\*based mostly on 8086 processor

Register Cluster-

AX- accumulator, passes through to the alu through position A

BX- base register, used in index addressing- Used as a pointer to data (located in segment register DS, when in segmented mode)- base register, typically used to hold the address of a procedure or variable-The common use is to do array operations. BX is usually worked with other registers, most notably SP to point to stacks- This would most likely need to have a display or its own block set

CX- count register, typically used for looping- as the ECX, CX registers store the loop count in iterative operations-

DX- data register, typically used for multiplication and division- It is also used in input/output operations. It is also used with AX register along with DX for multiply and divide operations involving large values-

SI- Source Index, It is used in the pointer addressing of data and as a source in some string related operations. It’s offset is relative to the data segment.

DI- Destination Index, It is used in the pointer addressing of data and as a destination in some string related operations.It’s offset is relative to extra segment

BP- Base Pointer, It is primary used in accessing parameters passed by the stack. It’s offset address relative to stack segment

SP- Stack Pointer, It points to the topmost item of the stack. If the stack is empty the stack pointer will be (FFFE)H. It’s offset address relative to stack segment.

IP- Instruction pointer, also called the PC, program counter, offset from the CS for the next instruction to execute

Segment Registers-

CS- code segment- is a 16 bit register containing the address of the 64KB segment with the processor instruction

DS-data segment

SS-stack segment

ES- extra segment

IP- instruction pointer, can also be called the program counter

Other-

IR- Instruction Register,

IQ- Instruction Queue,

Temporary register

MAR- memory address register

MBR- memory buffer register

Flags-

Status Flag-

S- After any operation if the MSB is 1, then it indicates that the number is negative. And this flag is set to 1

Z- If the total register is zero, then only the Z flag is set

AC- When some arithmetic operations generates carry after the lower half and sends it to upper half, the AC will be 1

P-This is even a parity flag. When result has even number of 1, it will be set to 1, otherwise 0 for odd number of 1s

CY- This is a carry bit. If some operations are generating carry after the operation this flag is set to 1

O- The overflow flag is set to 1 when the result of a signed operation is too large to fit.

Control Flags-

D- This is a directional flag. This is used in string related operations. D = 1, then the string will be accessed from higher memory address to lower memory address, and if D = 0, it will do the reverse.

I- This is the interrupt flag. If I = 1, then MPU will recognize the interrupts from peripherals. For I = 0, the interrupts will be ignored

T- This trap flag is used for on-chip debugging. When T = 1, it will work in a single step mode. After each instruction, one internal interrupt is generated. It helps to execute some program instruction by instruction.

What goes where generally

Execution Unit- Data Registers

AX- Numbers(operands)

BX- Memory addresses or memory address offsets

CX- Numbers(loop count)

DX- Numbers for advanced math, input/output port addresses

Execution Unit- Pointer Registers

BP- Pointing to data in the stack segment.Unlike SP,we can use BP to access data in the other segments.It is of 16 bits.

It is primary used in accessing parameters passed by the stack. It’s offset address relative to stack segment.

SP- Memory address of topmost item of the stack, offset address relative to stack segment,(if empty displays (FFFE)H)

Execution Unit- Index Registers

SI- It is used in the pointer addressing of data and as a source in some string related operations. It’s offset is relative to data segment.is the Source Index Register.Which is used to point to memory locations in the data segment addressed by DS. By increment the contents of SI one can easily access consecutive memory locations

DI- Destination Index, It is used in the pointer addressing of data and as a destination in some string related operations.It’s offset is relative to extra segment

Execution Unit- Other

Temporary Register-

ALU-

Status Flags-

Segment Registers

CS- memory address of the start of the code segment

DS- memory address of the start of the data segment

SS- memory address of the start of the stack segment

ES- memory address of the start of additional memory segments

IP- Instruction pointer, offset from the CS for the next instruction to execute

IR- Decoded instruction(converted from assembly to binary)

IQ- Instruction Queue

Temporary register

MAR- memory address being currently searched for

MBR- acts as a queue for the memory addresses that need to be searched for

Flag register- flags shown: S, Z, AC, P, CY, O