INTRODUCTION TO ADVANCED MICROPROCESSOR

The internal arrangement of a microprocessor varies depending on the age of the design and the intended purposes of the processor. The complexity of an integrated circuit is bounded by physical limitations of the number of transistors that can be put onto one chip, the number of package terminations that can connect the processor to other parts of the system, the number of interconnections it is possible to make on the chip, and the heat that the chip can dissipate. Advancing technology makes more complex and powerful chips feasible to manufacture.

A minimal hypothetical microprocessor might only include an arithmetic logic unit (ALU) and a control logic section. The ALU performs operations such as addition, subtraction, and operations such as AND or OR. Each operation of the ALU sets one or more flags in a status register, which indicate the results of the last operation (zero value, negative number, overflow. or others). The logic section retrieves instruction operation codes from memory, and initiates whatever sequence of operations of the ALU required to carry out the instruction. A single operation code might affect many individual data paths, registers, and other elements of the processor.

As integrated circuit technology advanced, it was feasible to manufacture more and more complex processors on a single chip. The size of data objects became larger; allowing more transistors on a chip allowed word sizes to increase from 4- and 8-bit words up to today's 64-bit words. Additional features were added to the processor architecture; more on-chip registers speeded up programs, and complex instructions could be used to make more compact programs. Floating-point arithmetic, for example, was often not available on 8-bit microprocessors, but had to be carried out in software. Integration of the floating point unit first as a separate integrated circuit and then as part of the same microprocessor chip, speeded up floating point calculations.

Occasionally the physical limitations of integrated circuits made such practices as a bit slice approach necessary. Instead of processing all of a long word on one integrated circuit, multiple circuits in parallel processed subsets of each data word. While this required extra logic to handle, for example, carry and overflow within each slice, the result was a system that could handle, say, 32-bit words using integrated circuits with a capacity for only 4 bits each.

With the ability to put large numbers of transistors on one chip, it becomes feasible to integrate memory on the same die as the processor. This CPU cache has the advantage of faster access than off-chip memory, and increases the processing speed of the system for many applications. Generally, processor speed has increased more rapidly than external memory speed, so cache memory is necessary if the processor is not to be delayed by slower external memory.

Microprocessor History and Background

The CPU ("central processing unit," synonymous with "microprocessor," or even simply "processor") is often referred to as the "brain" of the computer.

Choosing the correct processor is vital to the success of your homebuilt computer project.

Here's a little background about the history of microprocessors.

1.1 A Historical Background

In historical background, our aim is to study about the events that led to the development of microprocessors especially the modern microprocessors, namely, 80x86, Pentium, Pentium pro, Pentium 3 and the Pentium 4. The historical background can be studied in three different accounts:

1.The Mechanical Age

2. The Electrical Age

3. The Microprocessor Age