XDF XILINX DEVELOPER FORUM

Bringing the benefits of Cortex-M processors to FPGA

Presented By

arm XILINX

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Agenda

- Market trends
- Introducing Arm DesignStart FPGA
- DesignStart FPGA in the Xilinx Ecosystem
- Summary

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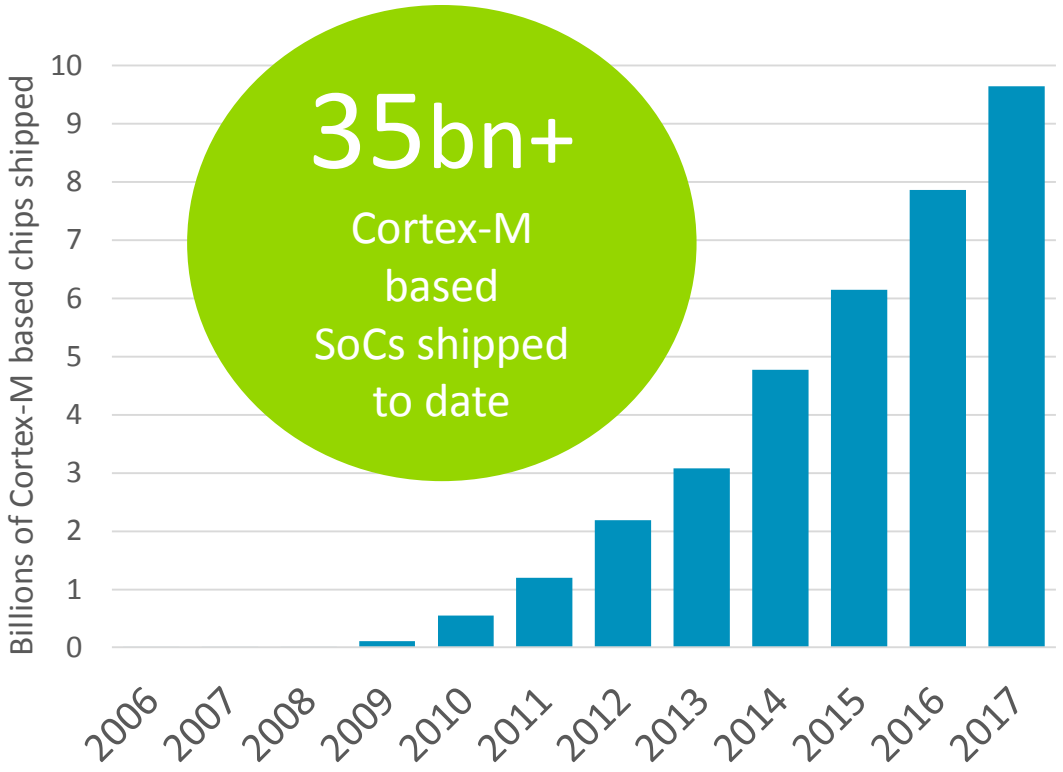
Powering diverse embedded devices with Arm Cortex-M CPUs

Cortex-M based devices are growing exponentially



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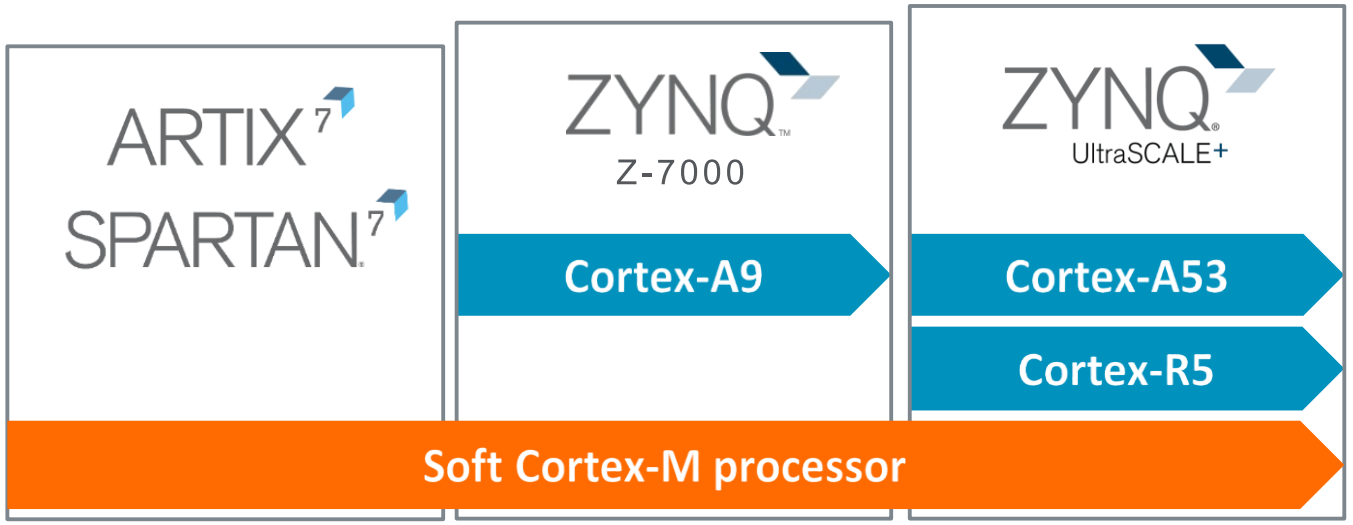
A large growth in application-optimized designs

- Over **1 billion** cost-optimized Xilinx devices sold to date
- Xilinx continues investment in their cost-optimized portfolio with new devices, tool, and IP improvements
- **Multiple generations** of Arm-based embedded processing solutions:



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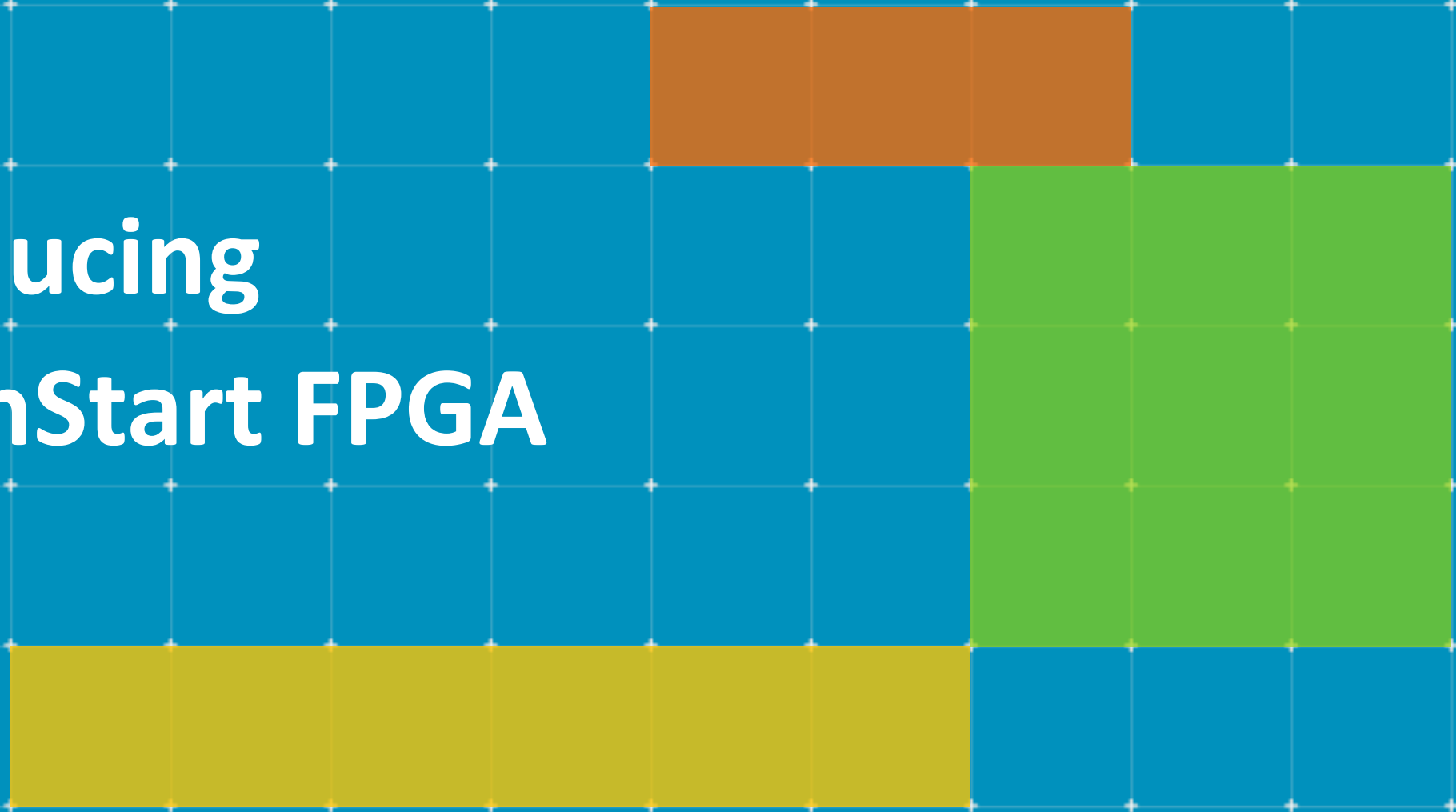
Introducing DesignStart FPGA



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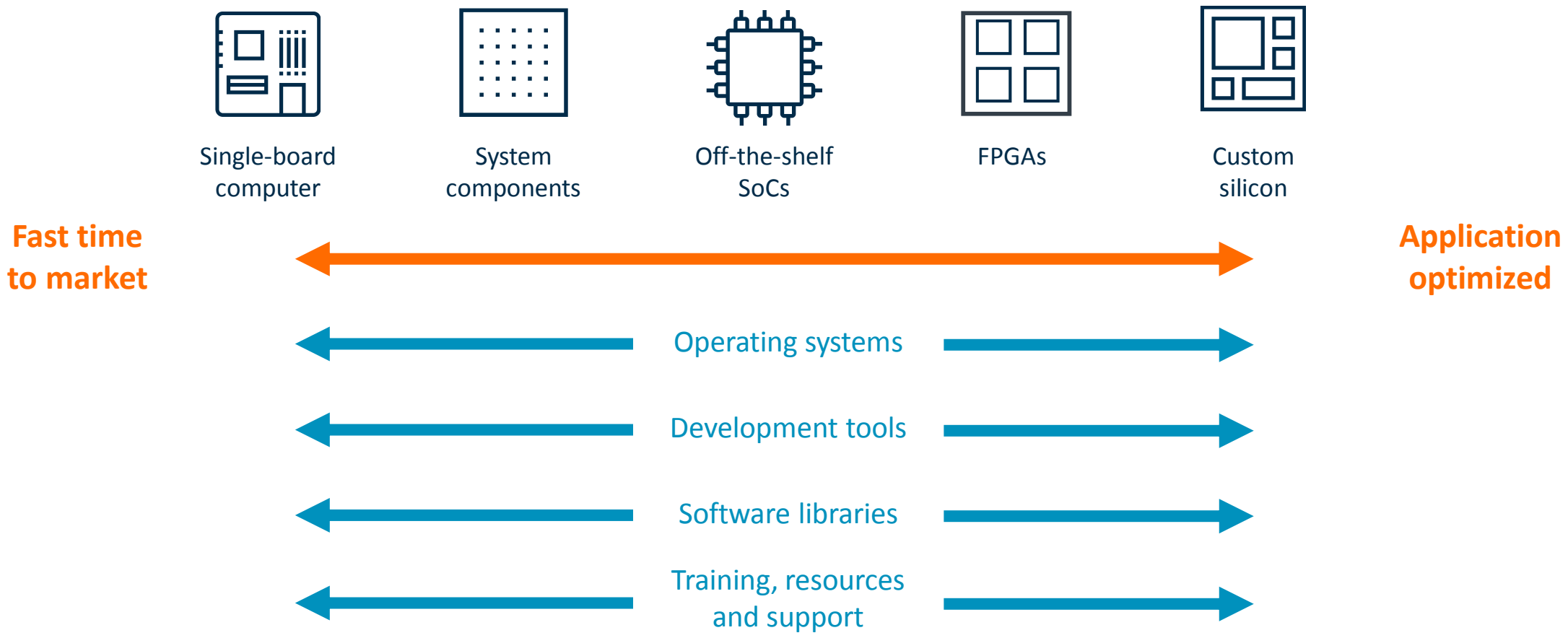
Consistent architecture across the hardware spectrum



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DesignStart: addressing the needs of FPGA users

DesignStart for SoC

- Quick and easy access to
  - Cortex-M0 and subsystem
  - Cortex-M3 and subsystem
- DesignStart Eval for design, simulation and prototyping on FPGA
- DesignStart Pro for full products with manufacturing rights for SoC

DesignStart FPGA

- Easy to access and free to use
  - Cortex-M1
  - Cortex-M3
- For use in FPGA fabric, including full commercial use
- Integrated in Xilinx Vivado Design Suite for ease of use

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Fast and simple access to the world's leading IP

Quick and easy access

- Instant download of Cortex-M1 and Cortex-M3 processors
- Simple click-through agreement

Free to use on FPGA

- Free use on FPGA for Cortex-M1 and Cortex-M3
- For prototyping, research and commercial use

Integrated with Xilinx Vivado Design Suite

- Drag and drop the Vivado compatible Cortex-M component
- Available for on any Vivado supported Xilinx FPGA device

Available at designstart.arm.com/fpga

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Proven Cortex-M technology optimized for FPGA integration

Cortex-M1

- FPGA-optimized version of Cortex-M0
- 32-bit processing in the smallest area
- For constrained devices

Cortex-M3

- General purpose 32-bit processor
- Balanced performance and area
- For diverse embedded and IoT applications

Exceptional code density

Simplified software development and vendor-independent CMSIS abstraction layer

Supported by the broadest technology ecosystem of software, tools and services

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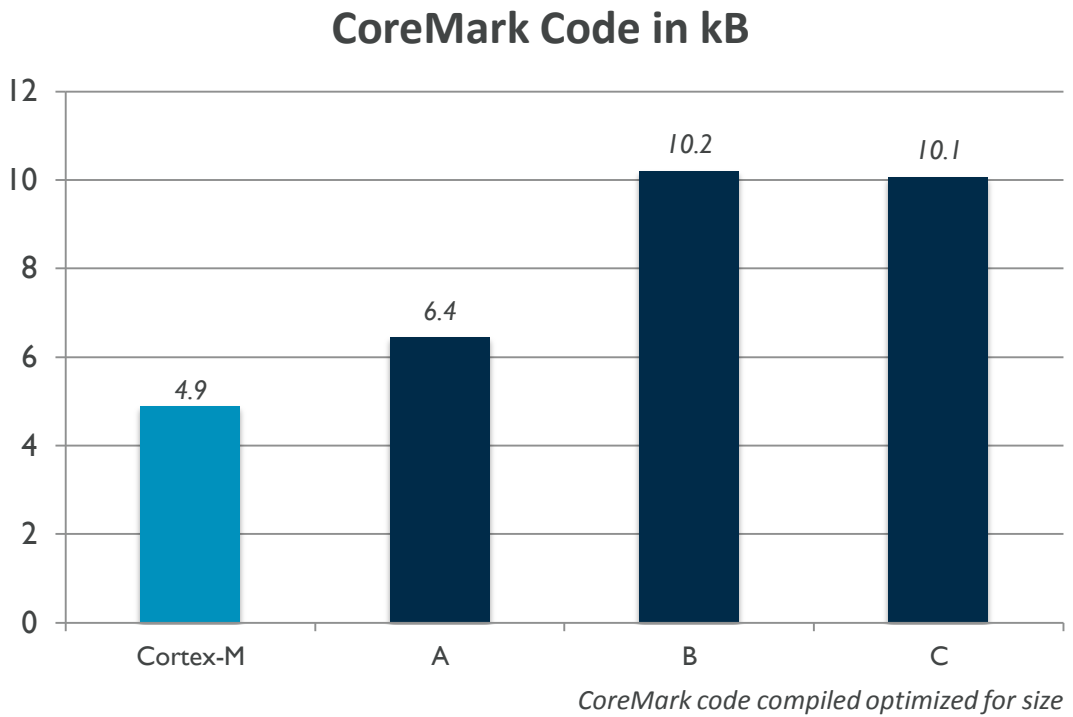
Best-in-class code density with Thumb instructions

- Cortex-M are 32-bit processors with 32-bit and 16-bit Thumb instructions
- Thumb technology brings to reduced code size than 8/16-bit processors

Together resulting in reduction of memory flash size



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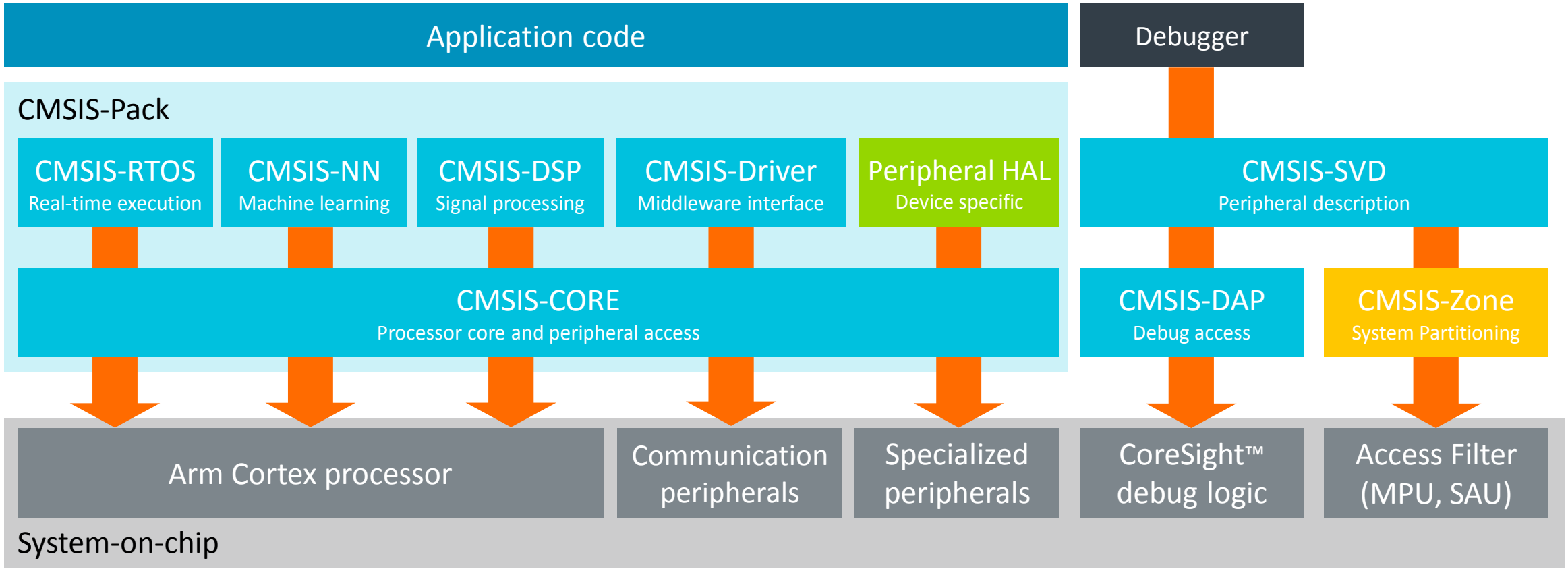
Cortex Microcontroller Software Interface Standard (CMSIS)

Vendor-independent standard for hardware manufacturers and tool vendors



Available open source at https://github.com/ARM-software/CMSIS_5

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Access the world's #1 embedded ecosystem on Xilinx

Largest choice of proven OS and tools

40+ RTOS

20+ IDE compiler

21+ Debug & trace

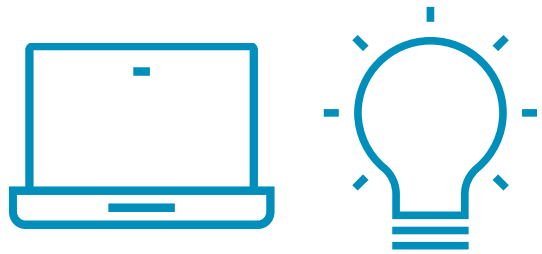
Thriving developer base

350k+ Mbed OS registered developers

2+ million Eclipse/GCC (Arm) downloads in 1 year

8.5+ million CMSIS pack downloads in 1 year

Largest open-access development resources



arm Community
arm Developer

1000s of how-to guides, articles, and online development resources

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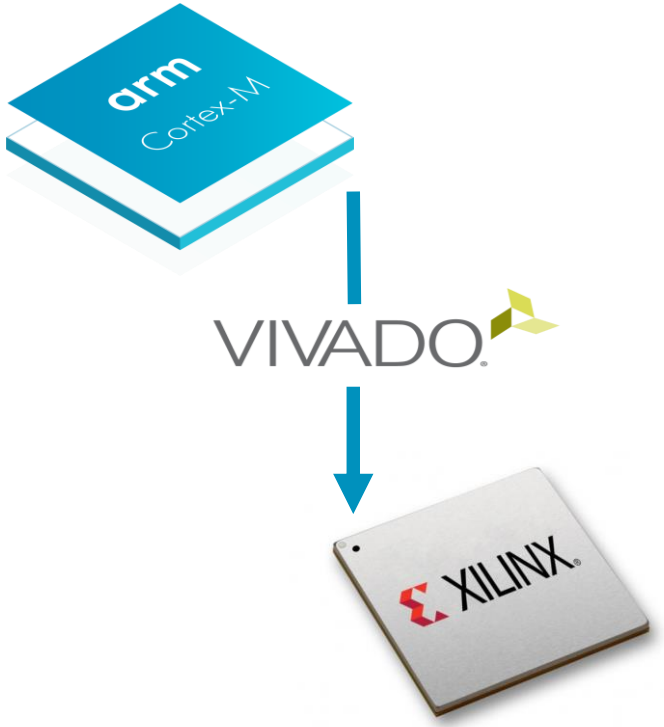
Rapid time to market with simplified development flow

Design hardware

Simple drag-and-drop integration of CPU



Develop software

Benefit from broadest embedded ecosystem

Reuse existing code

Access widest range of third-party software

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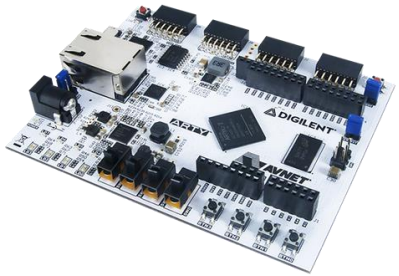
Deploy on FPGA

Deploy to any development board



Pre-integrated on Arty A7 & S7

DAPLink adaptor board available for a simpler, out-of-box experience

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DesignStart FPGA in the Xilinx Ecosystem

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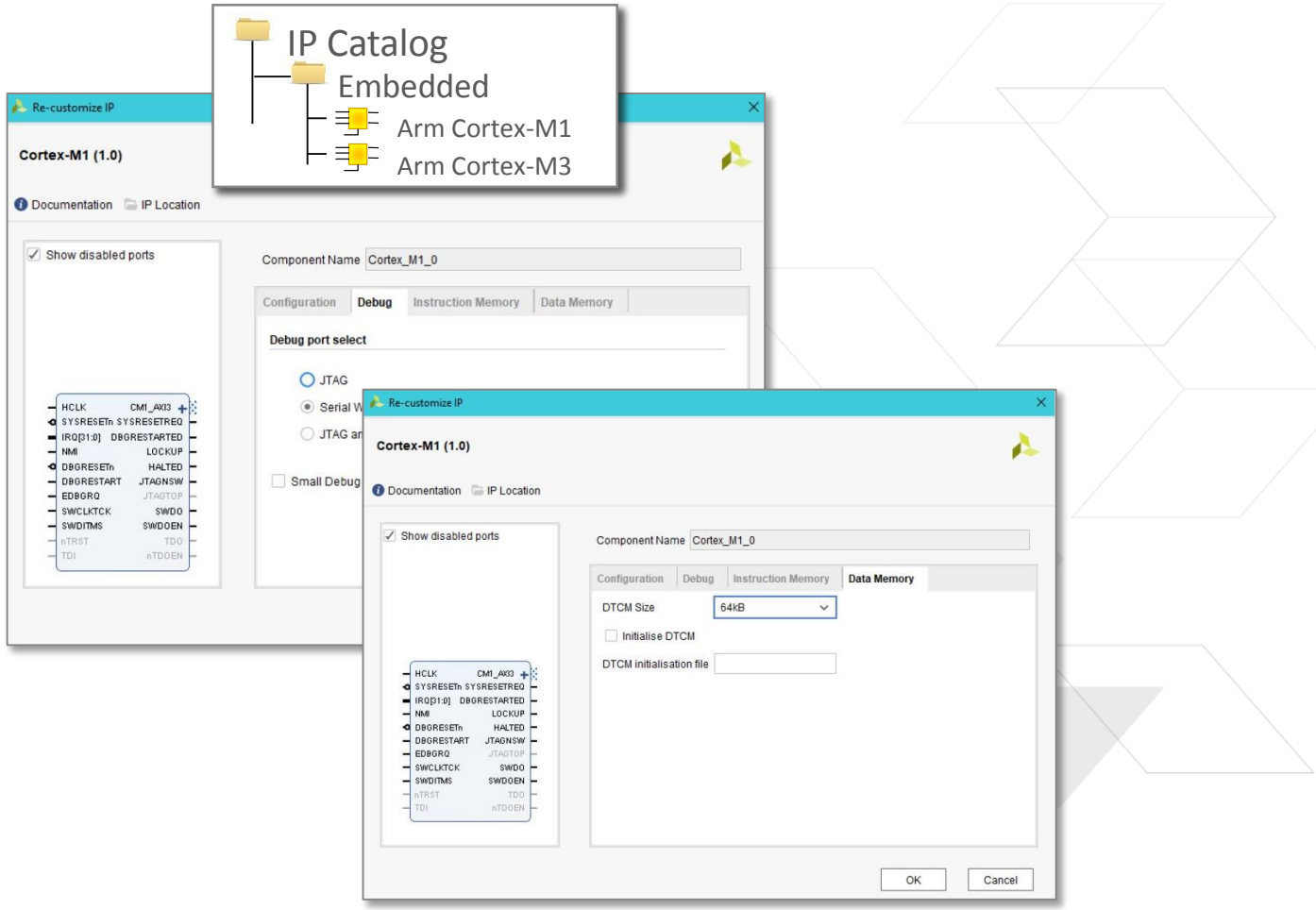
Arm DesignStart FPGA is integrated with Vivado

1. DesignStart FPGA imports as a Vivado repository
2. Cortex-M1/Cortex-M3 then part of the Vivado IP catalog
3. Configure M cores as needed:
   - Configuration
   - Debug
   - Instruction Memory
   - Data Memory
4. Add and configure peripherals
5. Hardware/Software Manager recognizes the Arm CPUs
6. Export to your IDE for software implementation



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Innovative Arm / Programmable Logic Architecture

Complete Arm-based Processing Systems

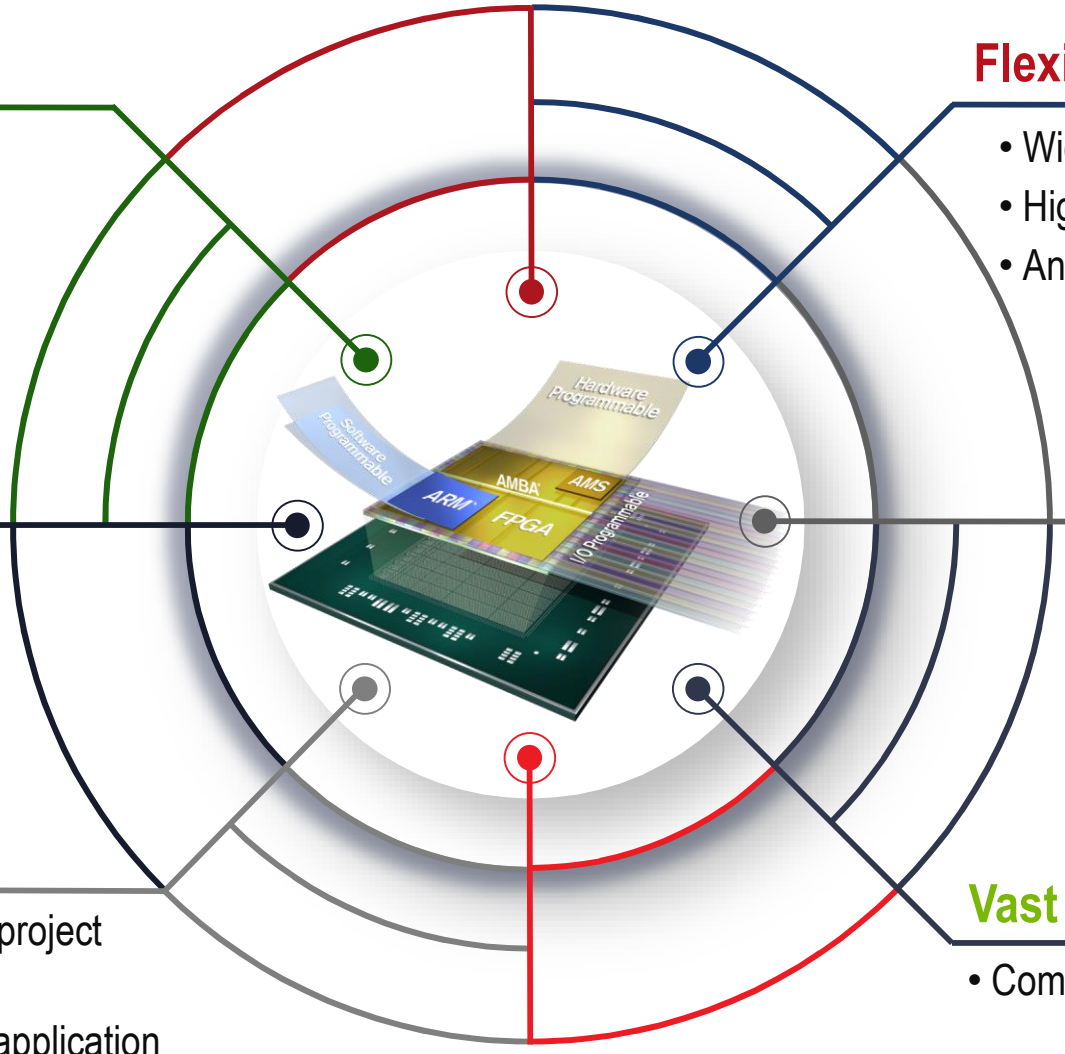
- Single/Dual Cortex-A9 (Zynq-7000)
- Dual/Quad Cortex-A53 (ZU+)
- Dual Cortex-R5 (ZU+)
- Soft Cortex-M processing options

Tightly Integrated Programmable Logic

- Extension of the processing system
- Scalable density and performance

Ultimate Flexibility

- Create custom, flexible SoC to meet exact project needs in a single device
- HW / SW partitioning optimized to specific application requirements



Flexible Array of External Interfaces

- Wide range of external multi-standard I/O
- High performance integrated serial transceivers
- Analog-to-digital converter inputs

Remove the Multi-chip Bottleneck

- Data transfers
  Up to ~100Gbps BW

Vast Internal IP Catalogs

- Common functions and peripherals

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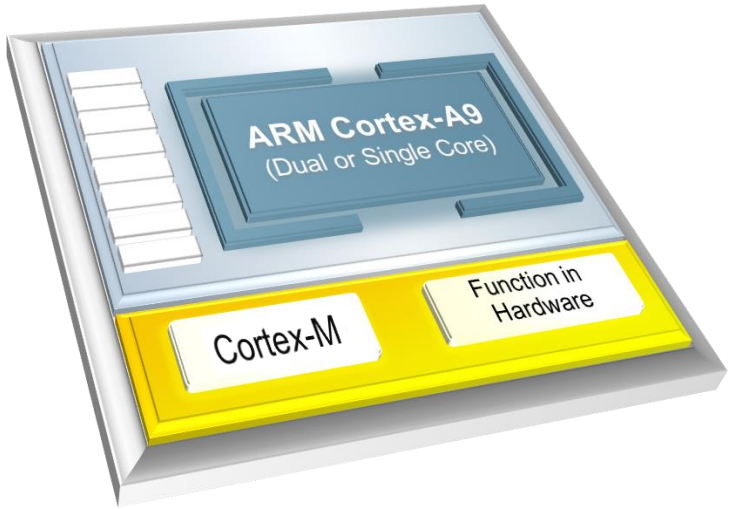
Cortex-M ideal for optimizing Zynq hardware performance



ARM Cortex-A9
for Application Processing

Cortex-M
Real-Time Co-Processing

Hardware
for Parallelism and Determinism

Programmable Logic

Non-Critical
Compute-Intensive Tasks

Linux

ARM Cortex-A9 Processor

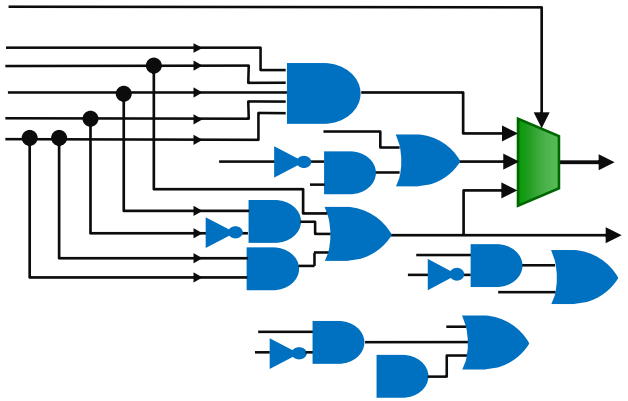
+

Critical
Tasks

RTOS

Cortex-M

+



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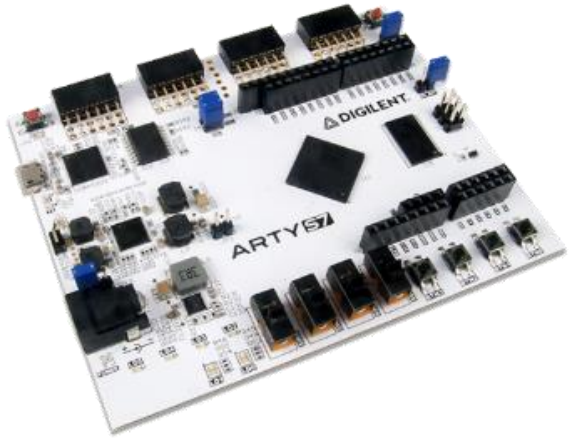
DesignStart FPGA is ready to use today

SPARTAN 7

Part Number	XC7S6	XC7S15	XC7S25
Logic Cells	6,000	12,800	**23,360**

- Spartan XC7S25 on the Arty-S7 features over 23K logic cells!
- A single Cortex-M consumes less than **1/10th** of the programmable logic
- Block RAM can be configured as on-chip memory

Cortex M1/M3 reference designs available on the **Arty-S7 and A7**



Optional DAPLink adaptor
with Arm mbed support

- Serial wired debug over USB
- Dedicated QSPI flash
- DAPLink USB composite device

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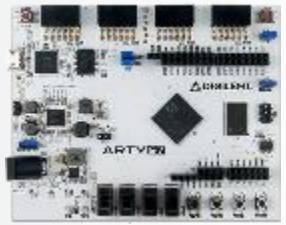
Cost-optimized development kits available

ARTY S7
Spartan-7 25

✓

$89



Spartan-7 50

$119

DIGILENT

ARTY A7
Artix-7 35T

✓

$119

Artix-7 100T

$249

AVNET
DIGILENT

ARTY Z7
Zynq-7000 Z7-10

$149

Zynq-7000 Z7-20

$199

DIGILENT

MiniZed
Zynq-7000 7S

$89

AVNET

Ultra96
Zynq UltraScale+ ZU3EG

$249

AVNET

✓ *Cortex-M1 and Cortex-M3 reference designs available*

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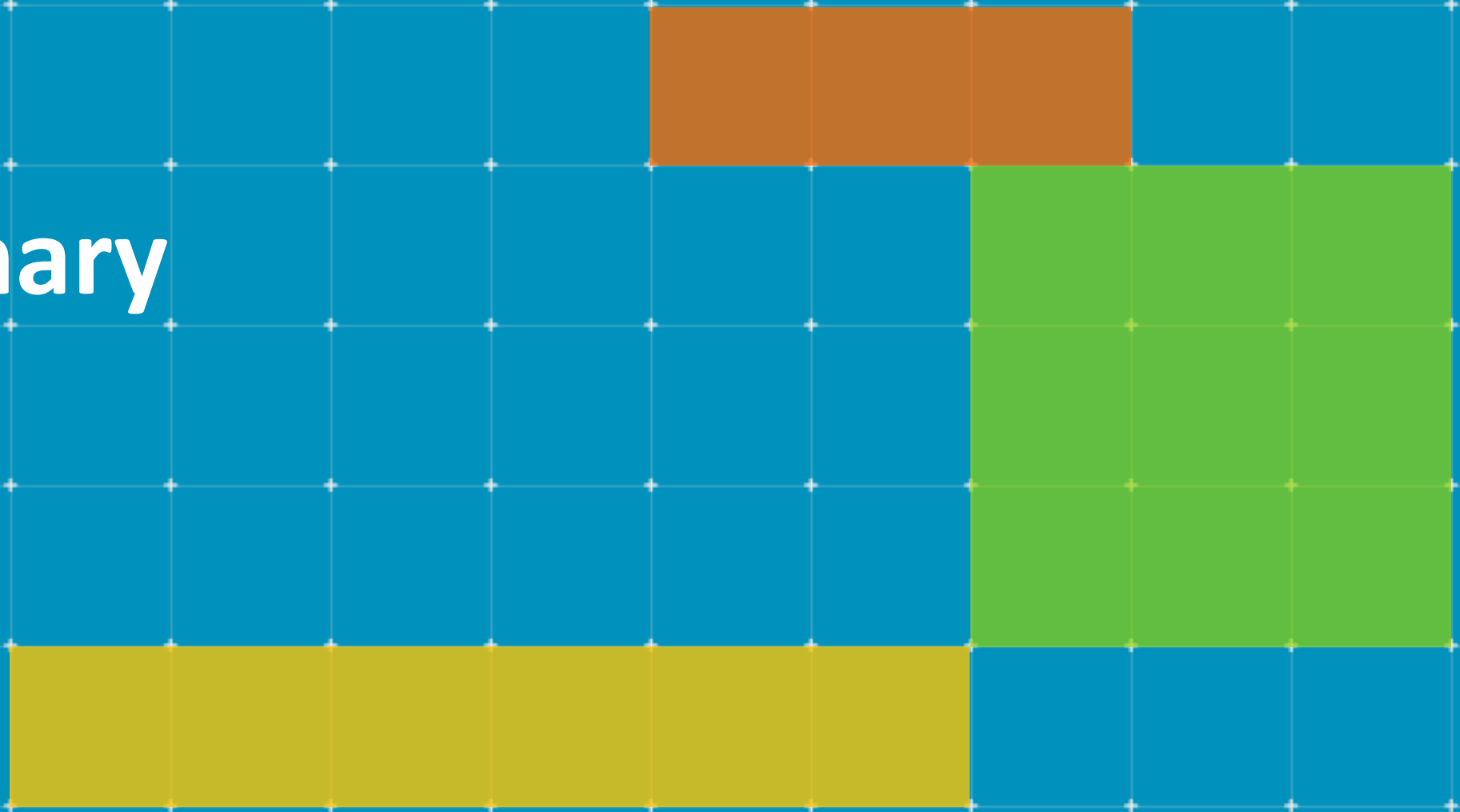
Summary



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Easier, faster development of FPGA-based products

$0 and instant access

to Arm Cortex-M1 and Cortex-M3

+

Faster hardware development

with integration in Xilinx FPGA tools

+

Faster software development

with the extensive Arm ecosystem

=

Choice, flexibility and innovation

Using the CPUs of choice

Download today at **designstart.arm.com/fpga**

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