Chapter 13

PIC Family Microcontroller

Lesson 01

PIC Characteristics and Examples

PIC microcontroller characteristics

- Power-on reset
- Brown out reset
- Simplified instruction set
- High speed execution
- Up to 25 mA output pin drive
- Programming of microcontroller by synchronous serial pins

PIC microcontroller characteristics

- Watchdog timer
- Parallel slave port (PSP)
- SPI (Serial Peripheral Interface) called MSSP (Master-Slave Serial Port)
- USART
- Analog input ports

PIC microcontroller development tools

- In-circuit debugger
- Free integrated development environment (IDE)
- Free Assembler and Simulator

PIC microcontroller versions

- C versions having EPROM (Erasable and programmable Read Only memory)
- F versions having flash memory

12Cxxx family

- 12/14 bit internal operations
- 33/35 instructions
- 0.4μs time instruction cycle time (minimum time for instruction execution)
- PIC12F675 high performance with flash memory
- 12F675 has 1k of code space (program memory), 64 bytes of RAM and 128 bytes of EEPROM and runs up to 20 MHz clock speed

PIC12F675

- High performance
- Flash memory
- 1k of code space (program memory)
- 64 bytes of RAM
- 128 bytes of EEPROM
- Runs up to 20 MHz clock speed

16C5xx family

- 12 bit internal operations
- 33 instructions
- 0.2μs (200 ns) instruction cycle time

16CFxx family

- 14 bit internal operations
- 35 instructions
- 0.2μs (200 ns) instruction cycle time

PIC 16F877A

- High performance
- Flash memory
- 8 k × 14 code space
- 368 bytes RAM
- 256 bytes of EEPROM
- Single-cycle (0.2μs) instructions for all except branch instruction [20 MHz clock]
- Branch takes two cycles

17C5xx family

- 16 bit internal operations
- 58 instructions
- 0.12μs time for instruction cycle time

17Cxx family

- 17Cxx is for 16 bit enhanced internal operations
- 77 instructions
- 0.1 μs time for minimum instruction execution time

18Fxxx

- New and advanced features— Twice the program memory space and greater four times RAM, two times the speed

PIC 18F452

- High performance and Flash memory
- 16 kB of code space, 1536 bytes of RAM
- 256 bytes of EEPROM
- Runs up to 40 MHz clock speed [X-Tal of 10 MHz and a 4.7 MOhm resistance between OSC1 and OSC2 pins are used and then PLL (phased locked loop) option is enabled when programming the chip. The internal clock thus multiplies four times.]

18F4550

- USB interface

PIC32 family

- 32-bit
- Highest DMIPS per MHz clock operation
- Efficient internal bus architecture
- Advanced features of instruction caching and DMA controller channels
- Flash memory 32 kB to 512 kB
- On-chip RAM from 8 kB to 128 kB
- Integrates with CAN, USB and Ethernet buses

PIC32

- 80 MHz clock operations (internal)
- 256 B cache and flash pre-fetch module
- Performance 1.56 DMIPS per MHz
- Single cycle multiply and division unit
- Atomic bit manipulation unit. [No interrupt till bit-manipulation completes.]

PIC32

- Fast context switching. [CPU data and status registers save automatically on call or interrupt and restore automatically.]
- 8-channel DMA controller
- Nested vector interrupt controller. [When an ISR is running, it can be interrupted by a higher priority interrupt event.]

PIC32

- 10-bit ADC with 1 M samples per second
- 16-bit parallel port
- 2.3-3.6V operation
- Up to 5 V IOs

Summary

We learnt

- PIC Characteristics- Synchronous serial pins used for programming, simpler instruction set , free assemble, simulator and IDE
- C and F versions
- PIC 12, 16, 17, 18 and 32 families

End of Lesson 01 on

PIC Examples