

Lesson 1

Introduction

Lecturer: Harvard Tseng

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- Introduction
- Hardware
- Software
- Summary

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ARM is a Company

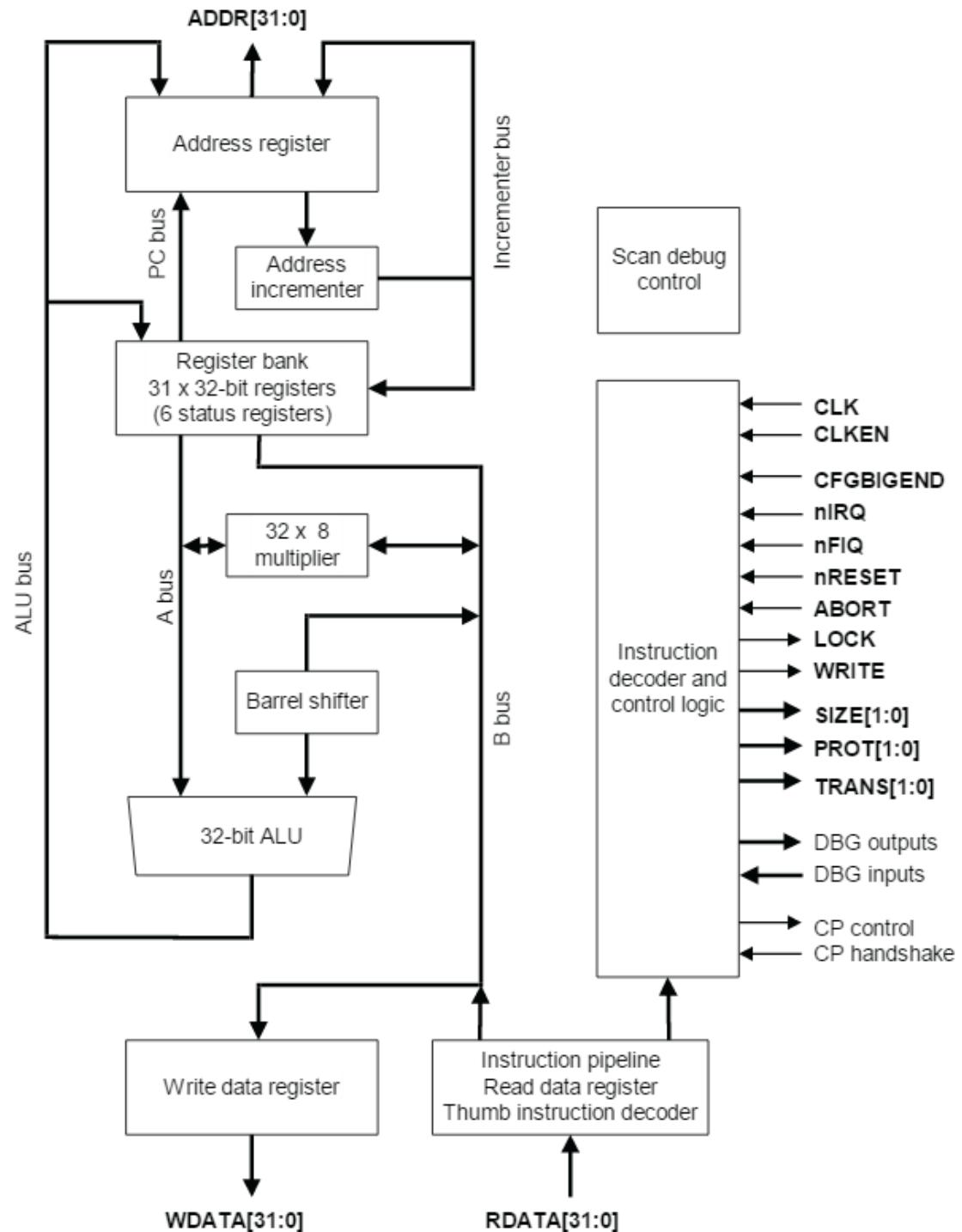


ARM Holding plc (ARM)

Founded	November 27, 1990
Headquarters	Cambridge, England, United Kingdom
Revenue	£968.3 million (2015)
Net income	£339.7 million (2015)
Website	arm.com

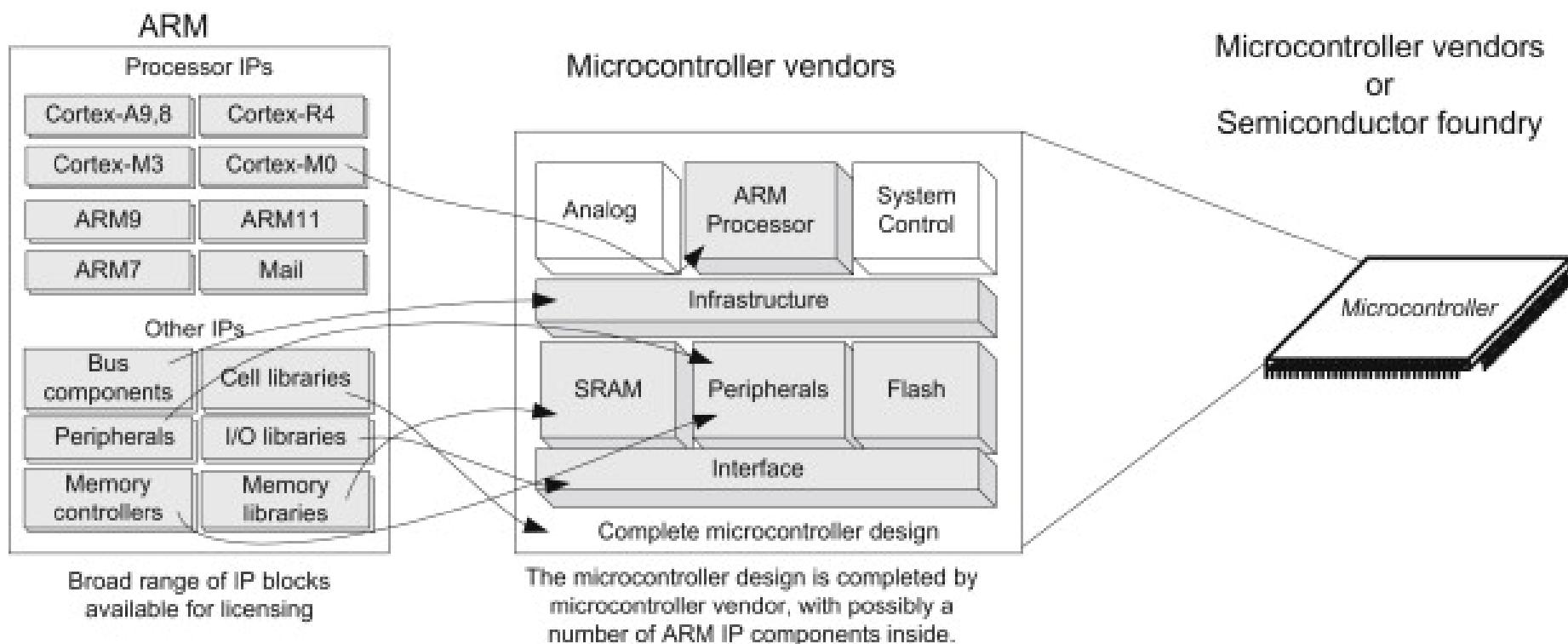
ARM is an Architecture of CPU

Advanced RISC Machine



How ARM Earns Money?

- By intellectual property (IP) licensing.



Silicon Vendors

- Apple Inc.
- MediaTek Inc.
- Qualcomm Inc.
- ...

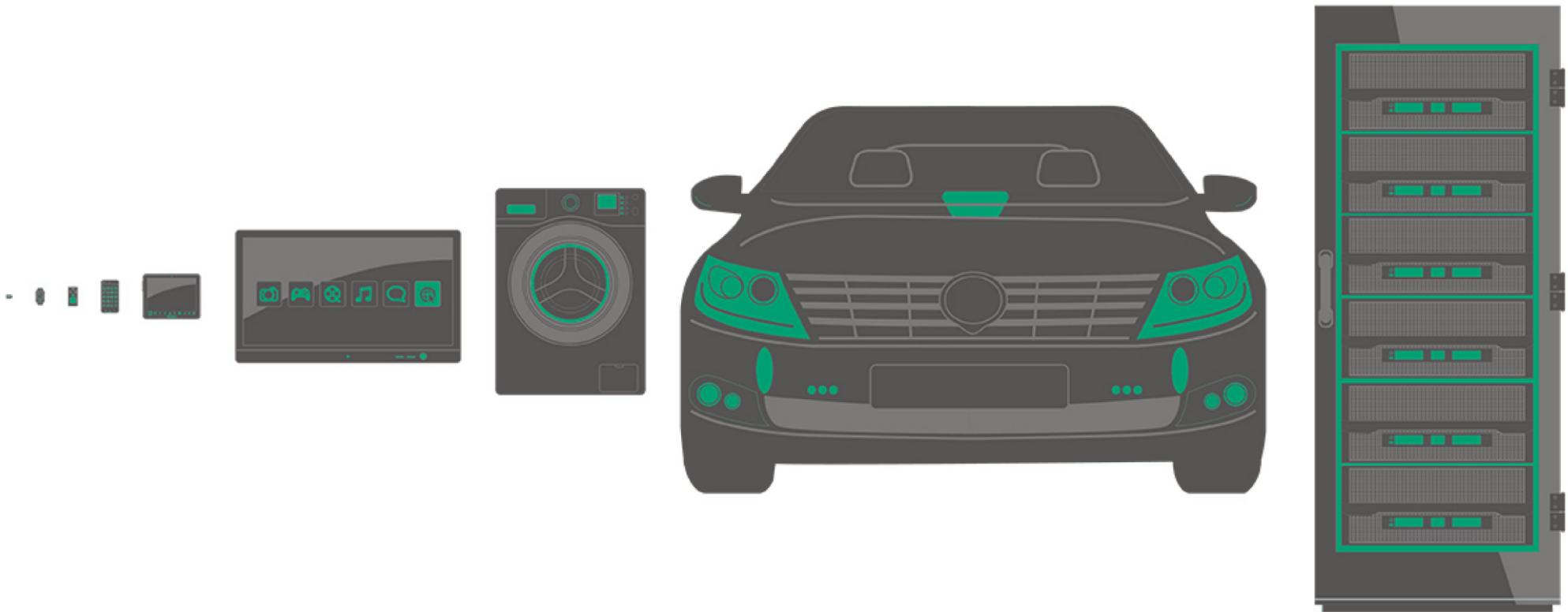


Microcontroller Vendors

- STMicroelectronics (ST)
- Texas Instruments Inc. (TI)
- NXP Semiconductors N.V. (NXP)
- ...



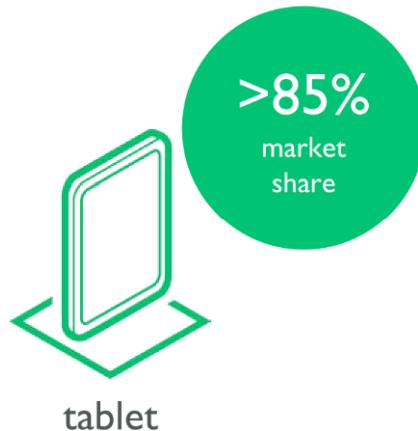
Sensors to smartphones to servers



Broad Market Penetration



smartphone



tablet



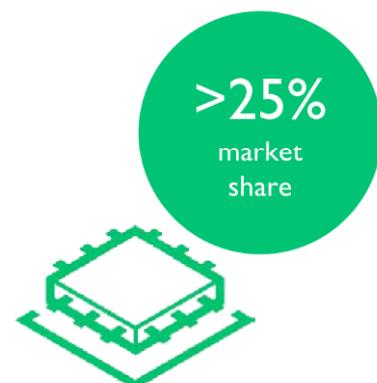
wearables



storage



automotive
infotainment



microcontrollers



wireless
connectivity



consumer
electronics

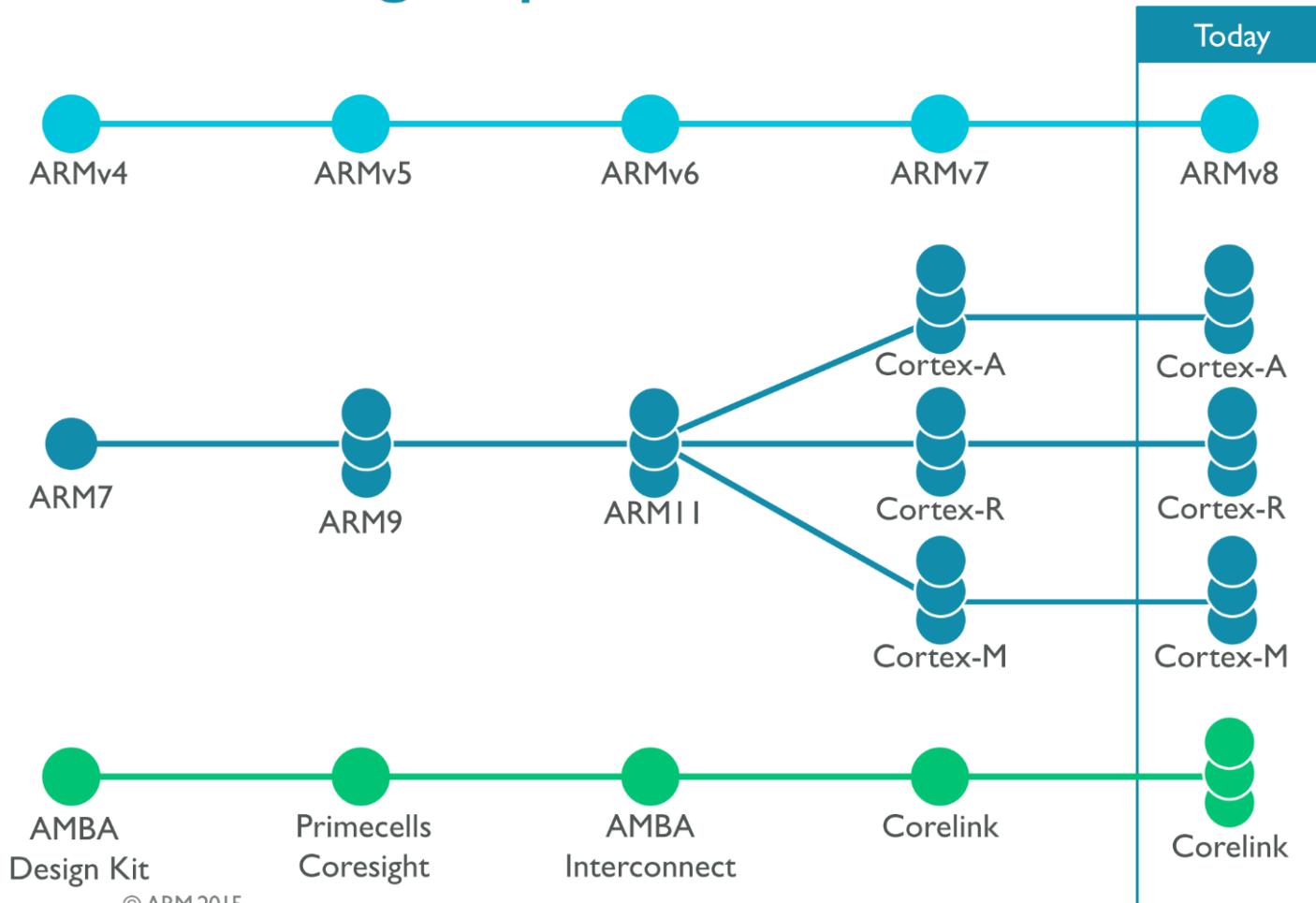
ARM

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- Introduction
- Hardware
 - Cortex-M Series
 - STM32F0x8
 - Development Board
- Software
- Summary

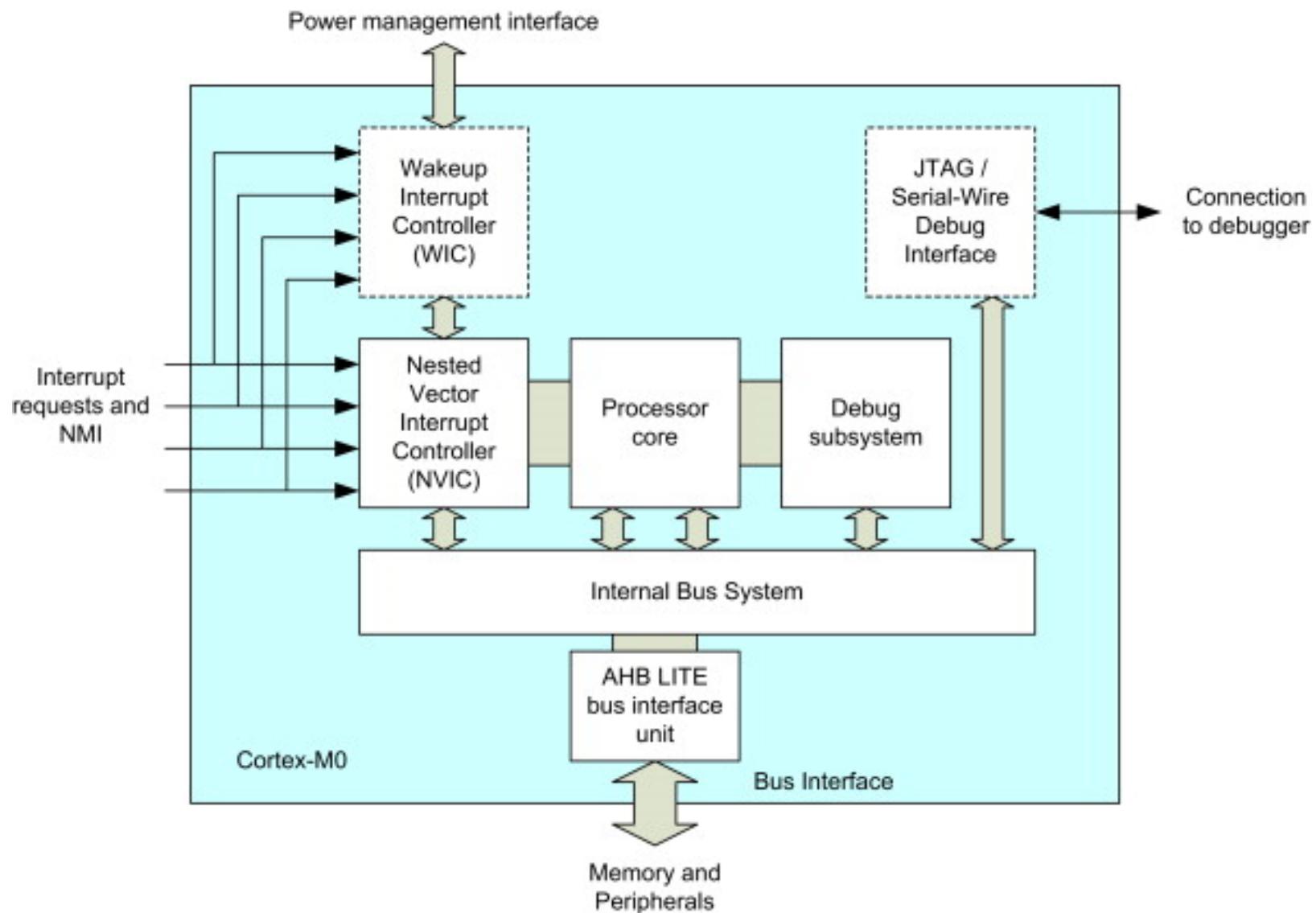
Cortex-M Series

Investing in processor innovation



ARM

Simplified Block Diagram

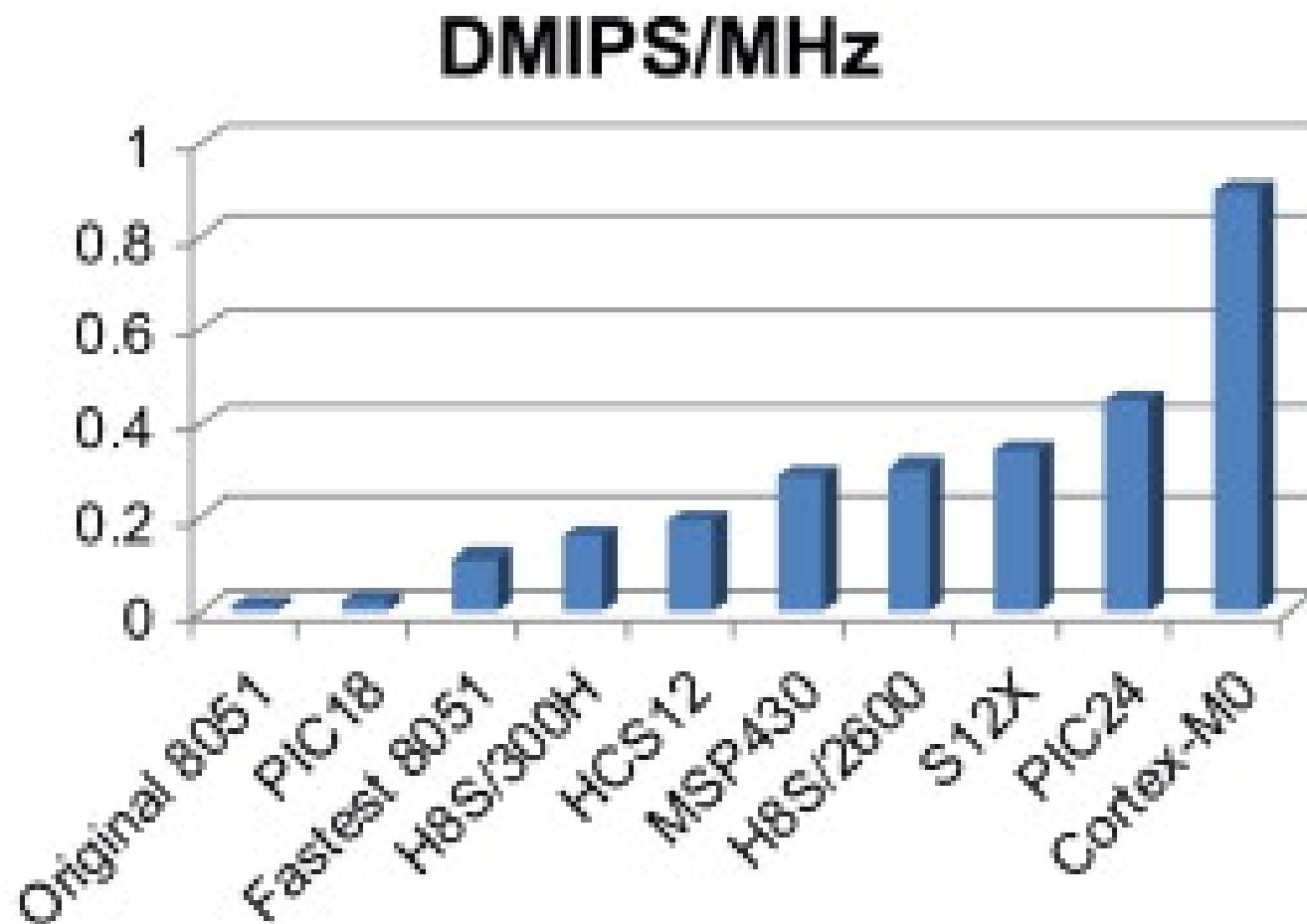


Advantages of the Cortex-M Processor

- Energy Efficiency
- Limitations in 8-Bit and 16-Bit Architectures
- Easy to Use, Software Portability
- Wide Range of Choices

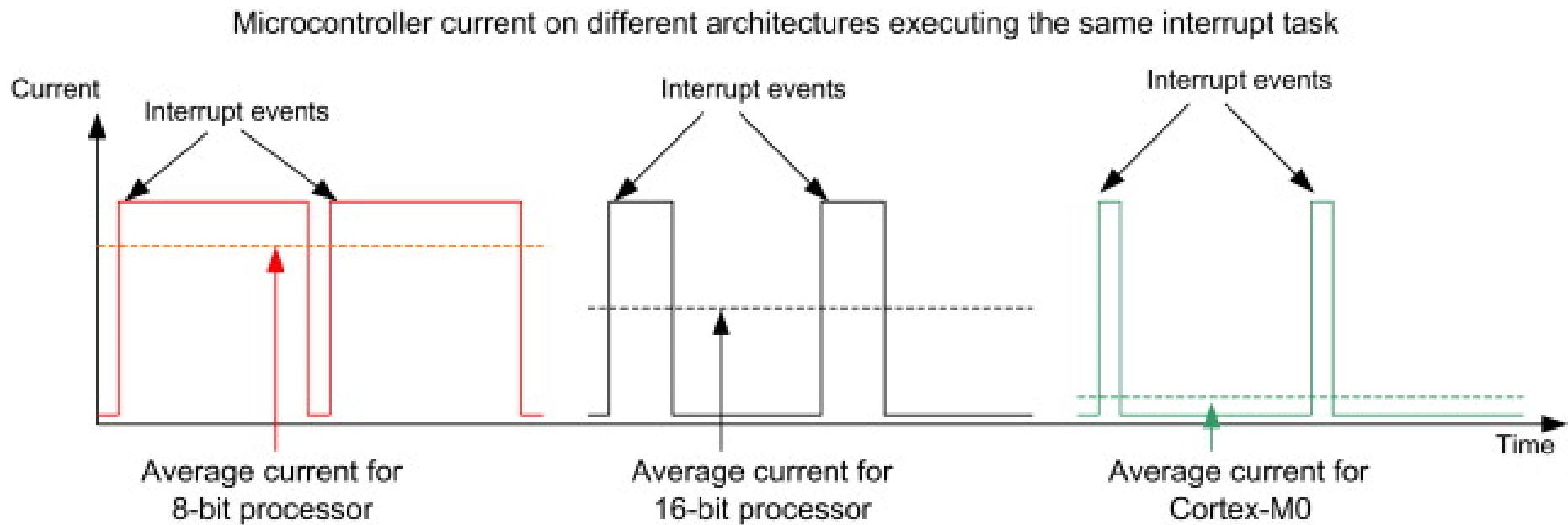
Why choose Cortex-M?

- High efficiency

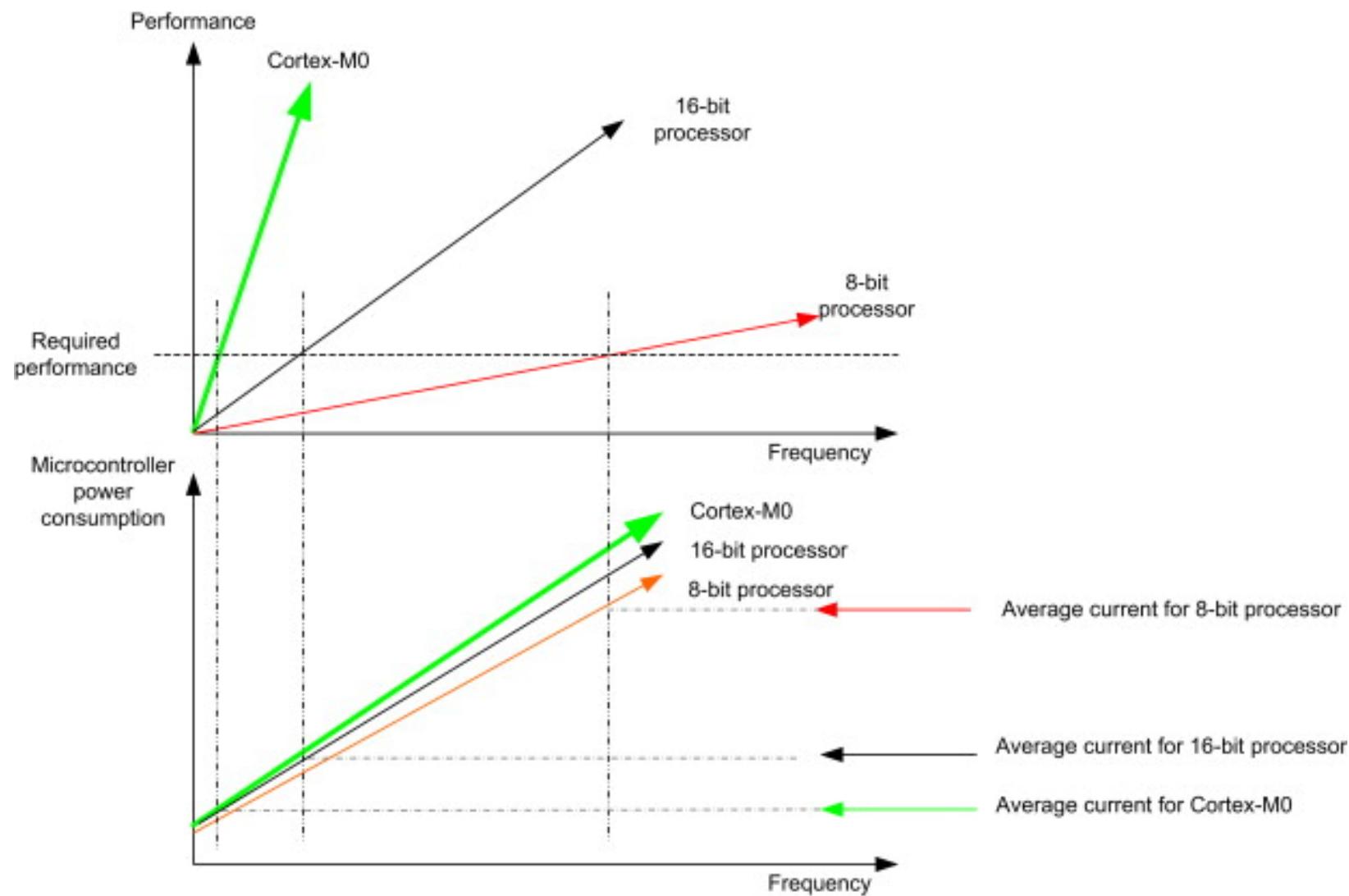


Why choose Cortex-M?

- Low-power features



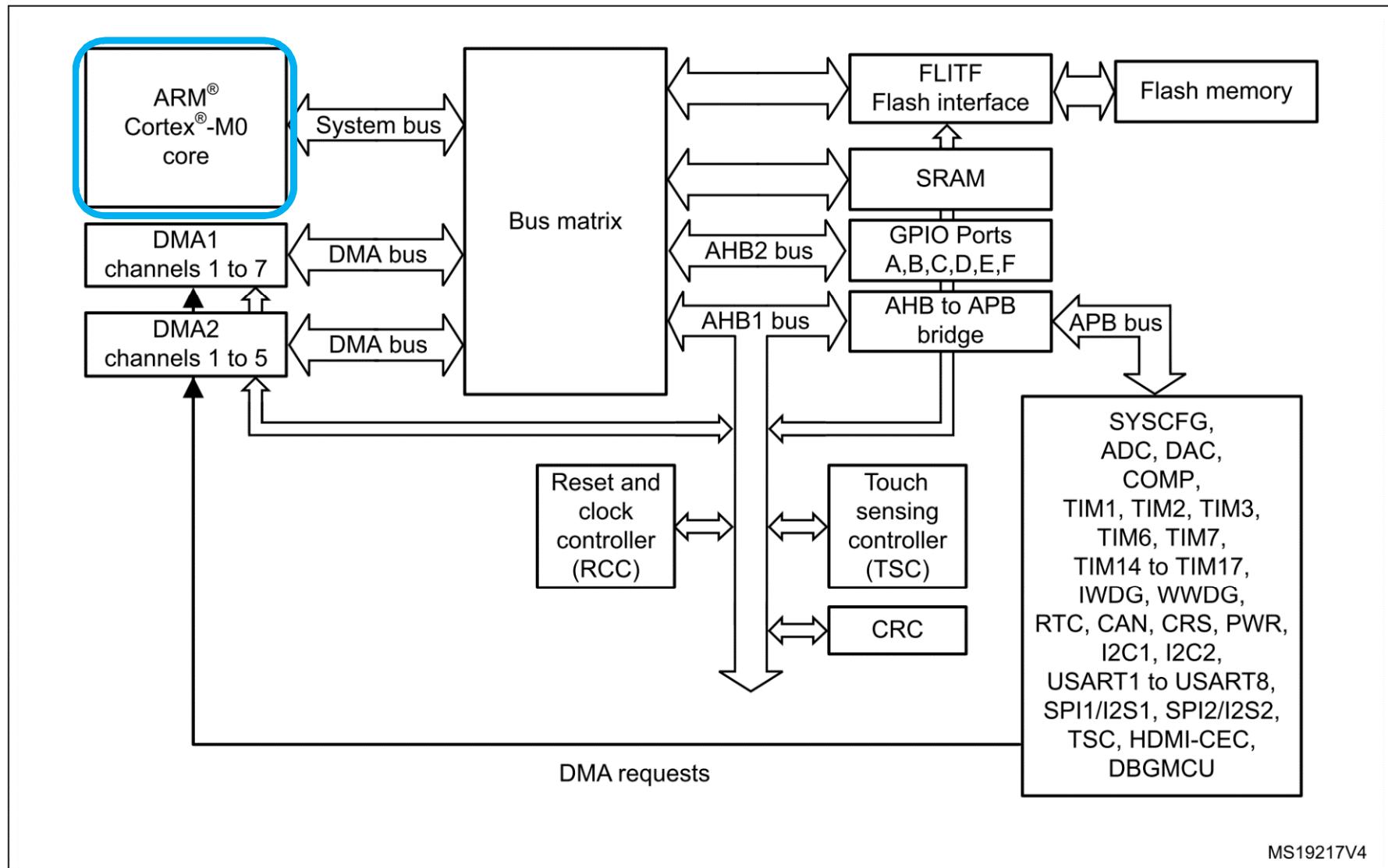
Why choose Cortex-M?

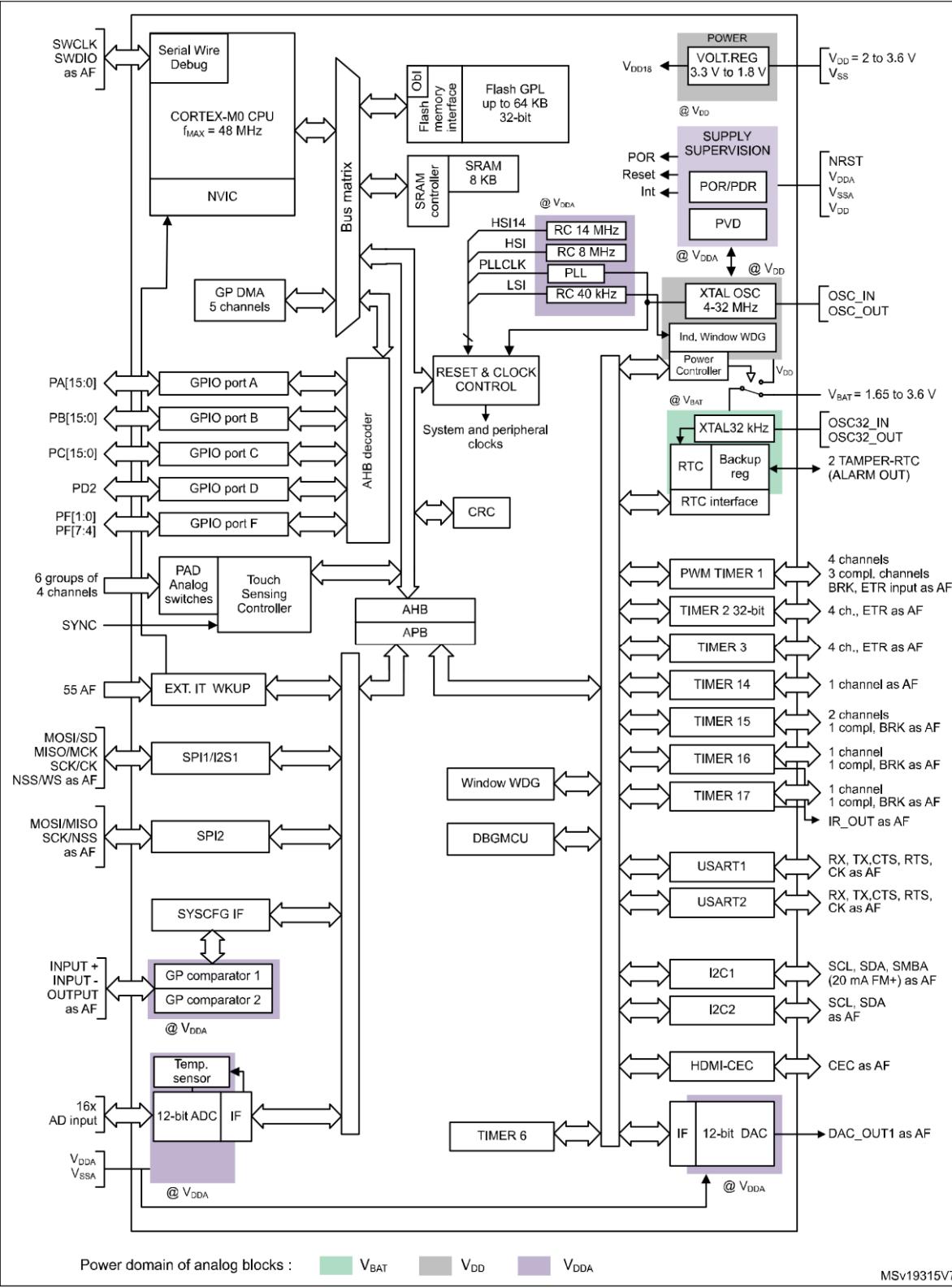


STM32F0x8

Advanced ARM®-based 32-bit MCUs

System Architecture





Power domain of analog blocks :

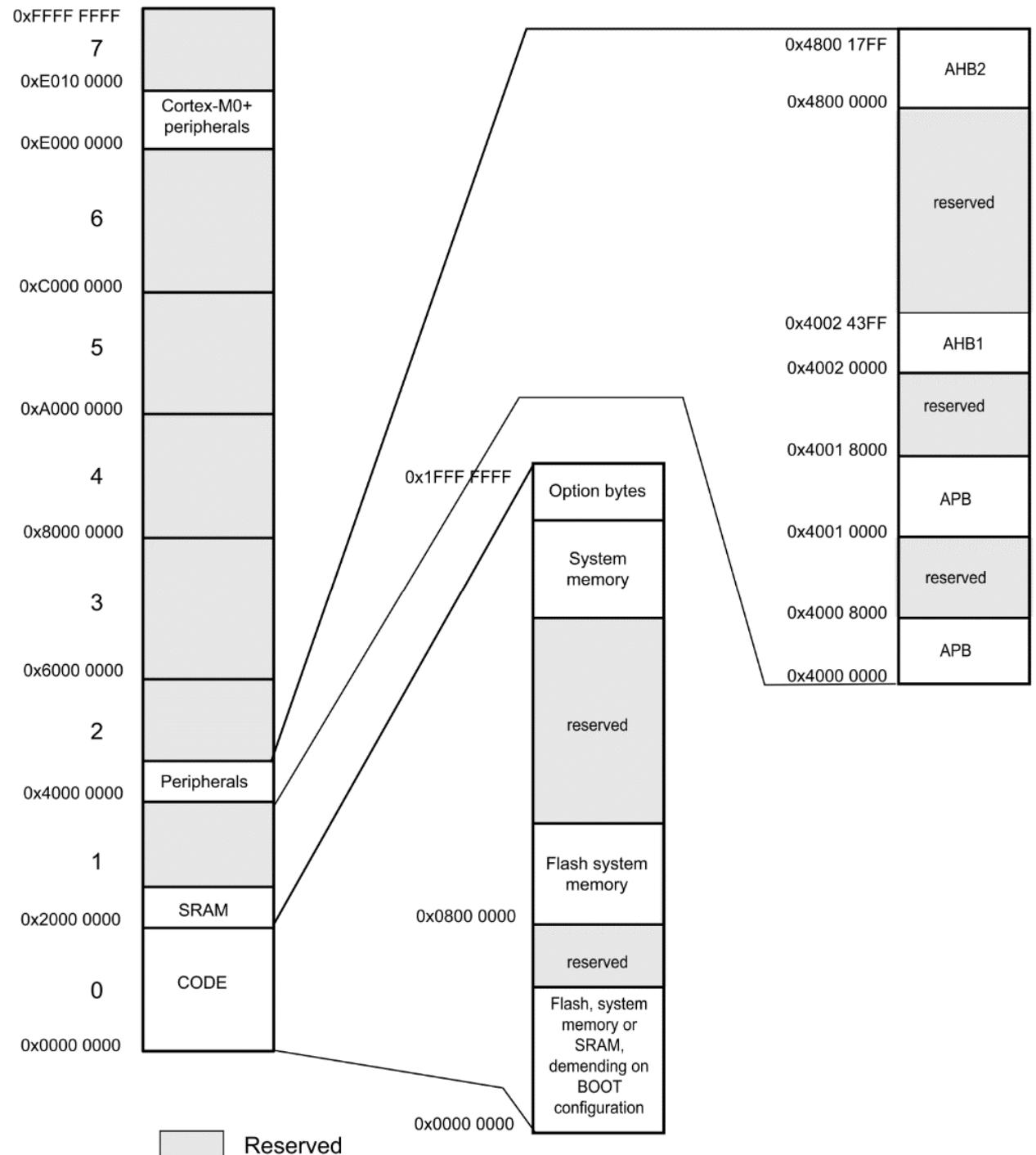
V_{BAT}

V_{DD}

V_{DDA}

MSv19315V7

Memory Map



Hint

- Think every peripheral as an independent IC.
- Every pin connects to memory map.

Reference Manual

- Some MCU vendors call it datasheet.
- Download from [ST](#) (RM0091).

Reference Manuals			
Description	Version	Size	
 RM0091: STM32F0x1/STM32F0x2/STM32F0x8 advanced ARM®-based 32-bit MCUs	8.0	13 MB	

Development Board

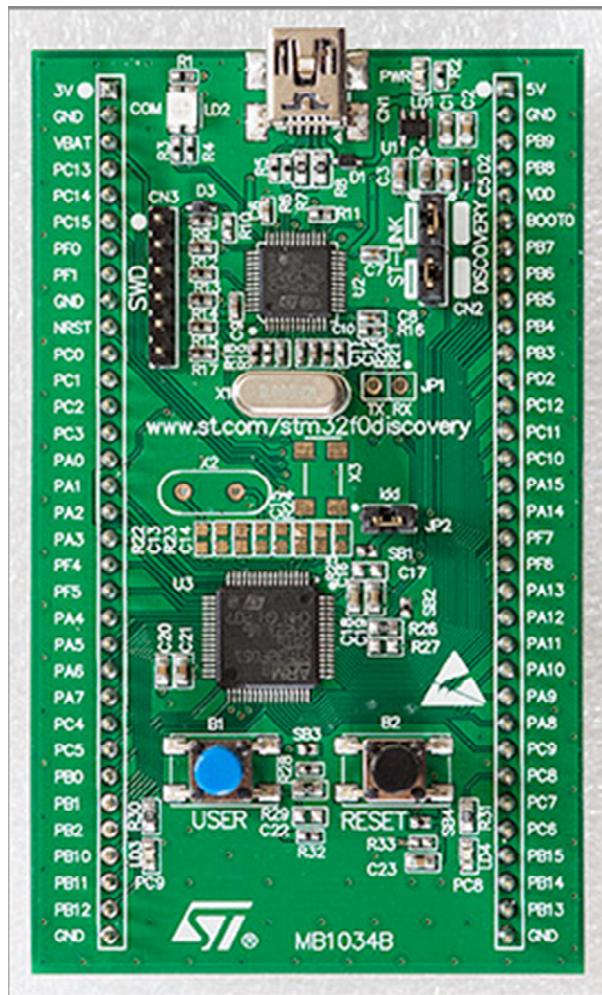
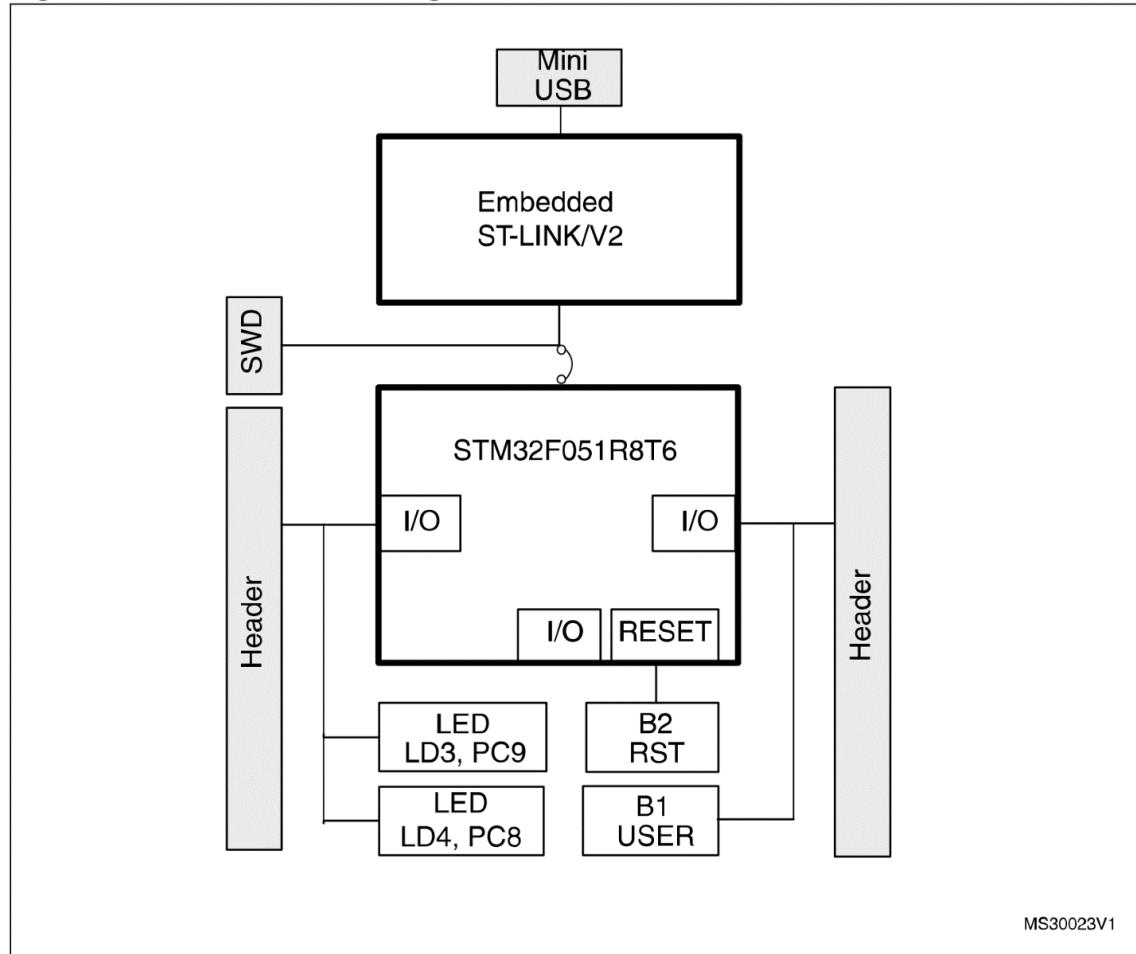


Figure 2. Hardware block diagram



MS30023V1

Content

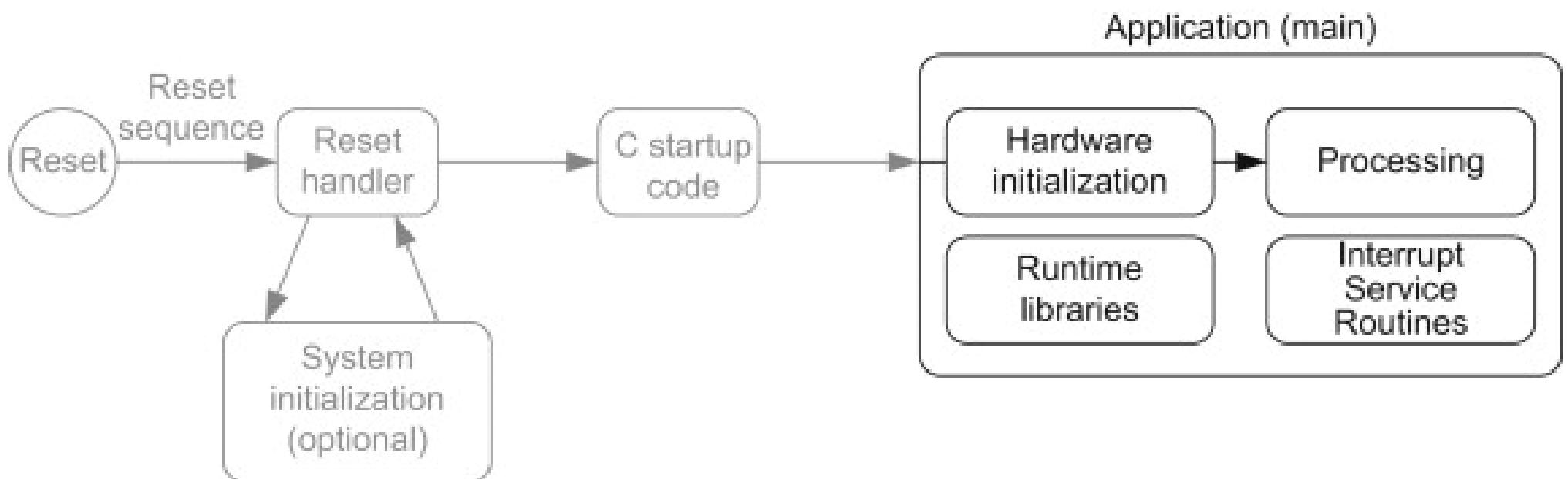
- Introduction
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 - Cortex-M0 Programming
 - IDE
- Summary

Cortex-M0 Programming

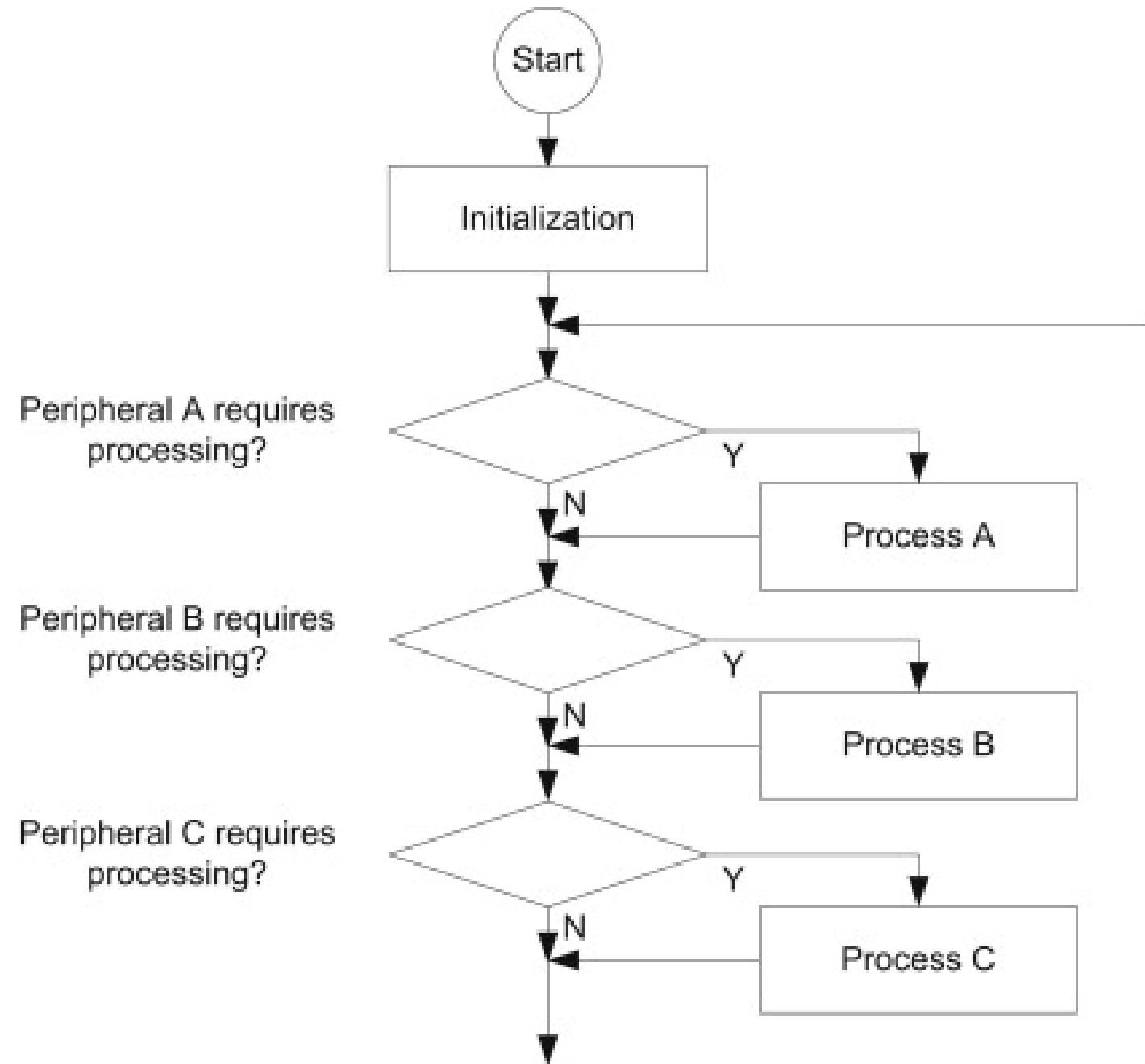
When a Microcontroller Starts

startup_stm32f0xx.s

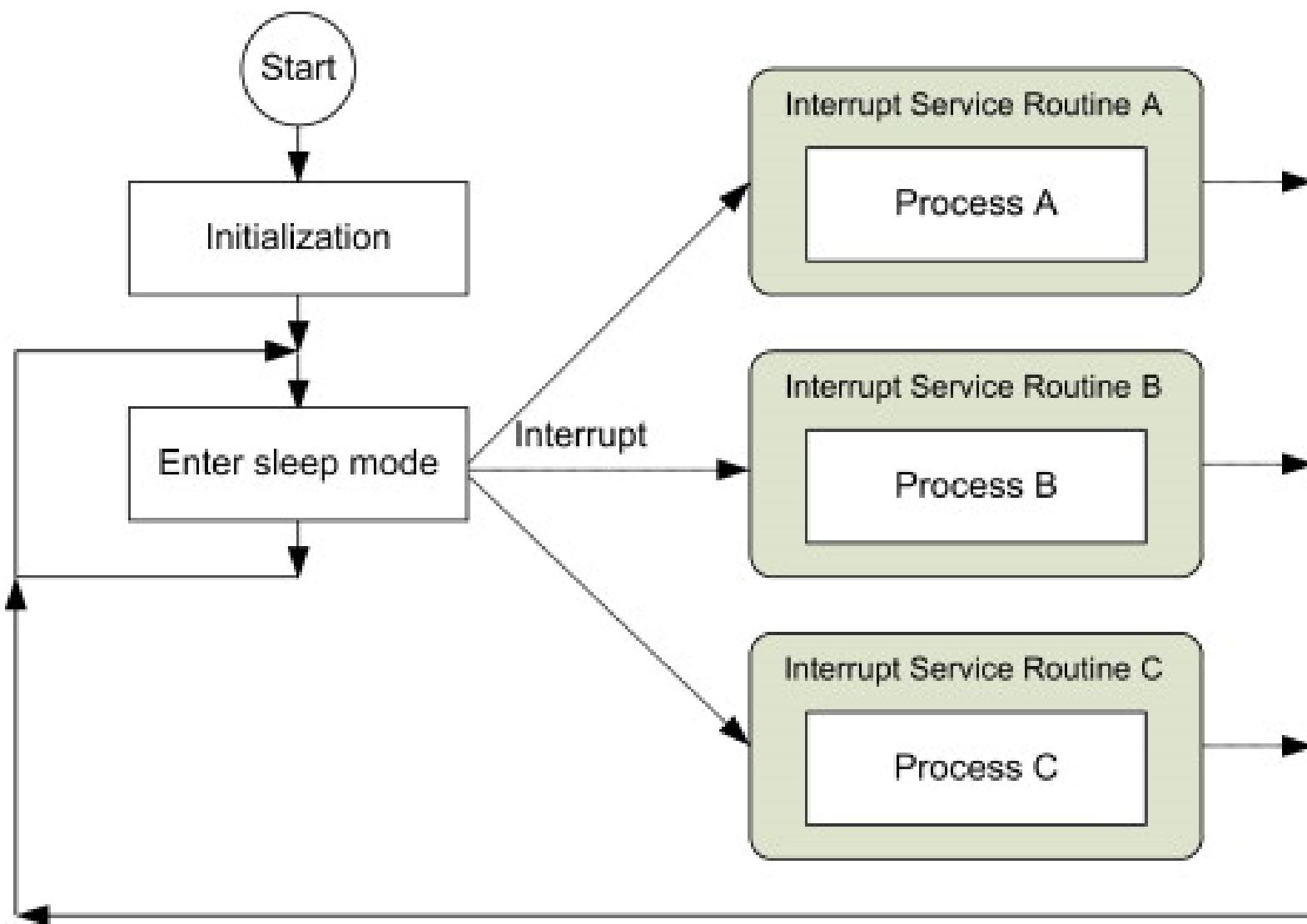
system_stm32f0xx.c



Polling

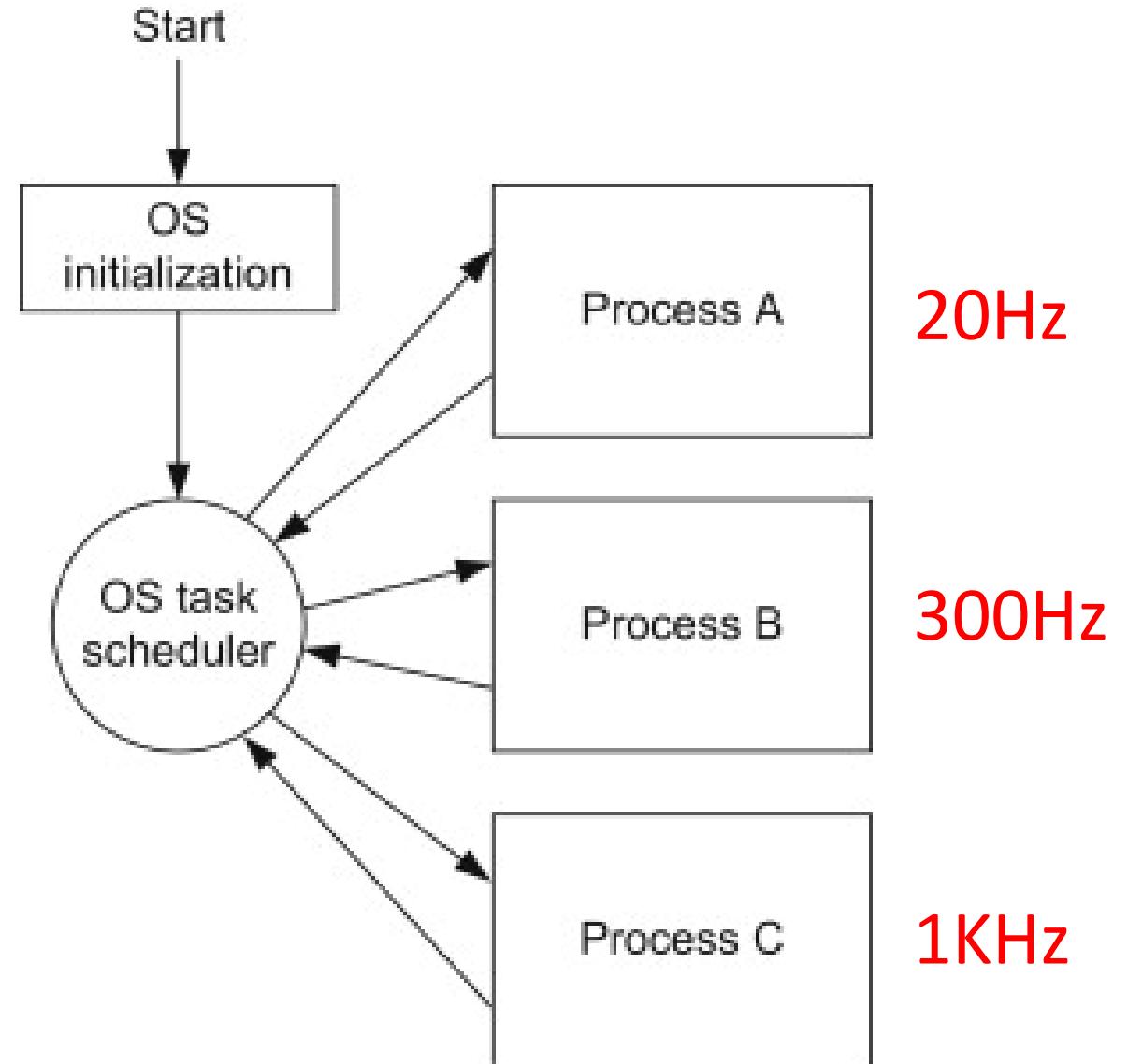


Interrupt Driven



RTOS

Processing flow



IDE

Integrated Development Environment

Development Toolchain

- IAR EWARM
 - 30-day evaluation edition
 - 32-Kbyte Limited QuickStart edition (16-Kbyte limitation for Cortex M0)
- Keil MDK-ARM
 - MDK-Lite (32-Kbyte code size limitation)
- ARMmbed
 - Free Online Development Tools
- GCC-based IDE



ARMmbed

What does IDE Contain?

- Coding environment
- C/C++ compilers
- Debuggers

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Summary

- ST is a MCU vendor of ARM.
- Bottom-up viewing of STM32F0x8.
- Programming styles.
- IDE introduction.