

Add diagrams, pg 35  
2's complement: add 1!

**Instruction Execution Cycle:**\*\*\*\*\*

1.Fetch instruction 2.Increment IP 3. Decode 4.Fetch operands 5.Store result

**CISC (Complex Instruction Set Computer)**\*\*\*\*\*

Peripheral Devices: External

non-volatile storage

convert human/machine readable forms

I/O Unit: Communcate between CPU, peripherals

Main Memory Unit: stores programs, volatile

CPU: ALU(integer unit, floating point),clock,register,control unit

**Registers:**\*\*\*\*\*

Control: current state of machine

Status: status of operation

MAR: memory address register, holds address

MDR: memory data register, holds data MAR points to

IP: instruction pointer

IR: instruction register

\*\*\*\*\*

bit = 1

byte = 8

word = 16

double word = 32

quadword = 64

double quadword = 128

\*\*\*\*\*

kilobyte = 2<sup>10</sup>

megabyte = 2<sup>20</sup>

**modes of operation:**\*\*\*\*\*

protected: native, features available,programs given segments

virtual 8086: multiple reall address mode

**intel ia-32:** 4GB, byte addressable, little endian

.386

.model flat,stdcall

.stack 4096

ExitProcess proto,dwExitCode:dword

.data

; declare variables here

.code

main proc

; write your code here

invoke ExitProcess,0

main endp

end main

**Flags:**\*\*\*\*\*

carry: unsigned overflow

overflow: signed overflow

zero: operation produced zero

sign: negative result

parity: even number 1's in LSB

auxiliary carry: carries out of position 3 in LSB

**creating stack frame:**

arguments pushed

subroutine return address pushed

EBP pushed

ebp equal esp

esp decremented

registers pushed

**stack frame notes:**

ESP points to last value added to stack

stack parameters: reference, value

stack frame: set aside for passed arguments, subroutine return address,

local vars, saved registers

argument passed by reference = offset of object

**single precision:** sign:1 exp:8 significand: 23

**double precision:** sign:1 exp:11 significand:52

**double extended precision:** sign:1 exp:16 significand:63

CloseFile-close disk file

Clrscr-clear screen

CreateOutPutFile-new disk file

CrLf-endline

Delay-Pause for n millisecond

DempMem-mem block to console in hex

DumpRegs-regs, flags to console in hex

GetCommandTail-command line args into array

GetDateTime-date and time

**General Notes:**

sign stored in MSB

integer range of ascii codes:0-127

UTF-8 same as ascii

UTF-16 16 bits, used by windows

UTF-32 32 bits, space no concern, fixed width chars required

integer in bits: 2<sup>31</sup>-1

AH(high); AL(low) 8bit, AX 16bit, EAX 32 bit

Hamming Code: xx0x000x0000, log<sub>2</sub>n+1, 2<sup>n</sup>

GetMaxXY-#rows, columns in window	ReadFromFile-input file into buffer	WriteDec-unsigned,32bit
GetMSeconds-#milliseconds since midnight	ReadHex-read hex int	WriteHex-32bit hex
GetTextColor-foreground,background text color	ReadInt-32 bit signed decimal	WriteHexB-write byte,word,doubleword int in hex
Gotoxy-move cursor	ReadKey-char w/out waiting	WriteInt-32bit signed
IsDigit-sets 0 if Al=digit,0-9	ReadString-read string	WriteStackFrame-current procedures stack frame, to console
MsgBox-message box	SetTextColor-sets foreground,background color	WriteStackFrameName-cur procedure name,stack frame
MsgBoxAsk-msg box w/ yes/no	Str_compare-compare strings	WriteString-write string
OpenInputFile-open disk file	Str_copy-copy strings	WriteToFile-write byffer to output file
ParseDecimal32-unsigned decimal to string	Str_length-length/string	WriteWindowsMsg-string w/most recent windows error
ParseInteger32-signed decimal to string	Str_trim-remove chars	
Random32-32 bit integer	Str_ucase-change to uppercase	
Randomize-set random seed	WaitMsg-message,wait for key	
RandomRange-random w/in range	WriteBin-write 32bit int in ascii	
ReadChar-reads char	WriteBinB-write in byte,word,dword format	
ReadDec-read unsigned	WriteChar-write char	
*****		
CMP Flags:	Unsigned Comparisons:	Signed Comparison:
JC-jump if carry	JA-above >	JG-greater >
JNC-jump if not carry	JNBE-not below or equal	JNLE-not less than or equal
JZ-jump if zero	JAE-above or equal >=	JGE-greater than, equal >=
JNZ-jump if not zero	JNB-not below	JNL-not less
JO-jump if overflow	JB-if below <	JL-less <
JNO-not overflow	JNAE-not above or equal	JNGE-not greater than, equal
JS-signed	JBE-below or equal	JLE-less than, equal <=
JNS-not signed	JNA-not above	JNG-not greater
JP-parity		
JNP-not parity		
*****		
Passing Parameters:	offset: distance bytes from beginning of segment, macroname MACRO [param1,param2..]	
1 <sup>st</sup> pushed has biggest offset	OS adds address	ENDM
Indirect-accessing through registers-reference	ptr: access different size, al byte	use LOCAL for labels
arrays in proc	ptr[myDouble+1]	params=memory,register,literal
-mov esi,[EBP+8]-add esi,4		
Indexed-array name w/distance to element	2D arrays: row first	Distributive Law:
list[edi], add edi, 4-gloabal array refs		A+BC=(A+B)(A+C)
Base indexed-starting address in one,offset		A(B+C)=AB+AC
another-	lodsb: [esi] into AL, if direction flag=0,inc esi	Absorption Law:
reference arrays in proc-mov edx,[ebp+8],mov	stosb: move AL to [edi], edi inc if dir flag=0	A(A+B)=A
ecx,20 mov[edx+ecx]	FPU-registers=ST(0)..ST(7)	A+AB=A
	FINIT: initialize FPU registers-reference	
RISC-reduced instruction set computer	FSUB,FADD etc—FISUB,FIADD for internal	memory types: RAM-static RAM, dynamic
longer, but faster (executed in hardware)	FDIVR-division, operands reversed	RAM, synchronous DRAM
only LOAD, STORE reference memory	FLD-push ST(i) to ST(i+1)	ROM-programmable ROM, erasable ROM,
	FST-top of stack to mem-FSTP-pop top	electrically EPROM
*****		
Instruction parallelism: pipeline, cache	Parallel Perfomance depends on:	
processor: multiprocessor, multicomputer	hardware:	
Amdahls Law-speedup: n/(1+(n-1)f)-T/speedup	CPU, I/O speed, interconnection, scalability	
maybe probs w/ decision, repetition,procedure	latency, bandwidth scalability-more processors	
structures	affects bandwidth	
multiprocessor-hard build, easy programs		
communicate w/circuits	software:	
multi computer-easy build, hard program	parallelizabililty, language, OS, parallel system	
comms w/packets, links, switches	library	
hybrid-cloud computing		
	applications: networks, internet	
	make things faster (chess, AI, expert systems)	