Game of Verticles I: Introduction to Vert.x

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Goals

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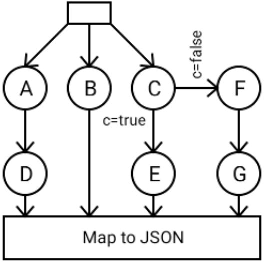

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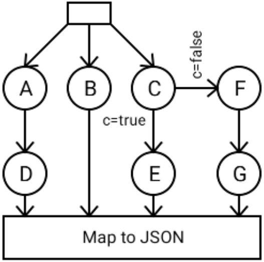

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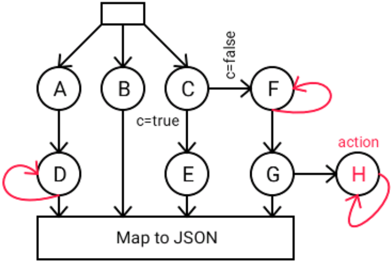

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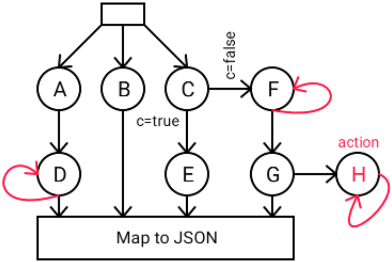

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History

Actor Model (1973)

Actor Model of Computation:
Scalable Robust Information Systems

Carl Hewitt

This article is dedicated to Alonzo Church and Dana Scott.

The Actor Model is a mathematical theory that treats "*Actors*" as the universal primitives of digital computation.

Hypothesis:[i] **All physically possible computation can be directly implemented using Actors.**

The model has been used both as a framework for a theoretical understanding of concurrency, and as the theoretical basis for several practical implementations of concurrent systems. The advent of massive concurrency through client-cloud computing and many-core computer architectures has galvanized interest in the Actor Model.

Message passing using types is the foundation of system communication:

- Messages are the unit of communication[1]

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- "I made up the term 'object-oriented', and I can tell you **I didn't have C++ in mind**."
- Download Pharo and be blown away!

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- WhatsApp and WeChat are implemented in Erlang!

Influential people

Vertx

Recomendations (my own)

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- Dependency injection == Coupling
- **Have a plan to handle complexity**.

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- **The more verticles, the better**

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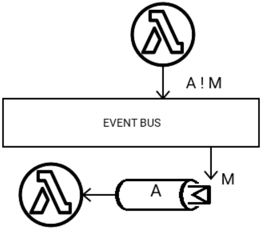
- **send and pray** semantics. We send the message and pray that it arrives

Vertx model (I)



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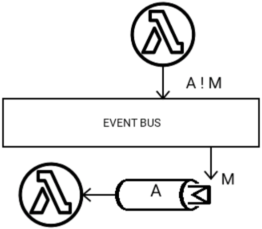

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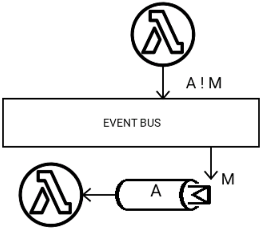

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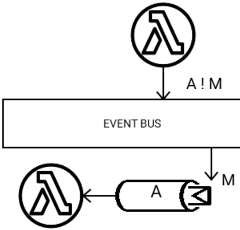

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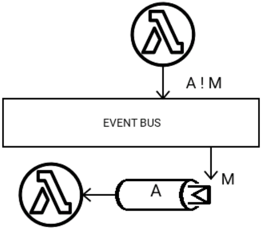

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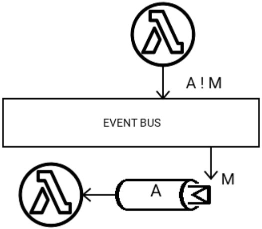

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- **Verticles process ONE message at a time**. Synchronization is implemented this way

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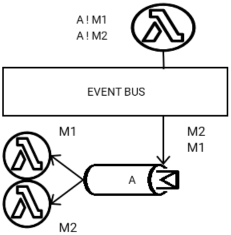

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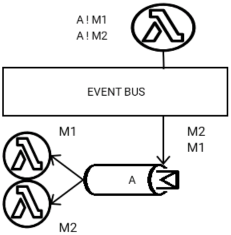

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- The instance that receives the message is chosen using a non-strict round-robin algorithm

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Imagine that a verticle **sends a message** to another verticle and has to **process the response**

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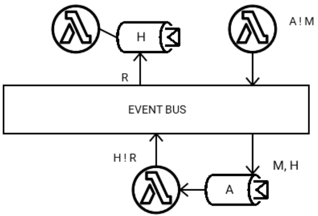

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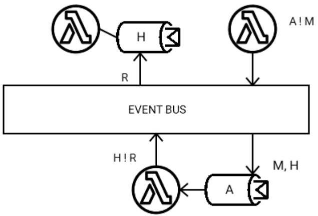
- but in practice, it's just another verticle listening on a random address



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- imrafaelmerino/json-values is a better alternative: it's persistent and provides a better api

```java
@Override
public JsObj transform(final JsObj obj) {
  return obj;
}
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  - What's the right size?
- What about green threads and project Loom?

Alternatives

- Erlang

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- Erlang
- Scala Akka
- Pony (compiled programming language)

vertx-effect: where Vertx meet FP

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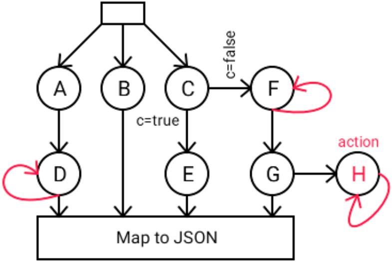
Vertx future

- Vertx 4 use futures to represent asynchronous results, but
- Vertx future API **is not rich enough** to develop complex verticles:
- **Only three methods to coordinate**: join, all and any
- Since **it's not lazy**, key reactive operations like *retry*, *recoverWith* and *fallbackTo* are missing

Impossible to address the following flow reasonably:



Val and λ to the rescue

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import java.util.function.Supplier;
import java.util.function.Function;
import io.vertx.core.Future;

public interface Val<O> extends Supplier<Future<O>> {...}

public interface λ<I,O> extends Function<I, Val<O>> {...}
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- The types **I** and **O** represent messages sent to the Event Bus
- If they are not supported by Vertx
    - Implement and register a **MessageCodec** for them

Practice makes perfect

Hands-on

What we will do in the next session:

- Playing around with values

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References I

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