Swift on Windows

Saleem Abdulrasool (@compnerd)

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Quid Celeri?

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What is Swift?

```
import WinRT

@main
struct Asynchronous {
  public static func main() async throws {
    try RoInitialize()
    let controller =
        try Windows.System.DispatcherQueueController.CreateOnDedicatedThread()
    try await controller.ShutdownQueue()
  }
}
```

Source Code: https://github.com/compnerd/SwiftWinRT

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What is Swift?

- Modern

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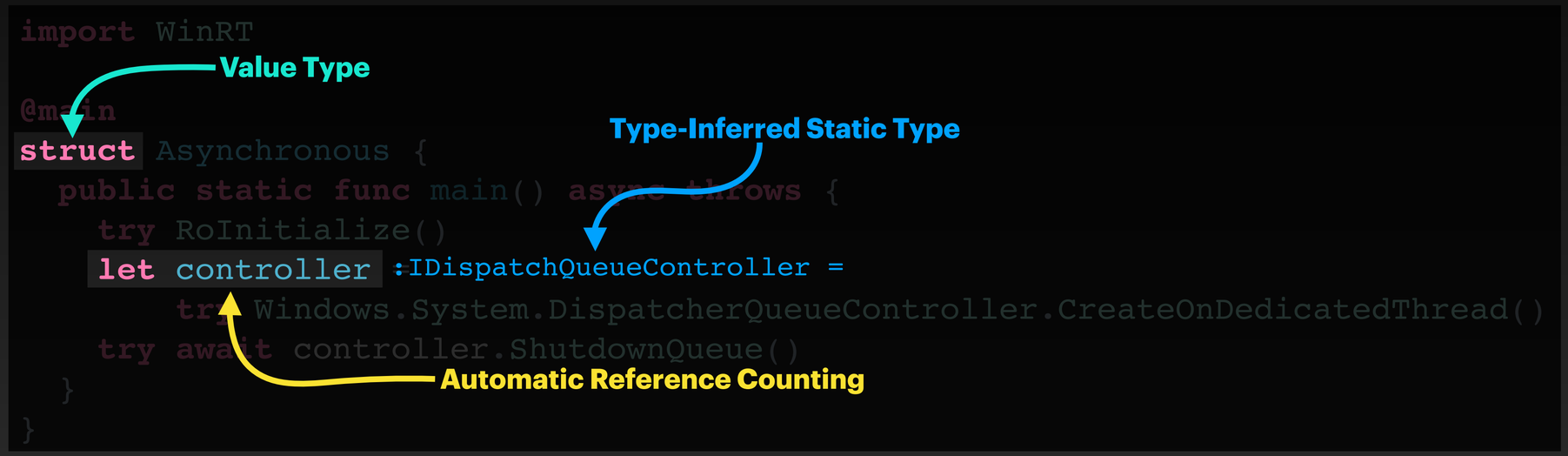
What is Swift?

- Modern
- Type Safe



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- Modern
- Type Safe
- Multi-paradigm
- General Purpose

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- Application Programming

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- Application Programming
- Systems Programming

Wrong Channel?

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- LLVM Based
- Supports Multiple Languages
  - Swift
  - C
  - C++
  - Objective-C

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- LLVM Based
- Supports Multiple Languages
  - Swift
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  - Objective-C
- Intended to be used as a complete toolchain

One More Thing ...

FFI

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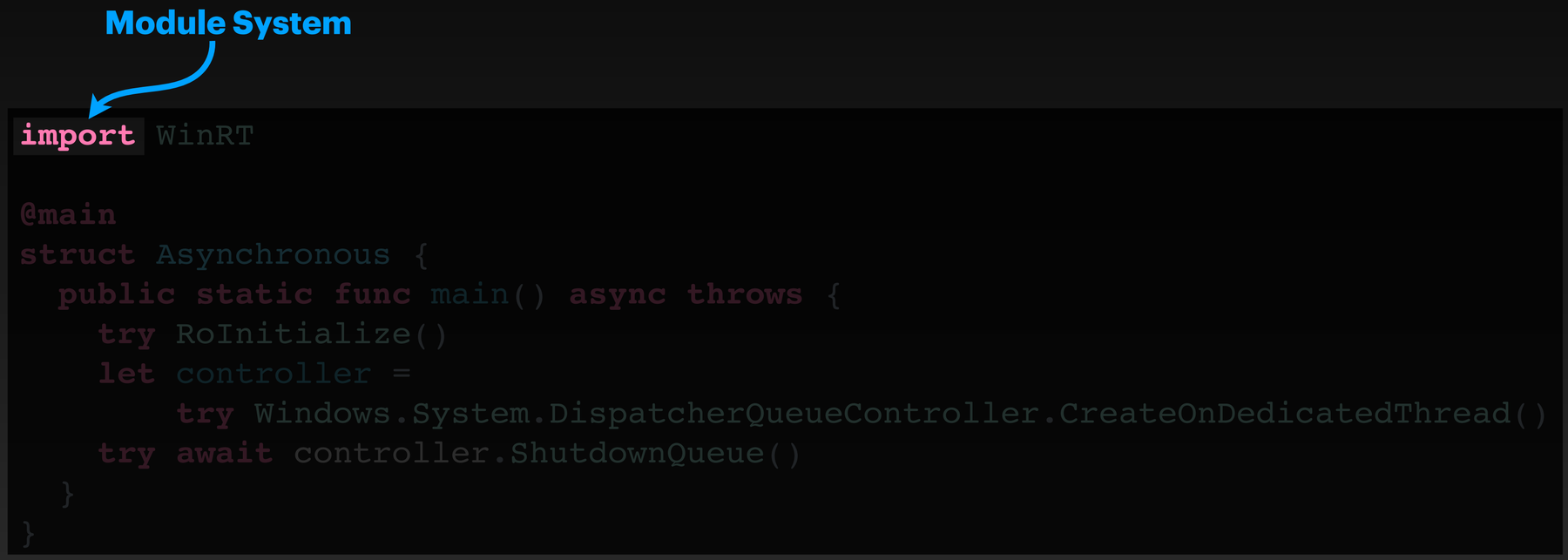

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One More Thing ...

FFI

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FFI

- Compile Time FFI

One More Thing ...
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- Embedded Clang

One More Thing ...
FFI

- Compile Time FFI
- Embedded Clang
- clang modules

Recipes

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Toolchain Hosts and Targets

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Host

- Windows
  - X64
  - ARM64

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Toolchain Hosts and Targets

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- Windows
  - X64
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Target

- Windows
  - X86, X64, ARM, ARM64
- Android
  - X86, X64, ARM, ARM64
- Linux
  - X86, X64, ARM, ARM64
- WASI
  - WASM

Elastic Sky

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Build Statistics

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- Azure Pipelines

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- ~30 min to clone sources (~5.5 GB)

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- Unified Installer ~500 MB

Flight Manifest

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Windows Swift Toolchain Distribution Contents

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  - nm, objdump, c++filt, ...
  - mt, rc, ...
- SDK
  - Swift runtime/standard library, libdispatch, Foundation, XCTest
- Developer Tools
  - Package Manager, clangd, LSP

Oscillations

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Building in Phases

Oscillations

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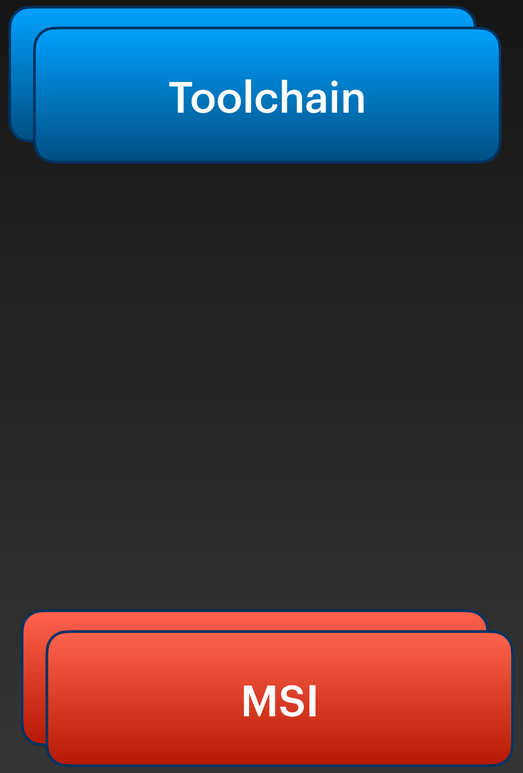

Oscillations

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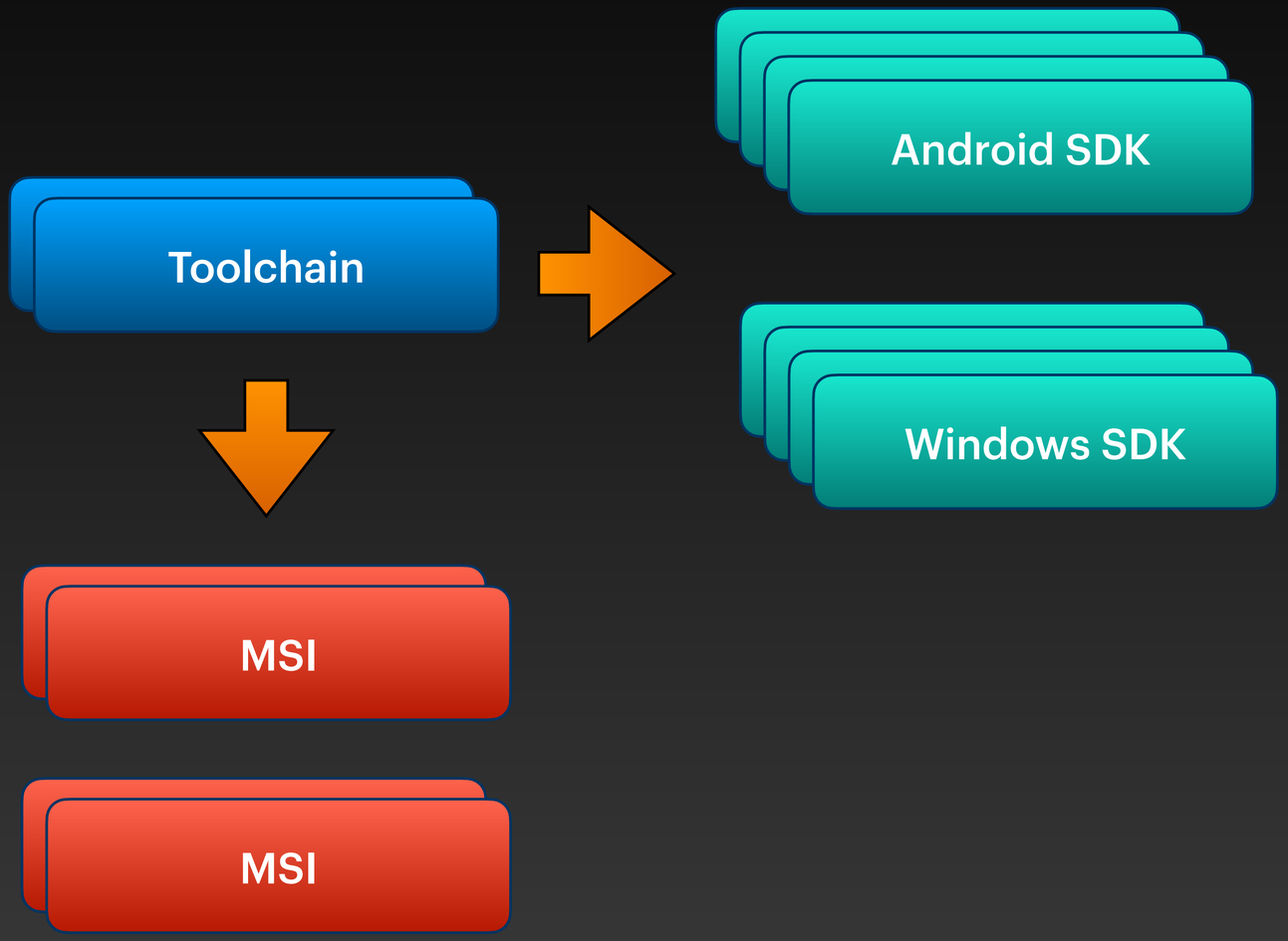

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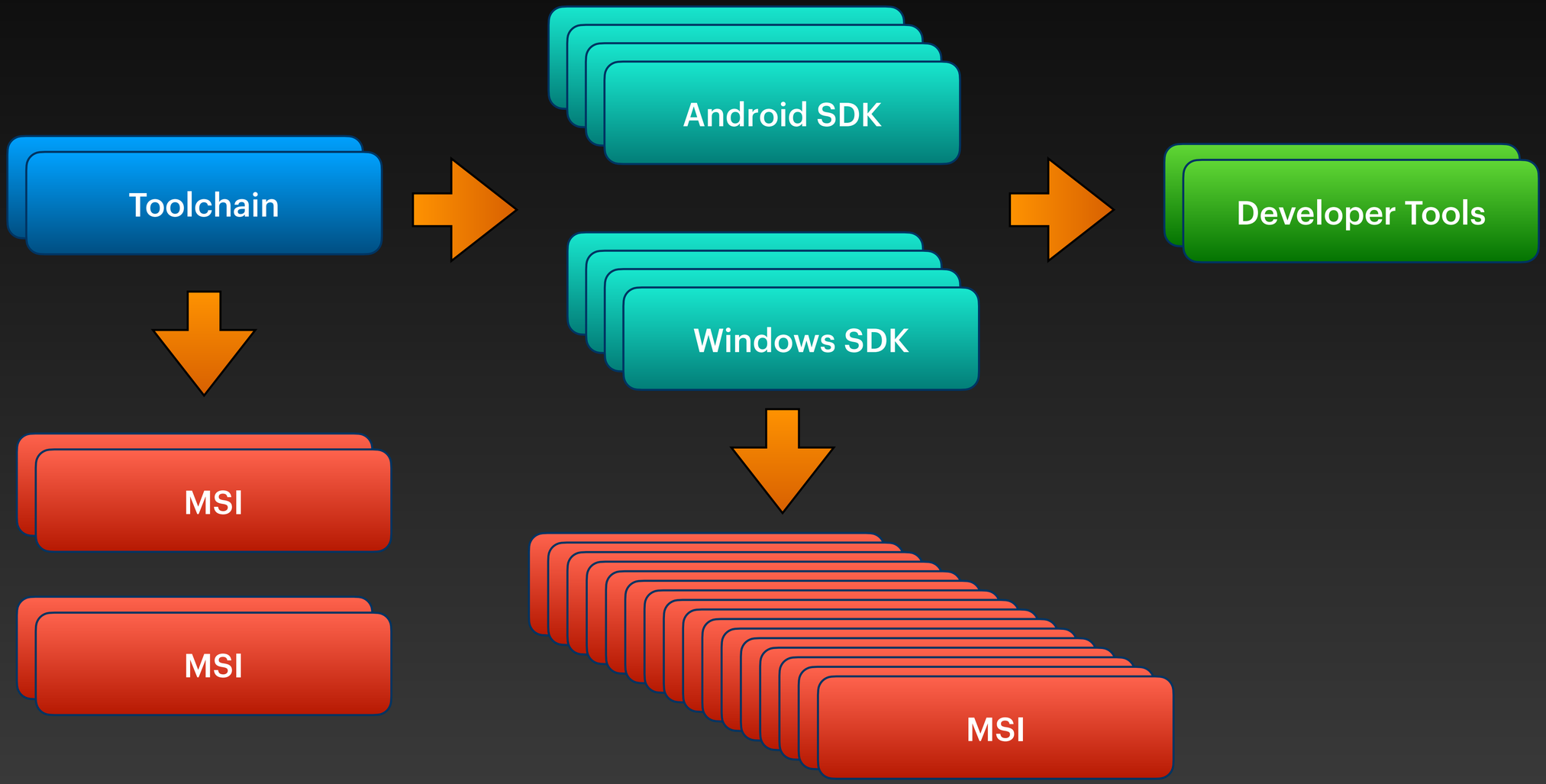

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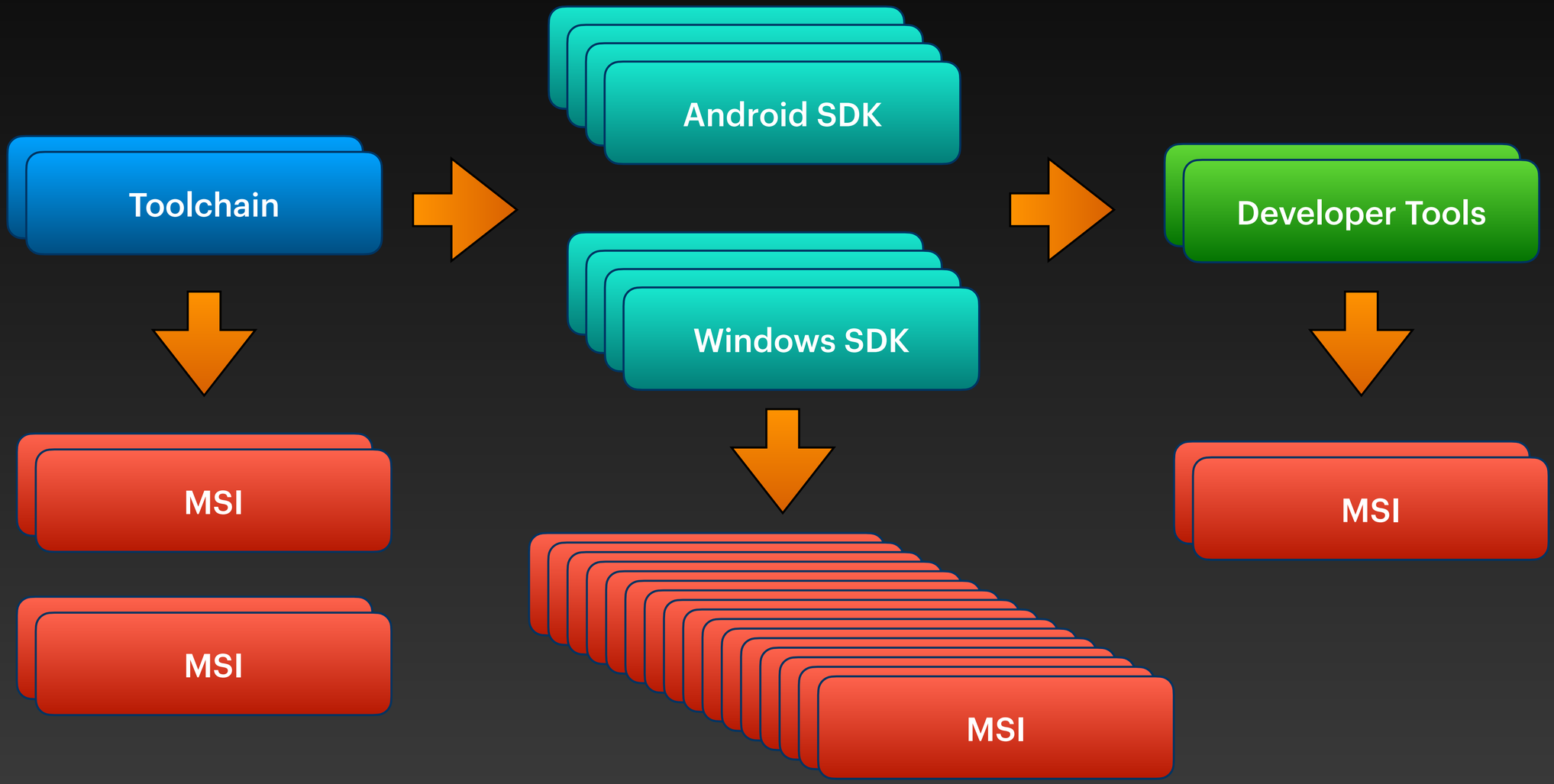

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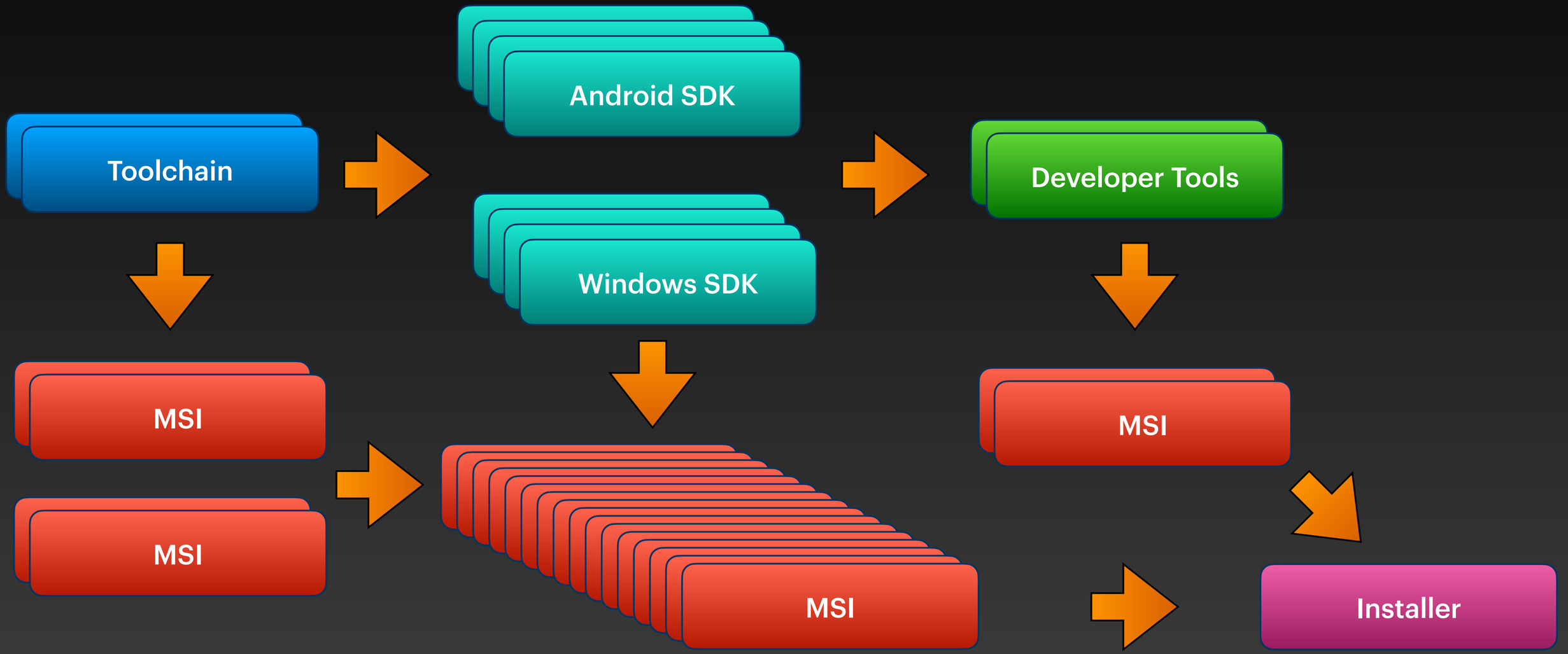

Build All The Things!

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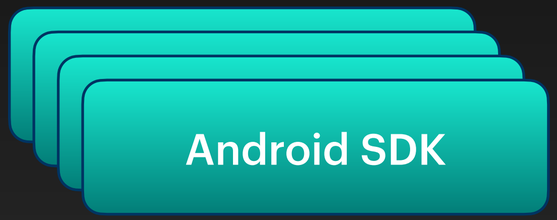
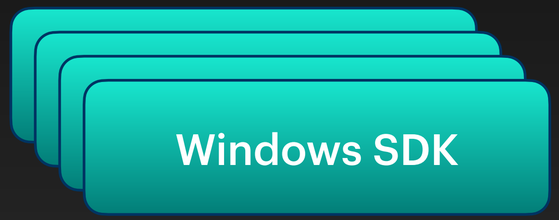
Packaging Explosion





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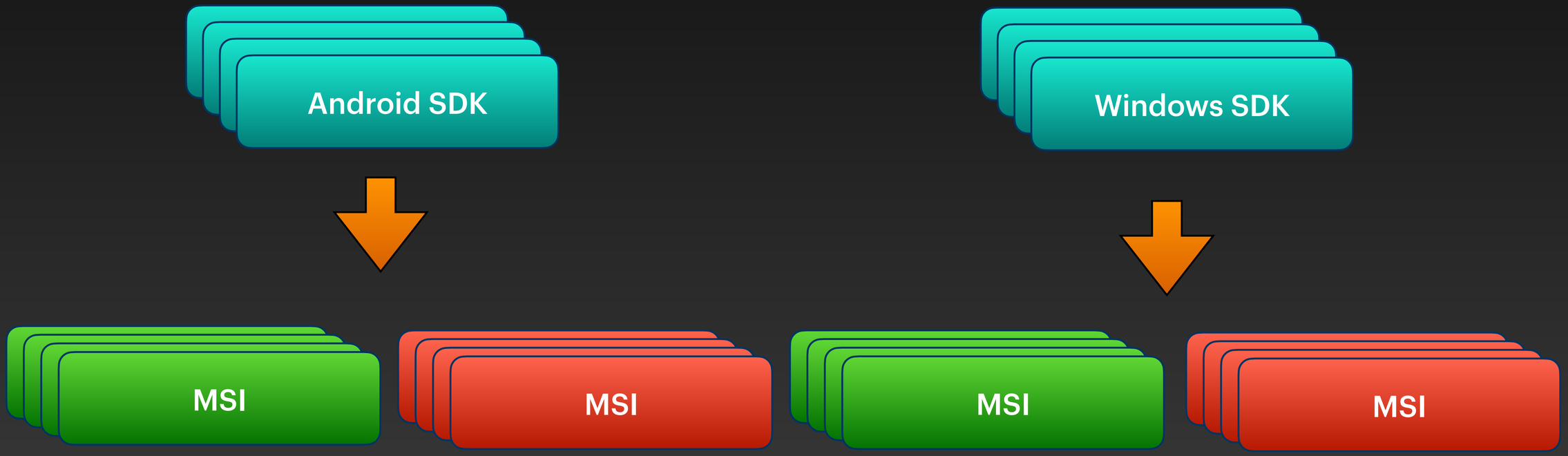

Not So Quick

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Complications

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- C/C++ SDK provided by the platform

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- clang modules are defined inline
- Post-facto modifications

Ignore Your Target Audience

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Toolchain Flexibility

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  - Installation Root (%SystemDrive%)
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- Setup for split, parallel toolchain installations
- Multiple parallel SDK installation

5 seconds of Fame

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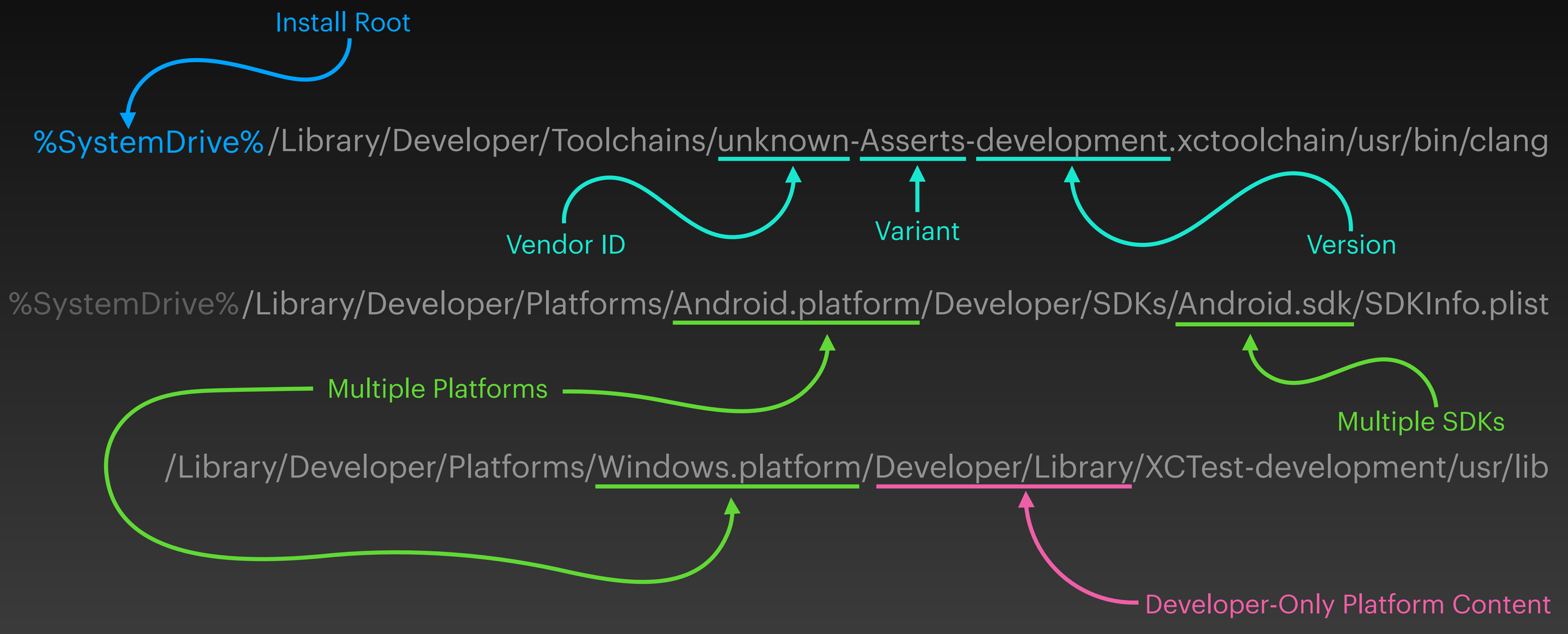
The Actual Layout



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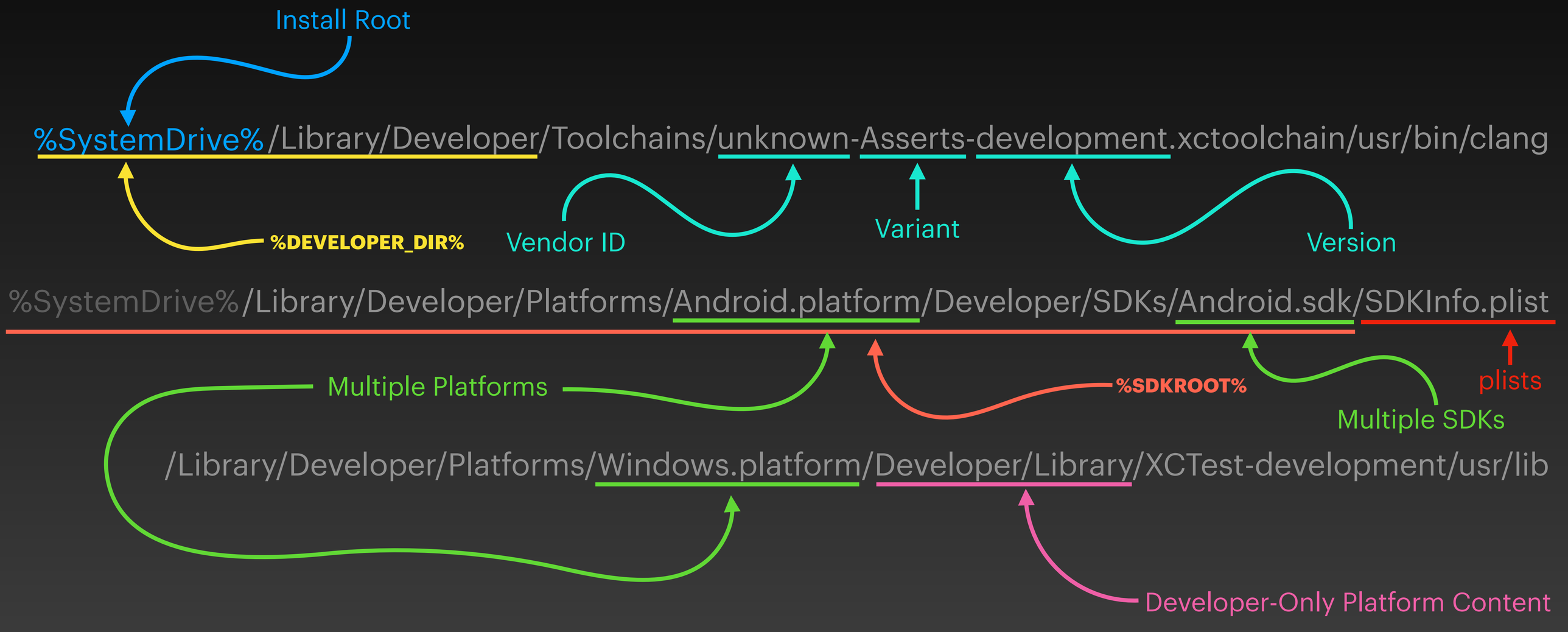

Something’s Amiss

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Missing Pieces

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- mt is incomplete

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Missing Pieces

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- Fallback to MSVC Tools

The Great Depression

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- LLVM is not a cross-compiling build setup

Schooling

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Lessons Learnt

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- Prefer MSVC over LLVM

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- Integrate into LLVM’s build if possible
- Compose CMake caches for external builds
- Overly verbose distribution cache

Thank You

winget install swift

https://youtu.be/ZjlXa1NIfJc