

# High performance reactive applications with Vert.x

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# Bio

- Employed By Red Hat to lead the Vert.x project
- Worked in open source exclusively for the past 9 years
- Some projects I've been involved with: Vert.x (creator), RabbitMQ, HornetQ (creator), JBoss AS, Mobicents...

# Overview

- Lightweight, reactive, application platform
- Superficially similar to Node.js - but not a clone!
- Inspired also from Erlang/OTP
- Polyglot
- High performance (see latest TechEmpower benchmarks!)
- Simple but not simplistic

# Polyglot

Full implementation:



Almost there:



# Core Asynchronous APIs

- Core is small and static
- TCP/SSL clients and servers
- HTTP/HTTPS clients and servers
- Websockets, SockJS
- File system
- Event bus
- DNS (new)
- UDP (new)
- etc

# Why Asynchronous?

- Modern servers need to handle high levels of concurrency – web servers, websockets, IoT etc
- OS threads are still a precious resource
- Need to service many connections with small number of threads
- Blocked OS threads means they can't do other work

# Verticle

- Execution unit of Vert.x
- Can be written in any language
- Single threaded – less scope for race conditions
- Verticles communicate by message passing
- Hmm.. sounds like the Actor Model?

# Demo



# Event Bus

- The nervous system of Vert.x
- Verticles send messages over the event bus
- Point to point. Publish/Subscribe. Request/Response
- Pass strings, buffers, primitive types or JSON
- JSON messages are preferred for structured data

# Clustered Event Bus

- Lightweight peer-to-peer messaging system
- Connects multiple Vert.x JVM instances
- Applications are loosely coupled components distributed across your network
- No monolithic “application server”
- Cluster manager is pluggable, default is Hazelcast

# Event bus in the Browser

- Event bus extends to *client side* JavaScript too
- Uses the same API on the client
- Powerful distributed event space spanning both client and server nodes
- Ideal for modern “real-time” web applications
- Use whatever client side toolkit you prefer

# Demo

# Modules

- Modules encapsulate code and resources
- One or more modules per application
- Must include a mod.json descriptor file
- Modules contain zero or more verticles
- Can be runnable or non runnable
- Module class-loaders provide isolation

# Demo

# An ecosystem of modules

- Sharing modules encourages reuse
- Modules can be pushed to any Maven or Bintray repository
- Vert.x can resolve modules at build time or run time
- Encourage an ecosystem of modules
- Register your modules in the registry
- Modules are the lego bricks to create your application

# It's all about the modules

MongoDB

Redis

MySQL/PostgreSQL

SMTP

JDBC

Jersey

Promises

Guice

Spring

Vertigo

Metrics

Facebook

Yoke

Kafka

BSON

work-queue

NoDyn

GCM

SocketIO

Sessions

Via

RxJava



# Fat jars

- Build module into self contained "fat" executable jar
- Convenient for devops
- Fairly small overhead ~ 4.7 MB

# Demo

# High Availability

- Automatic failover of deployed modules
- Nodes can be logically grouped
- Network partition detection (quorum)

# Demo

# Developing with Vert.x

- Vert.x is IDE and build system agnostic
- Can just use a text editor if you like
- Maven archetype
- Gradle template
- Debug and test in IDE
- Module auto-redeploy during development

# Demo

# Summary

- Write apps as set of loosely coupled components that live *anywhere* where you want
- Polyglot – use the language(s) you want
- Simple concurrency – wave goodbye to most race conditions
- Modules – a library of lego bricks to build apps with
- High availability
- Ease of development

# Project Info

- Independent Community Project
- The main project is an Eclipse Foundation project
- All code is on GitHub
- 100% open source (ASL 2.0 + Creative Commons)
- One of the most popular Java projects on GitHub





# Get involved!

- Loads more to do
- Very active and growing community
- Find us on GitHub
- Google group: `vertx`
- IRC channel: `#vertx` on `freenode.net`

**Q & A**