

Richtige Integrationstests mit Containern

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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

A close-up photograph of a baby with light brown hair and blue eyes, looking slightly to the right with a sad or pouting expression. The baby is wearing a green and white long-sleeved shirt and is holding a small amount of sand in their right hand. The background is a blurred outdoor setting, likely a beach. The text 'UNIT TEST' is overlaid in large, white, bold, sans-serif font with a thick black outline at the top of the image.

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)**





via reddit.com/r/programmerhumor







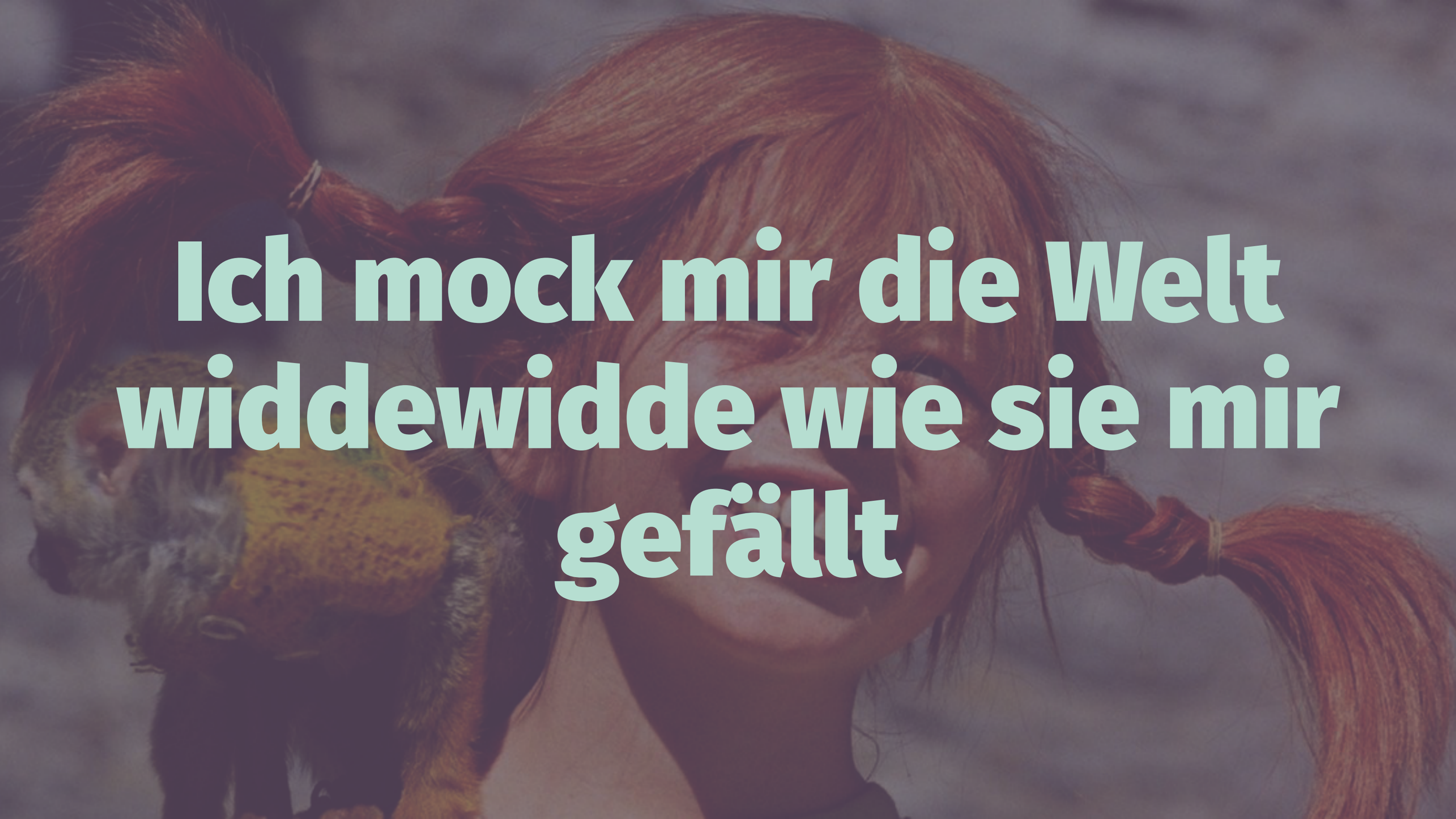


Integration Tests

Mocks

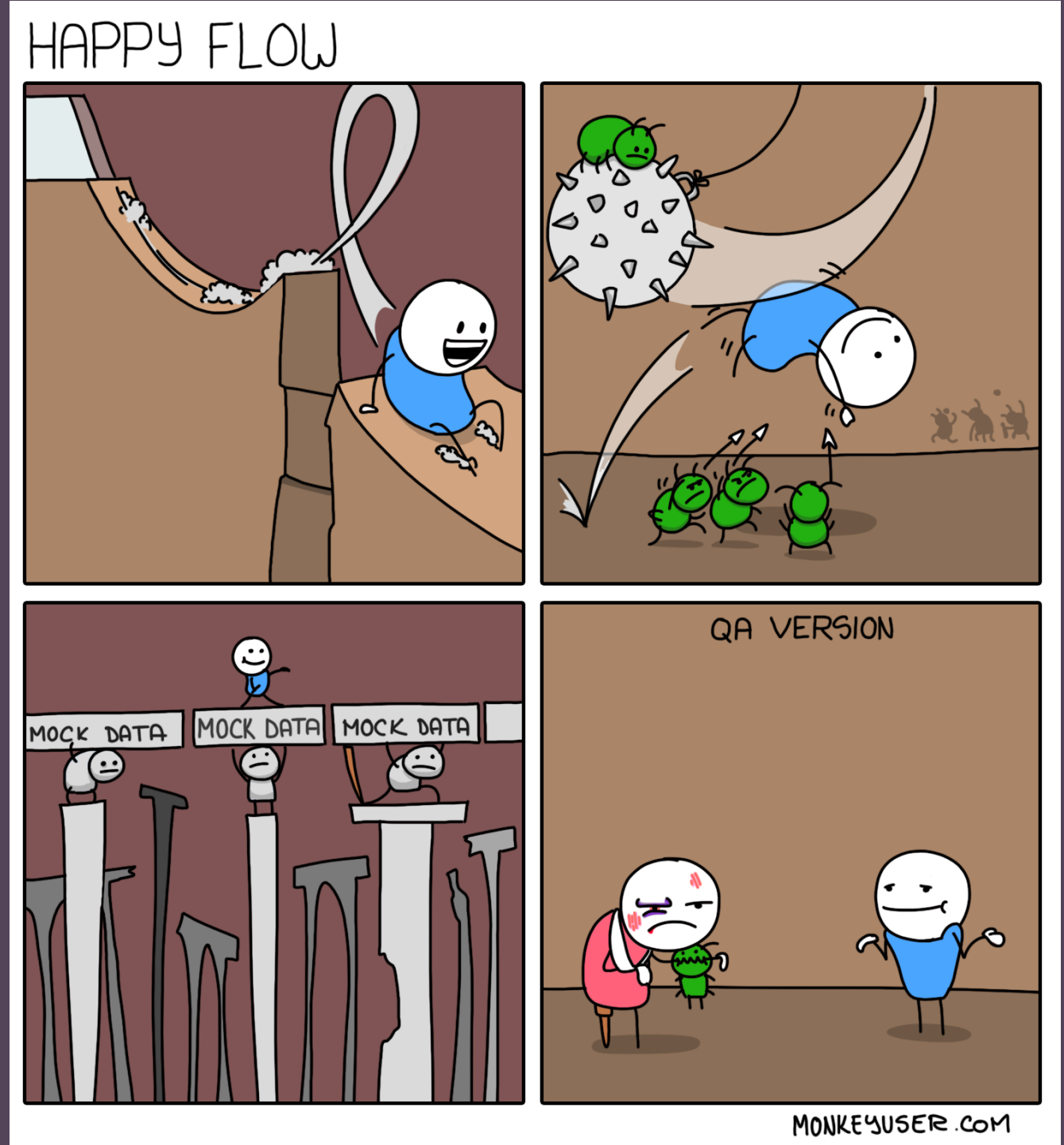
**Mockito, EasyMock,
JMock,...**



A close-up photograph of a woman with vibrant red hair styled in two braids. She is holding a small, fluffy dog with a yellow and white patterned hat. The background is a soft, out-of-focus grey. The text is overlaid in a bold, white, sans-serif font.

**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

Customization & Mappings

```
.withPlugin("analysis-stempel")  
.withIndex("cars", IndexSettings.builder()  
    .withType("_doc", getResourceAsStream("car-mapping.json")))
```

 **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:5.0.5")
        .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



Group ID	Artifact ID	Latest Version		Updated	Download
org.testcontainers	elasticsearch	1.10.6	(7)	29-Jan-2019	
org.testcontainers	influxdb	1.10.6	(14)	29-Jan-2019	
org.testcontainers	pulsar	1.10.6	(13)	29-Jan-2019	
org.testcontainers	jdbc	1.10.6	(48)	29-Jan-2019	
org.testcontainers	docs-examples	1.10.6	(1)	29-Jan-2019	
org.testcontainers	jdbc-test	1.10.6	(25)	29-Jan-2019	
org.testcontainers	junit-jupiter	1.10.6	(7)	29-Jan-2019	
org.testcontainers	kafka	1.10.6	(18)	29-Jan-2019	
org.testcontainers	localstack	1.10.6	(20)	29-Jan-2019	
org.testcontainers	mariadb	1.10.6	(27)	29-Jan-2019	
org.testcontainers	mockserver	1.10.6	(11)	29-Jan-2019	

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ElasticsearchContainer

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

Demo

More languages

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

* Early development

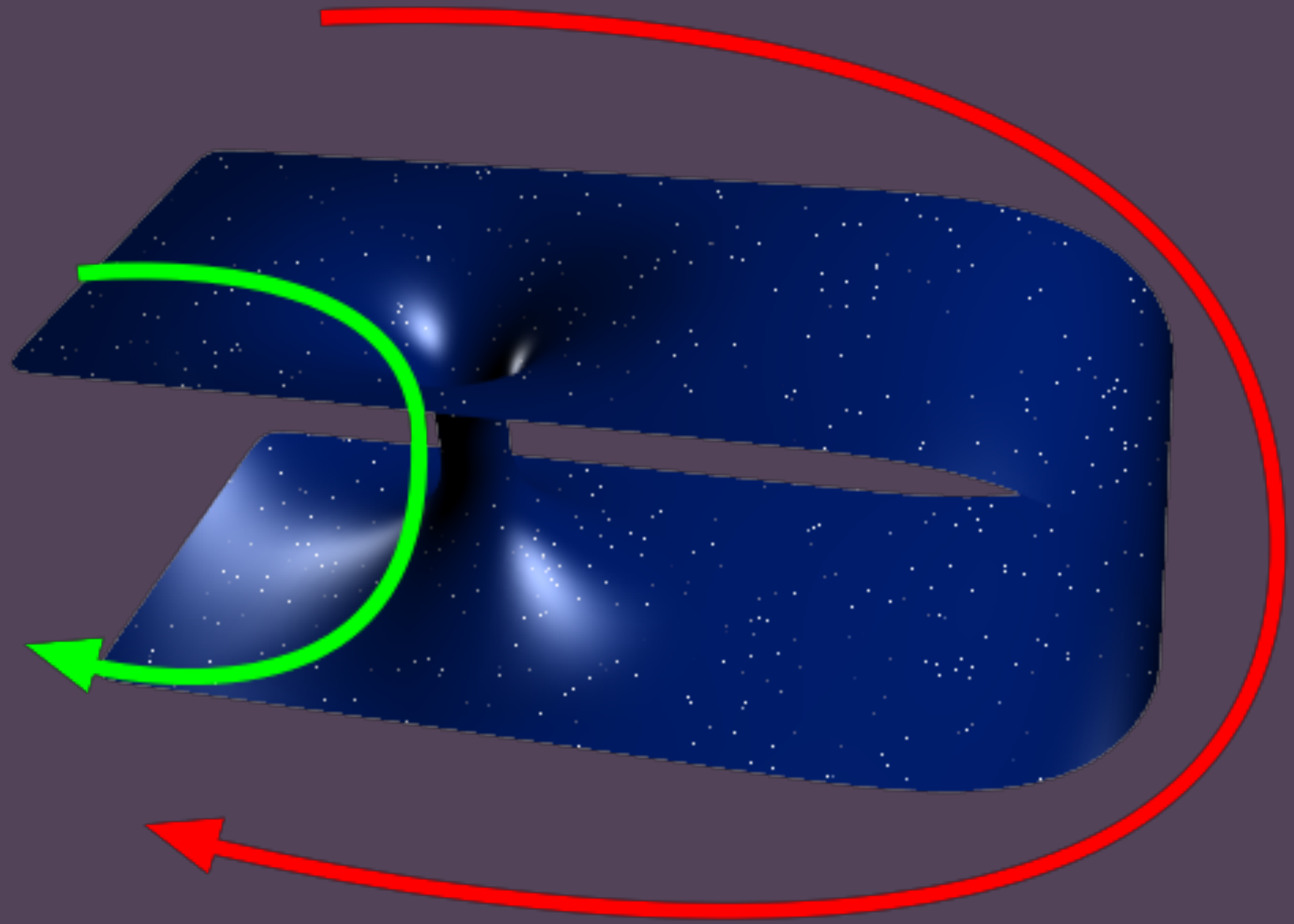
Selenium 2 / Webdriver

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
```

Conclusion

Why Integration Tests

**Why not
Mocking
In-Memory
Actual Datastore**

How Embedded Build Tool Testcontainers

Code

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

Questions?

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