AI编译器系列

编译器的发展

ZOMI

About 关于本内容

1. **传统编译器**
   - History of Compiler - 编译器的发展
   - GCC process and principle – GCC 编译过程和原理
   - LLVM/Clang process and principle – LLVM 编译过程和原理
2. **AI编译器**
   - History of AI Compiler – AI编译器的发展
   - Base Common architecture – AI编译器的通用架构
   - Different and challenge of the future – 与传统编译器的区别，未来的挑战与思考

两大开源编译器的相爱与相杀

两大开源编译器的恩怨情仇

What is Compiler 编译器是什么

- In computing, a compiler is a computer program that translates computer code written in one programming language into another language. The name "compiler" is primarily used for programs that translate source code from a high-level programming language to a lower level language to create an executable program.

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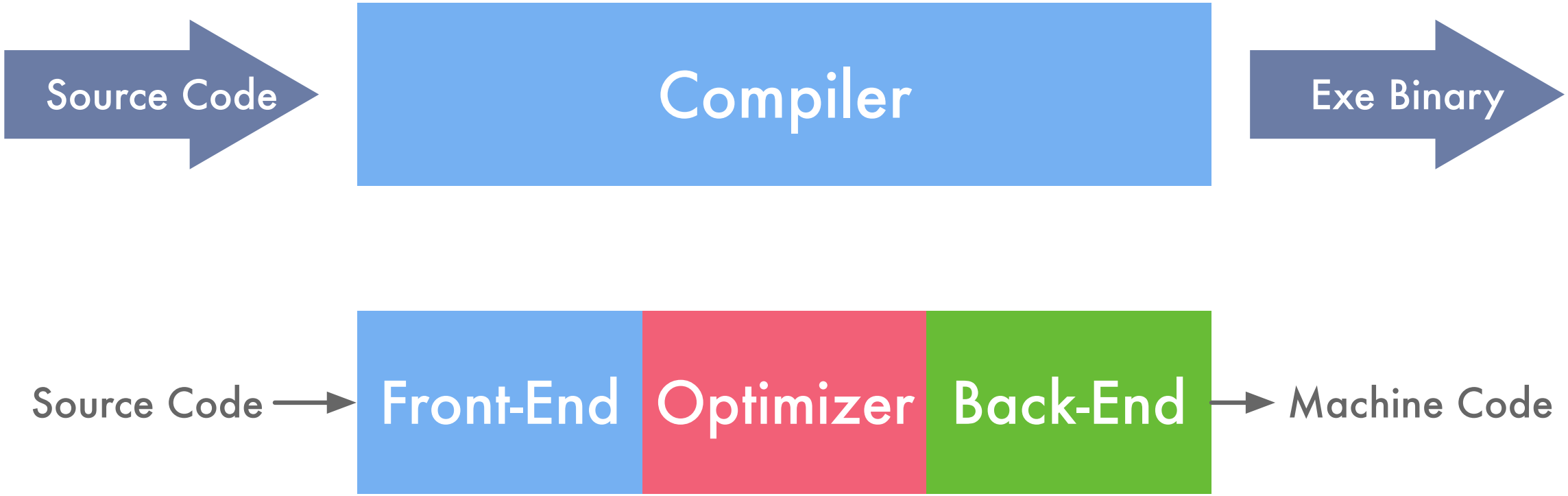
Compiler basic constitution 编译器基本构成



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Compiler basic constitution 编译器基本构成

- Front-End：主要负责词法和语法分析，将源代码转化为抽象语法树；

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Compiler basic constitution 编译器基本构成

- Optimizer：优化器则是在前端的基础上，对得到的中间代码进行优化，使代码更加高效；

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Compiler basic constitution 编译器基本构成

- Back-end：后端则是将已经优化的中间代码转化为针对各自平台的机器代码；

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GNU Compiler Collection, GCC

- first released in 1987 by Richard Stallman, GCC 1.0 was named the GNU C Compiler since it only handl ed the C programming language.
- The GNU Compiler Collection (GCC) is an optimizi ng compiler produced by the GNU Project supportin g various programming languages, hardware architect ures and operating systems.

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GNU Compiler Collection, GCC

RMS

Richard M. Stallman

FSF
FREE SOFTWARE
FOUNDATION

GNU's Not Unix!

GNU

GNU Compiler Collection
(GNU C Compiler)

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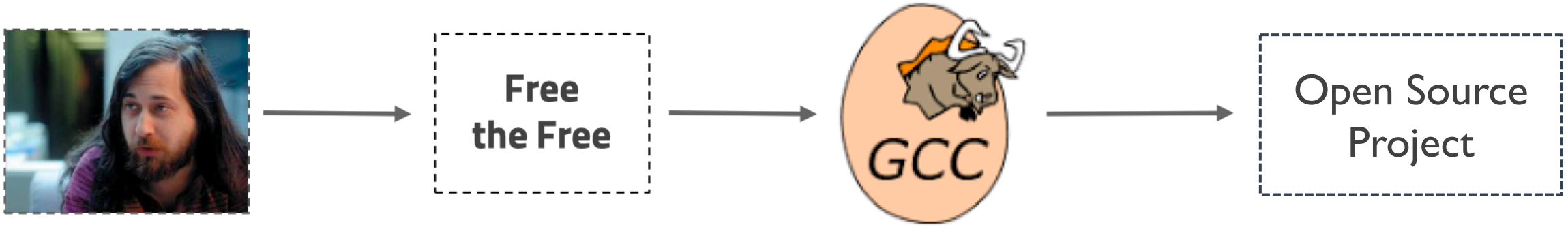
GNU Compiler Collection, GCC



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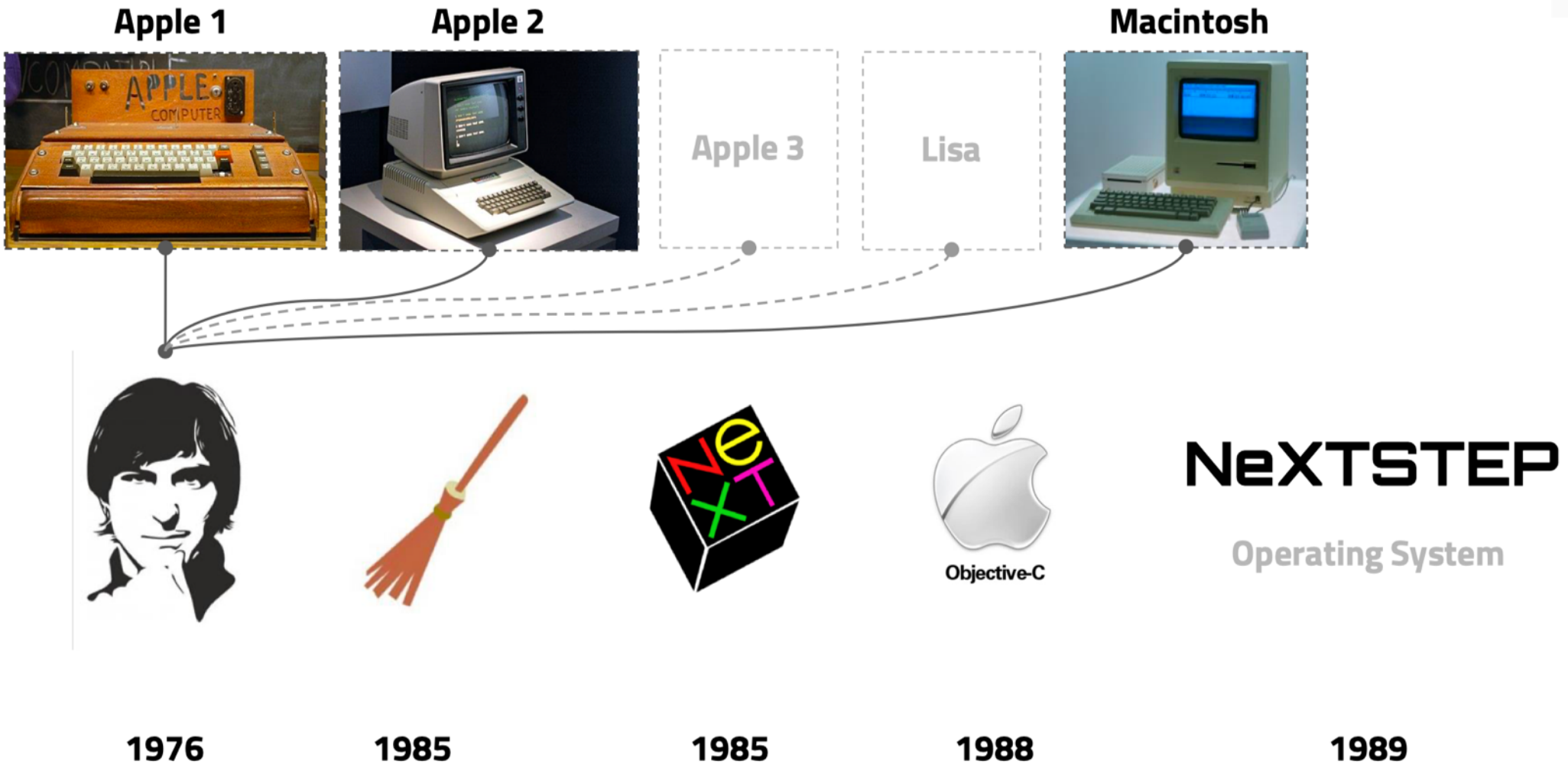
Apple

Apple Computer & NeXT



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Apple Computer & NeXT

1997

NeXTSTEP

1997

2001

1998 Power Macintosh G3
1999 Power Macintosh G4
2000 PowerBook
2001 iPod
2002 iPod2
2003 iPod3
2004 iPod4 & Mini & Photo
2005 iPod5
iPod Shuffle
iPod Nano
Power Macintosh G5 (Intel)
2006 MacBook Pro
2007 Apple TV
iPhone
2008 MacBook Air
iPod Touch
iPhone 3G

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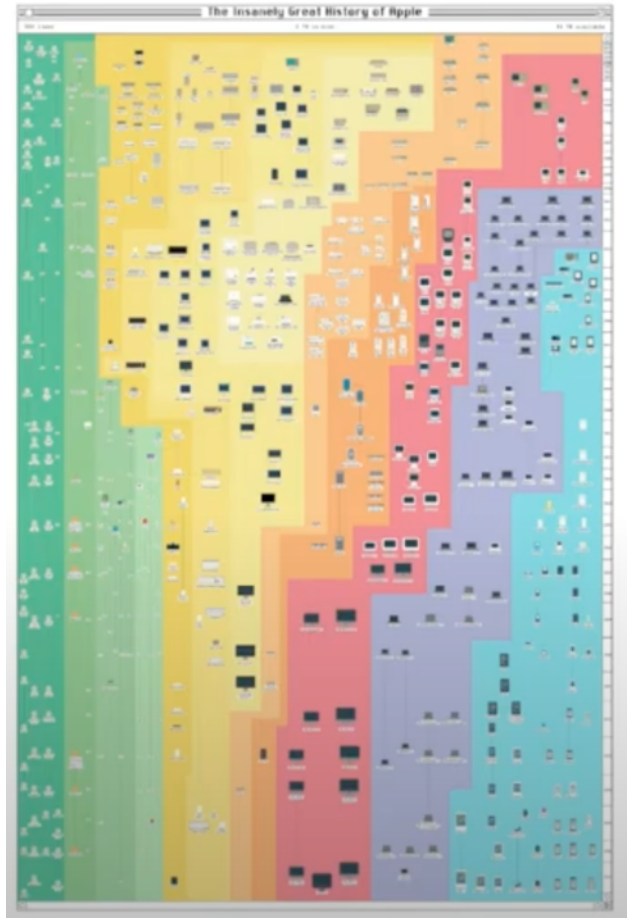
Complicate Ecosystem



CPU	OS	Language
ARMv6	macOS	C
ARMv7	iOS	C++
ARMv8	watchOS	Objective-C
Intel X86	tvOS	Swift
PowerPC		

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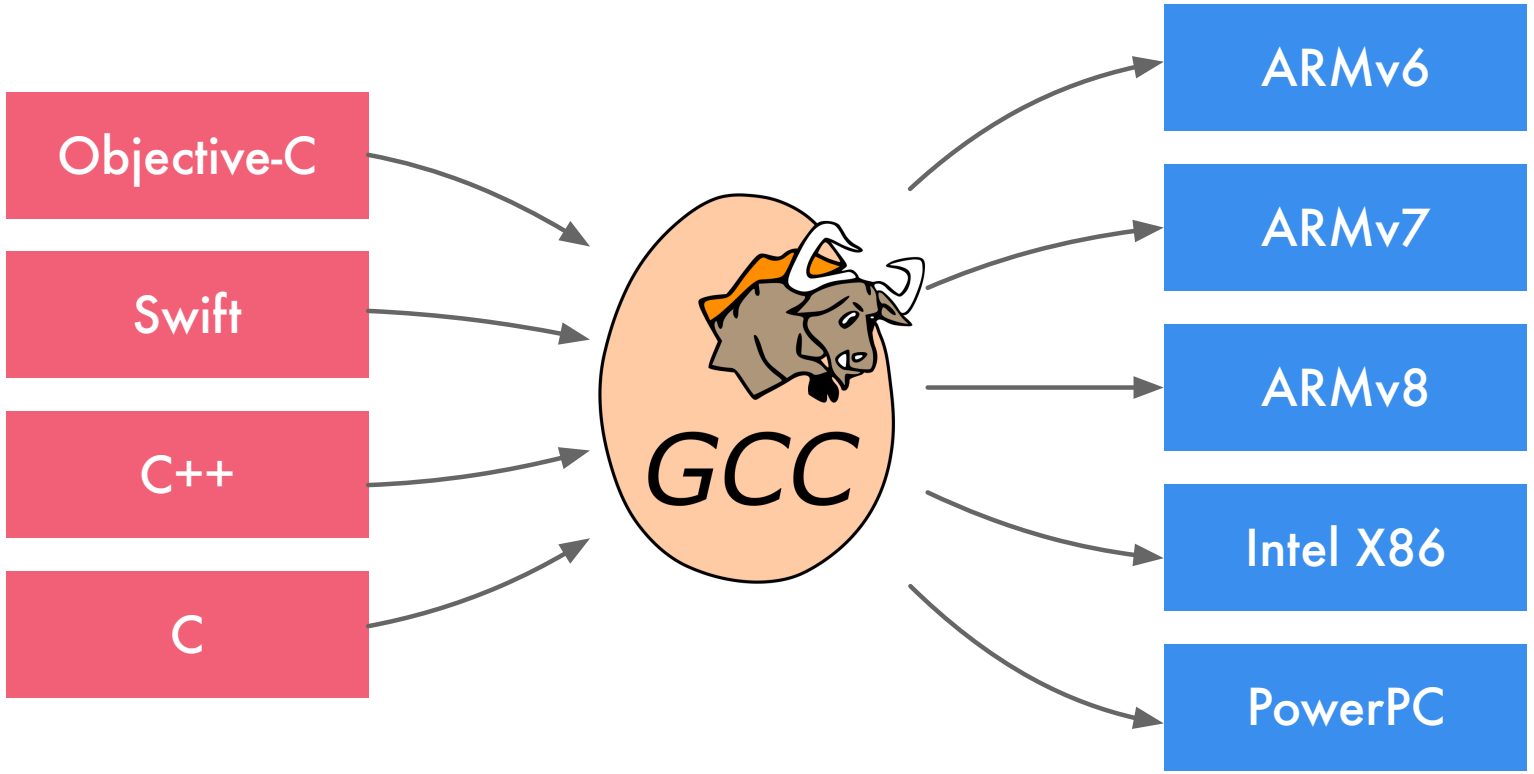
Complicate Ecosystem



Application Driver OS ← SDK ← Xcode

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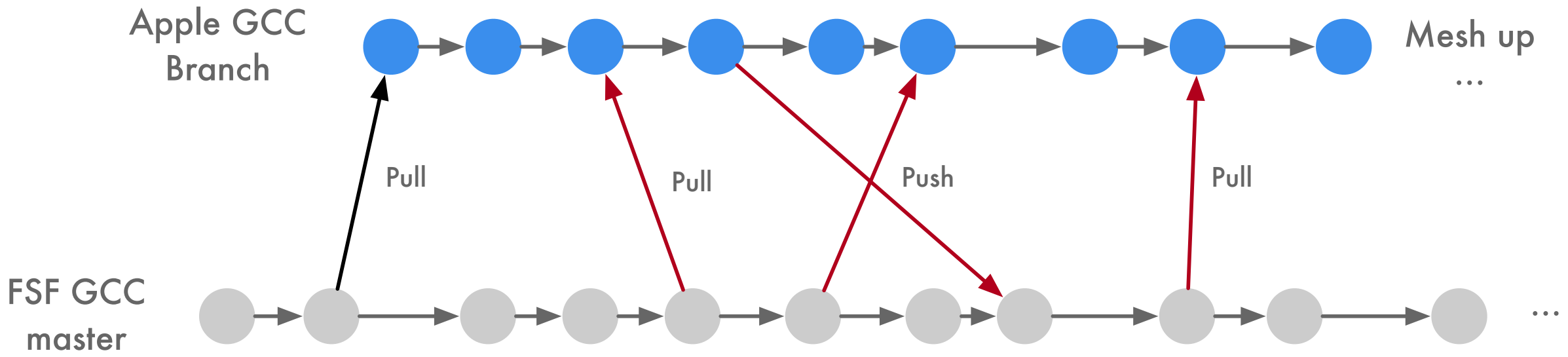
Apple needs find a way out



GCC is developed for solving real problems,
it has no time to make a good everything perfect.

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Apple met LLVM

Chris Lattner

Twitter: https://twitter.com/clattner_llvm
Website: http://nondot.org/sabre

Apple met LLVM

1997

NeXTSTEP

1997

mac OS

2001

2000

2005

2007 Xcode 3.x
2011 Xcode 4.x
2013 Xcode 5.x

2011 gcc > llvm 10%
2013 gcc ≈ llvm

(run-time performance)

1998 Power Macintosh G3
1999 Power Macintosh G4
2000 PowerBook
2001 iPod
2002 iPod2
2003 iPod3
2004 iPod4 & Mini & Photo
2005 iPod5
iPod Shuffle
iPod Nano
Power Macintosh G5 (Intel)
2006 MacBook Pro
2007 Apple TV
iPhone
2008 MacBook Air
iPod Touch
iPhone 3G

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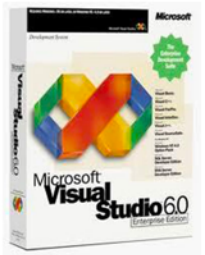
Microsoft

1997 - 2002



2002 - 2005

Microsoft Visual Studio .net

2005 - 2008

Microsoft Visual Studio 2005

2008 - 2010

Microsoft Visual Studio

2010 - 2012

Microsoft Visual Studio

2012 - 2017

Visual Studio

2017 - 2019

2019 - NOW

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Microsoft

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