C/C++ in Android Apps

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Setup

- Android SDK
- Android NDK r10b
- Eclipse with ADT and CDT
- Code
  https://github.com/arturdm/cppworkshop

Why would we need it?

- increase performance
- already have a working cross-platform library
- obfuscate our app even more
- access to low level APIs

Which IDE?

IDEA

+ Great Java support
- Basic build system integration with NDK
- Lacks C/C++ support

Eclipse

+ Java/C/C++ support
- No automatic dependency management (lib/*.jar)

How to build?

- Makefile-based
  - ndk-build script

- Others
  - android.toolchain.cmake
    https://github.com/taka-no-me/android-cmake

Host or Device/Emulator?

Host

+ possible to run tests with Robolectric
+ don’t have to wait for all classes to compile
- needs native libraries compiled for host arch

Device/Emulator

+ native API available
- needs a full build of the project

What do we need to add?

- JNI glue between Java and C/C++
- Build libraries for architecture
  - armeabi
  - armeabi-v7a
  - mips
  - x86

What can be tested?

- Java code that uses native library underneath
  - regular JUnit tests

- Native code itself
  - CppUnit
  - google-test
  - etc.

01-KeyProvider

- add `native` modifier to the method
- generate glue stubs

```
$ javah -v -d jni -classpath bin/classes
cpp.android.keyprovider.NativeKeyProvider
```

- load the library

02-KeyProviderObfuscated

- Run `$ strings libs/libapp.so`

03-Bitmap

- What if there's a much faster solution?
- Add `native` modifier
- Build project
- Generate glue stubs

```
javah -v -o jni/jniNativeColorInverter.h
-classpath %ANDROID_HOME%
\platforms\android-19\android.jar;
bin/classes cpp.android.bitmap.
NativeColorInverter
```

- Add System.loadLibrary call

03-Bitmap

- Add LOCAL_LDLIBS := -llog -ljnigraphics to Android.mk

04-JavaCPP

“Javacpp excels at making native C++ code available to Java via JNI without requiring the developer to type the massive amount of repetitive overhead code demanded of jni implementations. (...)”

04-JavaCPP

- https://github.com/bytedeco/javacpp

05-gtest

- Implement native test using google-test suite

```
#include <gtest/gtest.h>

#include "NativeKeyProvider.h"

TEST(NativeKeyProviderTest, shouldProvideKey) {
    // given
    std::string expected = "deadbaca";

    // when
    std::string actual = nativekeyprovider::provide();

    // then
    ASSERT_STREQ(expected.c_str(), actual.c_str());
}
```

Q&A

Thank you for staying so late!