

BUILDING & DEPLOYING NETFLIX WITH KOTLIN



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PROGRAMMING LANGUAGES AT NETFLIX

FREEDOM & RESPONSIBILITY

“You build it, you own it”



NETFLIX LANGUAGE LANDSCAPE





NEBULA: THE NETFLIX BUILD LANGUAGE

ENGINEERING TOOLS ECOSYSTEM





SPINNAKER: NETFLIX'S CONTINUOUS DELIVERY PLATFORM

SPINNAKER

PIPELINES1CLUSTERSTASKSLOAD BALANCERSSECURITY GROUPSPROPERTIESANALYTICSCONFIG

ClustersEdit multipleShowInstanceswith detailsCreate Server Group

MGMTorca-main5 / 4 : 55%

US-EAST-1

V160: Build: #14181 / 1 : 100%

US-WEST-2

V257: Build: #14294 / 4 : 100%

V256: Build: #14184 / 4 : 0%

MGMTorca-main-loadtemp4 / 4 : 50%

US-WEST-2

V147: Build: #14294 / 4 : 100%

V146: Build: #14184 / 4 : 0%

MGMTorca-prestaging2 / 2 : 100%

US-EAST-1

V353: Build: #1429

US-WEST-2

V491: Build: #14292 / 2 : 100%

V490: Build: #1428

orca-main-v257Server Group ActionsInsight

SERVER GROUP INFORMATION

Created2017-10-30 09:06:46 PDTSourcepipelineChangesview changesInMGMTus-west-2VPCvpc0 (vpc-fbcb1b9e)Subnetinternal (vpc0)Zonesus-west-2aus-west-2bus-west-2c

CAPACITY

Min/Max4Current4

Resize Server GroupView Scaling Activities

HEALTH

Instances4 / 4 : 100%

LAUNCH CONFIGURATION

SECURITY GROUPS

NETWORKING

SCALING PROCESSES

SCALING POLICIES

PIPELINES1CLUSTERSTASKSLOAD BALANCERSSECURITY GROUPSPROPERTIESANALYTICSCONFIG

PipelinesCreateConfigureStart Manual Execution

+ -Group byPipelineShow2 executions per pipelinestage durations

Filtered by: PIPELINE: Prod Deploy

MGMTProd Deploy1ConfigureStart Manual Execution

BUILD #1429MANUAL STARTchrisb@netflix.com16 minutes agoDetails

00:0006:4309:2400:00-Status: RUNNINGDuration: 16:09

Find AMIDeployWait before promote to failoverDeploy

STAGE DETAILS: WAIT BEFORE PROMOTE TO FAILOVERDuration: 09:25

Step	Started	Duration	Status
Wait before promote to failover	2017-10-30 09:13:26 PDT	09:25	RUNNING

Wait ConfigTask Status

Wait time: 3587 secondsRemaining: 50:22Skip remaining wait

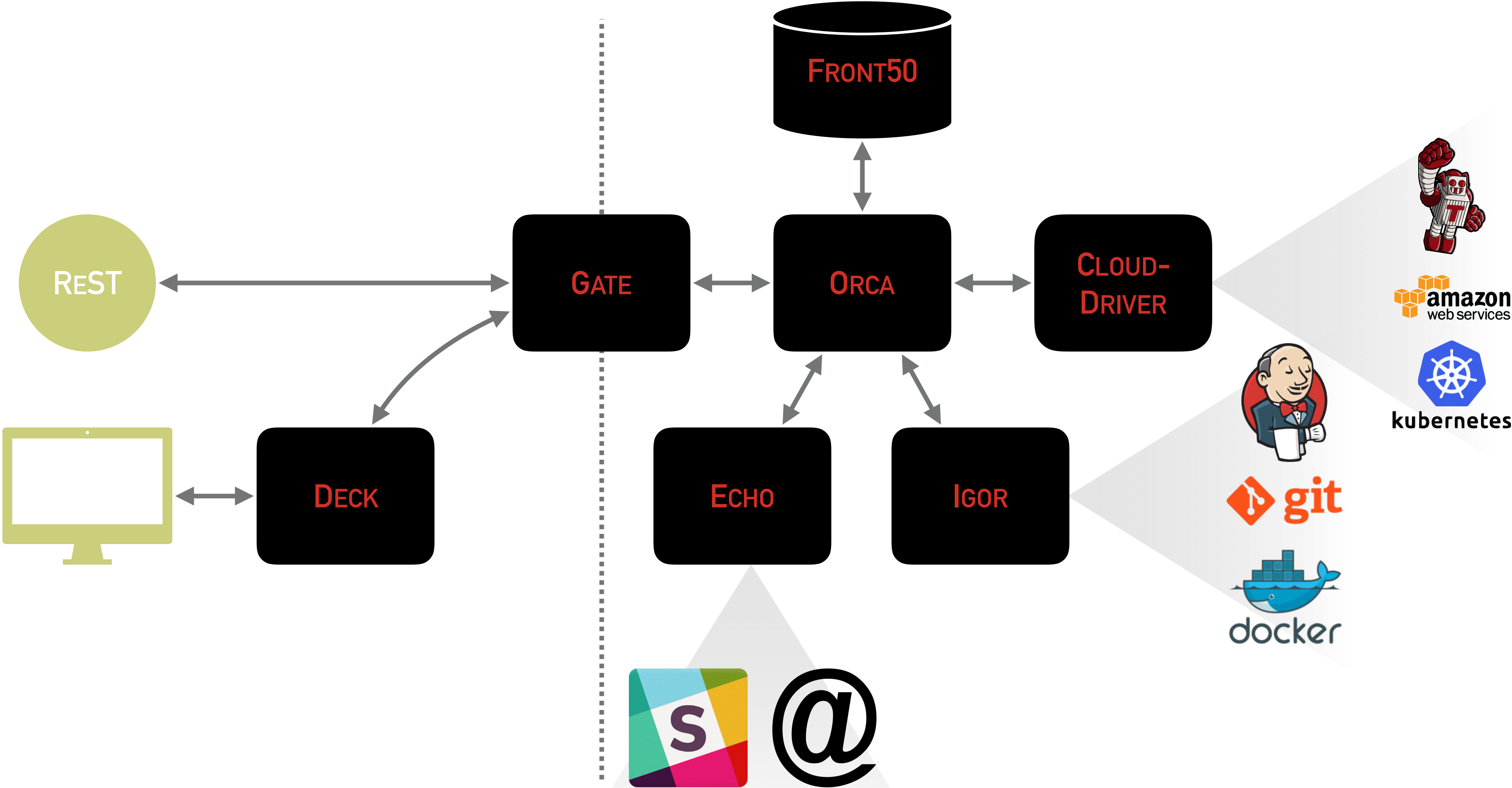
BUILD #1418MANUAL STARTemburns@netflix.com6 days agoDetails

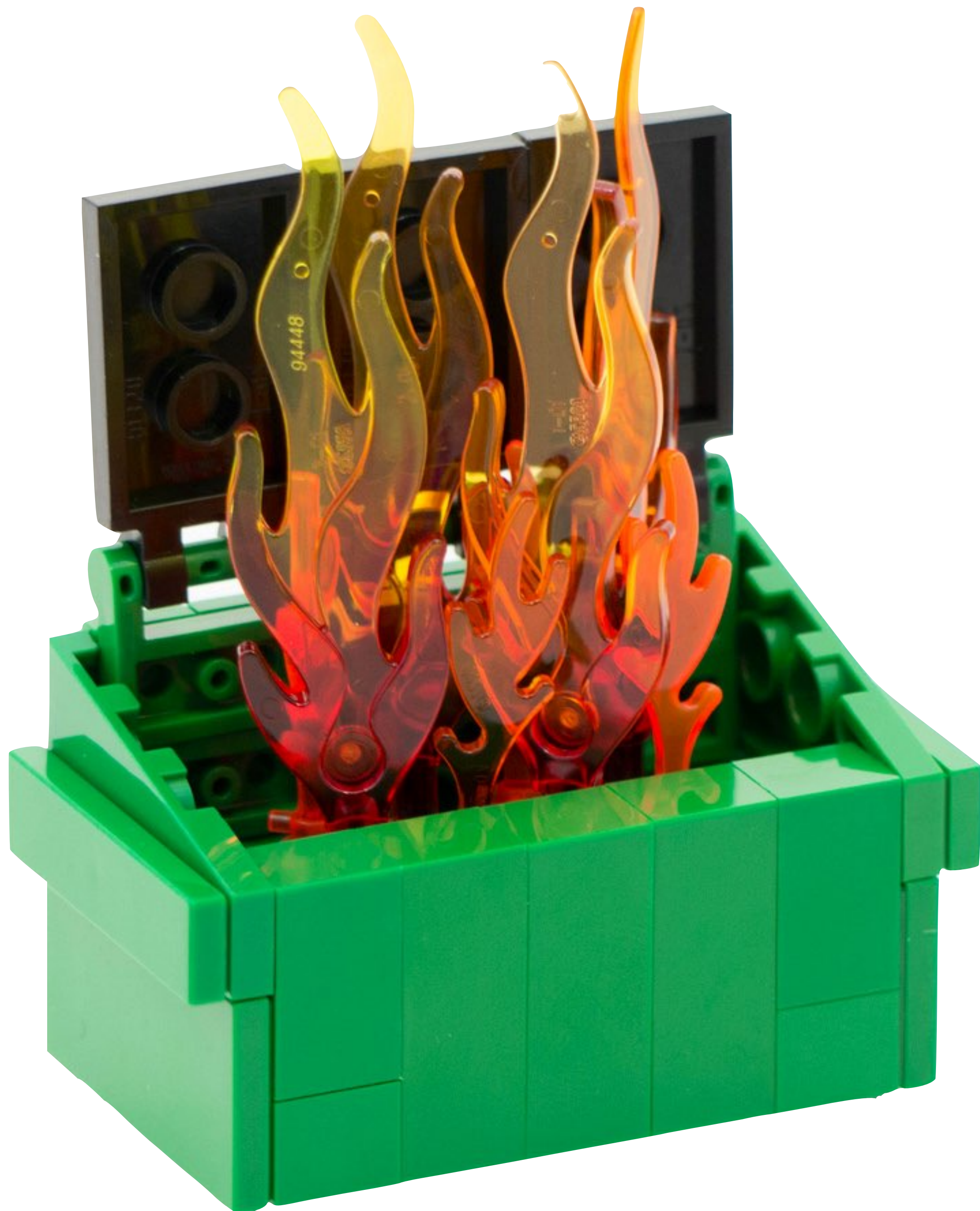
00:0006:4359:4800:0007:01Status: SUCCEEDEDDuration: 01:13:35



READY FOR THE UGLY ARCHITECTURE SLIDE?...

SPINNAKER MICROSERVICES





OLD ORCA

- Prototype code that lived on.
- Stateful service:
 - Work lost in cases of instance failure.
 - Need to drain work after deployment.
- Mixture of Groovy, RxJava and Spring Batch.
- Pipeline → Spring Batch Job not idempotent.



LANGUAGE SHOWDOWN

GROOVY

Pros

- Pragmatic.
- Cuts down on boilerplate.
- Strong existing skills on team.

Cons

- Meta-programming is a shotgun aimed at your foot.
- `@CompileStatic` issues.
- Strong typing for closure params / delegate very verbose.
- Extension methods cannot be scoped.

JAVA 8

Pros

- Lambdas.

Cons

- No: value types, string interpolation, type inference, immutable collections, collection literals...
- Still lots of boilerplate.
- Checked exceptions clash with Lambdas.
- Awkward streams API.

SCALA

Pros

- Powerful, advanced language features.
- Pattern matching, partially applied functions, etc. first class.

Cons

- Steep learning curve.
- Java interop a secondary concern.
- Sacrifices explicitness / clarity.

KOTLIN

Pros

- Shallow learning curve.
- Rock solid type system.
- Almost all compelling features of other options present.
- Better interoperability with Java than Scala *or* Groovy.
- Elegant solution to the null problem.

Cons

- New language.



HANDLING THE “BILLION \$ MISTAKE”

Java 8

- Use Optional, (except when you shouldn't!)

Groovy

- ?. operator
- “Groovy Truth”

Scala

- Use Option, no protection against null.

Kotlin

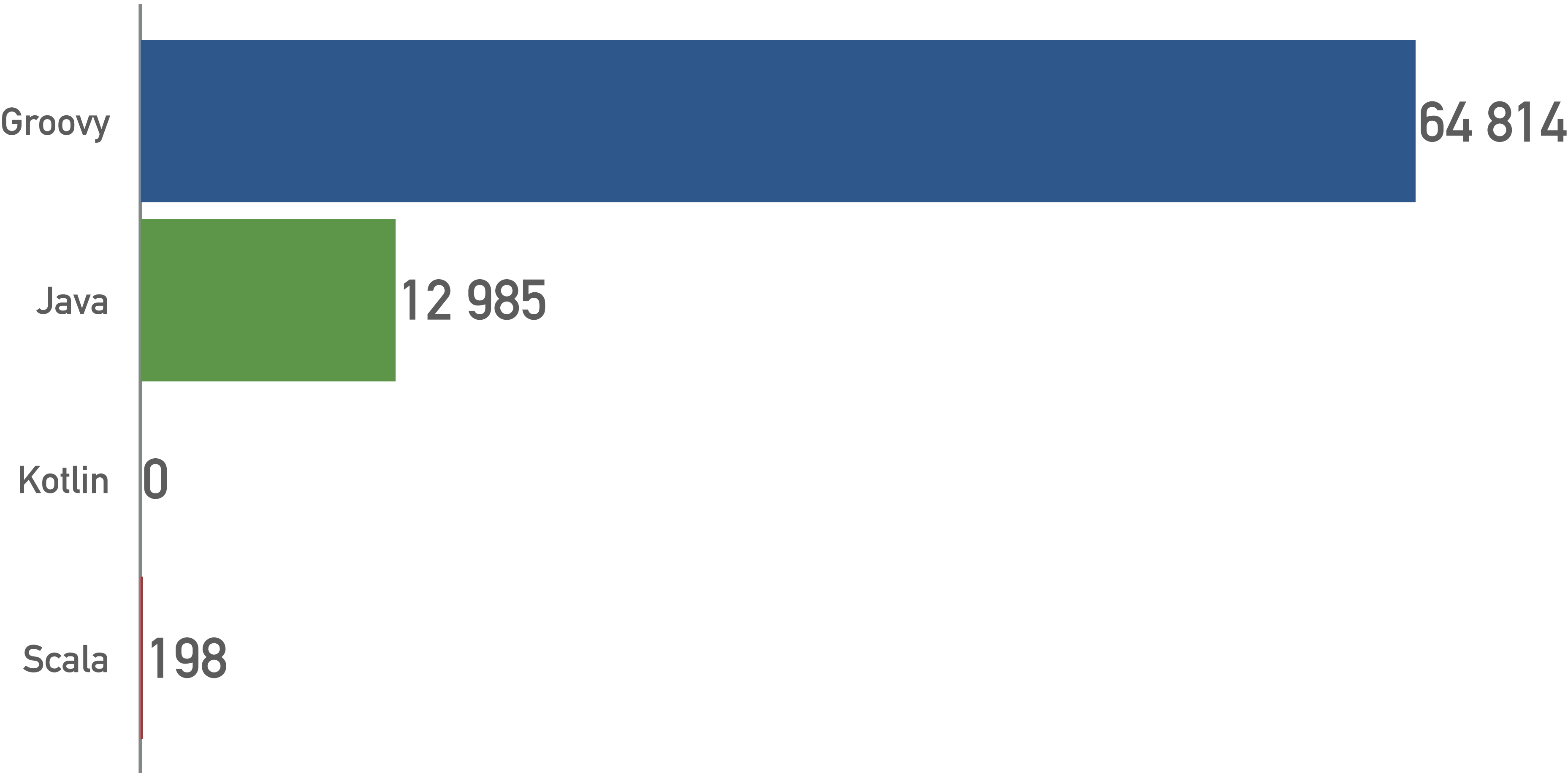
- Null is an option type.
- Compile-time guarantees.



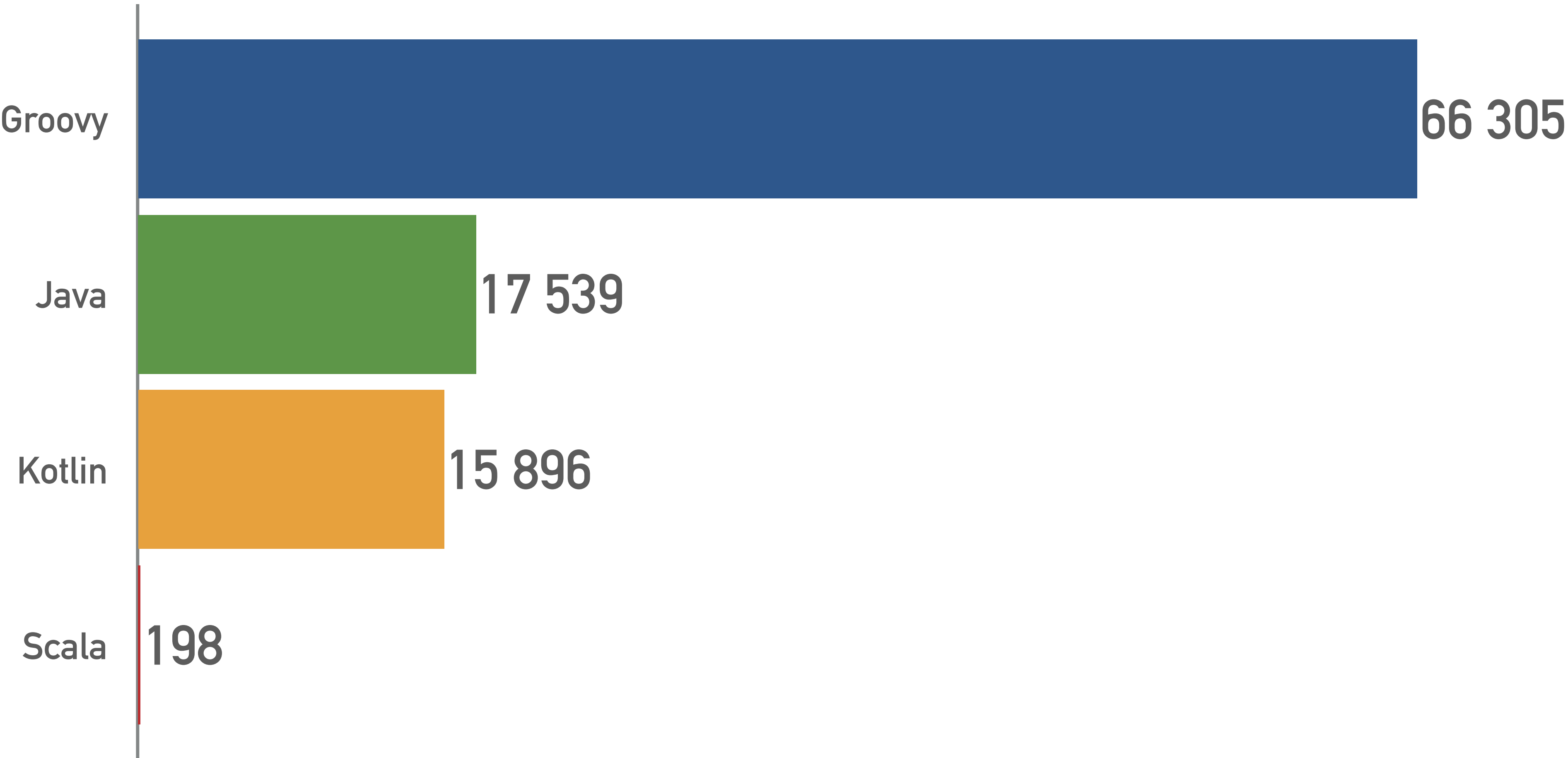
NÜ ORCA

- Redis-backed work queue
- 100% Kotlin
- Around 7,000,000 messages / day.
- Work distributed across Orca cluster.
- (Close to) guaranteed once delivery.
- Messages retried in case of instance failure / termination.
- Deployed under load with no downtime.

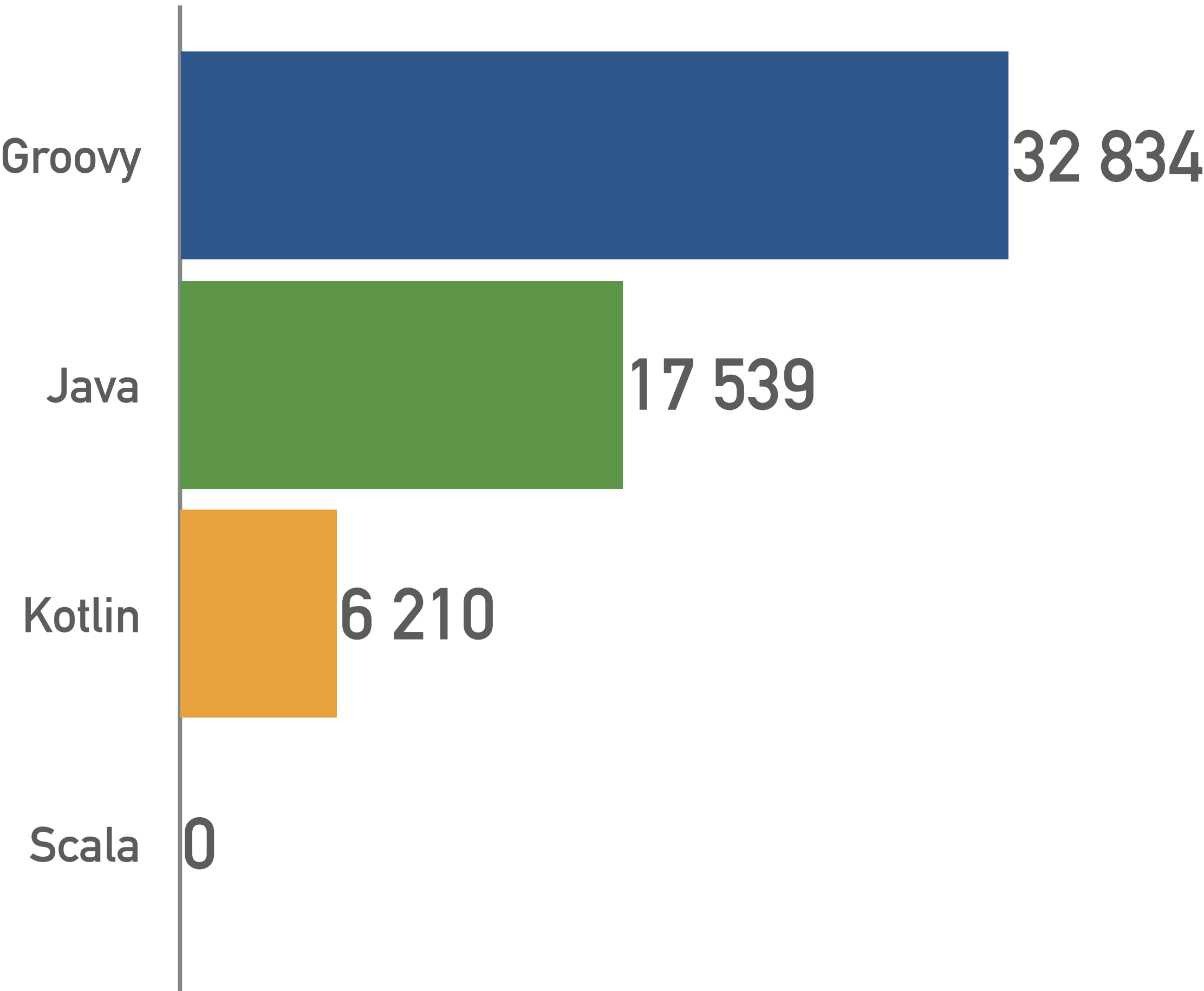
LINES OF CODE BY LANGUAGE : APRIL 2017



LINES OF CODE BY LANGUAGE : OCTOBER 2017

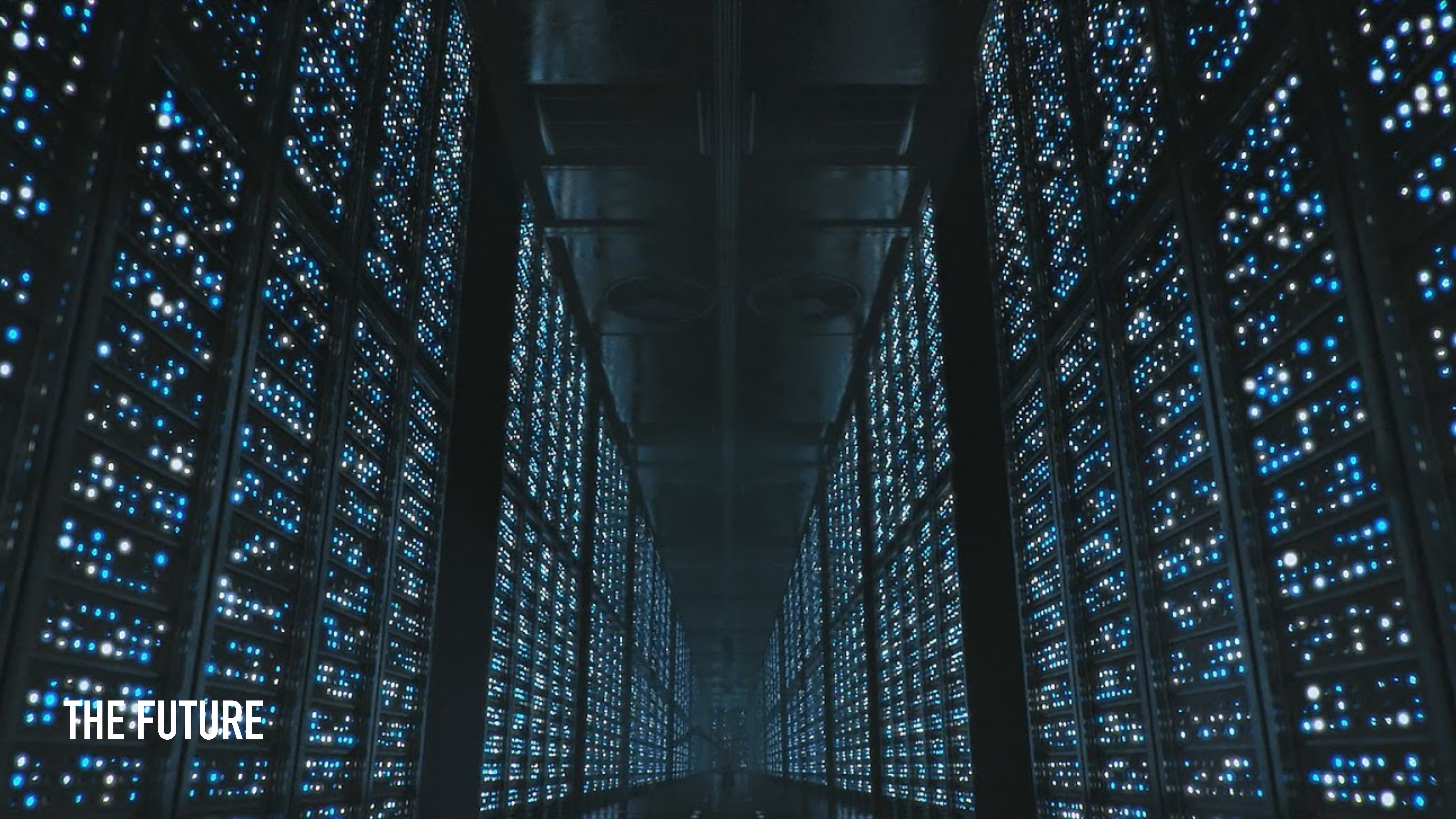


LINES OF PRODUCTION CODE BY LANGUAGE





TESTING



THE FUTURE

THANK YOU!

@rfletcherEW

git.io/nebula

spinnaker.io

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