MICROCHIP

Regional Training Centers

Section 1
Microchip 16-Bits Microcontroller Architecture

Microchip 16 Bits MCU Series

Microchip 16 Bits MCU include below:

- **PIC24FJ (16 MIPS)**
  - Very high CP. Low price and high performance.
- **PIC24HJ (40 MIPS)**
  - Add DMA, promote performance to 40 MIPS.
- **PIC24EP(70 MIPS)**
  - Newest generation, promote performance to 70 MIPS.
- **dsPIC30F (30 MIPS)**
  - Base on PIC24FJ, Add DSP.
- **dsPIC33FJ (40 MIPS)**
  - Base on PIC24HJ, Add DSP.
- **dsPIC33EP(60 MIPS)**
  - Newest generation, Add DSP & USB OTG, promote performance to 60 MIPS.

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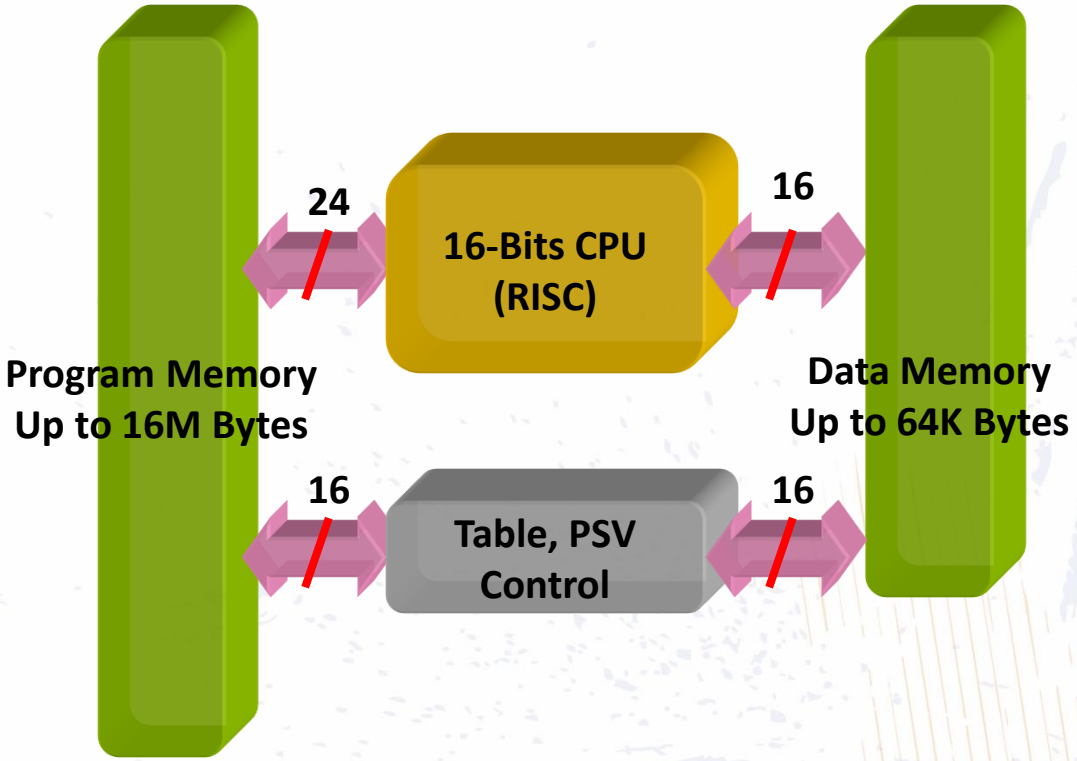
Harvard Architecture

- Microchip 16-Bits MCU is Harvard Architecture. Program and Data Memory bus are independently.
- Data Memory's Data Bus : 16-Bits.
- Program Memory's Data Bus : 24-Bits.
- Provide Table and PSV mechanism to increase Program Memory access performance.



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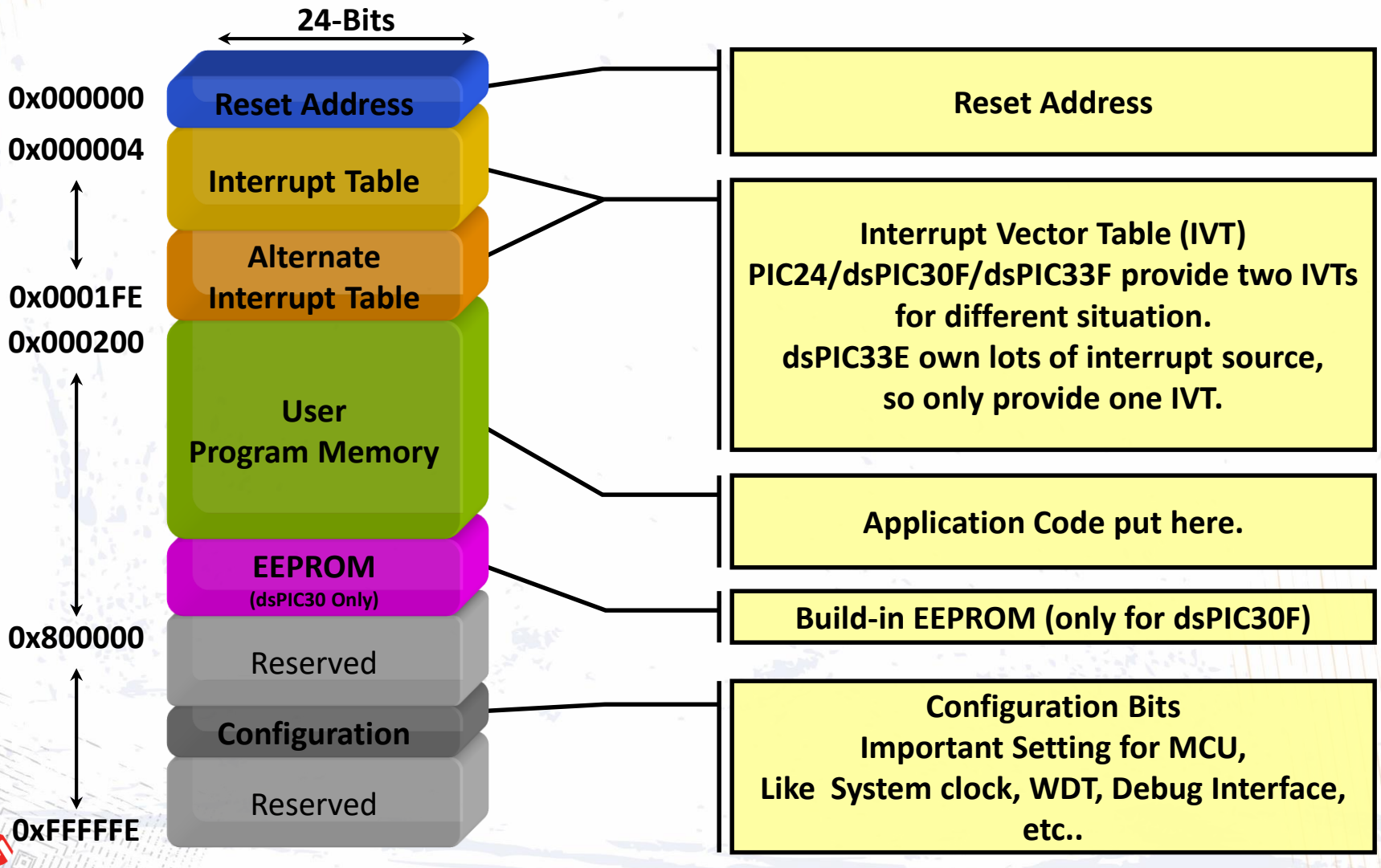
Program Memory Mapping



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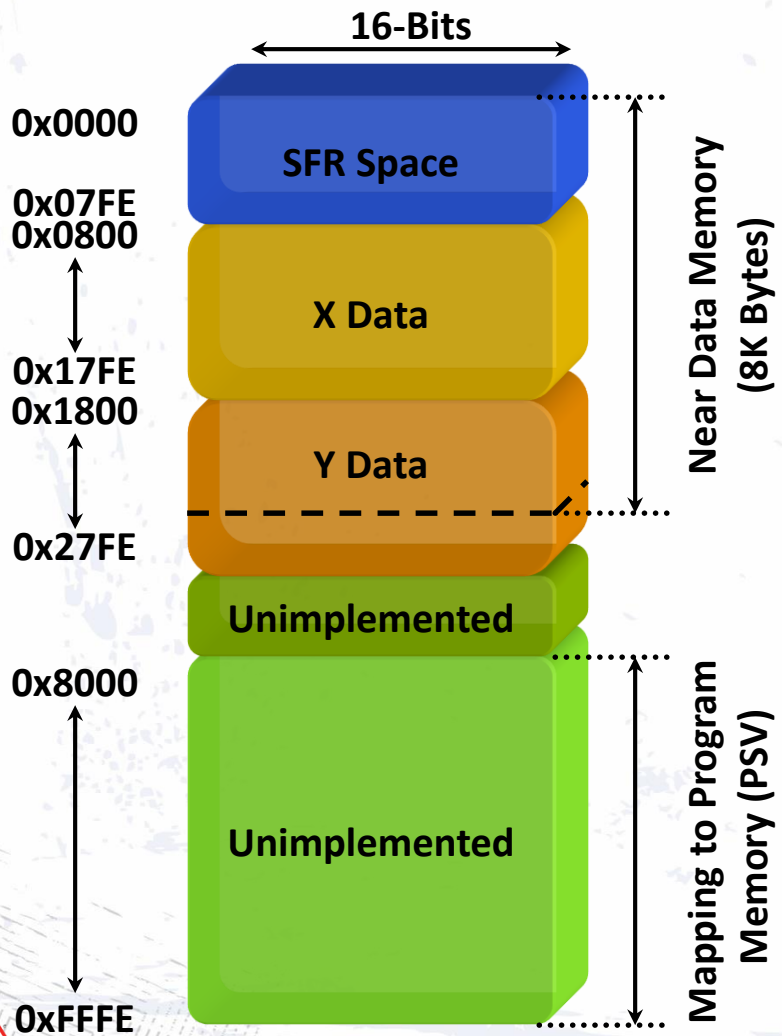
Data Memory Mapping



The 8-Kbyte area is referred to as the near data space.
The 64-Kbyte area is referred to as the far data space.

The first 2 Kbytes are primarily occupied with Special Function Registers (SFRs).

X Data, Y Data area only for DSP Engine For Dual Access Operation.
All Data is X Data area for PIC24 series.

0x8000 ~ 0xFFFF is mapping area for PSV use.

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Machine & Instruction Cycle

- **T_{OSC}(Machine Cycle) :**
  A machine cycle consists of the steps that a computer's processor executes whenever it receives a machine language instruction. (techopedia)
- **T_{CY}(Instruction Cycle) :**
  The basic operational process of a computer system.(wiki)
- **dsPIC30 Family**
  $1\ T_{CY} = 4\ T_{OSC}$. ($F_{CY} = F_{OSC}/4$)
  Ex:120 MHz => 30 MIPS, T_{CY} = 33nS.
- **PIC24F/PIC24H/dsPIC33F/dsPIC33E Family**
  $1\ T_{CY} = 2\ T_{OSC}$. ($F_{CY} = F_{OSC}/2$)
  Ex:32 MHz => 16 MIPS, T_{CY} = 62.5nS

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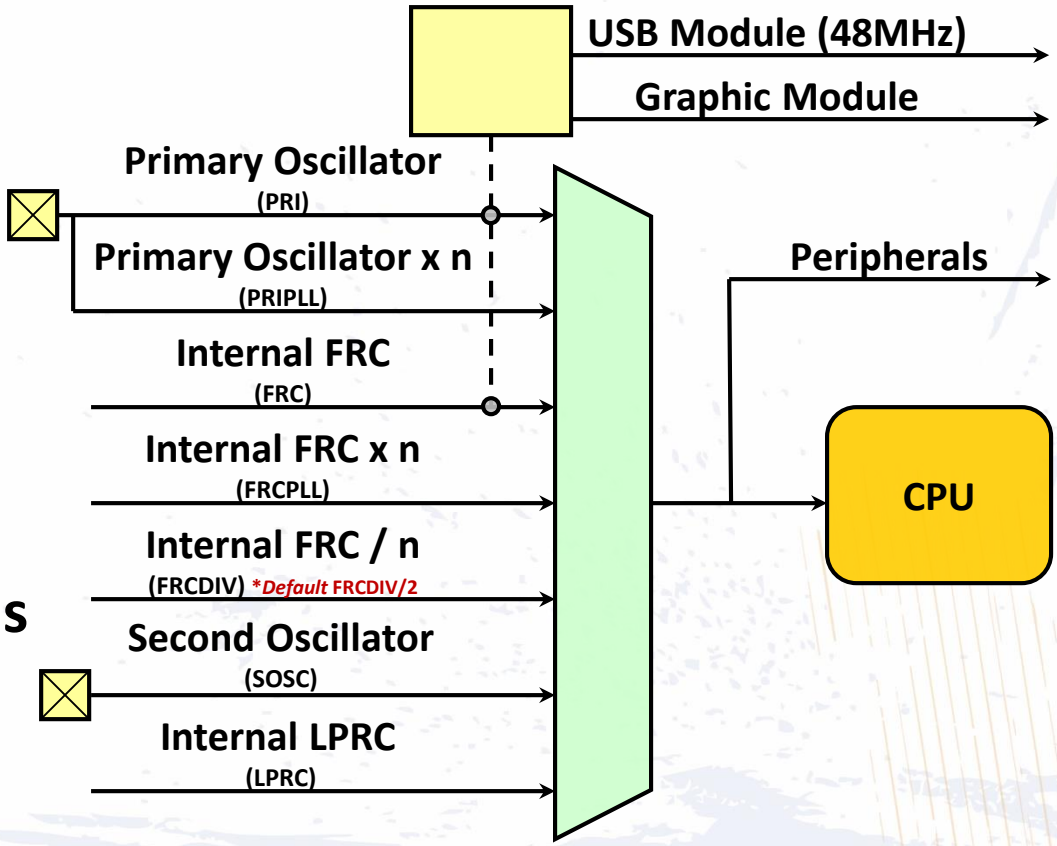
Microchip 16 Bits Clocks

- Microchip 16-Bits MCU available clock sources are internal Fast RC, Low Power RC, External Crystal and Oscillator, etc..
- The clocks can be divide or multiply by PLL.
- On-chip USB PLL block to provide a stable 48 MHz clock for the USB module.
- Software-controllable switching between various clock sources.



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