Project Loom:

A Summary For Busy Developers

Michael Easter

@codetojoy

Project Loom

~~Fibers~~ and Continuations

OpenJDK

Installing
Contributing
Sponsoring
Developers' Guide
Vulnerabilities
JDK GA/EA Builds

Mailing lists
Wiki ·IRC

Bylaws · Census
Legal

JEP Process

Source code
Mercurial
GitHub

Tools
Mercurial
Git
jtreg harness

Groups
(overview)

JDK 19

This release will be the Reference Implementation of version 19 of the Java SE Platform.

Status

The main-line code repository is open for bug fixes, small enhancements, and JEPs as proposed and tracked via the JEP Process.

Schedule

2022/06/09	Rampdown Phase One (fork from main line)
2022/07/21	Rampdown Phase Two
2022/08/11	Initial Release Candidate
2022/08/25	Final Release Candidate
2022/09/20	General Availability

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OpenJDK

JEP 425: Virtual Threads (Preview)

OpenJDK

JEP 428: Structured Concurrency (Incubator)

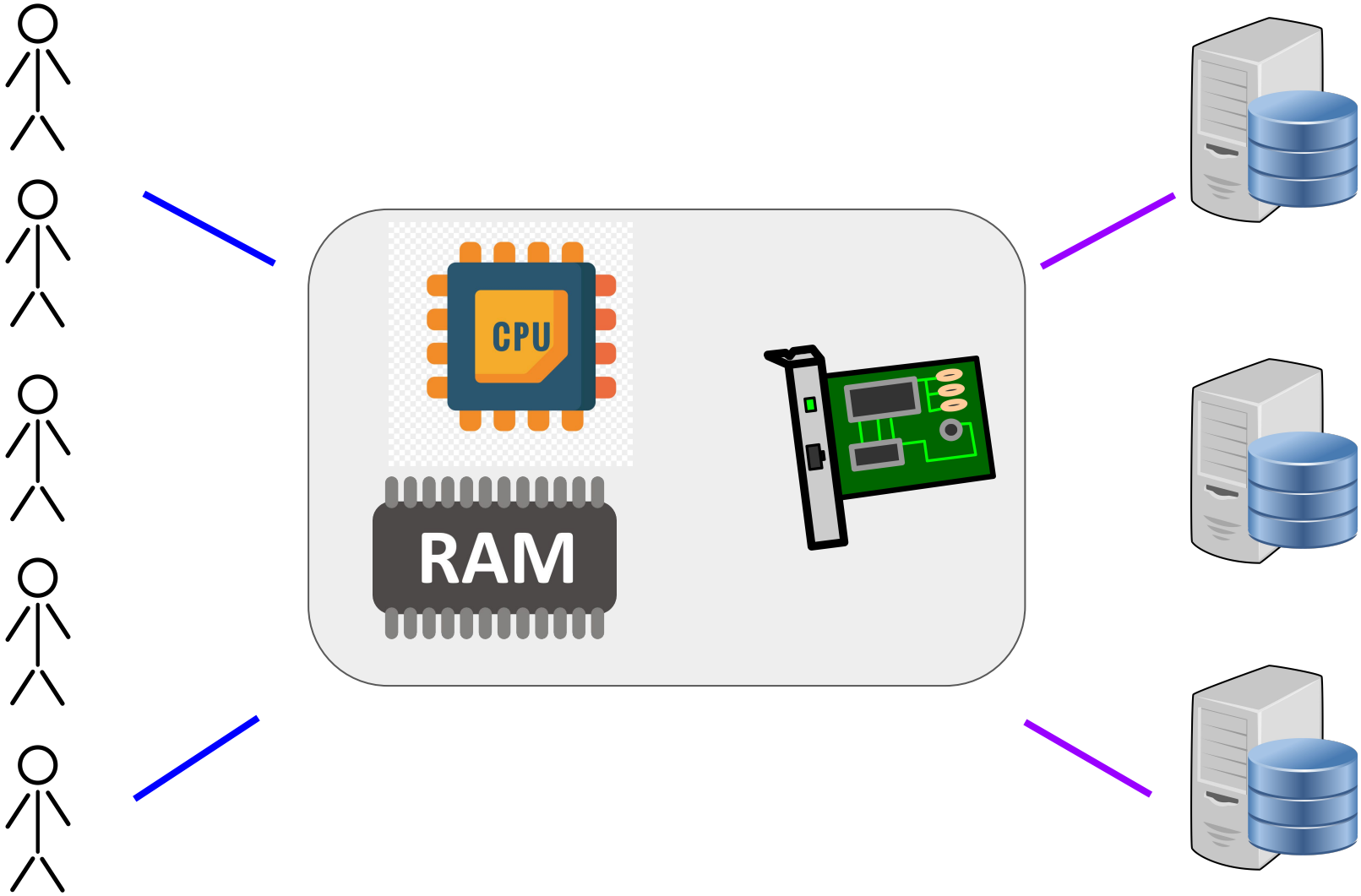
Virtual Threads

Platform threads

```
14  void createManyThreads(int numThreads) throws Exception {
15      Thread thread = null;
16
17      for (int i = 0; i < numThreads; i++) {
18          thread = new Thread(Runner::doWork);
19          thread.start();
20      }
21
22      thread.join();
23  }
```

Virtual threads

```
14  void createManyThreads(int numThreads) throws Exception {
15      Thread thread = null;
16
17      for (int i = 0; i < numThreads; i++) {
18          thread = Thread.startVirtualThread(Runner::doWork);
19      }
20
21      thread.join();
22  }
```


CPU
RAM

OS (Kernel)

JVM

OS (Kernel)

OS (Kernel)

JVM

Scheduler

OS (Kernel)

JVM

Scheduler

OS (Kernel)

Heap

JVM

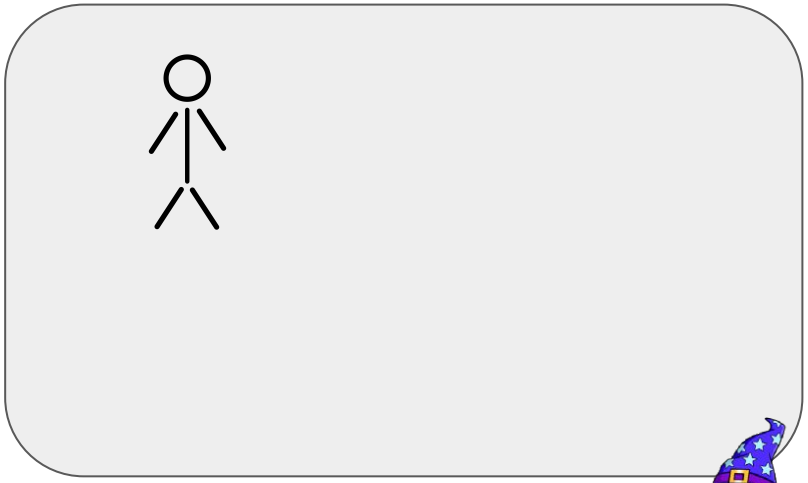
Scheduler

OS (Kernel)

Heap

Continuation

JVM



Project Loom

~~Fibers~~ and Continuations

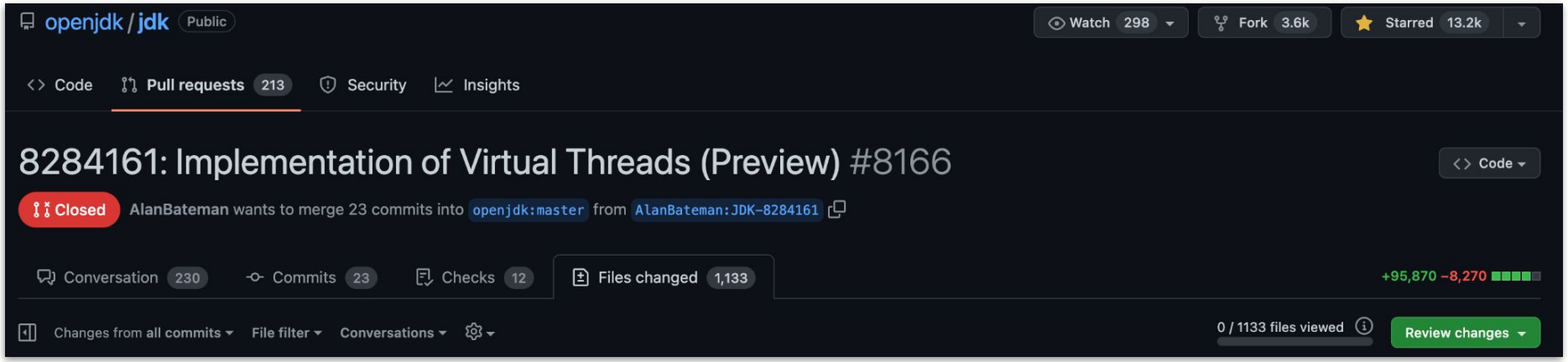
Project Loom

~~Fibers~~ and Continuations

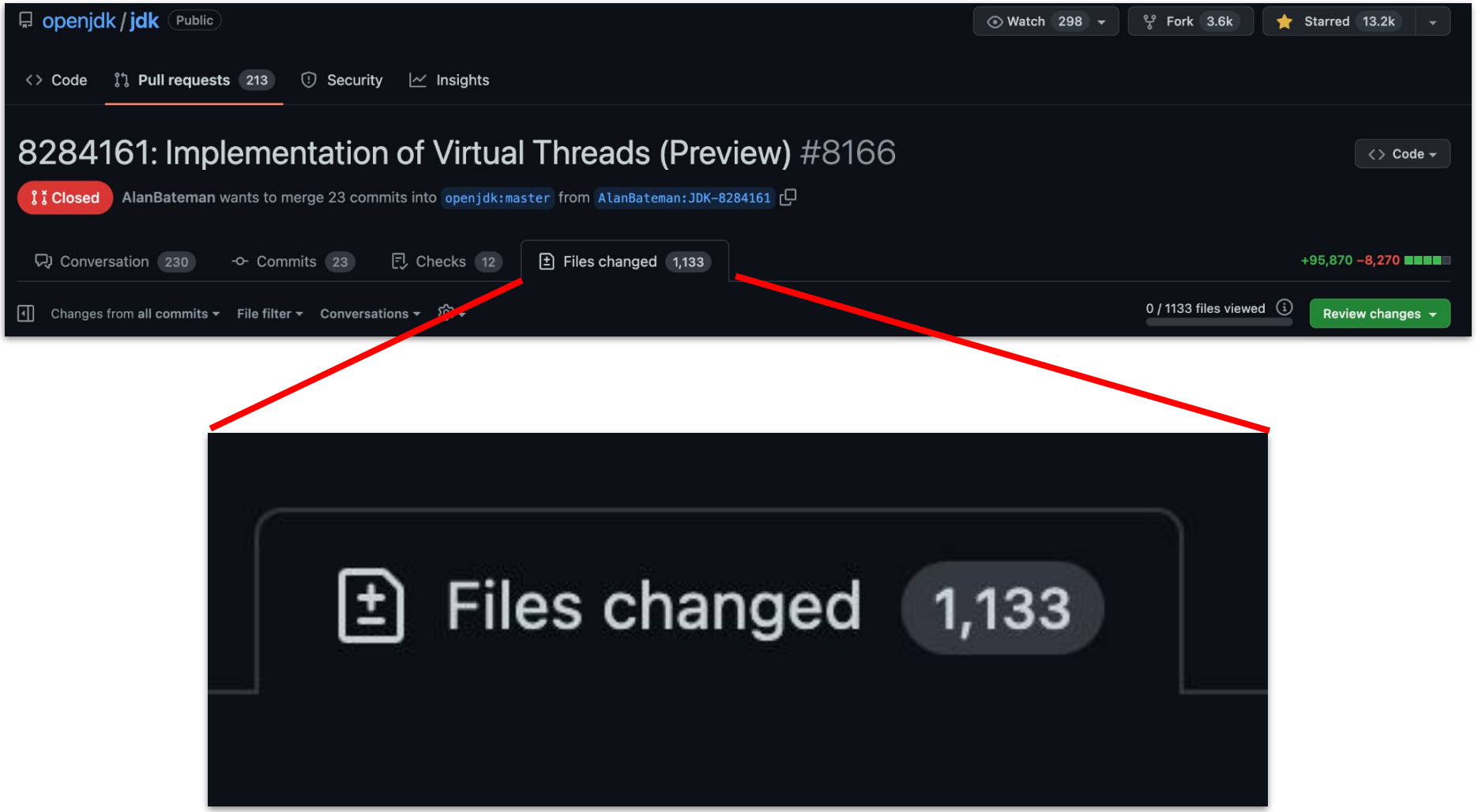
Project Loom

~~Fibers~~ and Continuations

Pull Request



Pull Request



Pull Request

openjdk / jdk Public

Code | Pull requests 213 | Security | Insights

8284161: Implementation of Virtual Threads (Preview) #8166

Closed AlanBateman wants to merge 23 commits into `openjdk:master` from `AlanBateman:JDK-8284161`

Conversation 230 | Commits 23 | Checks 12 | Files changed 1,133 +95,870 −8,270

Changes from all commits | File filter | Conversations | 0 / 1133 files viewed | Review changes

Pull Request

openjdk / jdk Public

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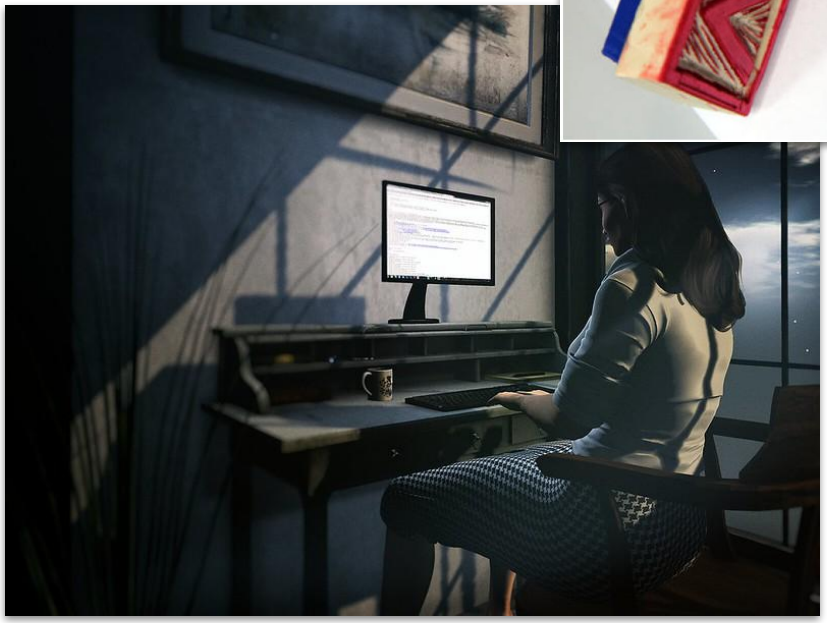
Pull Request



Codes like sync, scales like async

```
49  void run() throws Exception {
50      try (var executor = Executors.newVirtualThreadPerTaskExecutor()) {
51          int numTasks = 10;
52          for (int i = 0; i < numTasks; i++) {
53              executor.submit(new MyTask(i, database));
54          }
55      }
56  }
```

Codes like sync, scales like async

```
30  class MyTask implements Runnable {
31      @Override
32      public void run() {
33          var user = database.findUser(id);
34          // ...
35      }
```

Pros

JVM

Pros

sync

JVM

Pros

sync

scale

JVM

Pros

sync

scale

JVM

simple

Pros

sync

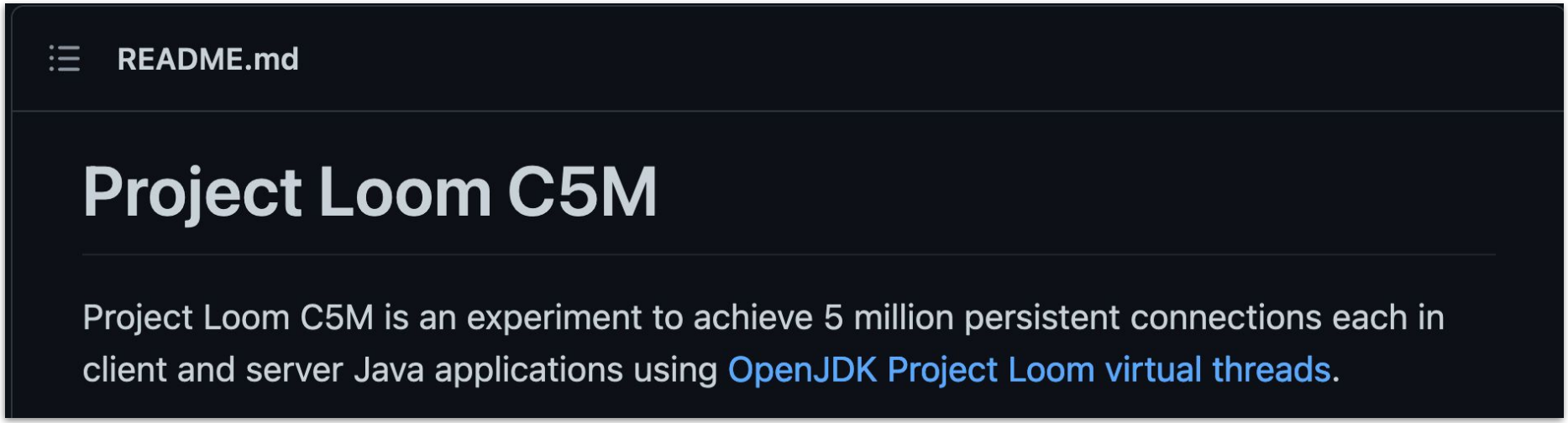
scale

JVM

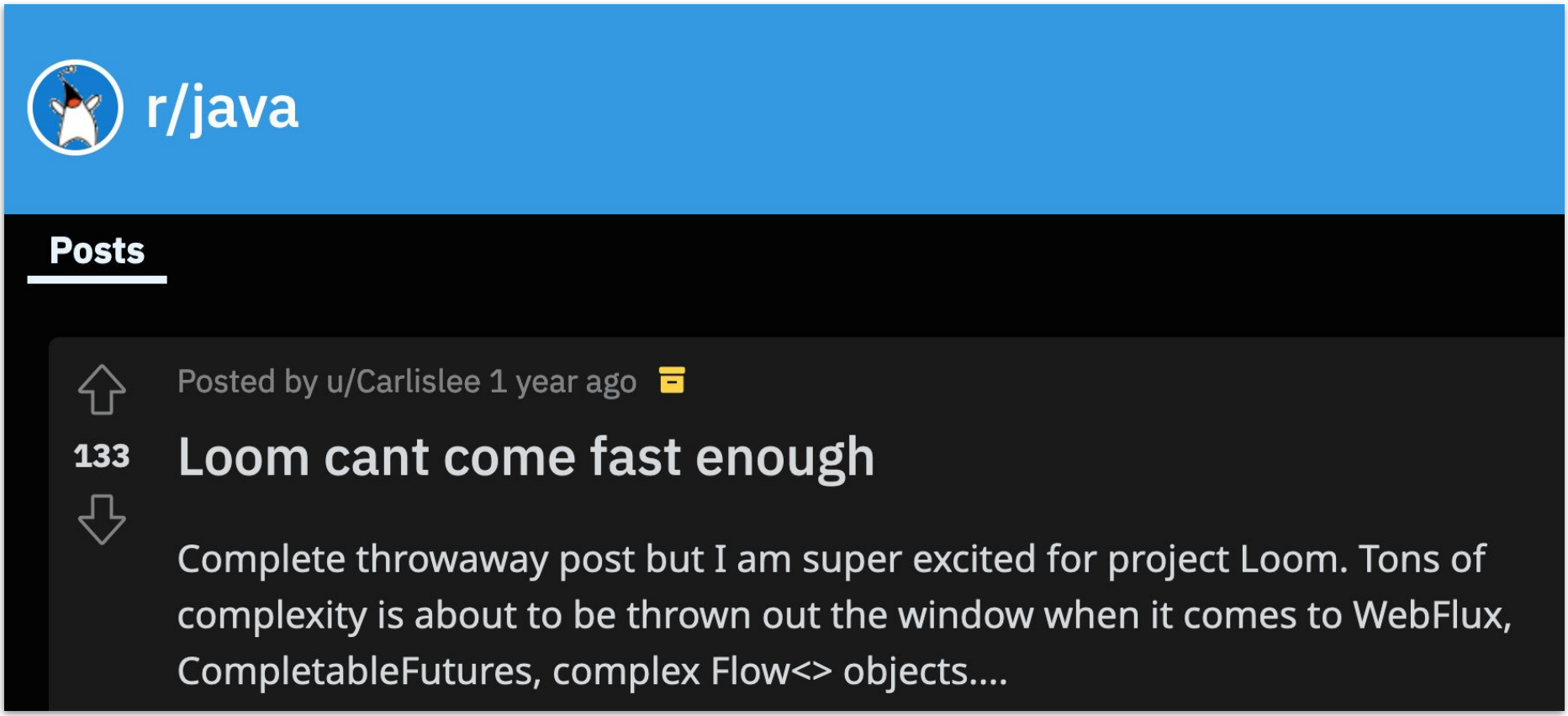
simple

debug,
tooling,
monitoring

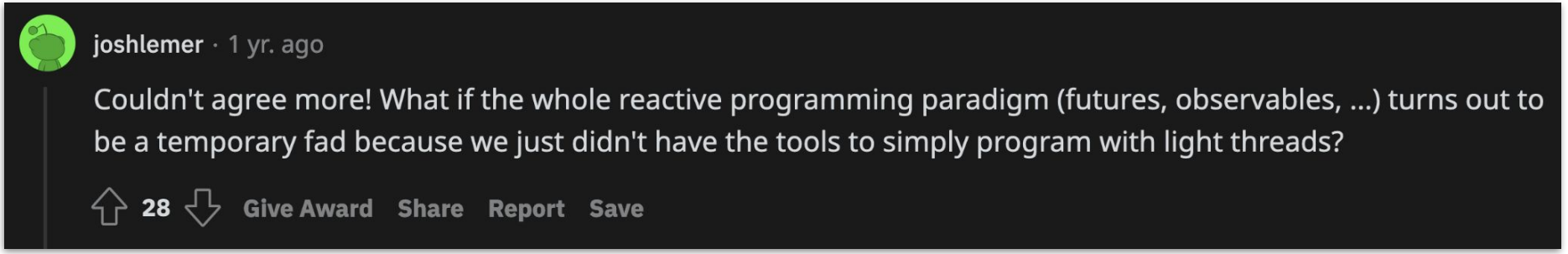
Loom C5M


README.md
Project Loom C5M
Project Loom C5M is an experiment to achieve 5 million persistent connections each in client and server Java applications using OpenJDK Project Loom virtual threads.

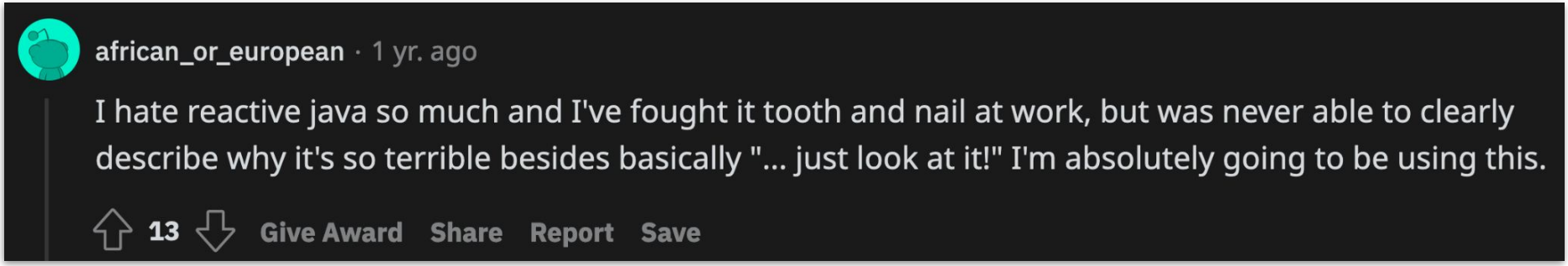
Hype


r/java
Posts
Posted by u/Carlislee 1 year ago
133
Loom cant come fast enough
Complete throwaway post but I am super excited for project Loom. Tons of complexity is about to be thrown out the window when it comes to WebFlux, CompletableFutures, complex Flow<> objects....

Hype


joshlemer · 1 yr. ago
Couldn't agree more! What if the whole reactive programming paradigm (futures, observables, ...) turns out to be a temporary fad because we just didn't have the tools to simply program with light threads?
28
Give Award
Share
Report
Save

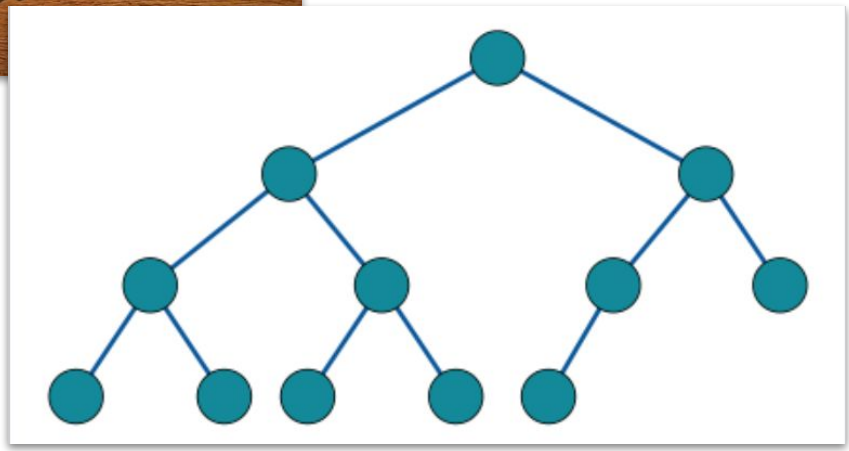
Hype


african_or_european · 1 yr. ago
I hate reactive java so much and I've fought it tooth and nail at work, but was never able to clearly describe why it's so terrible besides basically "... just look at it!" I'm absolutely going to be using this.
13
Give Award
Share
Report
Save

“Loom will kill Reactive programming”


OSSA ROMANI PRESB.
IN CŒMET. S. HELENÆ
VIA LABIC.
SUB PRÆPOSITO LAPIDE
REPERTA
HIC SITA SUNT
A. D. MDCCXLIX


JVC
POWER
HR-A61U
maxell



Reactive

:-|


Oleh Dokuka

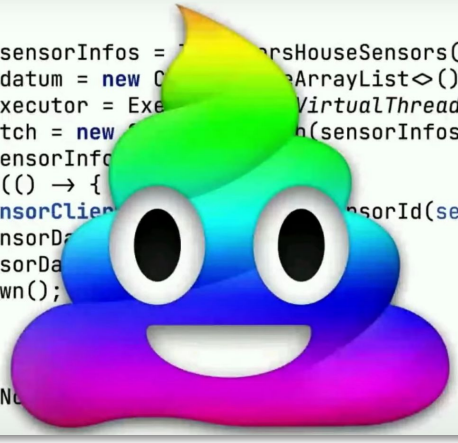
:-|

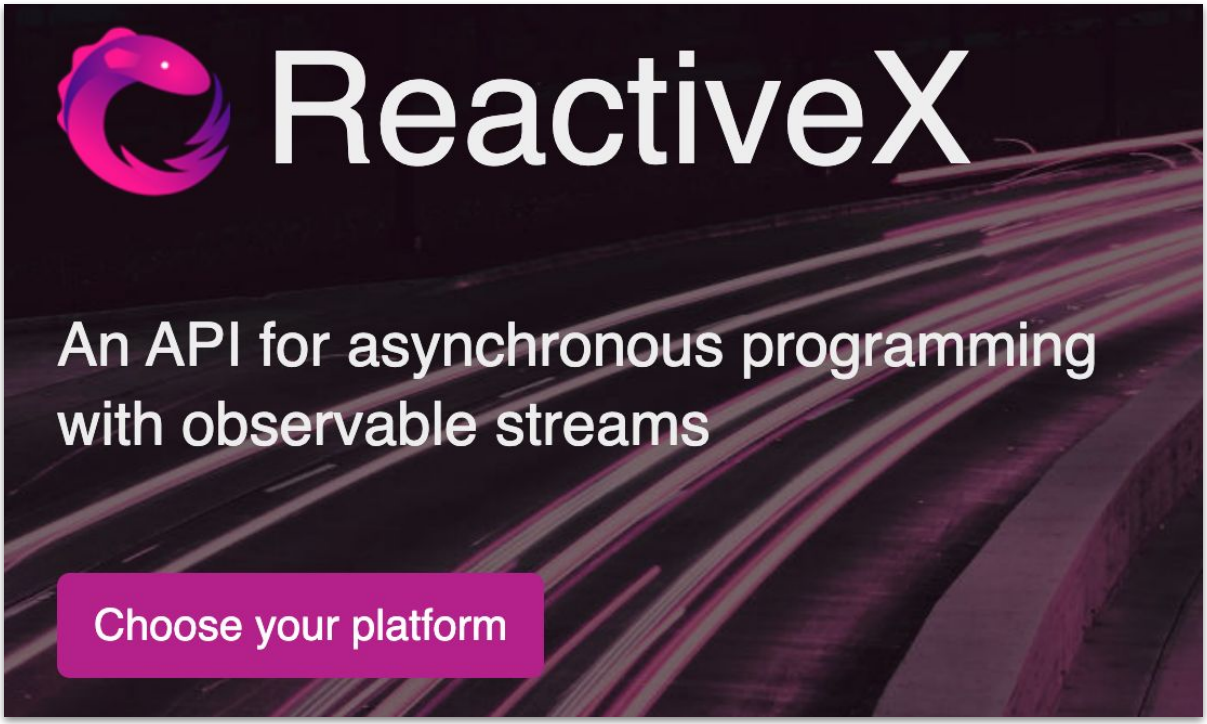

Project Loom

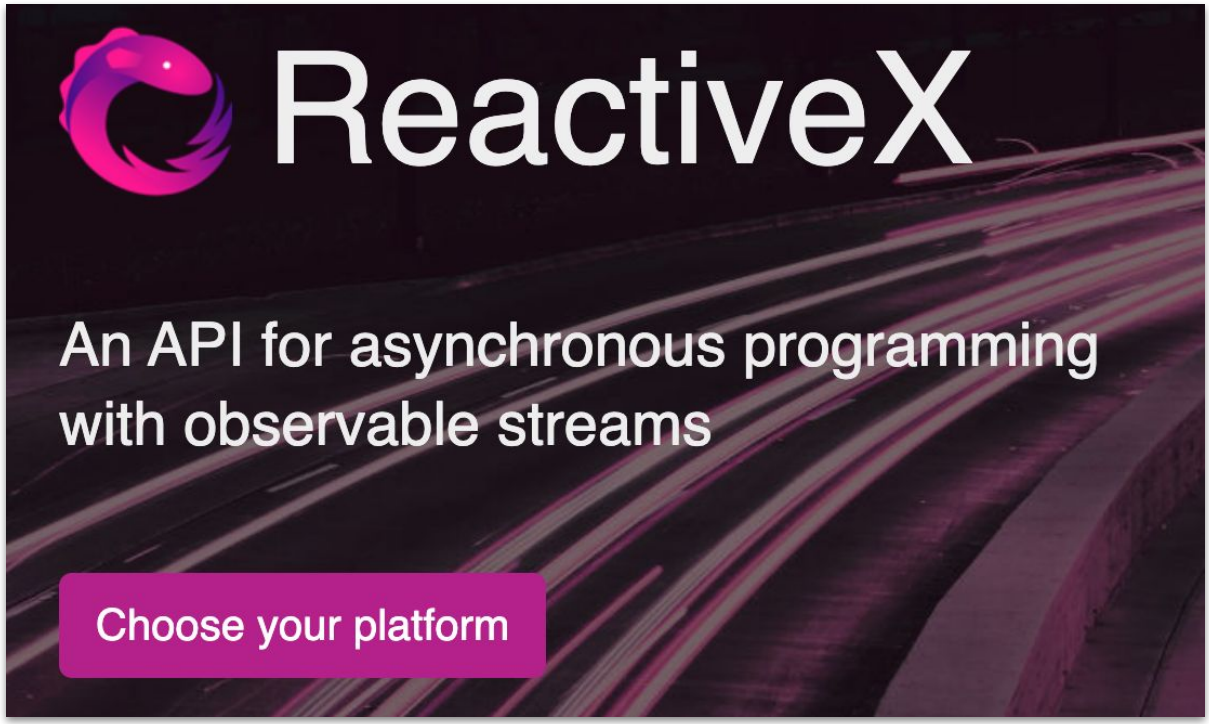

Oleh Dokuka

:-|


```
List<SensorInfo> sensorInfos = rsHouseSensors(userId, houseId);
List<SensorData> datum = new ArrayList<>();
ExecutorService executor = VirtualThreadPerTaskExecutor();
CountDownLatch latch = new (sensorInfos.size());
for (SensorInfo sensorInfo
  executor.submit(() -> {
    double t = sensorClier nsorId(sensorInfo.id());
    SensorData sensorDa
    datum.add(sensorDa
    latch.countDown();
  });
}
latch.await(1000,
executor.shutdownN
```




ReactiveX
An API for asynchronous programming
with observable streams
Choose your platform

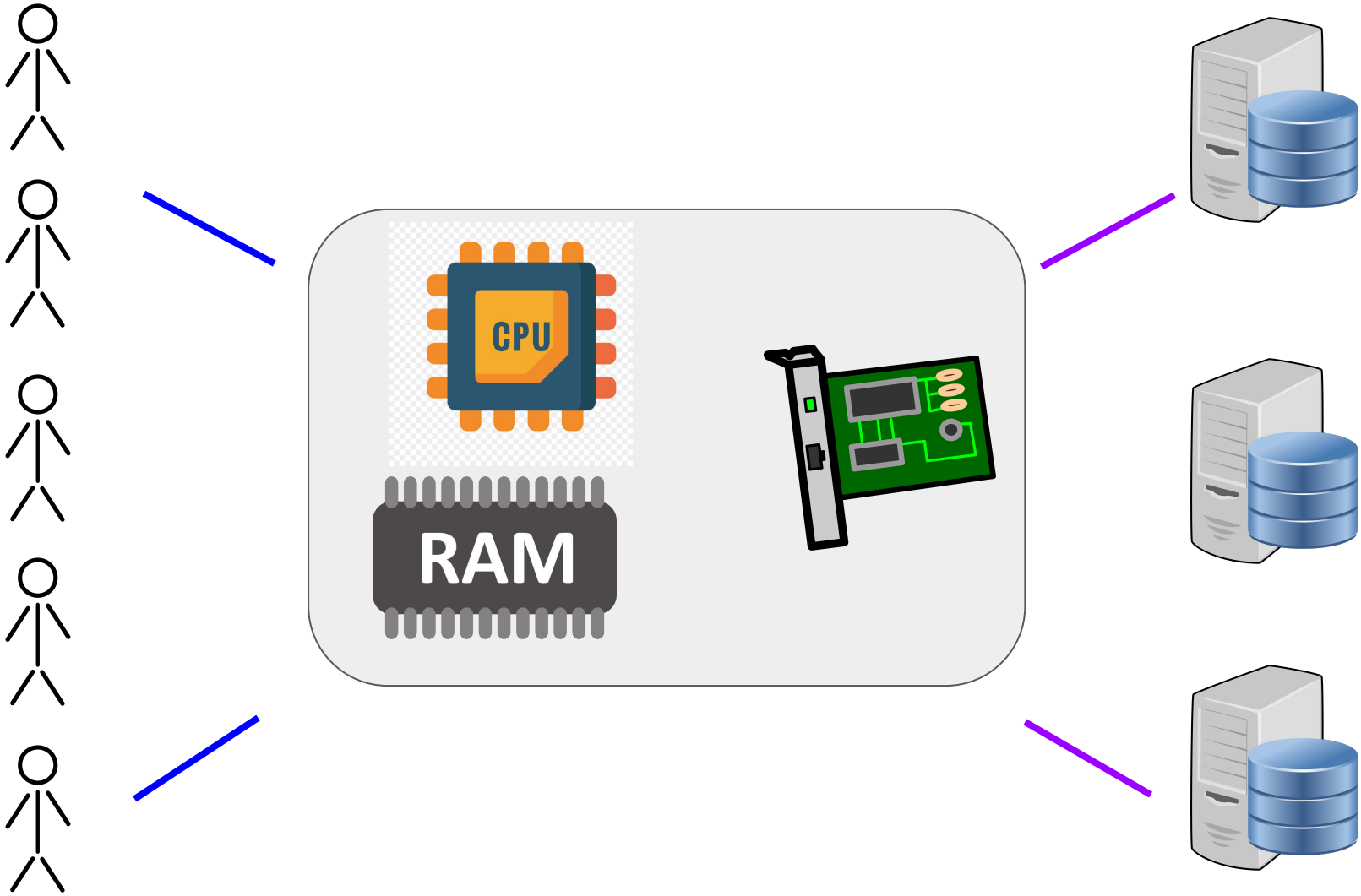


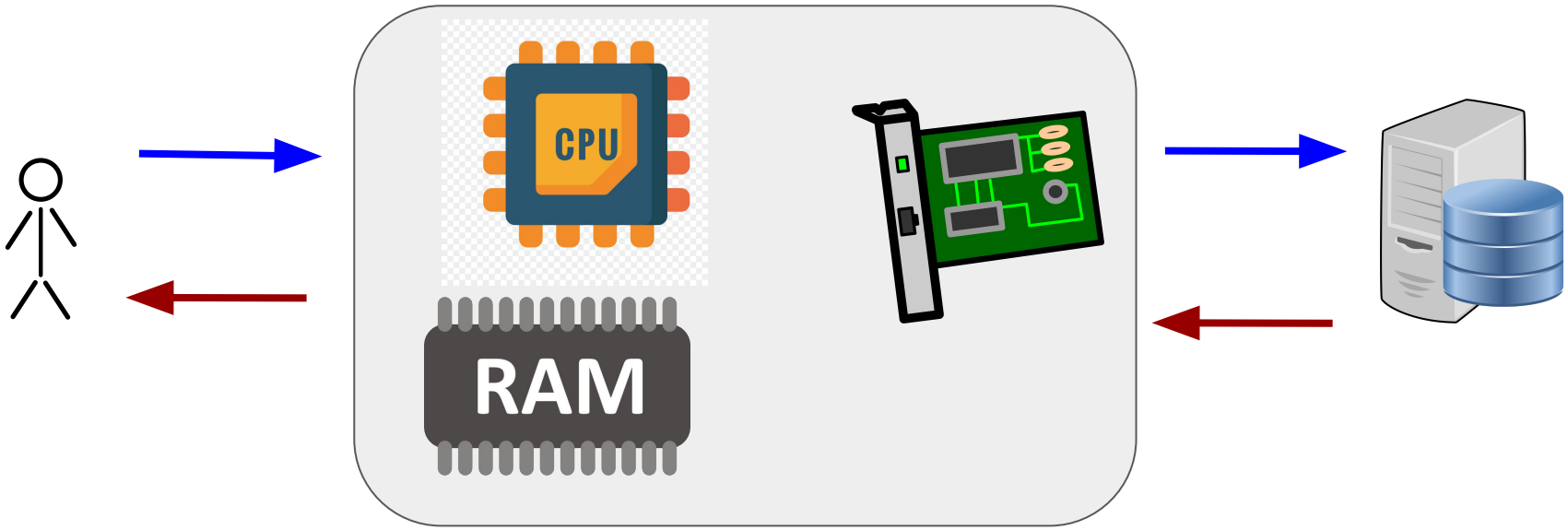
Languages

- Java: RxJava
- JavaScript: RxJS
- C#: Rx.NET
- C#(Unity): UniRx
- Scala: RxScala
- Clojure: RxClojure
- C++: RxCpp
- Lua: RxLua
- Ruby: Rx.rb
- Python: RxPY
- Go: RxGo
- Groovy: RxGroovy
- JRuby: RxJRuby
- Kotlin: RxKotlin
- Swift: RxSwift
- PHP: RxPHP
- Elixir: reaxive
- Dart: RxDart

The Reactive Manifesto

Published on September 16 2014. (v2.0)


CPU
RAM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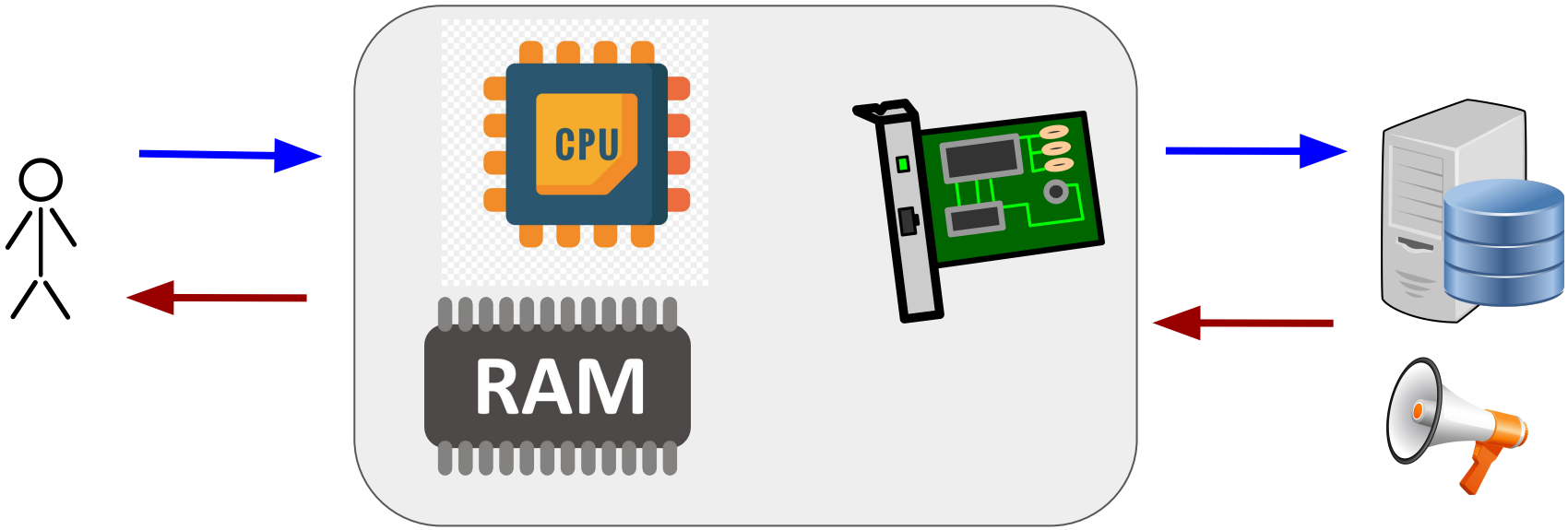
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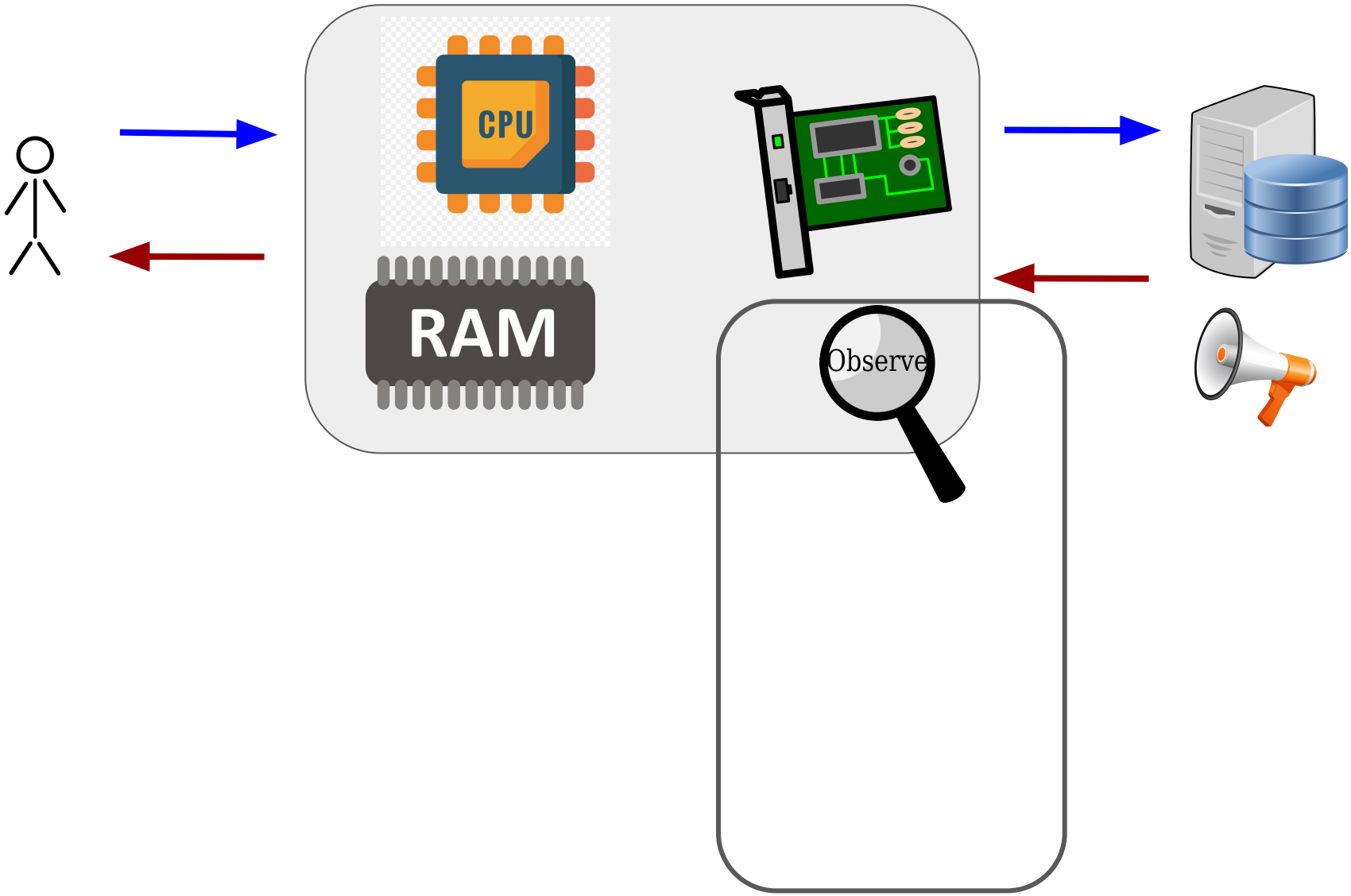
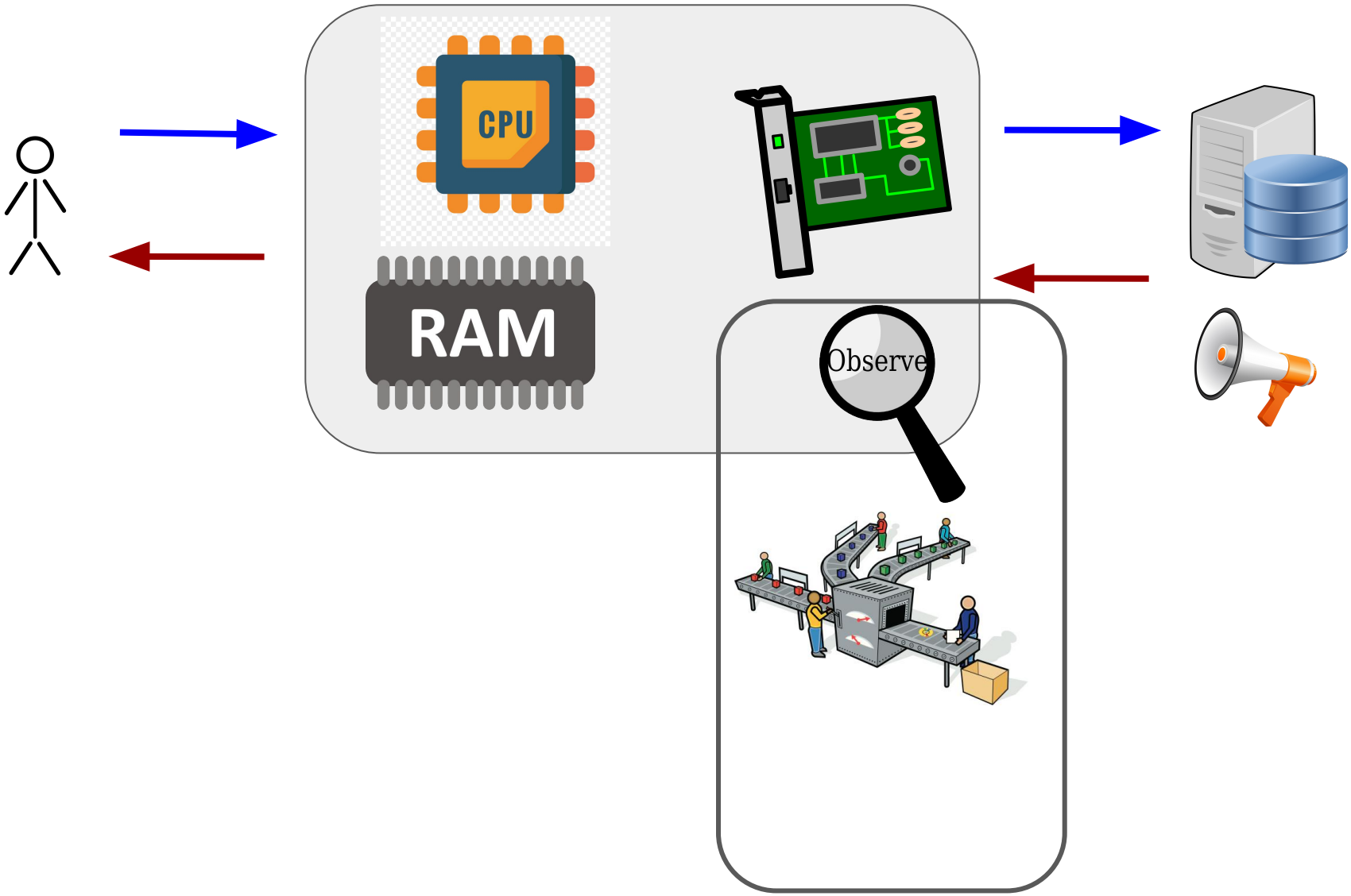
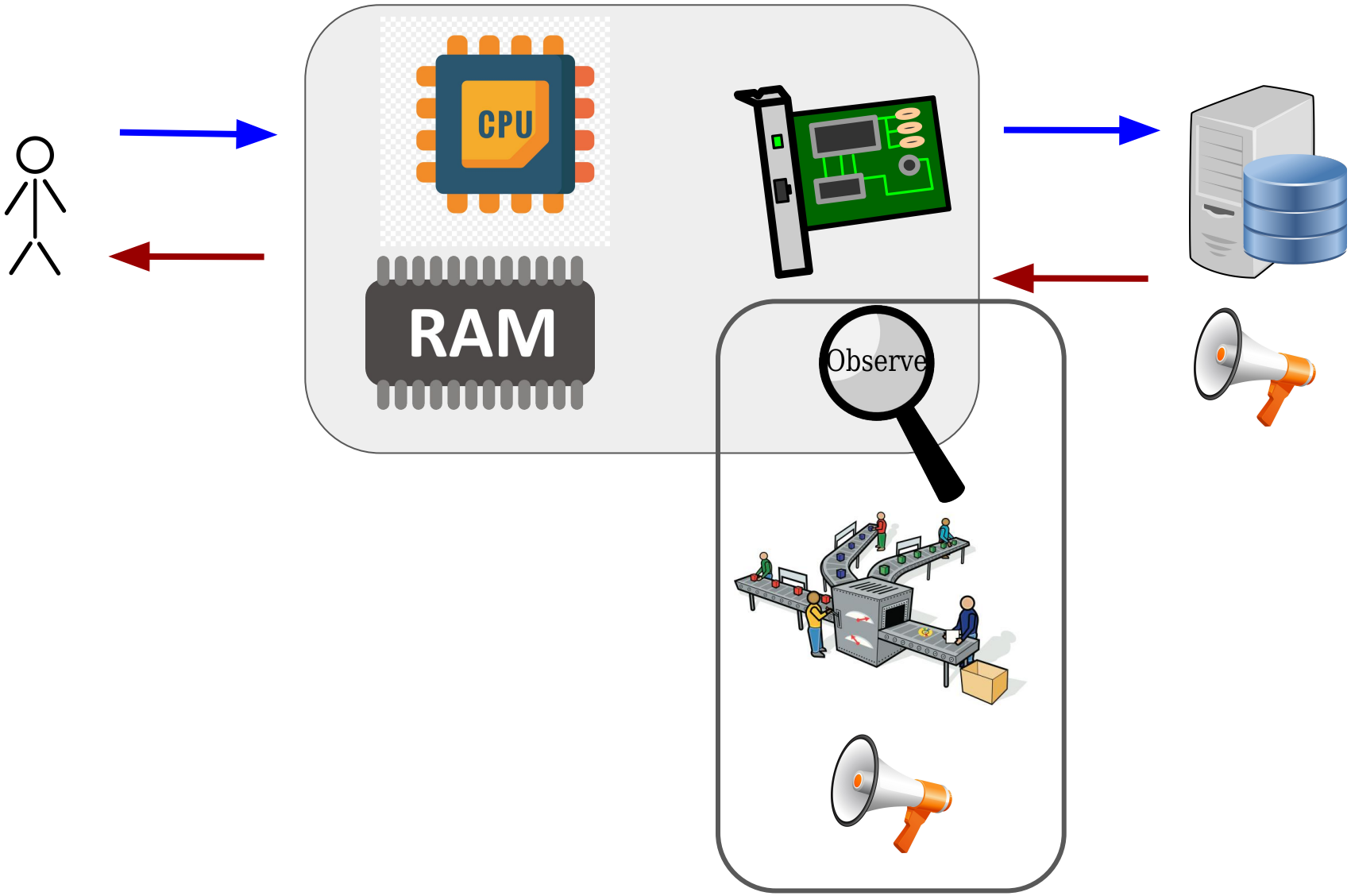
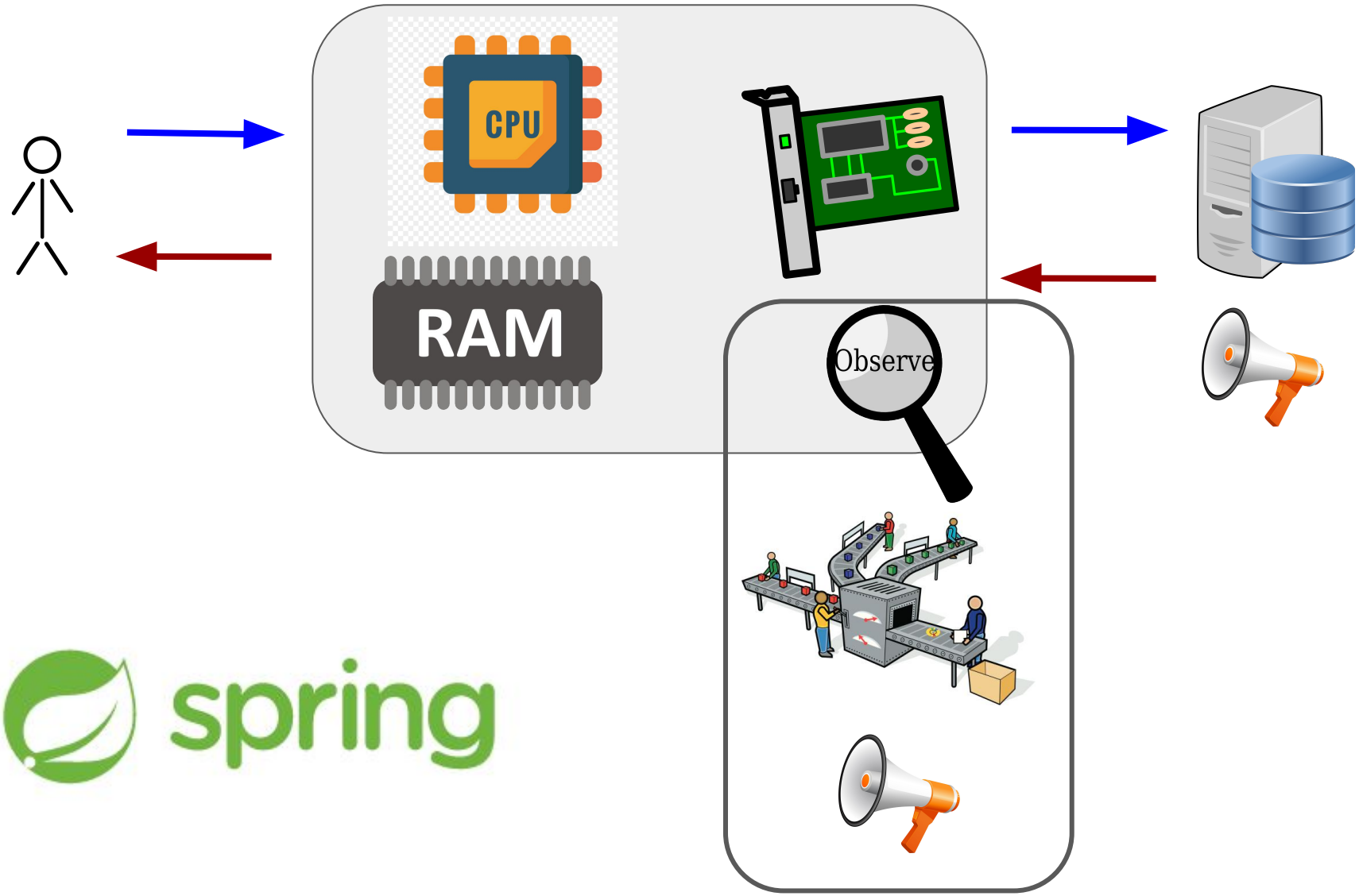
RAM


CPU
RAM
Observe

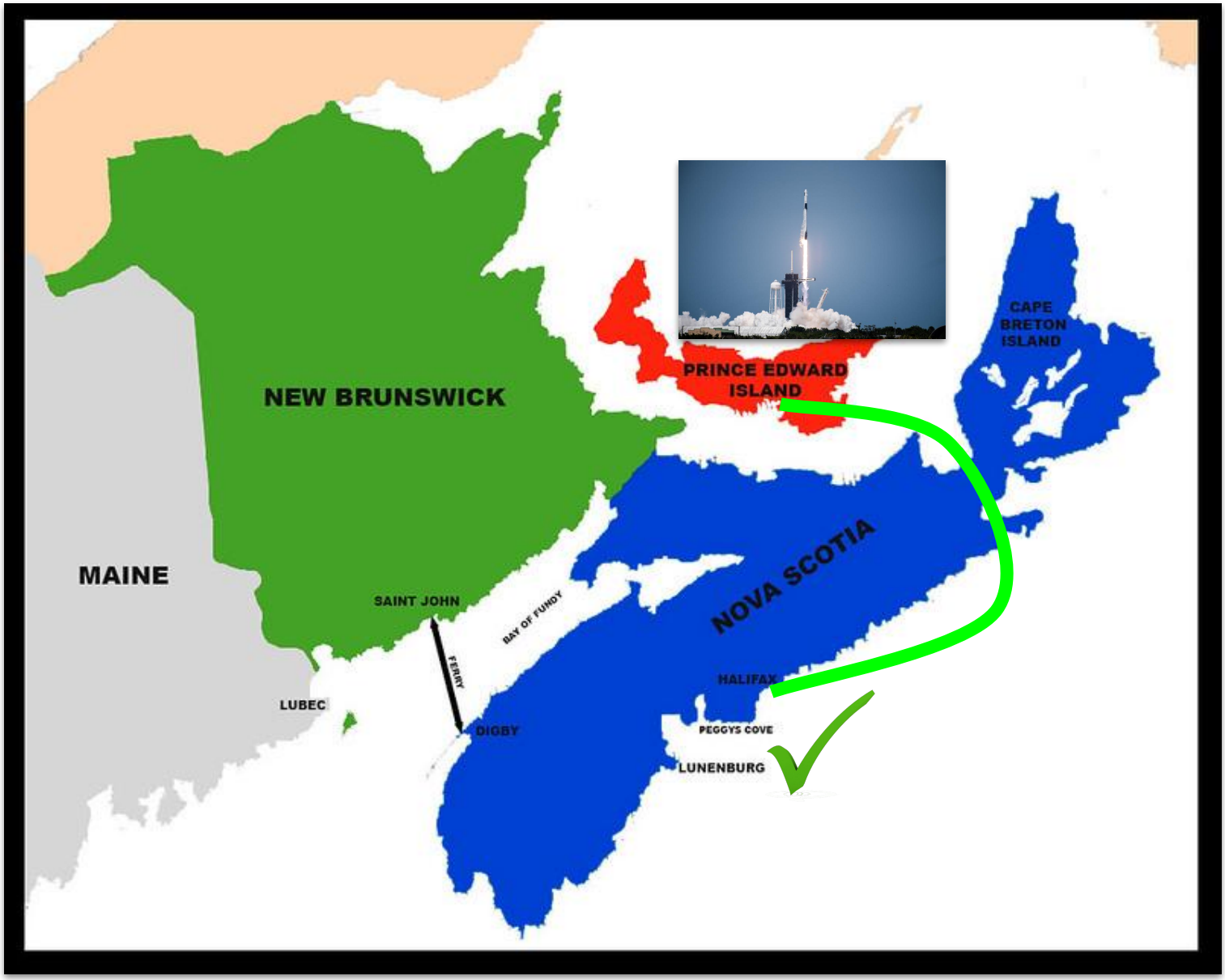

CPU
RAM
Observe


CPU
RAM
Observe


CPU
RAM
Observe
spring

FAANG

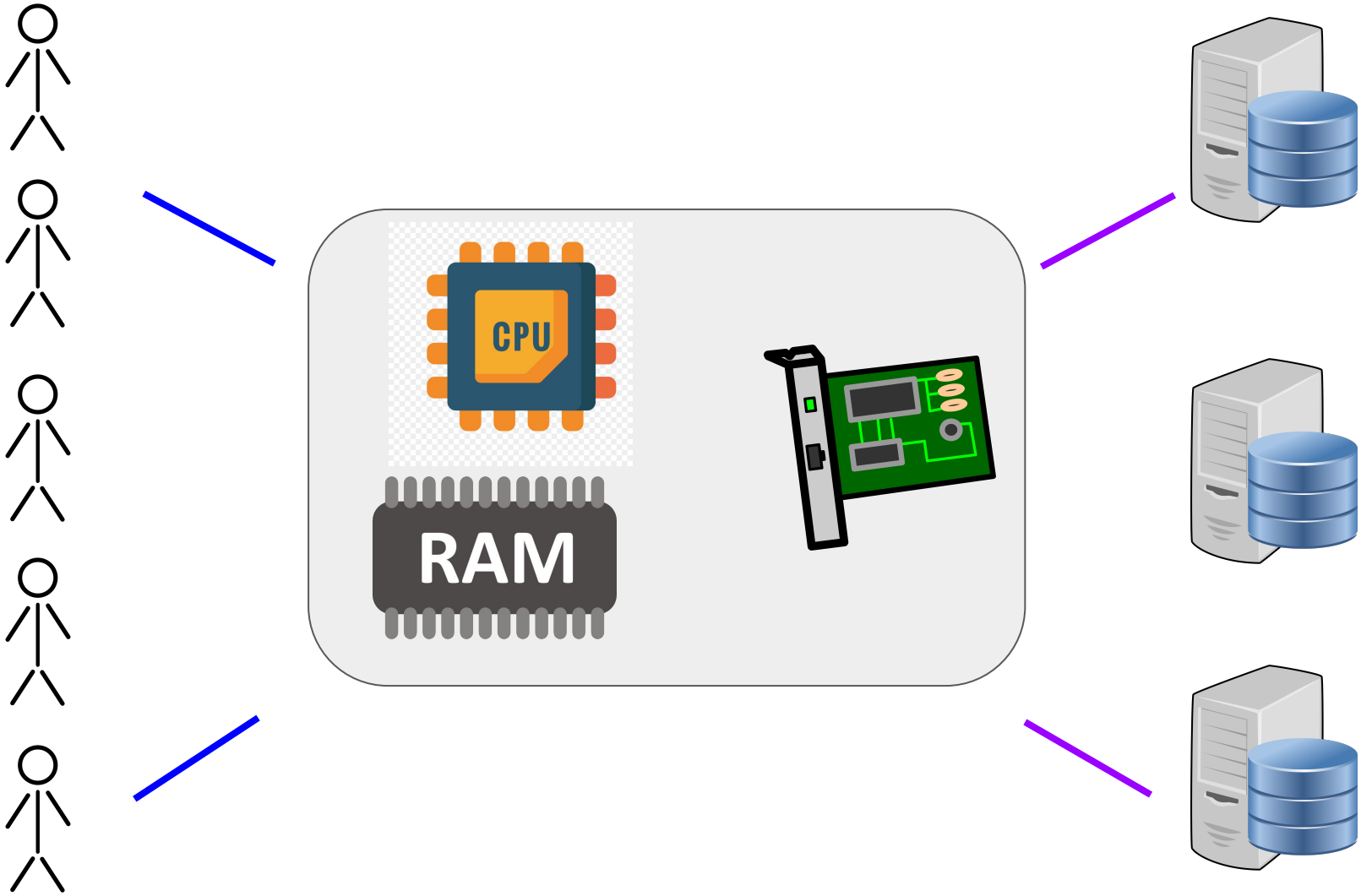
~~FAANG~~ -> MAANA

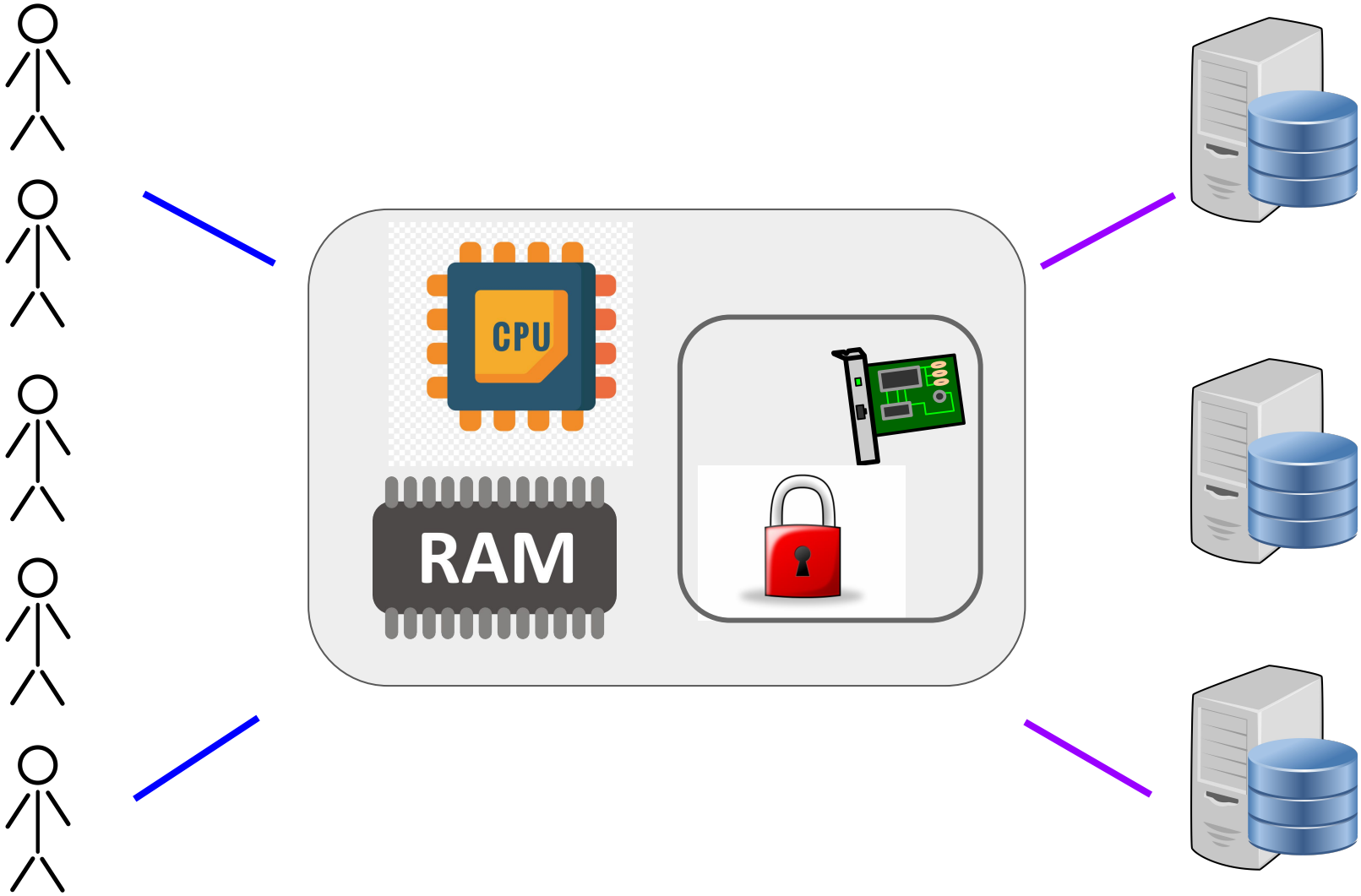

NEW BRUNSWICK
MAINE
SAINT JOHN
BAY OF FUNDY
FERRY
LUBEC
DIGBY
PRINCE EDWARD ISLAND
CAPE BRETON ISLAND
NOVA SCOTIA
HALIFAX
PEGGYS COVE
LUNENBURG

Cons

scale

JVM


CPU
RAM


CPU
RAM

Locks

```
45  class MyTask implements Runnable {
46      @Override
47      public void run() {
48          try {
49              var database = pool.acquireDatabase();
50              var user = database.findUser(id);
51              // ...
52          } catch (Exception ex) {
53              // #yolo
54          } finally {
55              pool.releaseDatabase();
56          }
57      }
```

Locks

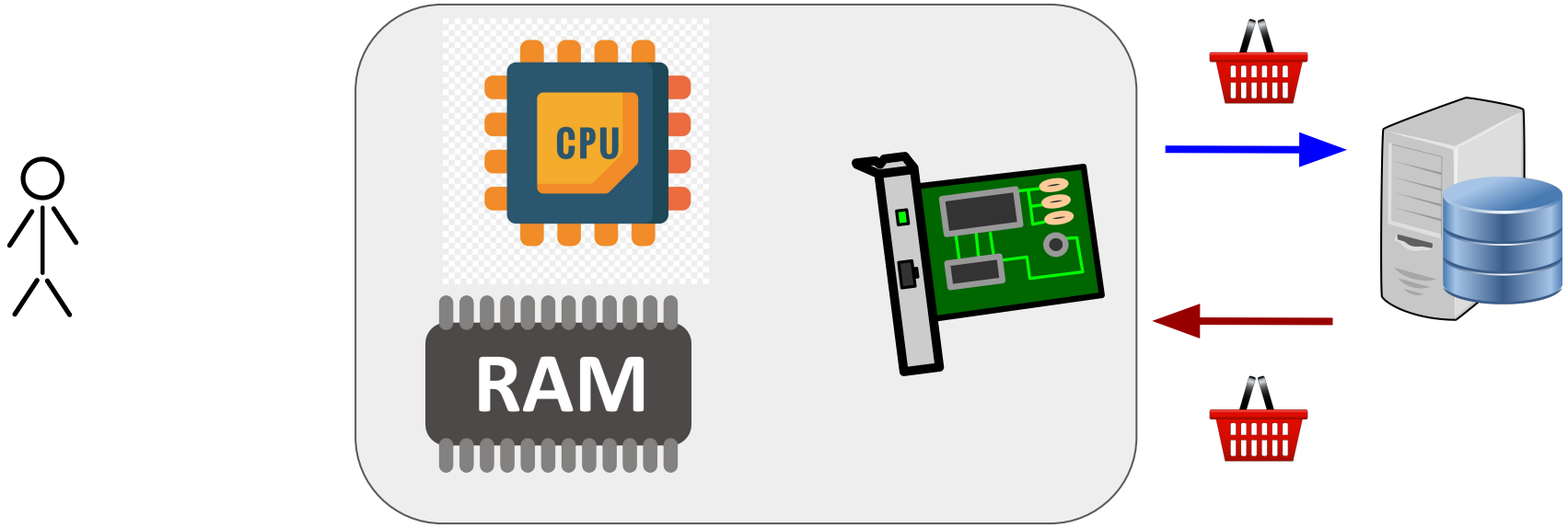
```
30  class ConnectionPool {
31      private static final int MAX_AVAIL = 2;
32      private final Semaphore available = new Semaphore(MAX_AVAIL
33      private final Database database = new Database();
34
35      Database acquireDatabase() throws InterruptedException {
36          available.acquire();
37          return database;
38      }
39
40      void releaseDatabase() {
41          available.release();
42      }
43  }
```

Cons

scale

back pressure

JVM


CPU
RAM


Joe's
TAKE AWAY

README.md

Project Loom C5M

Project Loom C5M is an experiment to achieve 5 million p
client and server Java applications using OpenJDK Projec

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Structured Concurrency

```
1 i=0;

2 i=i+1;

3 PRINT i; "squared=";i*i;

4 IF i>=100 THEN GOTO 6;

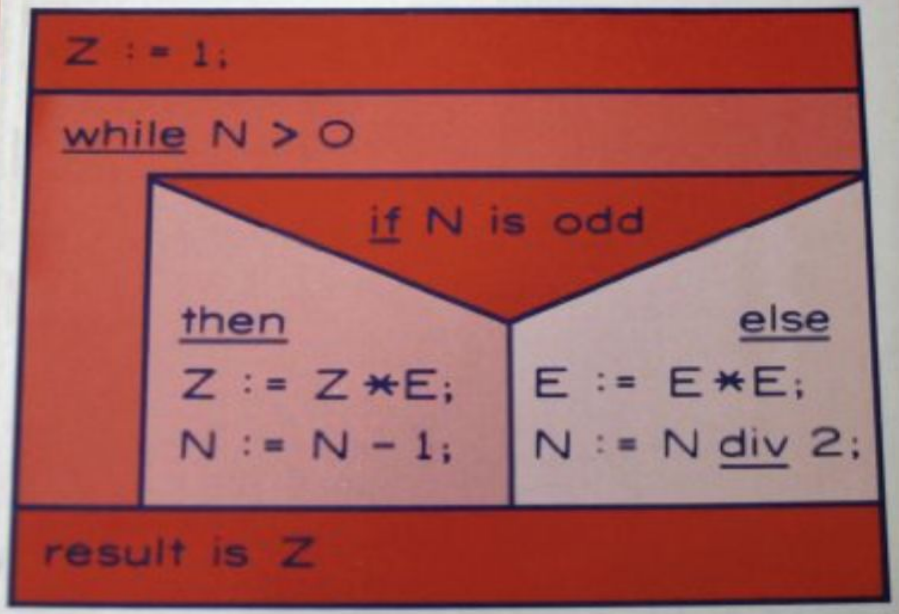
5 GOTO 2;

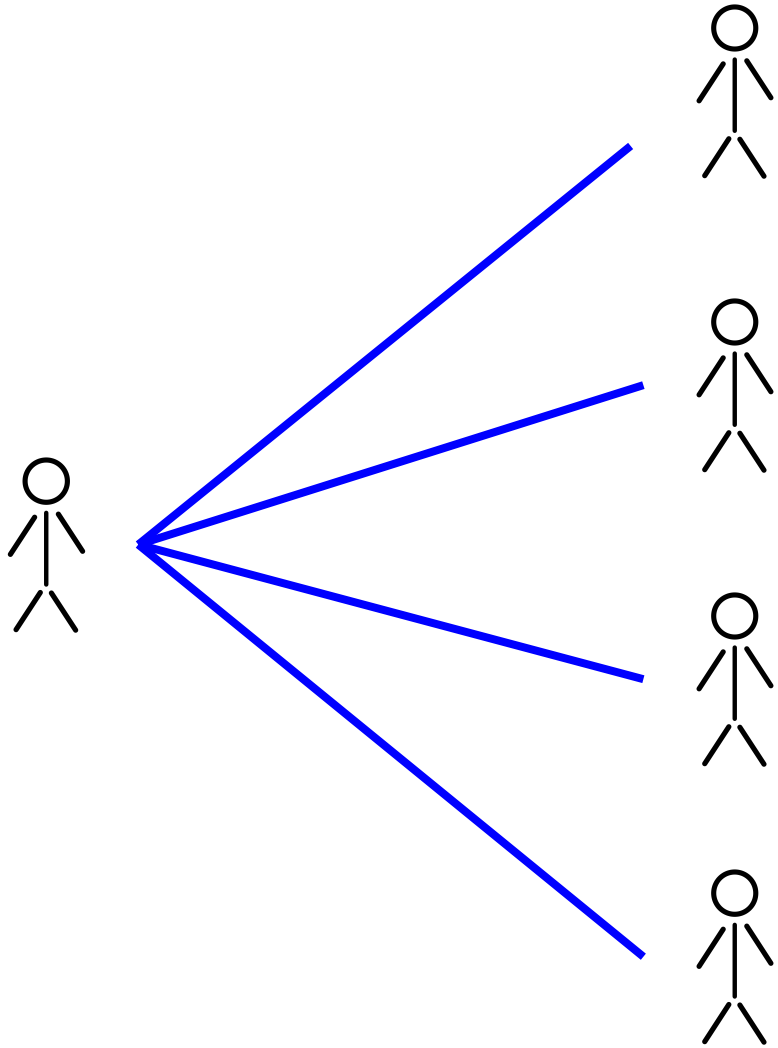
6 PRINT "Program Completed.";

7 END
```

STRUCTURED PROGRAMMING AND PROBLEM-SOLVING WITH PASCAL

Richard B. Kieburtz





njs blog

My homepage | Blog archive

WED 25 APRIL 2018

Notes on structured concurrency, or:

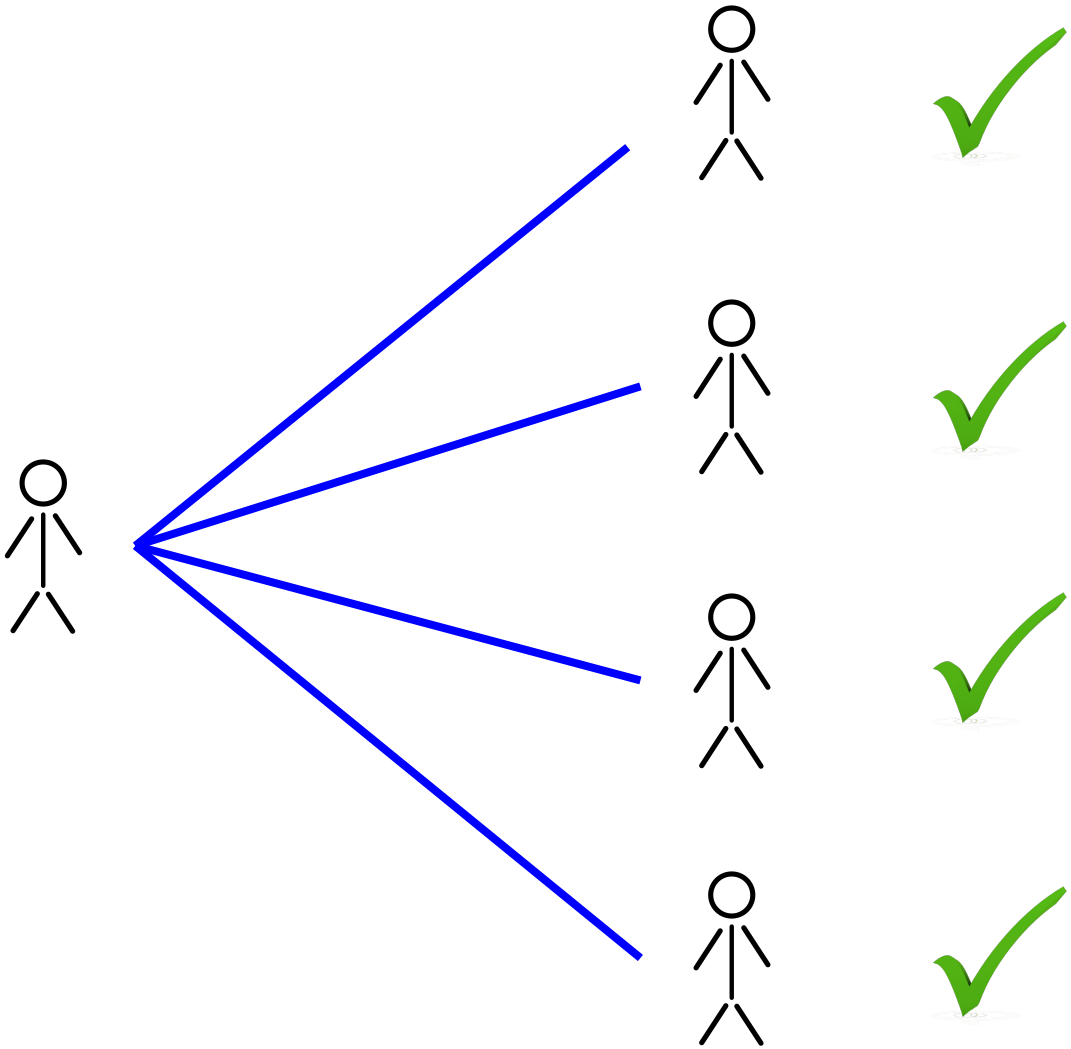
njs blog

My homepage | Blog archive

WED 25 APRIL 2018

Notes on structured concurrency, or: Go statement considered harmful

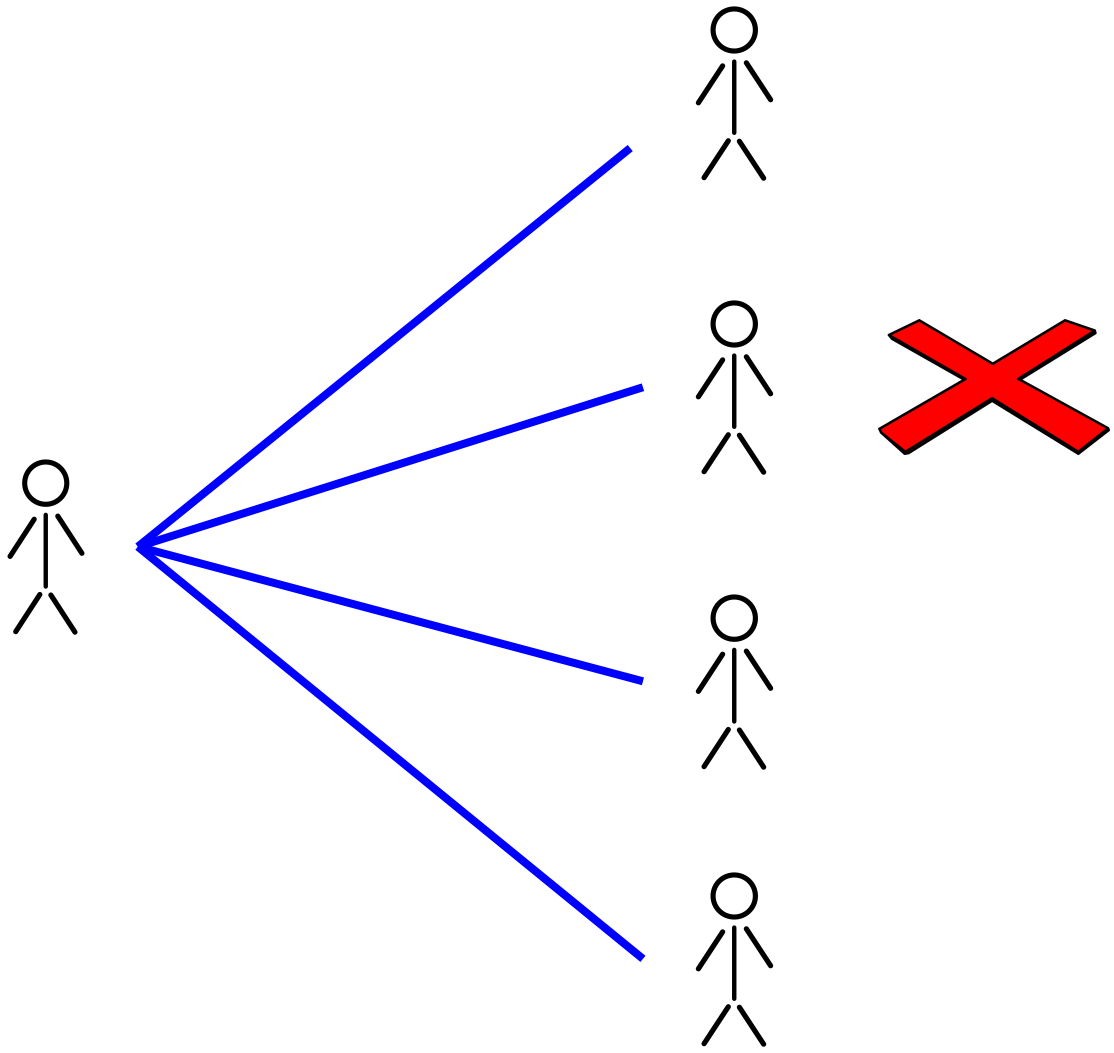
Invoke All



Invoke All

```
35  String run() throws Exception {
36      try (var scope = new StructuredTaskScope.ShutdownOnFailure()) {
37          Future<String> foo = scope.fork(() -> taskFoo());
38          Future<String> bar = scope.fork(() -> taskBar());
39
40          scope.join();
41
42          return foo.resultNow() + " " + bar.resultNow();
43      }
44  }
```

Invoke All

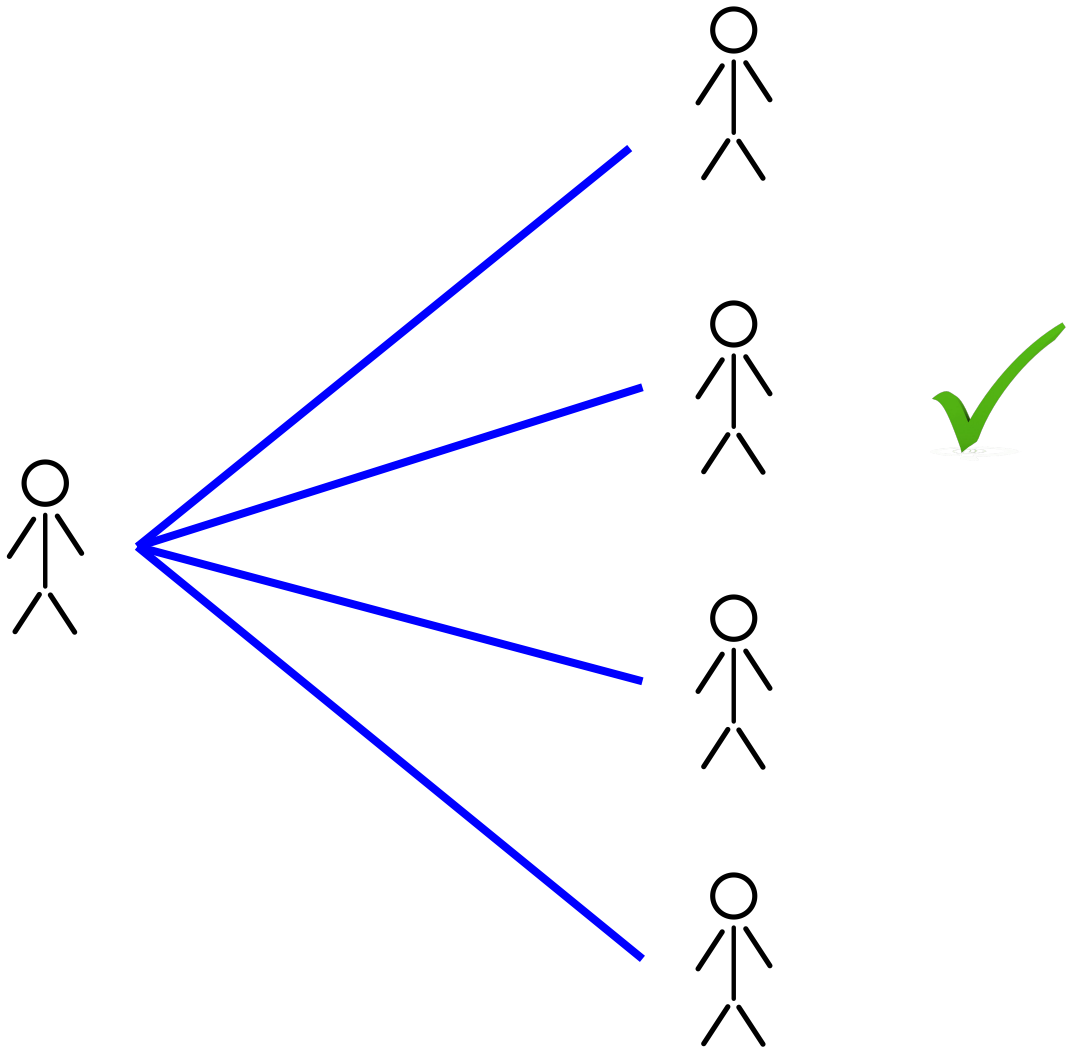


Invoke All

```
35  String run() throws Exception {
36      try (var scope = new StructuredTaskScope.ShutdownOnFailure()) {
37          Future<String> foo = scope.fork(() -> taskFoo());
38          Future<String> bar = scope.fork(() -> taskBar());
39
40          scope.join();
41          scope.throwIfFailed();
42
43          return foo.resultNow() + " " + bar.resultNow();
44      }
45  }
```

JVM

Invoke Any



Invoke Any

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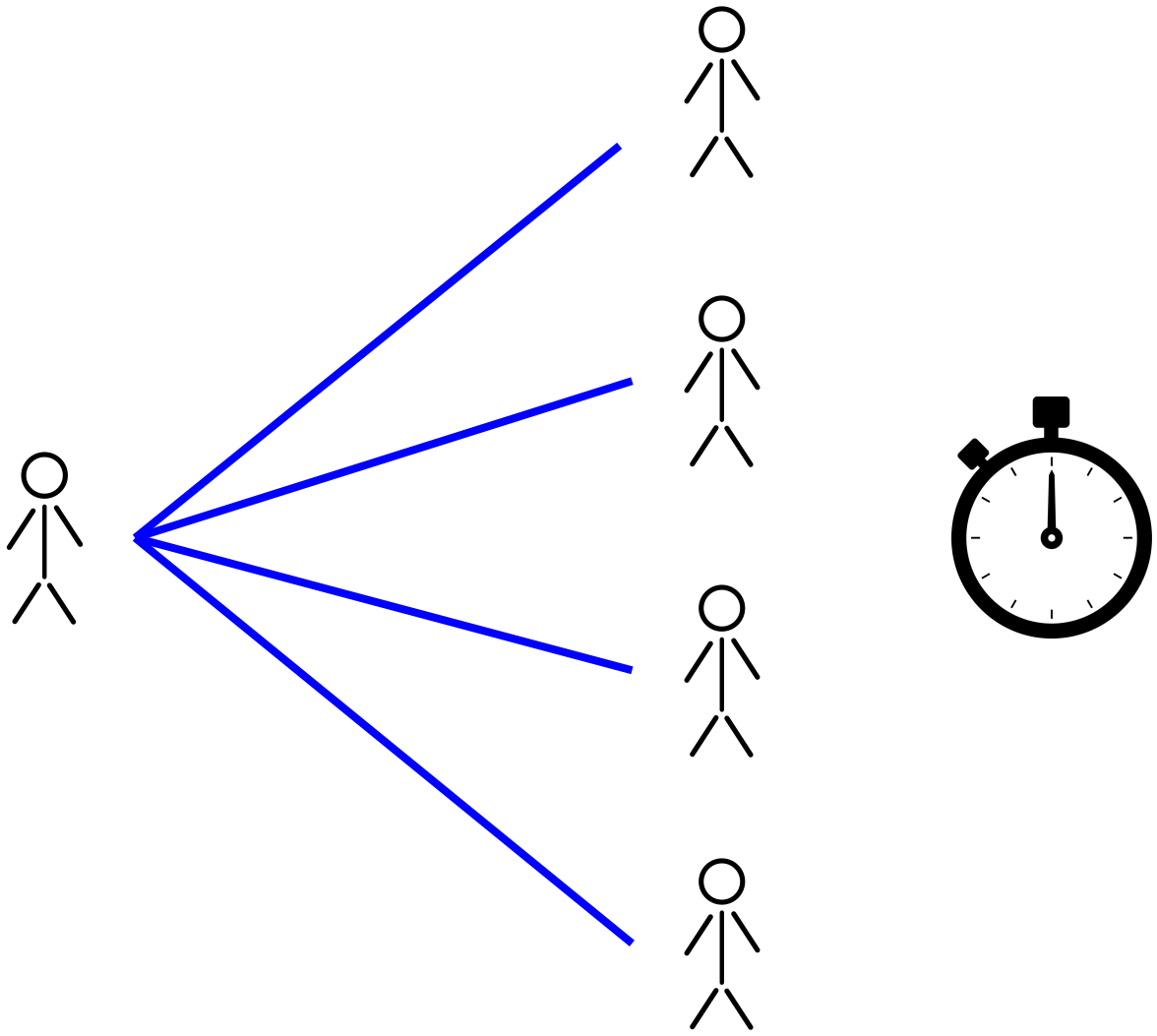
36      try (var scope =
37              new StructuredTaskScope.ShutdownOnSuccess<String>()) {
38          Future<String> foo = scope.fork(() -> taskFoo());
39          Future<String> bar = scope.fork(() -> taskBar());
40
41          scope.join();
42
43          return scope.result();
44      }
45  }
```

Deadline



Deadline

```
35  String run() throws Exception {
36      try (var scope =
37              new StructuredTaskScope.ShutdownOnSuccess<String>()) {
38          Future<String> foo = scope.fork(() -> taskFoo());
39          Future<String> bar = scope.fork(() -> taskBar());
40
41          var deadline = Instant.now().plusSeconds(secondsToAdd: 2);
42          scope.joinUntil(deadline);
43
44          return scope.result();
45      }
46  }
```

README.md

Project Loom C5M

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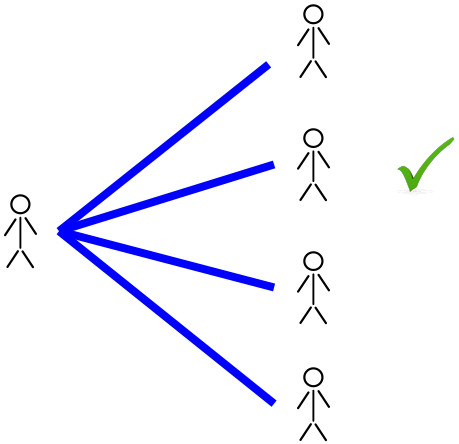

Code, Credits, Links

Available here on GitHub

شكراً جزيلاً
рахмат
danke
謝謝
ngiyabonga
teşekkür ederim
Баярлалаа
spas
mersi
kia ora
barka
welalin
tack
mahalo
tapadh leat
спасибо
faafetai lava
vinaka
dank je
misaotra
paldies
grazzi
спасибі
blagodaram
matondo
kiitos
dankie
thank you
gracias
хвала
nanni
nandri
dhanyavad
mauruuru
asante
manana
bedankt
hvala
köszönöm
aciú
obrigada
tenki
bayarlalaa
gràçie
dankon
akun
djiere dieuf
tau
mochchakkeram
murakoze
enkosi
дякую
mamnun
dziękuję
chnorakaloutioun
gratias ago
gràcies
sulpáy
go raibh maith agat
chokrane
sobodi
dēkuji
sagolun
sukriya
kop khun krap
taiku
obrigado
arigatô
takk
dakujem
trugarez
mèsi
didi madloba
ありがとう
tanemirt
grazie
najis tuke
terima kasih
rahmet
shukriya
mercé
мерси
kam sah hamnida
rahmat
ευχαριστώ
diolch
dhanyavadagalu
তোমাকে ধন্যবাদ
감사합니다
xièxie
merci