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JRuby at ThoughtWorks

Ola Bini
JRuby Core Developer
obini@thoughtworks.com

JRuby

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About me

- Ola Bini
- From Gothenburg, Sweden
- Works for ThoughtWorks Studios in London
- Programming language geek (LISP, Io, Erlang, ML, Smalltalk, etc)

JRuby

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ThoughtWorks

- Global consulting firm
- About 900 people worldwide (UK, US, Canada, Oz, India, China)
- Known for Agile practices
- Martin Fowler is our Chief Scientist
- 40% projected revenue in the US from Ruby/Rails

ThoughtWorks Studios

- Product development
- CruiseControl Enterprise
- Mingle
- RubyWorks
  - CruiseControl.rb
  - Production stack
  - JRuby

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Agenda

- Problems with Ruby
- JRuby
- Mingle
- Other uses
- Current problems
- Q&A

JRuby

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What's wrong with MRI

- Ruby 1.8: Green threading
  - Can't scale across processors/cores
  - C libraries won't/can't yield to Ruby code (DNS)
  - One-size-fits-all scheduler - doesn't really fit all
- Ruby 1.9: Native, non-parallel threads
  - Core classes and extensions not ready for parallel execution
  - Lots of work to ensure thread safety

JRuby

What’s wrong with MRI

- Ruby 1.8: Partial Unicode
  - Internet-connected apps MUST have solid Unicode
  - Ruby provides partial, inconsistent support
  - App developers must roll their own: Rails Multibyte
- Ruby 1.9: Full Unicode but drastic changes
  - String interface changes to per-char, not per-byte
  - Each String can have it’s own encoding

What's wrong with MRI

- Ruby 1.8: Slower than most languages
  - 1.8 is usually called "fast enough"
  - ... but routinely finishes last in benchmarks
  - ... and no plans to improve the situation in 1.8
- Ruby 1.9: Improvement, but still more to do
  - New engine averages 3-4x improvement
  - Only AOT - No JIT
  - More to do: GC and threading still slow

What's wrong with MRI

- Ruby 1.8: Memory management
  - Simple design
  - Good for many apps, but doesn't scale
  - Stop-the-world GC
- Ruby 1.9: No change
  - Improved performance => more garbage
  - GC problems could well multiply

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What's wrong with MRI

- Ruby 1.8: C language extensions
  - C is difficult to write well
  - No encapsulation in core
  - Threading, GC issues
  - Portable, but often needs recompilation
  - No security restrictions
- Ruby 1.9: No change

JRuby

What's wrong with MRI

- Politics
  - You want me to switch to what?
  - ... and it needs servers/software/training?
  - This will probably improve with time
- Legacy
  - Lots of Java apps in the world
  - Extensive library of Java frameworks/libraries

What is JRuby

- Java implementation of the Ruby language
- Current version 1.0.1, released in August
- Based on Ruby 1.8.5
- Started in 2001 by Jan-Arne Petersen
- Currently 6 Core developers
- Open Source - about 30-40 contributors

What can it do?

- All “pure Ruby” code works (with some caveats)
- Rake and RubyGems run well
- Rails works near nigh perfectly
- Many projects using JRuby+RSpec
- New combinations of JRuby+X popping up

What can't it do?

- Deterministic threading
- Continuations
- Some file system operations
- fork, and other POSIX-ilk

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JRuby solutions to MRI problems

- Native threading
- Scale across all processors/cores
- Concurrent execution, even in extensions
- Allow systems to schedule threads
- Ensure reasonable safety in core classes

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JRuby solutions to MRI problems

- World-class, native Unicode support
- Provide Ruby's byte[]-based String
- ... but also provide native Rails Multibyte backend
- ... and you can use the Java UTF-16 Strings directly
- ... and we're working at implementing 1.9 Strings
- Java has complete, reliable Unicode
- ... and all libraries are Unicode-ready

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JRuby solutions to MRI problems

- Scalable performance
- Make interpreter as fast as possible
  - Should be as fast as Ruby 1.8
- Support Ruby 1.9/2.0 bytecode engine
  - Same resulting performance boost
  - Future-proof
- Each new version of Java improves JRuby performance substantially

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JRuby solutions to MRI problems

- Compile to Java bytecodes
- AOT and JIT compilation
- Let HotSpot take over
  - ... by simplifying
    - HotSpot JIT
    - Code inlining
    - Dynamic optimizations

JRuby

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JRuby solutions to MRI problems

- Let Java manage memory
- Best memory management and GC in the world
- Wide variety of GC options
  - Concurrent
  - Generational
  - Real-time
- Scales up to enormous apps and systems

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JRuby solutions to MRI problems

- Java-based extensions
- Easier to write than C
- Truly portable: WORA
- Clean separation between core and extensions
- No GC, threading or security issues
- Easier to expose Java libraries

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JRuby solutions to MRI problems

- Politics don't get in the way
  - JRuby is "just another Java library"
  - Minimal impact dev, admin processes
  - Over ten years of mainstream Java
- Legacy integrates just fine
  - Use existing services and libraries

JRuby

Why ThoughtWorks likes JRuby

- JRuby gives access to the "enterprise" features of Java
- Conservative environments will not use MRI
- Quick integration with legacy systems
- Cost: Java+Ruby is more cost effective than MRI

Why JRuby on Rails for TW?

- Deployment, deployment, deployment
- JDBC for database access
- Other libraries that provide needed, cross-platform functionality (Java2D instead of RMagick?)
- Management (JMX and others)
- Common to do JRuby on Rails applications that work with legacy data

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Mingle

- Team Collaboration Tool
- First commercial JRuby on Rails application
- Originally choose JRuby for SVN plugin
- Originally developed in MRI - still MRI compatible
- Very well tested
- Mingle test suite is slower in JRuby than MRI
- ... but in production the JRuby version is quicker and scales better

JRuby

Mingle stats

```
+----------------------+-------+-------+---------+---------+-----+-------+
| Name                 | Lines |   LOC | Classes | Methods | M/C | LOC/M |
+----------------------+-------+-------+---------+---------+-----+-------+
| Controllers          |  2809 |  2377 |      32 |     276 |   8 |     6 |
| Helpers              |  1255 |  1038 |       8 |     138 |  17 |     5 |
| Models               | 11203 |  9079 |     176 |    1564 |   8 |     3 |
| Libraries            |  4784 |  3919 |      88 |     383 |   4 |     8 |
| Integration tests    |     0 |     0 |       0 |       0 |   0 |     0 |
| Functional tests     |  3494 |  2881 |      27 |     337 |  12 |     6 |
| Unit tests           | 16109 | 13272 |     105 |    1449 |  13 |     7 |
| Acceptance tests     | 13318 | 10689 |      87 |    1100 |  12 |     7 |
+----------------------+-------+-------+---------+---------+-----+-------+
| Total                | 52972 | 43255 |     523 |    5247 |  10 |     6 |
+----------------------+-------+-------+---------+---------+-----+-------+
  Code LOC: 16413     Test LOC: 26842     Code to Test Ratio: 1:1.6
```

Mingle license decryption

- Licenses uses strong cryptography
- Using a Java RSA library
- Would have been very hard in MRI
- JRuby Java integration made it dead simple to use the RSA library

Obfuscation

- Override JRuby's LoadService
- This allows us to encrypt/decrypt all Ruby files in app/*
- Will probably move to using AOT compilation when that is finished
- This is obfuscation - there is no real, safe protection in it
- ... but it seems to work well enough. =)

Mingle + ChartDirector

- ChartDirector is a proprietary library for making charts
- Have both a Java library and a C extension library for Ruby
- A thin wrapper over the Java library makes it possible to use the same chart code in MRI and JRuby

Mingle code example: chartdirector4jr.rb

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Mingle + SVNkit

- No MRI subversion library worked on all platforms
- Initial reason for going with JRuby
- SVNkit is a Java library that provides uniform subversion access on Linux, MacOS X, Windows, Solaris, and all other Java platforms
- SVNkit supports file system, DAV and SVN

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Mingle deployment

- install4j - installation and bundling of JVM
- Runs locally using Jetty
- BYO database - (used to be Derby)
- 1.1 or 1.2 will support WAR deployment
- Uses custom built Jetty launching
- Uses custom built AntBuilder scripts to generate WAR
- Uses CC.rb for MRI and Java CC for JRuby

Finance client 1

- Conservative, large company
- IS department standardized on Java
- JRuby on Rails application
- JRuby improves integration
- Uses the UnitRecord plugin to speed-up test suites
- Lack of good RMagick replacement have been hard
- Tomcat+Lucene seems to be causing bugs

Finance client 2

- Large, conservative company
- Separate business units: most information is not shared
- Project aims to consolidate all accounts and customer information into one place
- It's written in mainly Ruby with small amounts of Java
- 2 persons, probably 4 months from start to finish
- Interacting with 5 disparate data sources

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Finance client 2 - why JRuby?

- Infrastructure barrier was primary reason
  - “ Those infrastructure guys are just seeing another Java app with some static textual content (happens to be Ruby source files)”
- Higher business value by directly lowering integration estimates
- Using Java APIs (especially JDBC) allowed quicker development, since no need to write new functionality for Ruby

JRuby

Waffle

- Java web framework
- No XML - except minimal web.xml
- Easy to learn
- No base classes/interfaces needed
- Allows most functionality to work with Ruby
- ... ERb templates can be used as views
- Ruby classes as controllers

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Forthcoming Studios projects

- Other tools for development/team collaboration
- Will use JRuby in different ways
- ... including allow Ruby to be used as extension language for Java based applications
- ... and improving the deployment and management story for JRuby
- Next product will probably be GA in Jan/Feb ‘08

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Challenges with JRuby

- Performance of unit tests
  - Solution: running MRI precommit and JRuby in CI
  - Solution: using UnitRecord instead
- It's not free to run on both MRI and JRuby
- Start-up time (especially of Rails)
  - Solution: staged start-up in background
  - Not always enough for day-to-day development use

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Challenges with JRuby

- JRuby regular expressions have different performance characteristics and big-O running time in certain cases
- JRuby YAML isn't completely stable yet (but it's getting there)
- High memory consumption (but still lower than Mongrel)
- Good replacement for RMagick needed
- Lack of documentation

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The future of JRuby (at TW)

- Continue looking at products around JRuby
- JRubyWorks
  - Alleviate current problems with GoldSpike
- ActiveHibernate?
- Performance
- Other neat things

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Resources

- www.jruby.org
- studios.thoughtworks.com
- waffle.codehaus.org
- jruby-extras.rubyforge.org
- ola-bini.blogspot.com
- JRuby mailing lists at Codehaus

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Shameless plug

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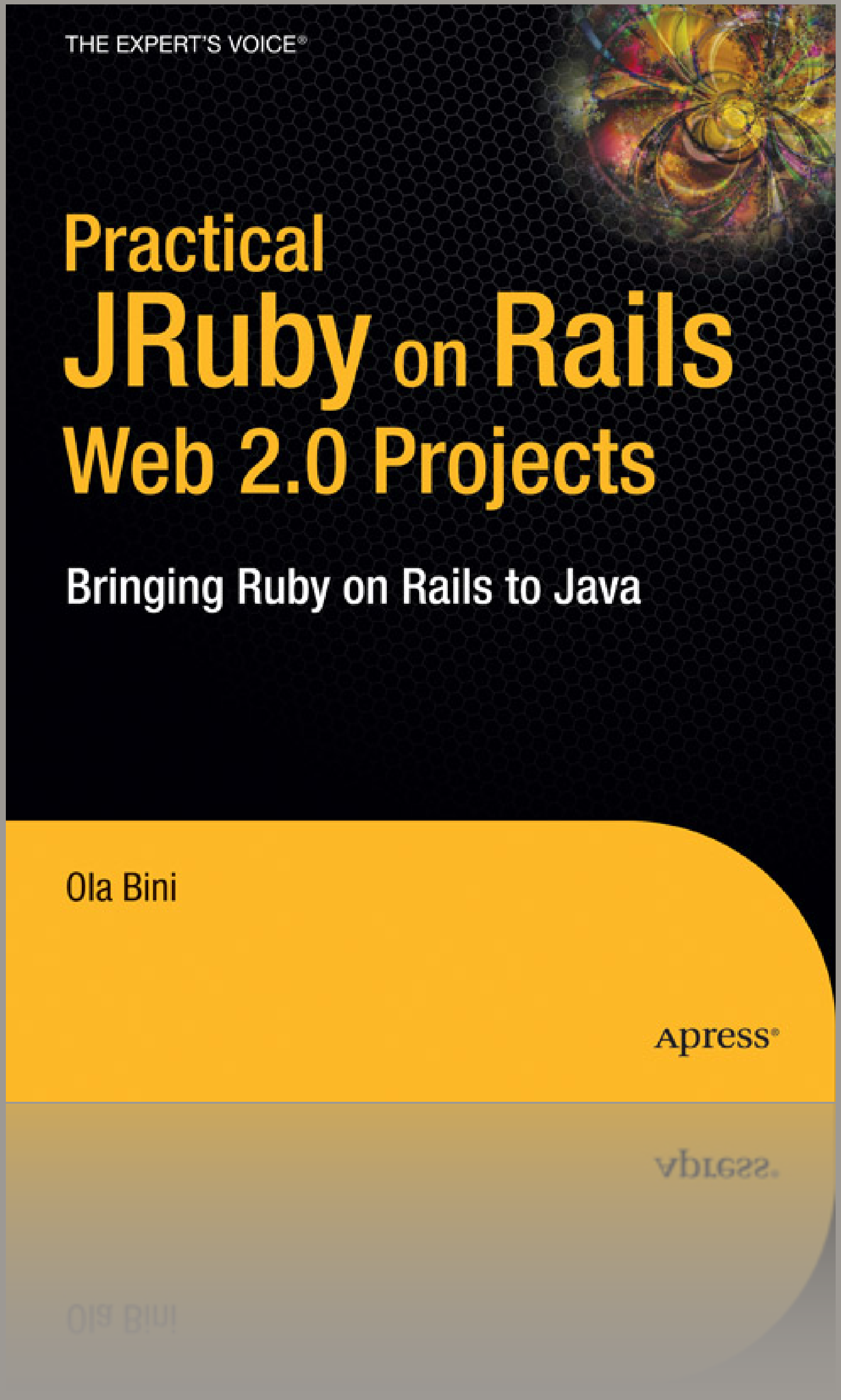
THE EXPERT'S VOICE

Practical JRuby on Rails Web 2.0 Projects

Bringing Ruby on Rails to Java

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Q & A

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