

# Chapter 1

## Microcontroller Overview

# Lesson 2

## Microcontrollers- Types and Examples

# Outline

- **Microcontroller Types**
- Examples- 8051 Series Family  
Members
- Examples- 68HC11/12 Series Family  
Members

**CPU**

**Memory**

**Interrupt Handler unit**

**Timing Devices**

**Micro-  
computer**

**Ports**

**Serial  
Devices**

**Watchdog Timer**

**Application  
specific Devices**

**PWM**

**ADC**

**Microcontroller Chip or VLSI Section**

# Microcontroller Bits

**8-bit** Microcontroller- 8051 Series,  
Motorola 68HC11

**16-bit** Microcontroller- Extended  
8051 XA, Intel 80x96, MC68HC12

**32-bit** Microcontroller- ARM7,  
ARM9, ARM 11, Motorola683xx

# Microcontroller Form

**Microcontroller chip**

**Microcontroller VLSI Core  
VHDL/Verilog File**

# Microcontroller Instruction Set

CISC Microcontroller - Complicated  
Instruction Set, Multiple addressing

modes

**RISC Microcontroller-Reduced  
Instruction Set, Fewer Addressing  
modes, Single cycle execution, Same  
instruction lengths**

# **Microcontroller Memory Architecture**

**Princeton Memory Architecture-**  
Common address space for program  
and data memories

**Harvard Memory Architecture -**  
Separate address spaces for program  
and data memories

# Microcontrollers

- 8051Series
- Motorola
- PIC
- Hitachi
- Texas
- ARM
- Others

# 8051 Family Microcontroller

- Intel
- Philips
- Atmel
- Siemens
- Dallas

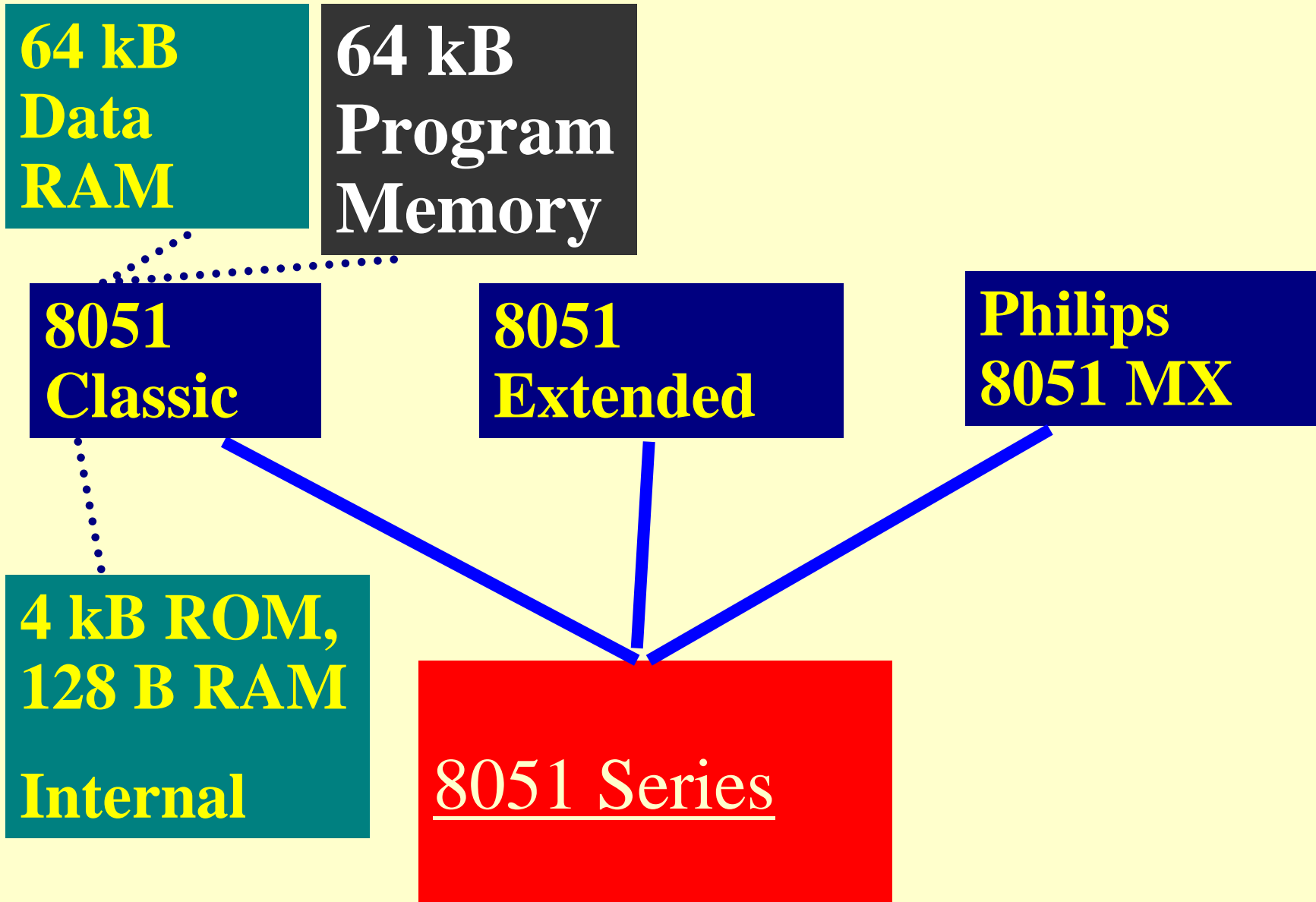
# ARM Microcontrollers

- ST Microelectronics
- Philips
- Atmel
- Samsung

# Outline

- Microcontroller Types
- **Examples- 8051 Series Family Members**
- Examples- 68HC11/12 Series Family Members

# 8051 Series Family Members



## Special Features

**No ROM,  
512 B RAM  
Internal**

**8 kB ROM,  
512 B RAM  
Internal**

**8 kB  
EPROM,  
512 B RAM  
Internal**

**80C51RA/R**

**B**

**83C51RA/RB**

**87C51RA/RB**

**80C51 RA/RB/RC Series**

# Special Features

**No ROM,  
256 B RAM  
Internal**

**8 kB ROM,  
256 B RAM  
Internal**

**8 kB  
EPROM,  
256 B RAM  
Internal**

**80C552**

**83C552**

**87C552**

**5 Ports**

**ADC**

**Out-  
compare**

**Philips  
80C552 Series**

**In-  
capture**

**2  
PWMs**

# Special Features

**No ROM,  
512 B RAM  
Internal**

**32 kB ROM,  
512 B RAM  
Internal**

**32 kB  
EPROM,  
512 B RAM  
Internal**

**80C528**

**83C528**

**87C528**

**5 Ports**

**I<sup>2</sup>C Bus**

**Out-  
compare**

**In-  
capture**

**2  
PWMs**

**Philips  
80C528 Series**

# Special Features

**No ROM,  
256 B RAM  
Internal**

**80515-N**

**8 kB ROM,  
256 B RAM  
Internal**

**80C535-N**

**8 kB  
EPROM,  
256 B RAM  
Internal**

**87C515-N**

**6 Ports**

**16-bit  
WDT**

**40 B  
standby  
powered**

**Siemens  
80515/535-N  
Series**

**In-capture  
and out-  
compare**

**2  
PWMs**

# Special Features

**No ROM,  
256 B RAM  
Internal**

**4 kB ROM,  
256 B RAM  
Internal**

**4 kB Flash,  
256 B RAM  
Internal**

**Atmel 80C51**

**Atmel 83C51**

**AT89C51-12PC**

**20 pin  
special  
package**

**Atmel 8051  
Series**

**40 Pin  
package**

# Special Features

**No ROM,  
256 B RAM  
Internal**

**4 kB ROM,  
256 B RAM  
Internal**

**4 kB Flash,  
256 B RAM  
Internal**

**80C51**

**83C51**

**89C51**

**24 MHz**

**Dallas 8051  
Series**

**up to 3 times  
fast code  
execution**

# 8051 Series Family Members

**4 kB ROM,  
256 B RAM  
Internal**

**Extended 16  
MB Data  
RAM**

**Unified  
64 MB  
Program  
Memory**

**8051  
Classic**

**8051  
Extended**

**Philips  
8051 MX**

**8051 Series**

# 8051 Series Family Members

**External/  
Internal  
unified**

**8 MB ROM  
+ 8MB  
Constants  
ROM**

**Unified 64 MB  
Program/Data  
Memory**

**8051  
Classic**

**8051  
Extended**

**Philips  
8051 MX**

**8051 Series**

**16-bit Stack  
Pointer,  
768 B  
Internal  
RAM**

# Outline

- Microcontroller Types
- Examples- 8051 Series Family Members
- **Examples- 68HC11/12 Series Family Members**

## 68HC11/12/16 Series Family Members

**Internal/External Unified 64 kB  
Data RAM/ Program  
memory/EEPROM**

**8-bit MCU**

**68HC11**

**68HC12**

**68HC16**

**4 Ports**

**1 Analog  
Inputs Port**

**68HC11/12/16  
Series**

# Special Features

**8-kB ROM, 256 B  
RAM, 512 B  
EEPROM Internal**

**12-kB ROM, 512 B  
RAM, 512 B  
EEPROM Internal**

**68HC11A8**

**68HC11E9**

**MC68HC11A8/E9**

# Special Features

**16 kB  
EPROM, 512  
B RAM  
Internal**

**84 pins, 1 MB Extended  
Addresses, 640 B EEPROM,  
768 B RAM, 24kB EPROM,  
PWM, Internal**

**68HC711L6**

**68HC711K4**

**68HC711E9**

**512 B  
EEPROM  
Internal**

**12 kB  
EPROM, 512  
B RAM, 512  
B EEPROM  
Internal**

**Four input  
captures**

**MC68HC711  
Series**

# Special Features

**4 kB EEROM  
or EPROM  
Internal**

**+ 128kB data  
memory**

**24 External  
Interrupts**

**1 kB RAM**

**4MB  
Addresses**

**16-bit Stack  
Pointer**

**ADC**

**12 Ports**

**22-bit  
Progra  
m  
Counter**

**16-bit  
68HC12A4**

**30% short code**

**8 Ch.-Timers**

**8MHz E-  
Clock  
0.125  $\mu$ s**

# Summary

Ch01L2-"Microcontrollers...", Raj  
Kamal, from Pearson Education,  
2005

- Microcontrollers Types - 8/16/32 bit, RISC/CISC, IC/Core, Many Sources and Many variants
- 8051 Family Examples
- 68HC11/12Series Examples

End of Lesson 2 on

# **Microcontrollers- Types and Examples**

THANK YOU

Ch01L2-"Microcontrollers...", Raj  
Kamal, from Pearson Education,  
2005