Portable Native Client

Fast, Secure, Simple
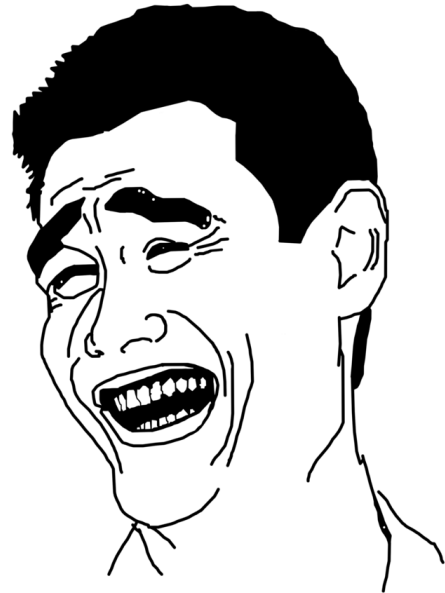
EuroLLVM 2014
JF Bastien
Google

You probably know NaCl

- Native C/C++ code on the web
- Near-native speed
- Software Fault Isolation sandboxing

You probably *think* you know PNaCl

That project that pretends bitcode is stable.

PNaCl: worthy of the Web

- Architecture independent
    - x86
    - ARM
    - MIPS
- Bindings to the Web platform

PNaCl: worthy of the Web

- Compute offload
  - Performance matters
  - But "good enough" isn't: battery life matters too
- Entire C/C++ code bases
  - POSIX & dynamic linking
  - OpenGL ES 2.0
  - Threads & atomics
  - SIMD & crypto

PNaCl: the Web, and then some more...
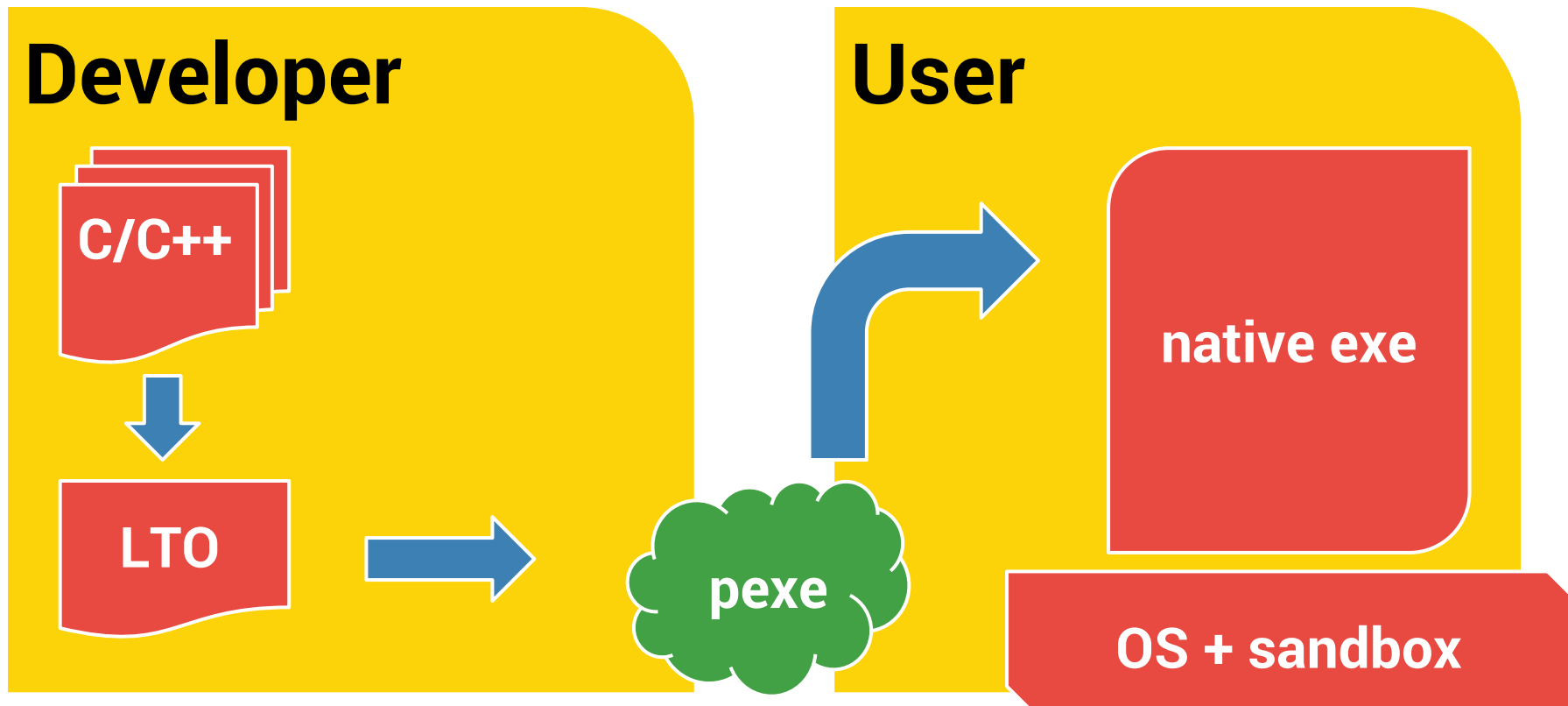
Untrusted code everywhere

- Image/video handling
- Lightweight datacenter VMs
- Smart devices

Also want portability and performance

What does PNaCl bring to LLVM?

- Novel concerns
- Lasting reach

PNaCl's use of LLVM

Developer

User

C/C++

LTO

pexe

native exe

OS + sandbox

Our folly: portable executable

- SSA
- Limited types
- Few relocations
- Mostly just arithmetic operations

Sounds like LLVM bitcode?

Code generation tuned to each device

- Generate code for the target
  - Fast
  - Parallel streaming CG
  - Dynamic load balancing
  - Cached
- O2 quality for generated code

Want a small and nimble compiler

Tuning to the target

- Know the exact target ISA
- Know the exact code being executed
- Adapt the sandbox
- Defense in depth

Questions?

gonacl.com

native-client-discuss

@nativeclient