

ARCHITECTURE OF 8051

The one we are studying is a 8 bit Embedded Microcontroller introduced by Intel, 8051.

8051 ARCHITECTURE:

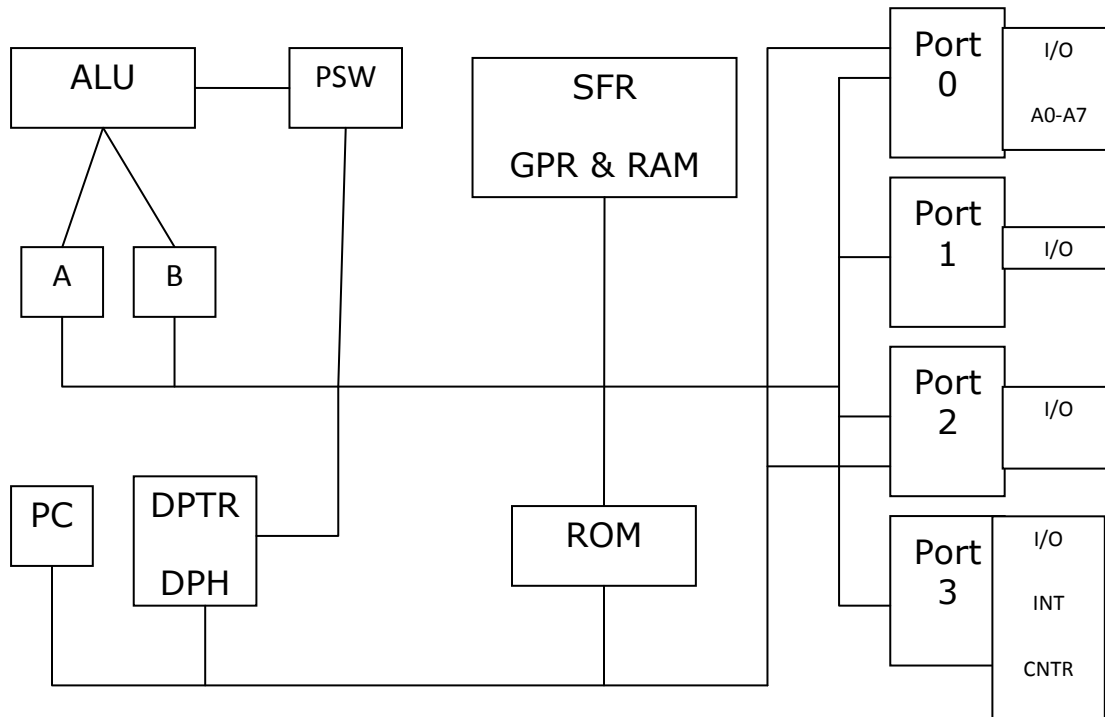


Fig 8. Block diagram of 8051 Microcontroller

Salient Features

- Eight bit CPU with registers A (Accumulator) and B
- Sixteen bit Program counter (PC) and a data pointer (DPTR)
- 8 Bit Program Status Word (PSW)
- 8 Bit Stack Pointer
- 4K Code Memory
- Internal Memory of 128 Bytes
- 32 I/O Pins arranged as 4 , 8 Bit ports
- Two 16 Bit Timer/Counter :T0, T1
- Full Duplex serial data receiver/transmitter
- Control Registers : TCON,TMOD,SCON,PCON,IP and IE
- Two External and Internal Interrupt sources
- Oscillator and clock circuits
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The programming model of 8051 shows the 8051 as the collection of 8 and 16 bit registers and 8 bit memory locations. These registers and memory locations can be made to operate using software instructions that are incorporated as part of the program instructions. The pin configuration of 8051 is shown in Fig.9.

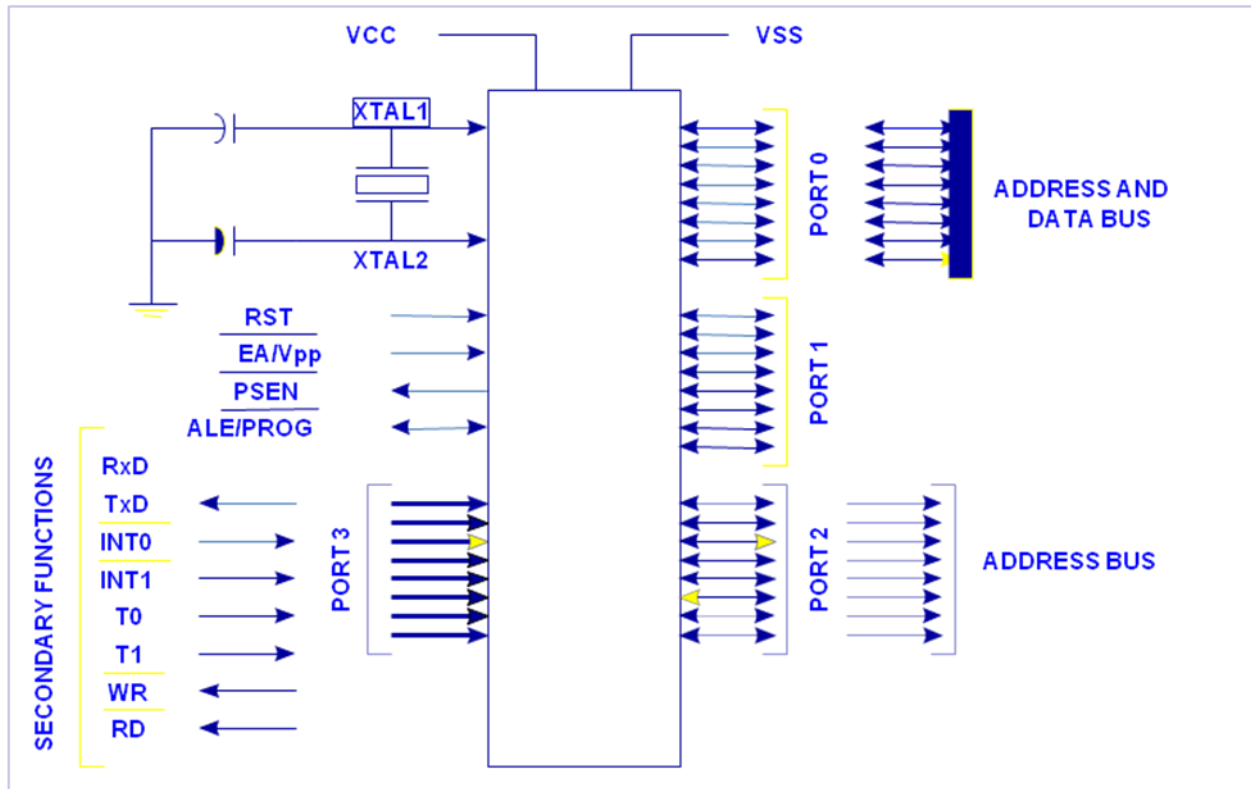


Fig.9 Pin configuration of 8051

8051 Clock and Instruction Cycle:

The heart of 8051 is the circuitry that generates the clock pulses by which all internal operations are synchronised. Pins XTAL1 and XTAL2 are provided for connecting resonator to form an oscillator. The crystal frequency is the basic internal frequency of the microcontroller. 8051 is designed to operate between 1MHz to 16MHz and generally operates with a crystal frequency 11.04962 MHz.

The oscillator formed by the crystal , capacitor and an on-chip inverter generates a pulse train at the frequency of the crystal. The clock frequency f establishes the smallest interval to accomplish any simple instruction. The time taken to complete any instruction is called as machine cycle or instruction cycle. In 8051 one instruction cycle consists of 6 states or 12 clock cycles, instruction cycle is also referred as Machine

Microcontroller Chips :

Broad Classification of different microcontroller chips could be as follows:

- Embedded (Self -Contained) 8 - bit Microcontroller
- 16 to 32 Microcontrollers
- Digital Signal Processors

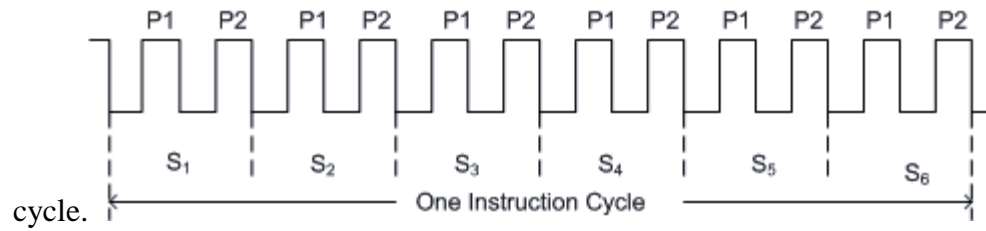


Fig. 10 Instruction cycle of 8051 (Instruction cycle has six states (S₁ - S₆). Each state has two pulses (P1 and P2))

Source : <http://elearningatria.files.wordpress.com/2013/10/ece-iv-microcontrollers-10es42-notes.pdf>