(Death_Note\)](https://en.wikipedia.org/wiki/Ryuk_(Death_Note))



 **IDE support,
customization, custom
lifecycle**

 **Hacky configuration**

Testcontainers Custom

g:org.testcontainers



org.testcontainers	solr	1.14.3	(2)	29-May-2020	↗	↓
org.testcontainers	influxdb	1.14.3	(31)	29-May-2020	↗	↓
org.testcontainers	selenium	1.14.3	(65)	29-May-2020	↗	↓
org.testcontainers	kafka	1.14.3	(35)	29-May-2020	↗	↓
org.testcontainers	oracle-xe	1.14.3	(57)	29-May-2020	↗	↓
org.testcontainers	mariadb	1.14.3	(44)	29-May-2020	↗	↓
org.testcontainers	couchbase	1.14.3	(30)	29-May-2020	↗	↓
org.testcontainers	mockserver	1.14.3	(31)	29-May-2020	↗	↓
org.testcontainers	database-commons	1.14.3	(34)	29-May-2020	↗	↓
org.testcontainers	db2	1.14.3	(11)	29-May-2020	↗	↓
org.testcontainers	localstack	1.14.3	(37)	29-May-2020	↗	↓
org.testcontainers	jdbc	1.14.3	(65)	29-May-2020	↗	↓
org.testcontainers	elasticsearch	1.14.3	(24)	29-May-2020	↗	↓
org.testcontainers	cockroachdb	1.14.3	(8)	29-May-2020	↗	↓

ElasticsearchContainer

<https://www.testcontainers.org/modules/elasticsearch/>

Demo

More languages

Scala, Go, .net*, Python*, JavaScript*, Rust*

*** Early development**

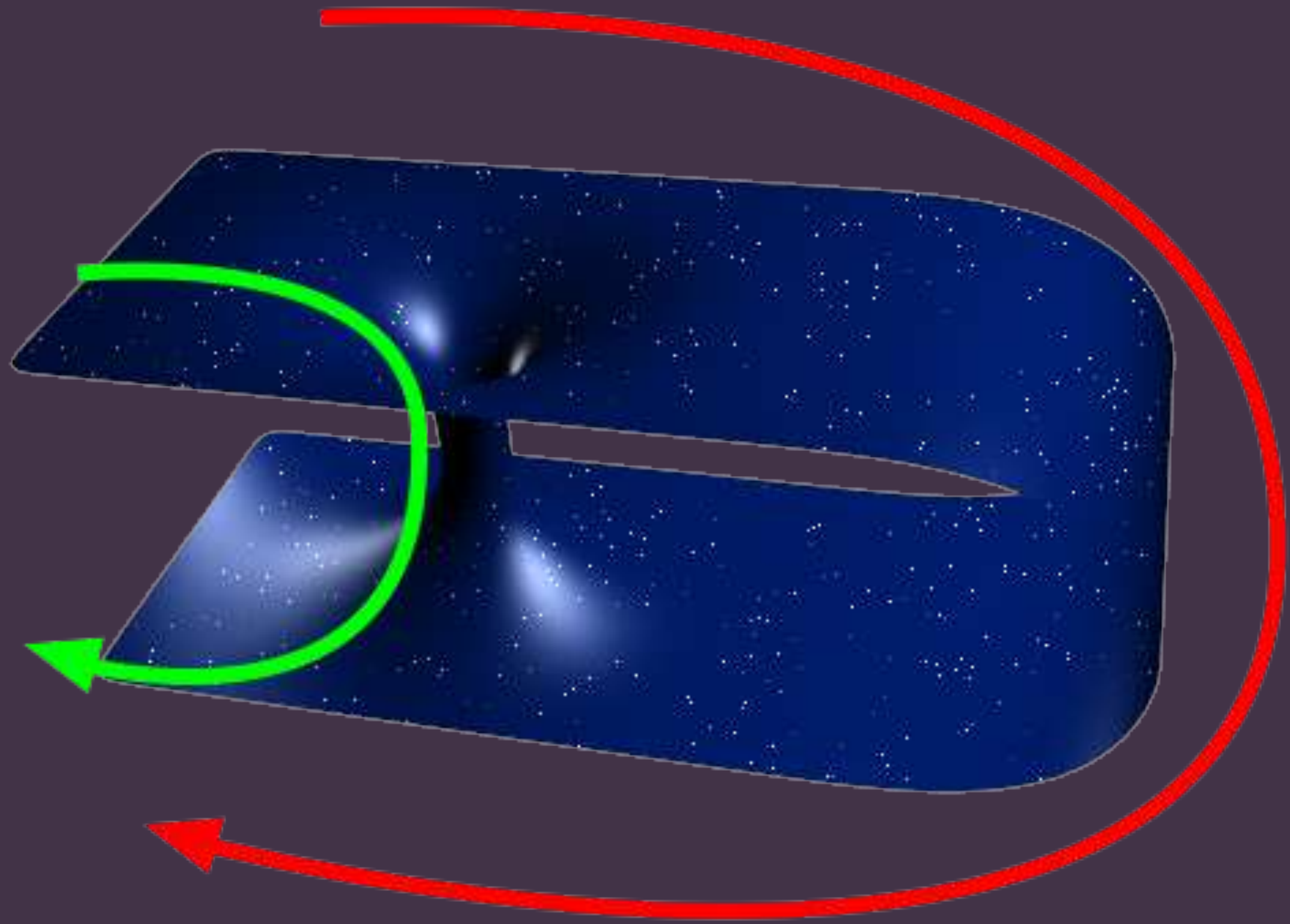
Selenium 2 / Webdriver

VNC screen recording

 **IDE support,
customization, custom
lifecycle**

 **Custom integration**

Inside Containers



Wormhole Pattern

```
$ docker run -it
--rm
-v $PWD:$PWD
-w $PWD
-v /var/run/docker.sock:/var/run/docker.sock
maven:3 mvn --projects parent,4_testcontainers-custom test
```

```
$ docker ps -a
```

```
$ docker run -it
--rm
-v $PWD:$PWD
-w $PWD
-v /var/run/docker.sock:/var/run/docker.sock
-v ~/.m2:/root/.m2
maven:3 mvn --projects parent,4_testcontainers-custom test
```

Conclusion

Why Integration Tests

Why not
Mocking
In-Memory
Actual Datastore

How Embedded Build Tool Testcontainers

Code

<https://github.com/xeraa/integration-test-demo>

[https://www.reddit.com/r/Pikabu/
comments/esqp94/
зонт_одного_знакомого/](https://www.reddit.com/r/Pikabu/comments/esqp94/зонт_одного_знакомого/)



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