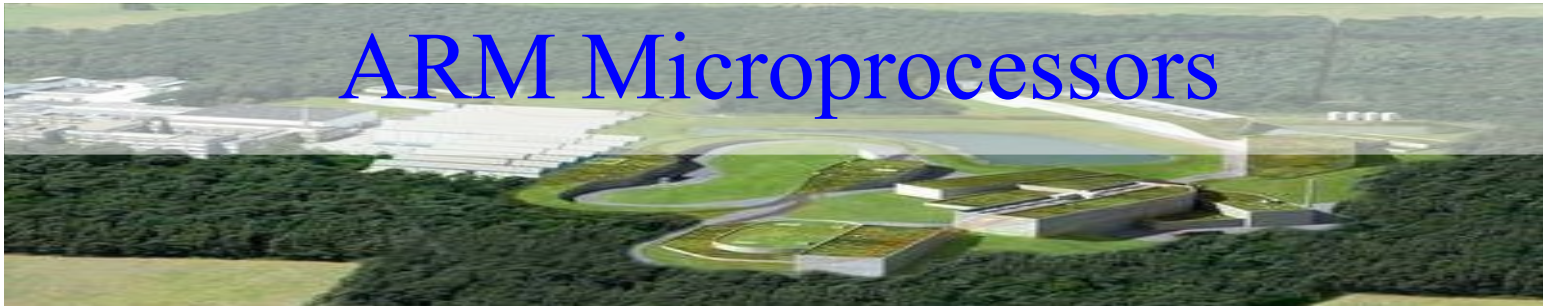


# ARM Microprocessors



- History
- Hardware
- Software
- ARM@GSI
- Future

# ARM Microprocessors

## History

- ARM, Acorn RISC Machine, Acorn founded in the 80th as a start-up from Cambridge university
- 1982: first success with the legendary BBC-Micro based on 6202 uP from Rockwell, promoted from BBC and used for education at schools in the U.K. ( similar to the raspberry-PI promotion today)
- 1985: first ARM-uP RISC machine, new shareholder Olivetti
- 1987: Archimedes, first Desktop with RISC CPU

# ARM Microprocessors

## History

- 1990: Acorn, Apple and VLSI technology joined to ARM Ltd. for embedded macrocell design (Advanced RISC machine )
- 1994: ARM uP used in Apple desktops, growing market for leisure, handheld electronics and embedded industrial / automotive control
- 1998: introduced embedded RISC ARM7TDMI core
- 2005: introduced embedded RISC Cortex-M3 core
- 2008 - About 98pc of the more than 1 billion mobile phones sold each year use at least one ARM processor

# ARM Microprocessors

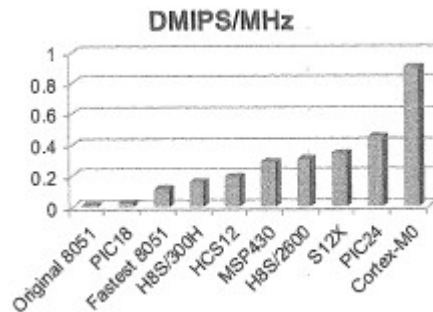
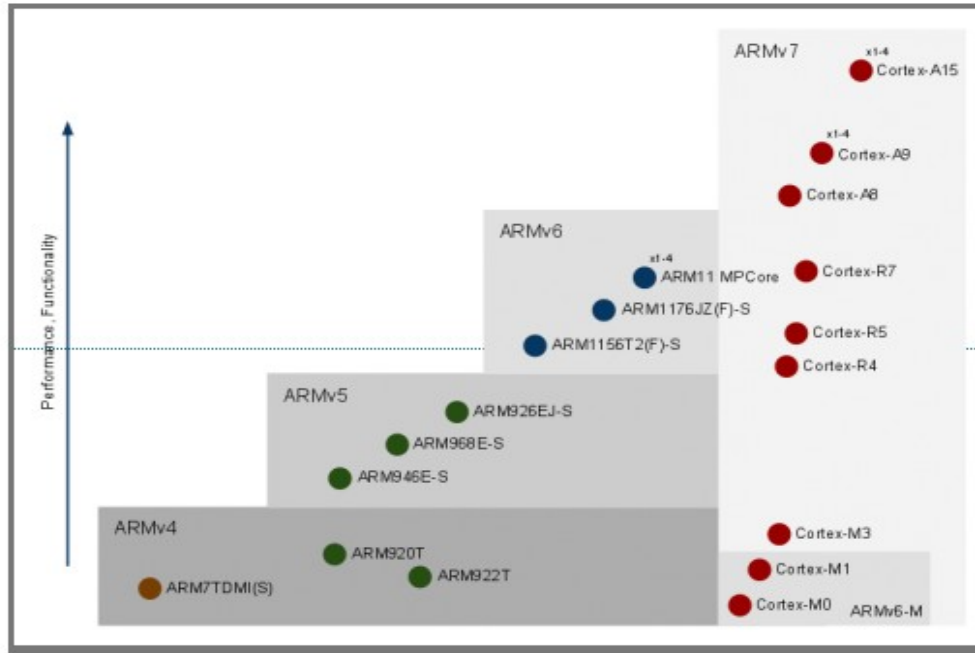
## Hardware

- two categories: families ( Classic and Cortex ), several architecture versions
- Classic: ARM1 ( 1985 ) 25.000 transistors ...
- ARM7TDMI ( 1998 ) 66MHz / 100mW ...
- ARM1175JZ ( 2003 ) 500MHz / 200mW, iPhone1 ( P-III 500MHz / 20W )
- Cortex:
  - A – Application, high end, running > 1 GHz
  - R – Realtime, mid range, running 200 MHz .. 1 GHz
  - M – Micocontroller, low end, running < 200 MHz, M0: 72MHz / 70mW
- Package: 8 pins ( DIP ) ... ~400 pins ( BGA )
- classic devices about 600 licences, cortex devices about 400 licences
- StrongARM von DEC 233MHz / 1W, Apples PDA newton
- XScale von Intel



# ARM Microprocessors

## Hard- Software



Integer performance



The title 'ARM Microprocessors Software' is displayed in a blue, serif font. The text is overlaid on a 3D architectural rendering of a modern building complex with a central pond, surrounded by greenery and hills.

# ARM Microprocessors Software

- IP cores
- Development Systems
- Operating Systems



- IP cores
  - Thumb instructions ( 16bit ), ARM instructions ( 32bit )
  - Thumb2: new instruction set ( 16bit / 32bit ), MPU and NIC used by Cortex family devices
  - no backward compatibility between Classic and Cortex families due to Thumb2 instruction set
  - 12 x 32bit general purpose registers + 8 special function registers
  - User and supervisor mode



- Development Systems:
  - Integrated development environment, including project management, editor, compiler, assembler, linker and debugger from various companies i.e. : NI, Keil, IAR,... or GPL: GNU / Eclipse
  - various languages: Labview, C / C++, Pascal, Basic, Assembler
- Operating Systems:
  - available from Keil ( RTX ), LynuxWorks ( LynxOS ), QNX ( Neutrino ), ..



# ARM Microprocessors

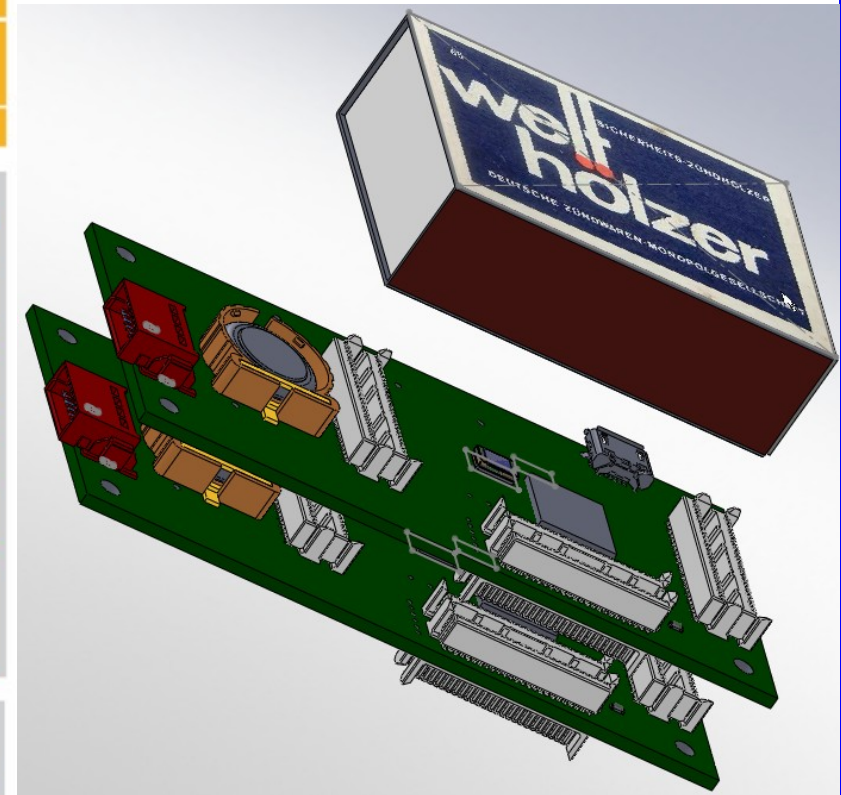
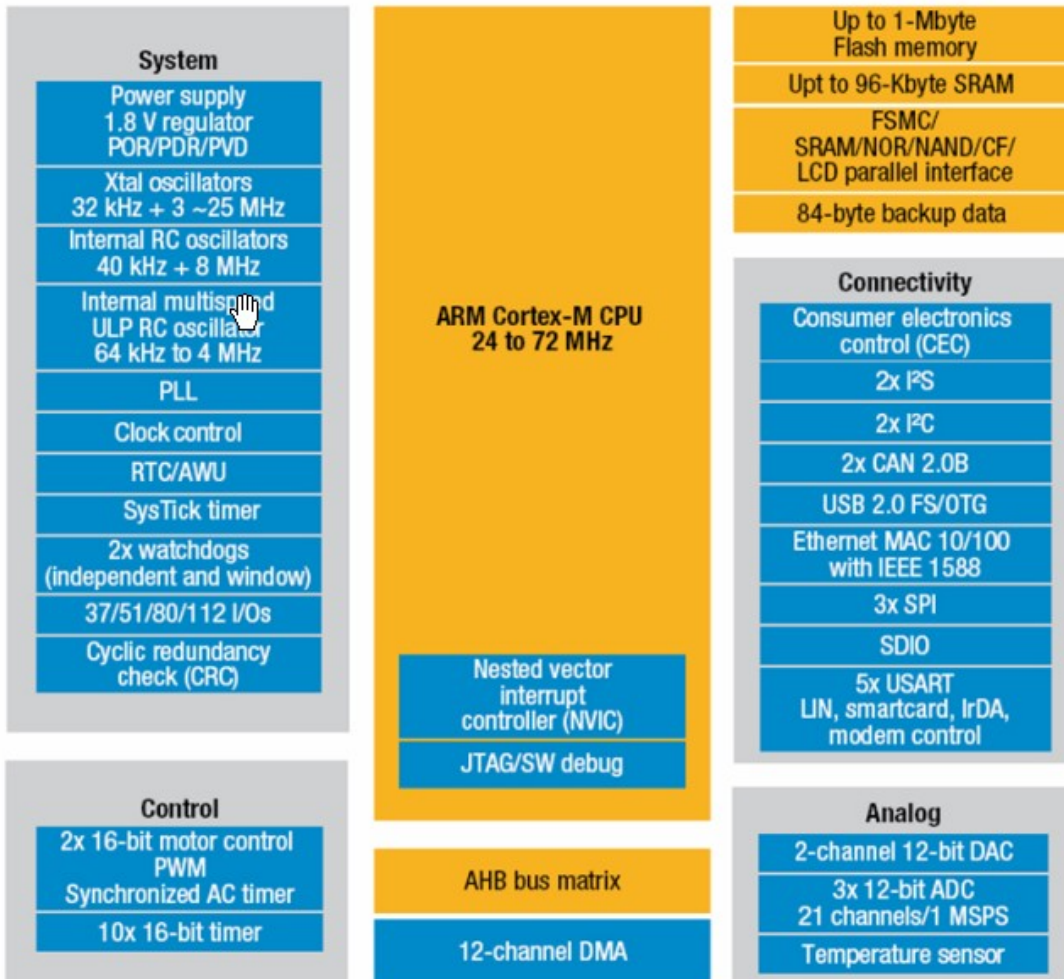
## ARM@GSI

- NI LabVIEW Embedded for ARM driven solution to overcome memory limitations of evaluation boards
- CPU only board without application hardware
- small size, low power consumption, easy memory extension -> STM32 devices



# ARM Microprocessors

## ARM@GSI





- Scheduled 2014: ARM Cortex-A50 chips, bringing higher performance, lower power consumption
- 20nm design, 64bit processing
- Multicore implementation ...