



# REGISTER ORGANIZATION OF INTEL® 8086 VS. INTEL® PENTIUM® 4 64-BIT

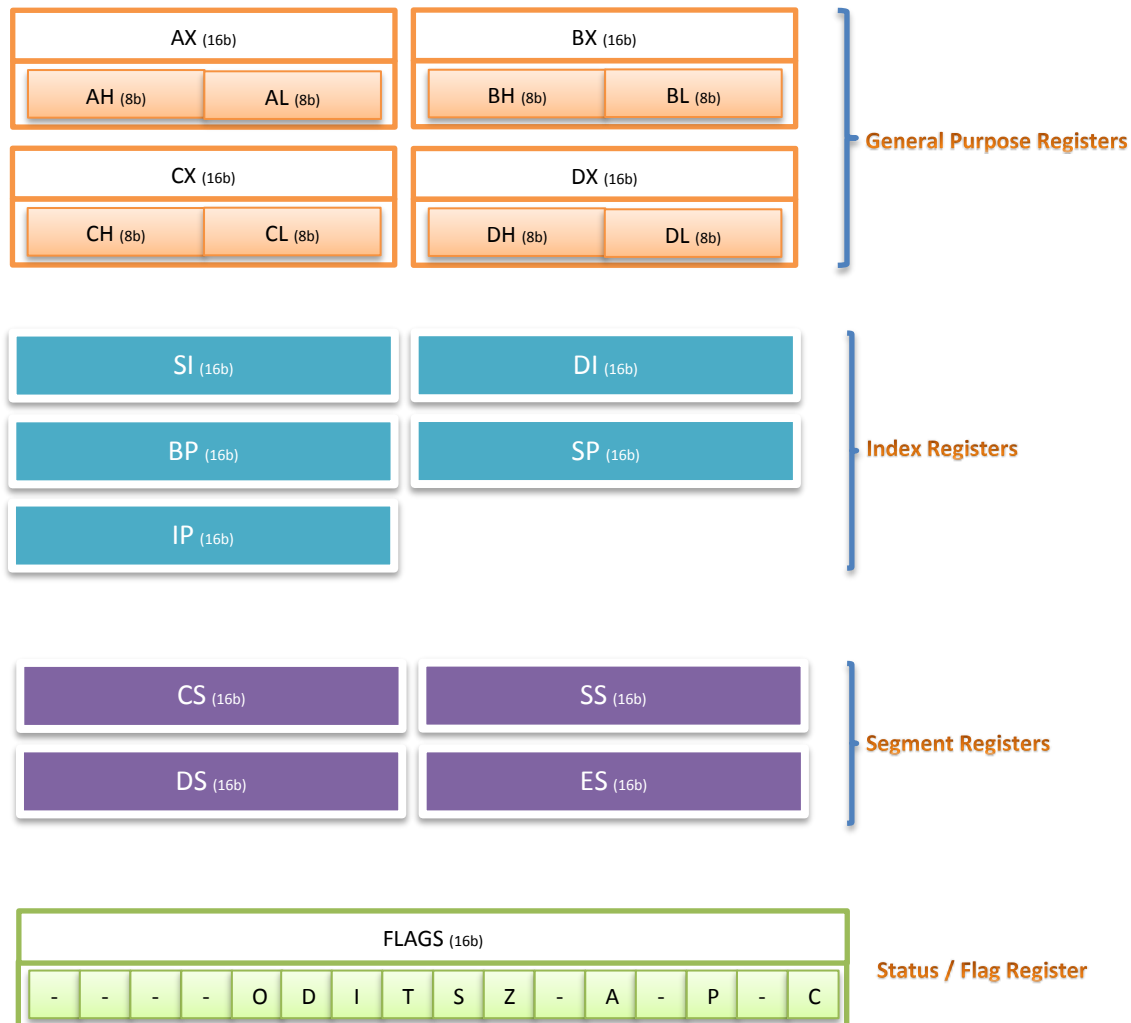
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## Register Organization of Intel® 8086



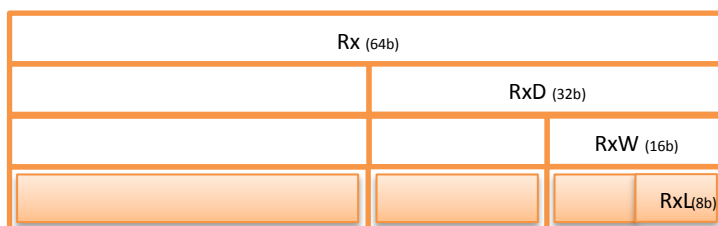
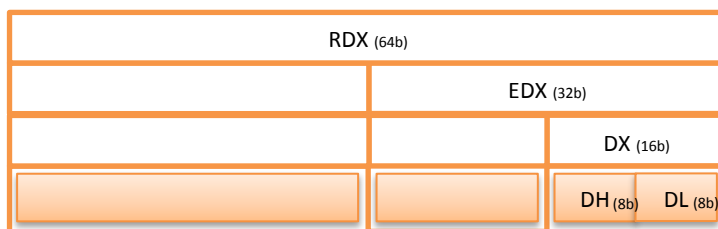
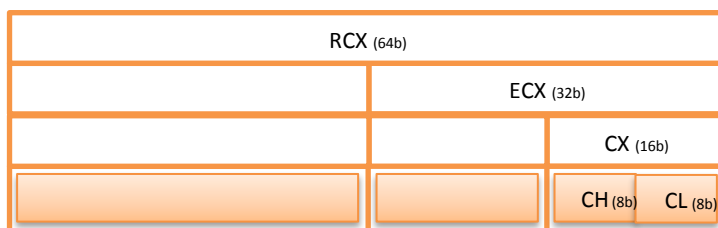
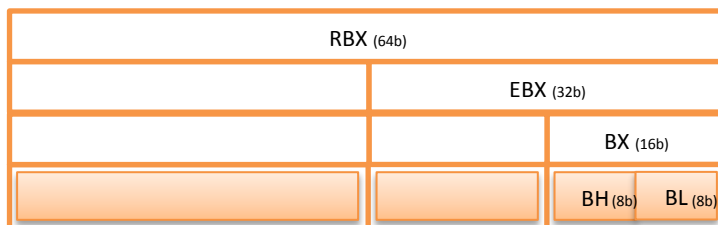
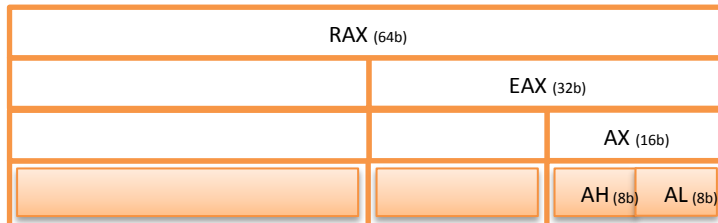
AX	=	Primary accumulator	BX	=	Base, accumulator
CX	=	Counter, accumulator	DX	=	Data, accumulator
SI	=	Source Index	DI	=	Destination Index
BP	=	Base Pointer	SP	=	Stack Pointer
IP	=	Instruction Pointer			
CS	=	Code Segment	SS	=	Stack Segment
DS	=	Data Segment	ES	=	Extra Segment
FLAGS	=	Status / Flag Register			

CS : IP → Memory address to next instruction to be executed  
 SS : SP → Memory address last data stored on stack

## Register Organization of Intel® Pentium® 4 64-bit



### General Purpose Registers



x = 8 → 15

⇒ 8 Registers

Index Registers

RSI (64b)			
		ESI (32b)	
		SI (16b)	
			SIL (8b)

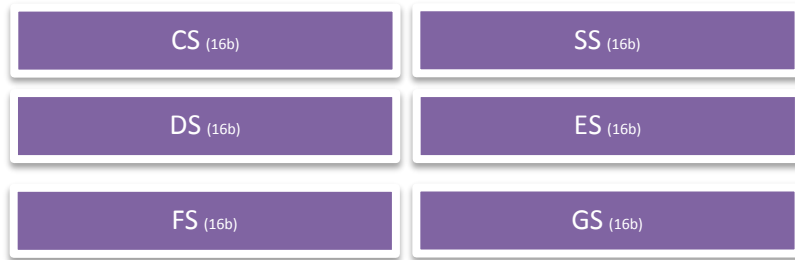
RDI (64b)			
		EDI (32b)	
		DI (16b)	
			DIL (8b)

RBP (64b)			
		EBP (32b)	
		BP (16b)	
			BPL (8b)

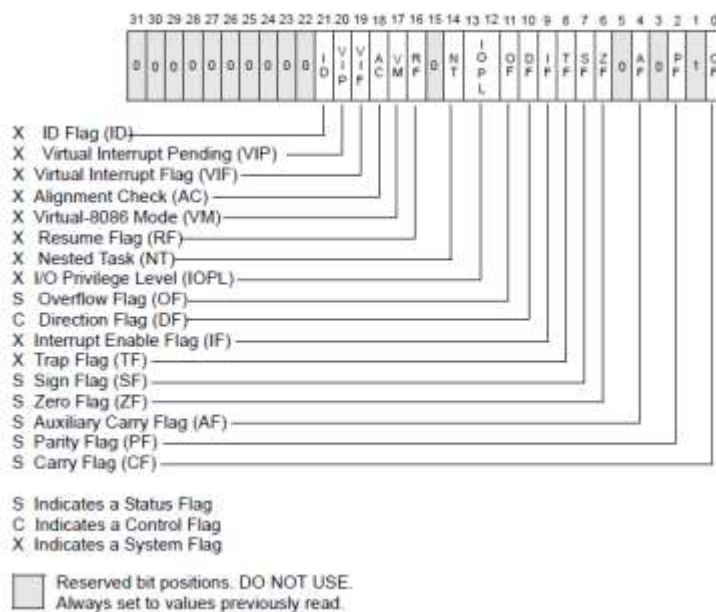
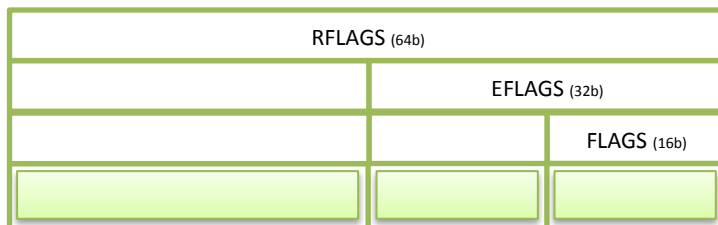
RSP (64b)			
		ESP (32b)	
		SP (16b)	
			SPL (8b)

RIP (64b)			
		EIP (32b)	
		IP (16b)	

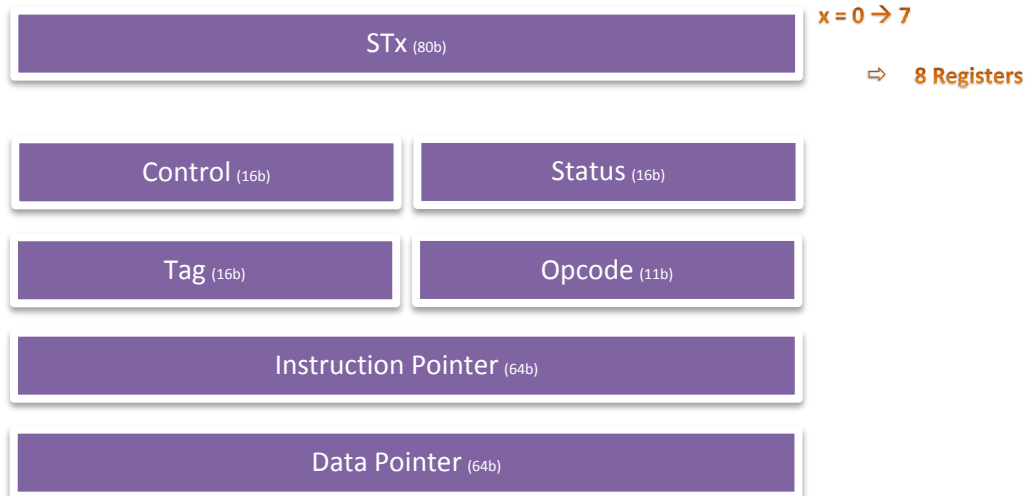
## Segment Registers



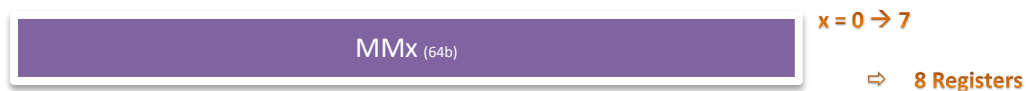
## Status / Flag Register



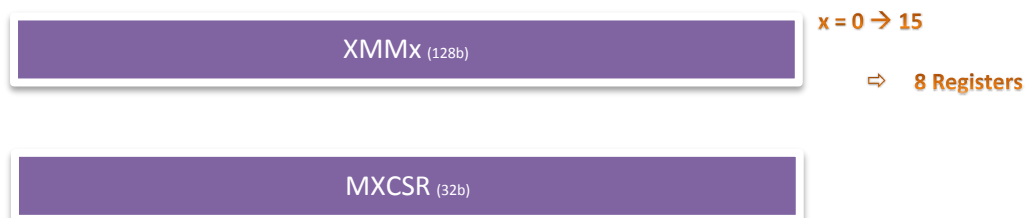
## FPU Registers



## MMX Registers



## XMM Registers



- FPU → Floating Point Unit
- MMX → Single Instruction – Multiple Data Instruction Set
- XMM → Streaming SIMD Instruction Set

## Register Organization of different Register Types

### General Purpose Registers:

These registers are used for arithmetic operations and temporary storage. BX / RBX / RCX can also be used for memory indexing for read/write.

### Index Registers:

These registers are normally used for indexing memory for read/write. IP / RIP is a special register which stores the address of the next instruction to be executed.

### Segment Registers:

These registers are used for segmentation operation in memory. These were very importantly used in 8086, but their usage is much reduced now due to flat memory concept, which is currently in use.

### Flag Register:

This register stores the status of the last arithmetic operation, along with much more other boolean information, which indicate the state of the processor.

### FPU Registers:

These are Floating Point Unit registers, used for performing floating-point arithmetic operations.

### MMX Registers:

These are special purpose registers, used for Single Instruction – Multiple Data (SIMD) instructions which help improve processing speed for large volume data processing applications.

### XMM Registers:

These are special purpose registers, used for Streaming SIMD instructions (SSE) which help improve processing speed for large volume data processing applications.

