80x86 Internal registers.

The original 8086 and 8088 processors had the following 16 bit internal registers:

AX,BX,CX and DX - four general purpose accumulators/calculation registers. These registers could be split into Higher and Lower 8 bit halves. This AL was the lower half of the AX register, AH its upper half. BX,CX and DX could be similarly split.

SI,DI - Index registers (Source Index, Destination Index) used for array manipulation

BP - Base pointer register used for managing parameters and local variables in subroutines and functions.

IP - The instruction pointer. This register points to the next instruction that is to be fetched from memory.

SP - The stack pointer. This register points to the last value pushed on to the stack.

The Flags register.
This register contains a set of bits used to indicate "special" result conditions following numeric operations such as zero results, negative results and various overflows.

The flags are defined as follows:

CF = Carry Flag
Used with unsigned numbers, used to indicate that the result of some operating is too big to fit in the destination operand.

PF = Parity Flag
If the result of some instruction contains an even number of 1's then the parity flag is set (to 1) otherwise it is cleared (to 0)

AF = Auxiliary Carry Flag
Indicates that a carry (or borrow) has taken place from the lower 4 bits of a register to the next 4 bits of that register.

ZF = Zero Flag
Indicates that the result of the last arithmetic operation was zero

SF = Sign Flag
Set if the result of an operation is negative

TF= Trap Flag

If set, then a special procedure is called at the end of each machine code instruction (used for program debugging)

IF = Interrupt Flag
If set then the processor ignores all “maskable” interrupts.

DF = Direction Flag
If clear then string operations work towards higher memory locations, otherwise string operations work downwards.

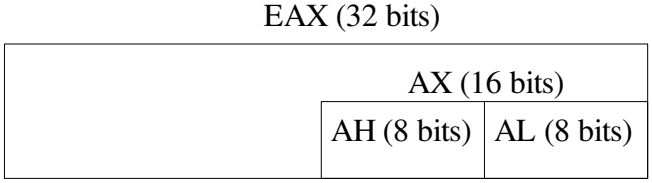
OF = Overflow Flag
Indicates that a two’s compliment overflow has occurred

In addition to these registers, the 8086/8088 processors had a number of segment registers used to manage memory regions. These registers are:

CS: The code segment register. This register points (partially) to the region of memory where program code is stored.
DS : The data segment register. Indicates region of memory where static and global data is stored for a program.
SS : The stack segment. Indicates region of memory where stack is stored.
ES : The extra (data) segment. Used by some programs to indicate region of memory where additional data is stored.

The original 8086 and 8088 processors interfaced to memory using a relatively complex segment plus offset addressing scheme. This scheme divided memory into overlapping 64kilobyte memory segments and caused much programming confusion especially when larger arrays of data were involved.

With the advent of the 80386 processor, the registers with the 80x86 family changed significantly. For a start, all of the registers with the exception of the segment registers were extended to 32 bits. The new 32 bit versions of the registers were renamed to EAX,EBX,ESI,EDI and so on ('E' standing for 'Extended'). The four general purpose accumulators EAX, EBX, ECX and EDX can still be split into a lower 16 bit half (AX,BX,CX and DX). Further splitting into AL, AH, BL, BH and so on is also possible just as in the case of the 8086.



The segment registers were not extended to 32 bits though in 32 bit protected mode, their role is that of a "segment selector".

Along with the change to the registers came a more straightforward way of addressing memory. 32 bit versions of Microsoft Windows for example now treat memory as a single 4GB address space.
More recently, 64 bit versions of the 80x86 family have emerged. The 64 accumulators, index registers, stack pointer and base pointer registers are now prefixed with the letter 'r' (e.g rAX, rBX and so on).