

Rackona

A pretty non-functional Racket->JVM FFI

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Java Native Interface

JNI is an interface provided by the JVM to:

- Enable calling C and C++ code from Java
- Embed a JVM runtime into a C or C++ program

But, but, but...

Writing JNI-using code in C is really yucky.

- Writing it in C++ is only marginally better
- Requires an insane amount of boilerplate
 - ...not to mention the manual error-checking needed

Wouldn't it be nice to use real macros to make it much prettier?

Racket to the rescue

Racket comes with a really sophisticated Racket->C FFI system.

- Define function types using pretty syntax
- System does data conversion automagically
 - Conversion is easy to customise
- Similar in concept to JNA (Java Native Access, a Java->C FFI), but much nicer to use thanks to macros

Great artists steal

The JNI interfaces use COM-style vtables.

- The `ffi/unsafe/com` module provides a macro, `define-com-interface`, to compactly describe a COM interface's vtable layout
- Rackona steals this concept to implement a `define-jni-interface` macro (though it has a totally different implementation)

Learning curve

I have used JNA a lot at work, but Racket FFI is new to me.

- So please be forgiving of my code :-)
 - It may not be pretty or idiomatic
 - I wrote the code in 2 days, and didn't even have time to finish the slides until after the fact
- And understand it's full of bugs, especially ones that crash your process
 - In fact, at the time I presented, even basic methods like FindClass caused crashes

Future directions

- Make `lowlevel.rkt` actually work
 - Compact the `JNIEnv` vtable
 - 233 entries!
 - Macros can help with a lot of the duplication
- Create a `highlevel.rkt`
 - Presents a similar interface to Racket FFI
 - Abstracts away all the invocation machinery
- Bind all the JVM languages?
 - Clojure definitely comes to mind

More to come

At my RacketCon presentation, people said I should post my code even though it's still full of bugs. So here it is:

`github:cky/rackona.git`

I want to acknowledge the awesome help of Eli Barzilay and Matthew Flatt in solving the crashing bug, and in creating Racket FFI in the first place. Thanks so much!