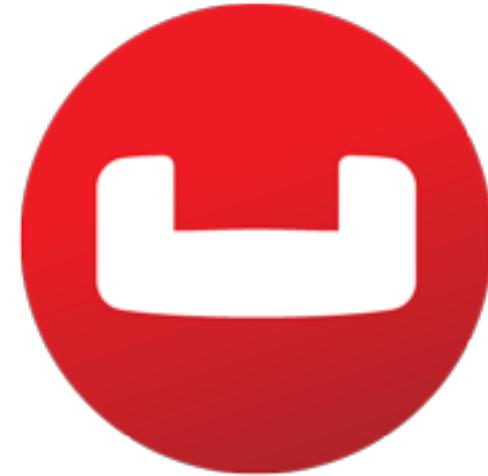


JRuby, a Pi and a Database



Twitter: @isch

Github: @sideshowcoder

Developer Advocate, Couchbase

PHILIPP FEHRE

It's just ruby!



3. irb (java) [INS]

```
~$ chruby jruby [INS]
~$ ruby -v [INS]
jruby 1.7.6 (1.9.3p392) 2013-10-22 6004147 on Java HotSpot(TM) 64-Bit Server VM
 1.7.0_25-b15 [darwin-x86_64] [INS]
~$ irb
irb(main):001:0> 1.class
=> Fixnum
irb(main):002:0> █
```

A screenshot of a terminal window titled "3. irb (java)". The window has a dark background and light-colored text. It shows the following command-line interaction:

```
~$ irb
irb(main):001:0> java.lang.System::out.println("Hello World")
Hello World
=> nil
irb(main):002:0> █
```

3. irb (java) [INS]

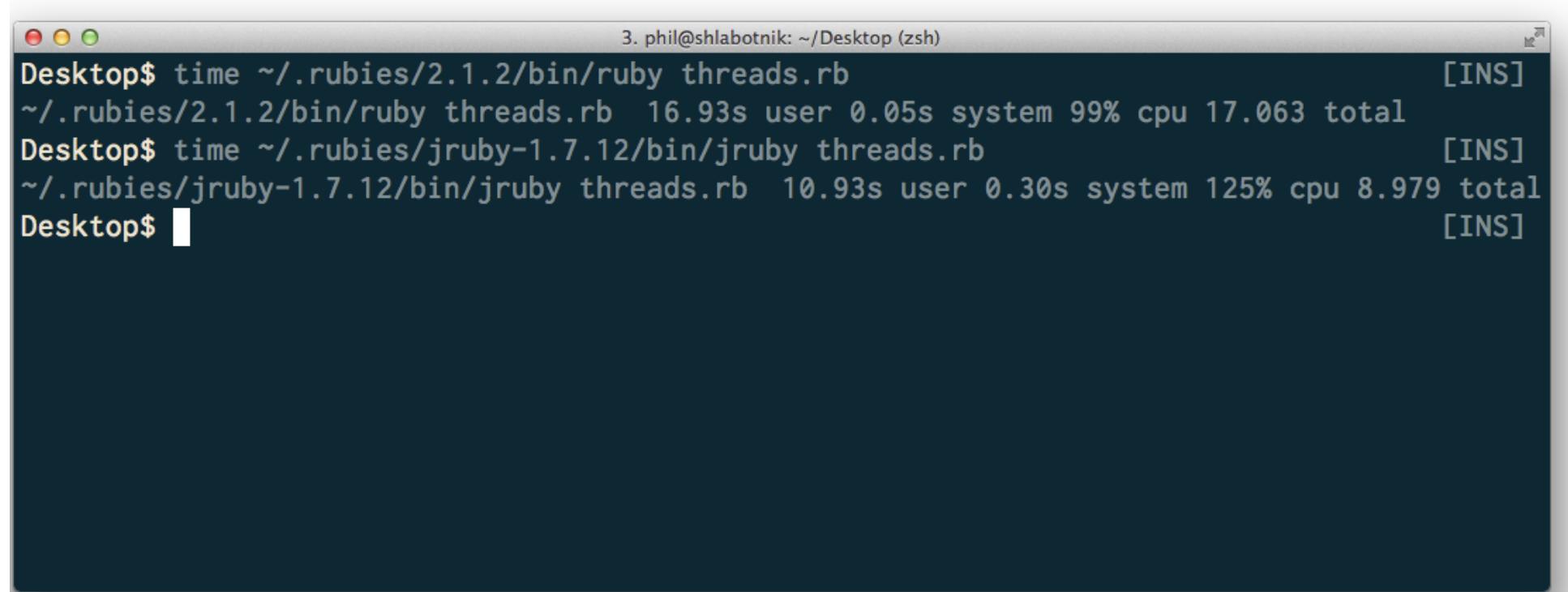
```
~$ irb
irb(main):001:0> 1.to_java
=> #<Java::JavaLang::Long:0x6573afde>
irb(main):002:0> 1.to_java.java_class
=> class java.lang.Long
irb(main):003:0> █
```

Native threads

A screenshot of a code editor window titled "threads.rb". The code defines a function fib(n) that returns n if n < 2, or the sum of fib(n - 1) and fib(n - 2). It then creates two threads to calculate fib(38) simultaneously. The code is as follows:

```
1 def fib n-
2   return n if n < 2
3
4   fib(n - 1) + fib(n - 2)
5 end
6
7 Thread.new { fib 38 }.value
8 Thread.new { fib 38 }.value
9
10
11
```

The status bar at the bottom shows "Line: 1 Column: 1", "Ruby on Rails", "Soft Tabs: 2", and "fib n".



A screenshot of a terminal window titled "3. phil@shlabotnik: ~/Desktop (zsh)". The window contains the following text:

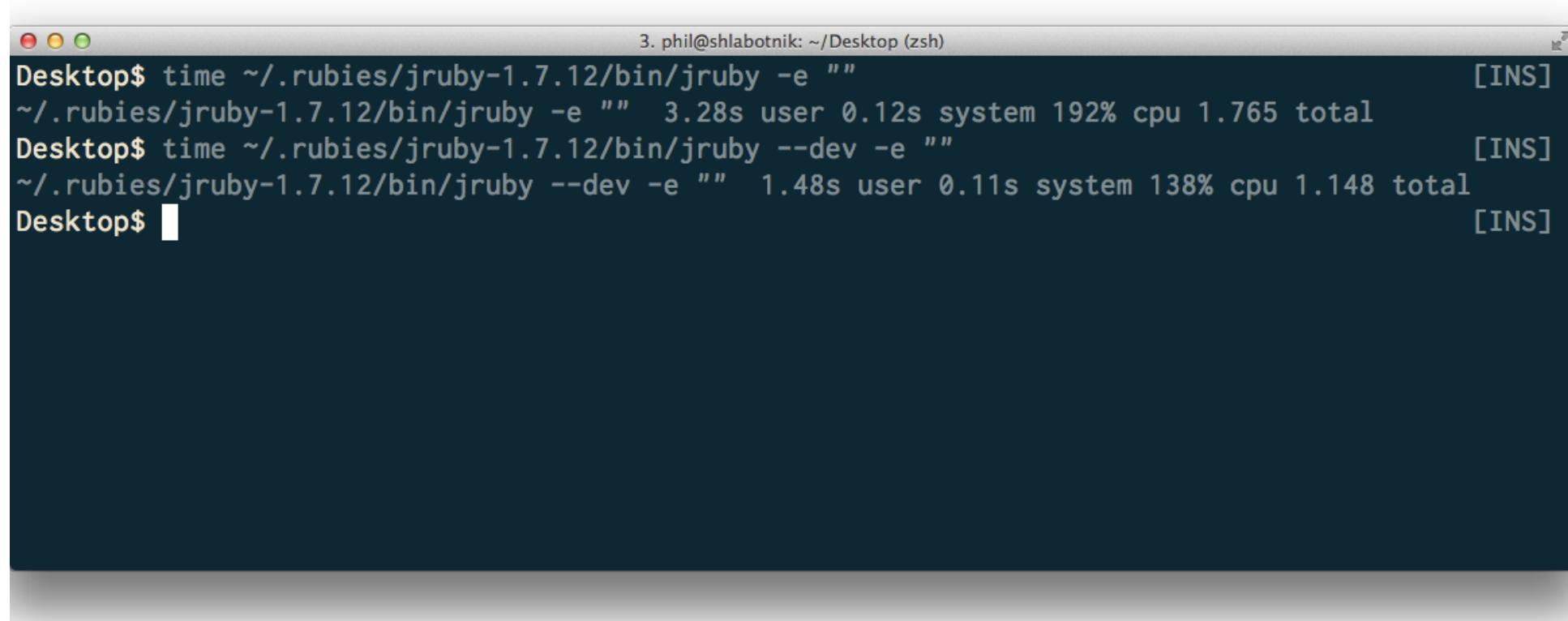
```
Desktop$ time ~/.rubies/2.1.2/bin/ruby threads.rb [INS]
~/.rubies/2.1.2/bin/ruby threads.rb 16.93s user 0.05s system 99% cpu 17.063 total
Desktop$ time ~/.rubies/jruby-1.7.12/bin/jruby threads.rb [INS]
~/.rubies/jruby-1.7.12/bin/jruby threads.rb 10.93s user 0.30s system 125% cpu 8.979 total
Desktop$ [INS]
```

99% vs 125% | 17 sec vs 11 sec

Yes jruby startup time is slow ...

And more

GC, Java Debugging tools, Java
Servers...

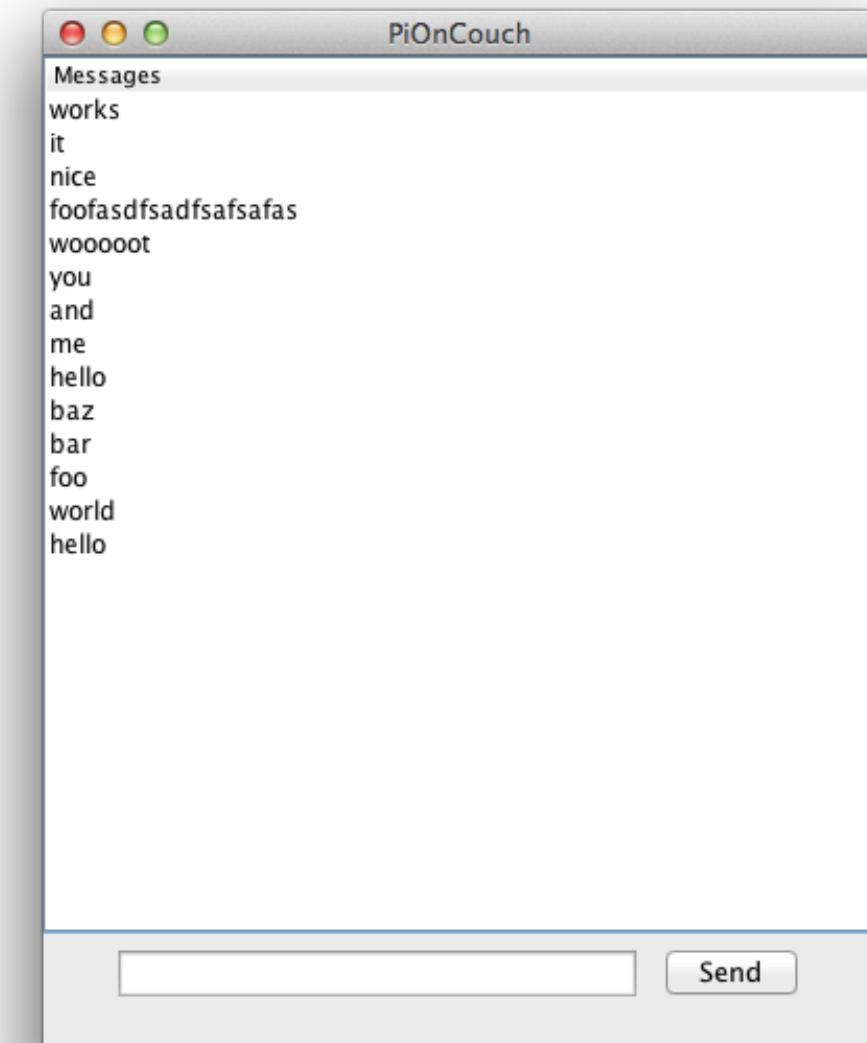


3. phil@shlabotnik: ~/Desktop (zsh)

```
Desktop$ time ~/.rubies/jruby-1.7.12/bin/jruby -e ""
[INS]
~/.rubies/jruby-1.7.12/bin/jruby -e "" 3.28s user 0.12s system 192% cpu 1.765 total
Desktop$ time ~/.rubies/jruby-1.7.12/bin/jruby --dev -e ""
[INS]
~/.rubies/jruby-1.7.12/bin/jruby --dev -e "" 1.48s user 0.11s system 138% cpu 1.148 total
Desktop$ [INS]
```

--dev tradeoff performance for startup time

Lets see it in practice



Couchbase Lite

Couchbase Mobil

Couchbase Lite + Sync Gateway



Couchbase Mobil

Couchbase Lite + Sync Gateway

Channels

Tags...

Authentication

Facebook, Mozilla Persona, User +
Password, OAuth

Sync Function

```
function(doc, oldDoc) {
  // NOTE this function is the same across the iOS, Android, and Web clients
  if (doc.type == "task") {
    if (!doc.list_id) {
      throw({forbidden : "items must have a list_id"})
    }
    channel("list-"+doc.list_id);
```

Channels

```
} else if (doc.type == "list") {  
    channel("list-"+doc._id);  
    if (!doc.owner) {  
        throw({forbidden : "list must have an owner"})  
    }  
}
```

Authentication

```
if (oldDoc) {  
    var oldOwnerName = oldDoc.owner.substring(oldDoc.owner.indexOf(":")+1);  
    requireUser(oldOwnerName)  
}  
var ownerName = doc.owner.substring(doc.owner.indexOf(":")+1);  
access(ownerName, "list-"+doc._id);
```

Why JRuby?

main/AndroidManifest.xml - [main] - ToDoLite-Android - [~/Source/ToDoLite-Android] - IntelliJ IDEA (Cardea) IU-135.1019

Project build.gradle gradle.properties AndroidManifest.xml settings.gradle

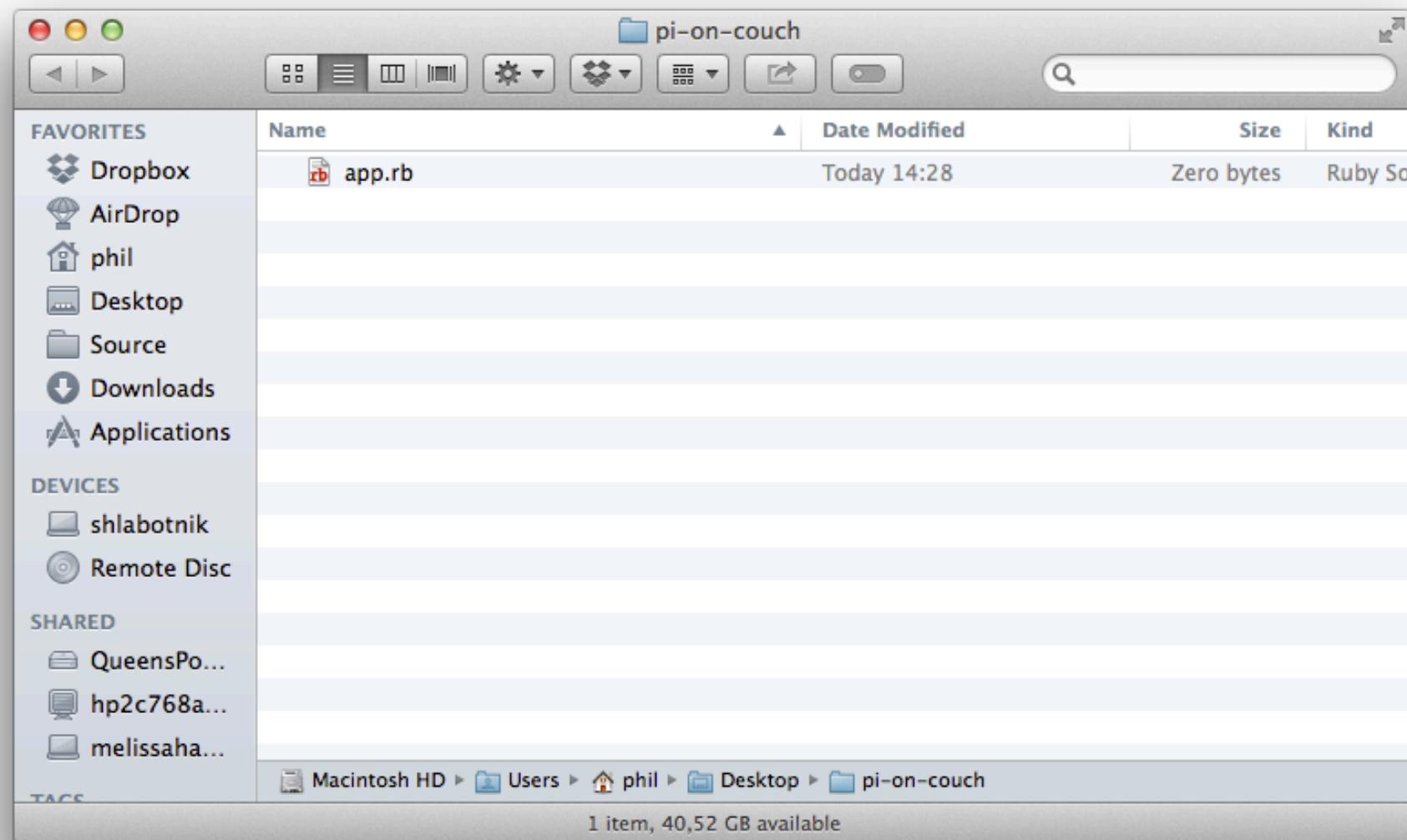
```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.couchbase.todolite" >

    <uses-feature android:name="android.hardware.camera" />

    <uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" />

    <application
        android:name="com.couchbase.todolite.Application"
        android:allowBackup="true"
        android:icon="@drawable/ic_launcher"
        android:label="@string/app_name"
        android:theme="@style/AppTheme" >
        <activity
            android:name="com.couchbase.todolite.MainActivity"
            android:label="@string/app_name" >
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
        <activity
            android:name="com.couchbase.todolite.ShareActivity"
            android:label="@string/title_activity_share" >
        </activity>
        <activity android:name="com.facebook.LoginActivity" />
        <meta-data
            android:name="com.facebook.sdk.ApplicationId"
            android:value="@string/app_id" />
        <activity android:name="com.couchbase.todolite.ImageViewActivity" />
    </application>
</manifest>
```

Unlinked Gradle project? Import Gradle project, this will also enable Gradle Tool Window. // Don't want to see the message for the project again: press here.



Java has loads of libraries (like Couchbase Lite) which are only on Java

NEED TO CALL TO JAVA

Pi on Couch

```
3. pi@raspberrypi: ~ (ssh)
Linux raspberrypi 3.10.25+ #622 PREEMPT Fri Jan 3 18:41:00 GMT 2014 armv6l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.

Last login: Fri Aug 22 13:31:35 2014 from 31.221.41.181
pi@raspberrypi ~ $ sudo apt-cache search jruby
jruby - 100% pure-Java implementation of Ruby
libbytelist-java - helper library for packaging JRuby
libjcodings-java - Java-based codings helper classes for Joni and JRuby
libjffi-jni - Java Foreign Function Interface (JNI library)
libjruby-joni-java - Java port of Oniguruma regexp library
ruby-ffi - load dynamic libraries, bind functions from within ruby code
pi@raspberrypi ~ $
```



3. pi@raspberrypi: ~ (ssh)



```
pi@raspberrypi ~ $ time jruby -e ""
```

```
real    0m27.037s
```

```
user    0m24.000s
```

```
sys     0m1.370s
```

```
pi@raspberrypi ~ $ 
```

Using JRuby

Loading JARs

```
1 # make sure we can load couchbase lite
2 VENDOR_PATH ||= File.expand_path("../vendor", __FILE__)
3
4 # load all vendored jar dependencies
5 Dir["#{VENDOR_PATH}/*.jar"].each { |jar| require jar }
```

Loading native JARs

```
7 # load native jars for platform
8 if RbConfig::CONFIG["target_cpu"] =~ /x86/ && RbConfig::CONFIG["host_os"] =~ /darwin/
9   require "#{VENDOR_PATH}/macosx/couchbase-lite-java-native.jar"
10 elsif RbConfig::CONFIG["target_cpu"] =~ /arm/
11   require "#{VENDOR_PATH}/linux_arm/couchbase-lite-java-native.jar"
12 end
```

Just for reference... ;)

```
18     /**
19      * Parameters of the method to add an URL to the System classes.
20      */
21     private static final Class<?>[] parameters = new Class[]{URL.class};
22
23     /**
24      * Adds a file to the classpath.
25      * @param s a String pointing to the file
26      * @throws IOException
27      */
28     public static void addFile(String s) throws IOException {
29         File f = new File(s);
30         addFile(f);
31     }
32
33     /**
34      * Adds a file to the classpath
35      * @param f the file to be added
36      * @throws IOException
37      */
38     public static void addFile(File f) throws IOException {
39         addURL(f.toURI().toURL());
40     }
41
42     /**
43      * Adds the content pointed by the URL to the classpath.
44      * @param u the URL pointing to the content to be added
45      * @throws IOException
46      */
47     public static void addURL(URL u) throws IOException {
48         URLClassLoader sysloader = (URLClassLoader)ClassLoader.getSystemClassLoader();
49         Class<?> sysclass = URLClassLoader.class;
50         try {
51             Method method = sysclass.getDeclaredMethod("addURL",parameters);
52             method.setAccessible(true);
53             method.invoke(sysloader,new Object[]{ u });
54         } catch (Throwable t) {
55             t.printStackTrace();
56         }
57     }
58 }
```

Calling Java Methods

24
25

```
include_package "com.couchbase.lite"
```

35 ▾
36

```
unless Manager.isValidDatabaseName(database_name)|
```

Calling Java Methods

```
34 def establish_connection database_name
35   unless Manager.is_valid_database_name database_name
36     raise InvalidDatabaseName.new(database_name)
37   end
38
39   @connections ||= {}
40   @manager ||= Manager.new JavaContext.new, Manager::DEFAULT_OPTIONS
41
42   @connections[database_name] = @manager.get_database database_name
43 end
```

Creating Items in the database

```
27 def create_text
28   document = database.create_document
29   data = {
30     "message" => text,
31     "channels" => ["all"],
32     "type" => DOC_TYPE,
33     "created_at" => Time.now.strftime("%Y-%m-%d %H:%M:%S")
34   }
35   document.put_properties data
36 end
37
```

Some Java Idioms

in Ruby

Naming

Setter and Getter

```
178     public Database getDatabase() {  
179         return this.database;  
180     }
```

Setter and Getter

```
1 my_object.database  
2 my_object.database = get_a_database
```

Setter and Getter

23

```
view.set_map(MessageMapper.new, nil)
```

Method names

```
unless Manager.isValidDatabaseName(database_name)|
```

```
unless Manager.is_valid_database_name database_name
```

Anonymous Classes

Java

```
150 private Replication.ChangeListener getReplicationChangeListener() {  
151     return new Replication.ChangeListener() {  
152         @Override  
153         public void changed(Replication.ChangeEvent event) {  
154             Replication replication = event.getSource();  
155             if (replication.getLastErrorMessage() != null) {  
156                 Throwable lastError = replication.getLastErrorMessage();  
157             }  
158         }  
159     };  
160 }
```

Ruby way number 1

```
25 replication_listener = Replication::ChangeListener.new
26 class << replication_listener
27   java_signature 'void changed(ChangeEvent event)'
28   def changed event
29     replication = event.source
30     if replication.last_error
31       $log.warn "replication encountered an error: #{replica
32     else
33       $log.debug "#{replication.getCompletedChangesCount}"
34     end
35   end
36 end
37
38 pull_rep.add_change_listener replication_listener
```

Ruby way number 2

```
11 class MessageMapper
12   include Java::com.couchbase.lite.Mapper
13   java_signature "void map(Map<String, Object> document, Emitter emitter)"
14   def map document, emitter
15     if document.get("type") == DOC_TYPE
16       emitter.emit(document.get("created_at"), document)
17     end
18   end
19 end
20
21 def find_all_by_date
22   view = database.get_view(VIEW_NAME)
23   view.set_map(MessageMapper.new, nil) if view.get_map.nil?
24   view.create_query
25 end
```

They don't auto convert types

GENERICs

```
1 import java.util.*;  
2  
3 public class MyClass {  
4  
5     private Map<String, String> map;  
6  
7     public MyClass() {  
8         this.map = new HashMap<String, String>();  
9     }  
10  
11    public Map<String, String> getMap() {  
12        return map;  
13    }  
14  
15    public void printMap() {  
16        Iterator<Map.Entry<String, String>> iter = map.entrySet().iterator();  
17        while (iter.hasNext()) {  
18            Map.Entry<String, String> entry = iter.next();  
19            System.out.println("Key class" + entry.getKey().getClass());  
20            System.out.println("Value class" + entry.getValue().getClass());  
21        }  
22    }  
23  
24 }  
25 }
```

```
1  java_import "MyClass"  
2  
3  my_class = MyClass.new  
4  
5  map = my_class.map  
6  
7  map.put("foo", "bar")  
8  my_class.print_map  
9  
10 map.put(1, "bar")  
11 my_class.print_map  
12
```

```
3. phil@shlabotnik: ~/Desktop/generics_example (zsh) [INS]
generics_example$ jruby generics.rb
Key class<class java.lang.String>
Value class<class java.lang.String>
MyClass.java:19:in `printMap': java.lang.ClassCastException: java.lang.Long c
annot be cast to java.lang.String
        from NativeMethodAccessorImpl.java:-2:in `invoke0'
        from NativeMethodAccessorImpl.java:57:in `invoke'
        from DelegatingMethodAccessorImpl.java:43:in `invoke'
        from Method.java:606:in `invoke'
        from JavaMethod.java:440:in `invokeDirectWithExceptionHandling'
        from JavaMethod.java:304:in `invokeDirect'
        from InstanceMethodInvoker.java:52:in `call'
        from AliasMethod.java:56:in `call'
        from CachingCallSite.java:306:in `cacheAndCall'
        from CachingCallSite.java:136:in `call'
        from generics.rb:11:in `__file__'
        from generics.rb:-1:in `load'
        from Ruby.java:810:in `runScript'
        from Ruby.java:803:in `runScript'
        from Ruby.java:672:in `runNormally'
        from Ruby.java:521:in `runFromMain'
        from Main.java:395:in `doRunFromMain'
        from Main.java:290:in `internalRun'
        from Main.java:217:in `run'
        from Main.java:197:in `main'
generics_example$ [INS]
```

Setting up sync

```
18 def setup_sync sync_url
19   database = Database.connection
20   url = java.net.URL.new(sync_url)
21
22   pull_rep = database.create_pull_replication(url)
23   pull_rep.continuous = true
24
25   replication_listener = Replication::ChangeListener.new
26   class << replication_listener...
27
28   pull_rep.add_change_listener replication_listener
29   pull_rep.start
30
31   push_rep = database.create_push_replication(url)
32   push_rep.continuous = true
33
34   push_rep.add_change_listener replication_listener
35   push_rep.start
36
37 end
```

Querying Couchbase Lite

```
11 ►   class MessageMapper...
20
21 □     def find_all_by_date
22       view = database.get_view(VIEW_NAME)
23       view.set_map(MessageMapper.new, nil) if view.get_map.nil?
24       view.create_query
25 □   end
26
```

Querying Couchbase Lite

```
11 class MessageMapper
12     include Java::com.couchbase.lite.Mapper
13     java_signature "void map(Map<String, Object> document, Emitter emitter)"
14     def map document, emitter
15         if document.get("type") == DOC_TYPE
16             emitter.emit(document.get("created_at"), document)
17         end
18     end
19 end
20
```

Querying Couchbase Lite

```
73 def load_data
74   query = @message.find_all_by_date.to_live_query
75   query.add_change_listener MessagesUpdateListener.new(@table)
76   query.start
77 end
```

Querying Couchbase Lite

```
class MessagesUpdateListener
  def initialize table
    @table = table
  end

  include Java::com.couchbase.lite.LiveQuery::ChangeListener
  java_signature "void changed(final LiveQuery.ChangeEvent event)"
  def changed event
    @table.model.row_count = 0 # reset the table
    documents = event.get_rows.map(&:document)
    documents.each do |doc|
      message = doc.properties["message"]
      @table.model.insertRow 0, [message].to_java(:String)
    end
  end
end
```

How JRuby is implemented

LOOKING UNDER THE HOOD

Creating a method from Scratch

HACKING JRUBY

```
git clone https://github.com/jruby/jruby
```

```
mvn -pBootstrap
```

```
jruby(master*)$ bin/jruby test/mri/ruby/test_fixnum.rb -n test_succ
Run options: -n test_succ

# Running tests:

Finished tests in 0.140000s, 7.1429 tests/s, 14.2857 assertions/s.
1 tests, 2 assertions, 0 failures, 0 errors, 0 skips
```

Running the tests

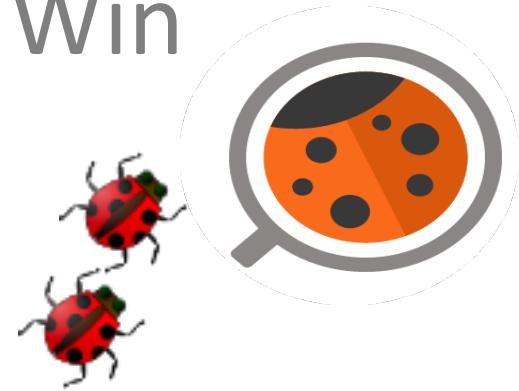
1.to_froscon # => “froscon”

Adding to RubyFixnum

Couchbase Server 3.0 Beta Bug Bash

Download, Find, Report, Win

- **DOWNLOAD Couchbase Server 3.0 Beta**
- **Run some workload, play with it, FIND a bug**
- **If you find a bug, REPORT it!**
 - All bugs count – anything from correctness, to performance, to usability, to docs
- **WIN Prizes!!**



<http://www.couchbase.com/bugbash>

Contest ends Aug 31st 2014

Questions?

Links

- <http://github.com/couchbaselabs/pi-on-couch>
- <http://www.couchbase.com/communities>
- <http://jruby.org>