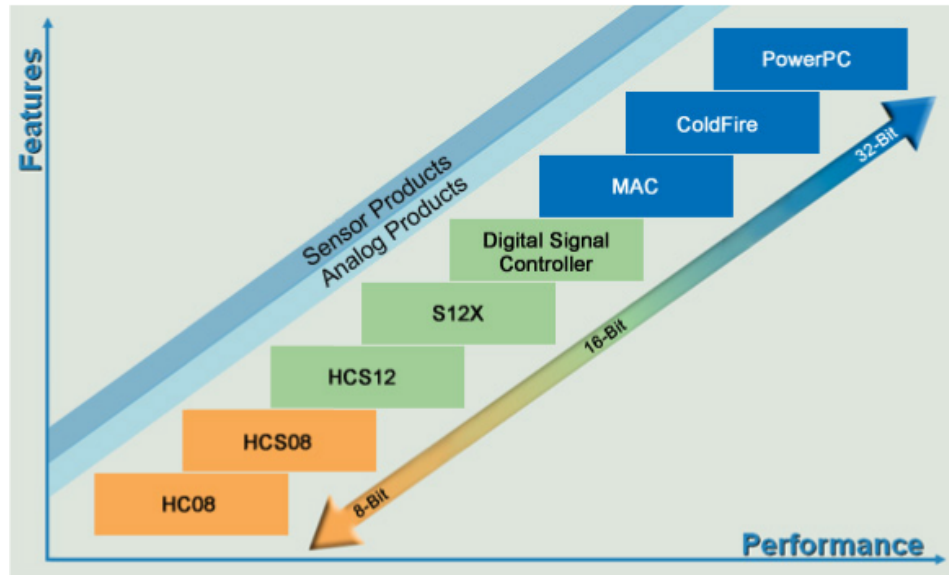


Microcontroller Architectures Things to Consider

- Performance vs. Cost
 - Speed (instructions/second)
 - Precision (8, 16, 32 or 64 bits, fixed or floating point)
- RISC or CISC
- Voltage
- Peripherals
 - A/D converter (number of bits)
 - COM ports (how many, what type – SCI, SPI I²C)
 - USB
 - Ethernet
 - Timers
 - Specialized items
 - * PWM
 - * Media control (Compact Flash, Secure Digital cards)
 - * Many others
- Memory
 - Address bus size
 - RAM
 - EEPROM
 - Flash EEPROM
- Special Requirements
 - Low power for battery applications
 - Radiation hardened for space applications
 - Temperature range

- Development Tools
 - Software Tools
 - * Assembler
 - * C Compiler
 - * IDE
 - Hardware tools
 - * Evaluation boards
 - * In Circuit Emulators
 - * Background Debug Mode
- Familiarity
 - Different lines from same manufacturer often have similar programming models and instruction forms
 - For example, consider writing the byte \$AA to address held in the X register:
 - * Motorola: `movb #$AA, 0,X`
 - * Intel: `mov [ECX] 0AAH`
 - Consider the way the 16-bit \$1234 number is stored in memory location \$2000
 1. Motorola: \$12 is stored in address \$2000,
\$34 is stored in address \$2001
 2. Intel: \$34 is stored in address \$2000,
\$12 is stored in address \$2001

Freescale (Motorola) Microcontrollers



- HC08 (8 bit)
 - \$1.00 each
 - 8 pins to 80 pins
 - 128 bytes to 2 KB RAM
 - 1.5 KB to 7680 KB Flash EEPROM
 - 2 MHz to 8 MHz clock
 - Lots of different peripherals
- HCS08 (8 bit)
 - \$2.00 each (and higher)
 - 8 pins to 64 pins
 - 512 bytes to 4 KB RAM
 - 4 KB to 60 KB Flash EEPROM
 - 8 MHz or 20 MHz clock
 - Lots of different peripherals
- HCS12 (16 bit)
 - \$10.00 each (and higher)
 - 48 pins to 112 pins
 - 2 KB to 12 KB RAM
 - 1 KB to 4 KB EEPROM
 - 32 KB to 512 KB Flash EEPROM
 - 25 MHz to 50 MHz clock

- Lots of different peripherals
- S12X (16 bit)
 - \$20.00 each (and higher)
 - 48 pins to 112 pins
 - 4 KB to 12 KB RAM
 - 1 KB to 4 KB EEPROM
 - 32 KB to 512 KB Flash EEPROM
 - 25 MHz clock
 - Lots of different peripherals
- 56800 DSP (32 bit)
 - \$7.00 each (and higher)
 - 48 pins to 112 pins
 - 4 KB to 32 KB RAM
 - 16 KB to 512 KB Flash EEPROM
 - 32 MHz to 120 MHz clock
 - Specialized for such things as audio processing
- MAC (32 bit)
 - \$20.00 each (and higher)
 - 32-bit upgrade of 9S12 line for automotive applications
 - 112 pins to 208 pins
 - 16 KB to 48 KB RAM
 - 384 KB to 1024 KB Flash EEPROM
 - 40 MHz to 50 MHz clock
 - Specialized for such things as audio processing
- ColdFire (32 bit)
 - \$40.00 each (and higher)
 - 144 pins to 256 pins
 - 16 MHz to 266 MHz clock
- Power PC (32 bit)
 - \$40.00 each (and higher)
 - 272 pins to 388 pins
 - 26 KB to 32 KB RAM
 - 448 KB to 1024 KB Flash EEPROM
 - 40 MHz to 66 MHz clock

Other Manufacturers

- Low end (8 bit)
 - PIC from Microchip
 - * Very inexpensive (\$0.50)
 - * Low pin count (6 to 100)
 - * Often small memory (16 bytes RAM, 128 bytes ROM)
 - * RISC
 - 8051 (Originally Intel, now National, TI)
 - Z8 (Zilog – similar to 8051)
- Mid-Range (16 bits)
 - Z80 and Z180 from Rabbit
- High End (32 bit)
 - ARM - licensed to Intel, TI, many others
 - MIPS - licensed to Hitachi