PRAKTIKUM SISTEM OPERASI

MODUL 1

PENGENALAN SISTEM PENGEMBANGAN OS DENGAN PC SIMULATOR "BOCHS"

Disusun Oleh :

MUHAMMAD WAHYU SYAFI'UDDIN

L200210056

PROGRAM STUDI TEKNIK INFORMATIKA

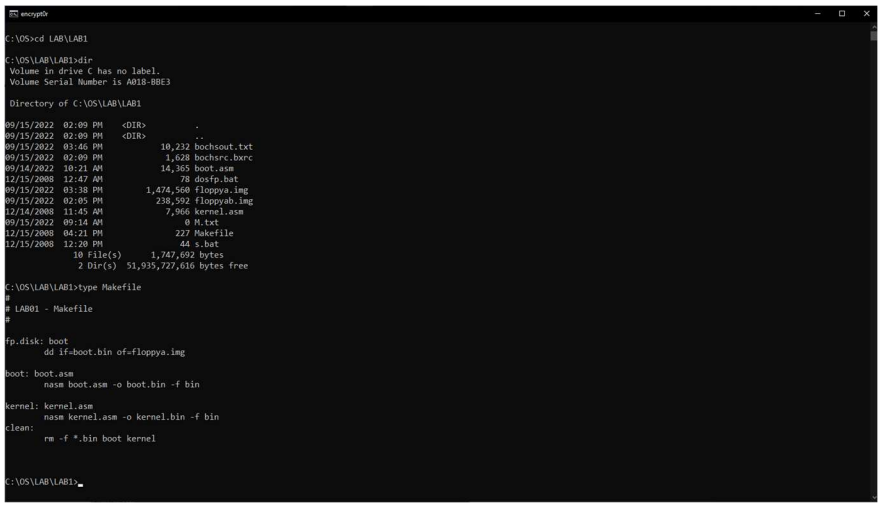
FAKULTAS KOMUNIKASI DAN INFORMATIKA

UNIVERSITAS MUHAMMADIYAH SURAKARTA

TAHUN 2021/2022

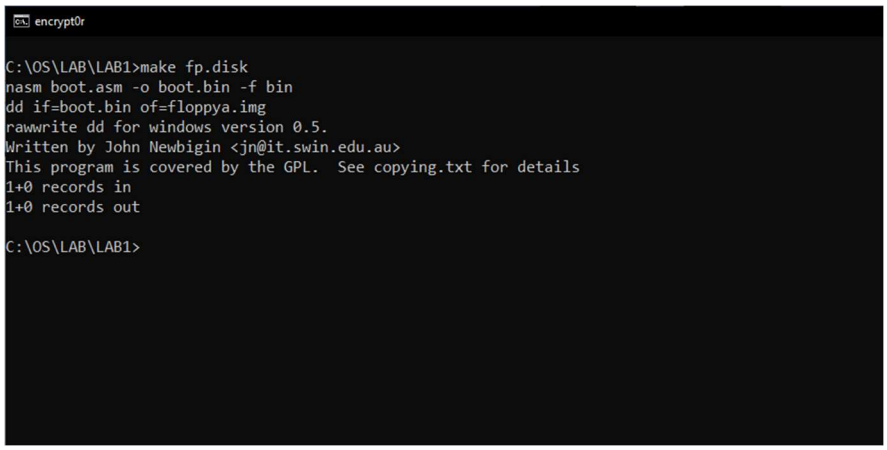
A. Langkah Kerja

1. Masuk ke direktori LAB/LAB1 dan melihat isi dari Makefile



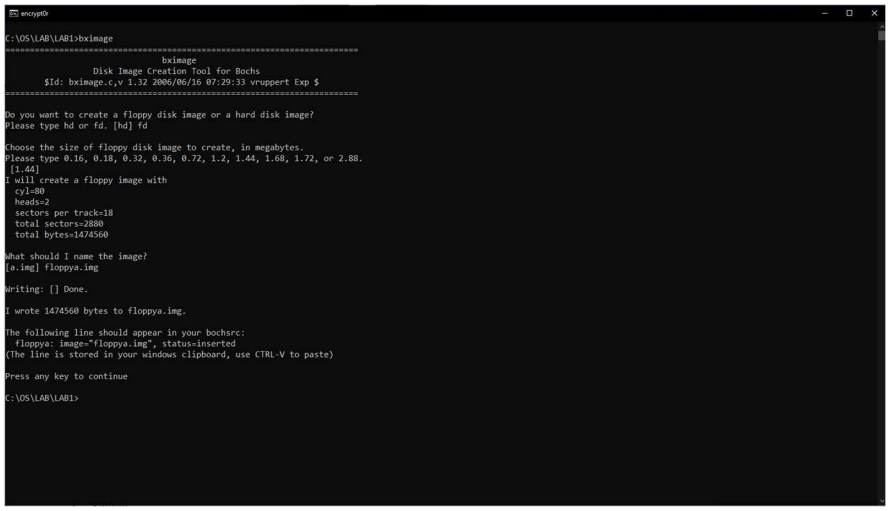
Gambar 1.3 Menyunting file ‘Makefile’

2. Make fp.disk



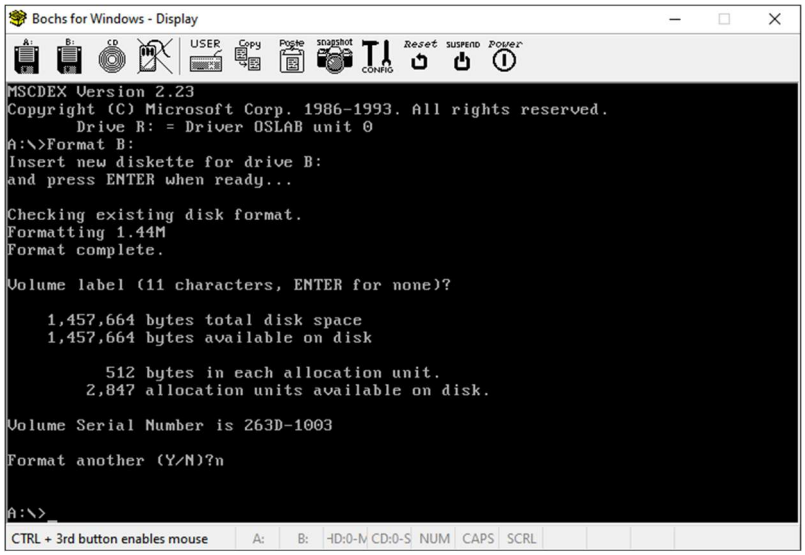
Gambar 1.4 Menggunakan perintah Make

3. Membuat Floppya.img dengan bximage



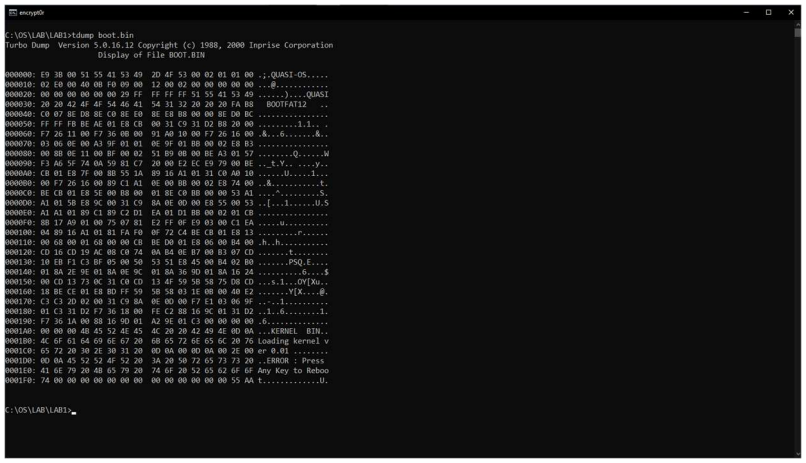
Gambar 1.5 – 1.8 Membuat File image Floppy

4. Memformat floppya.img dengan DosFp



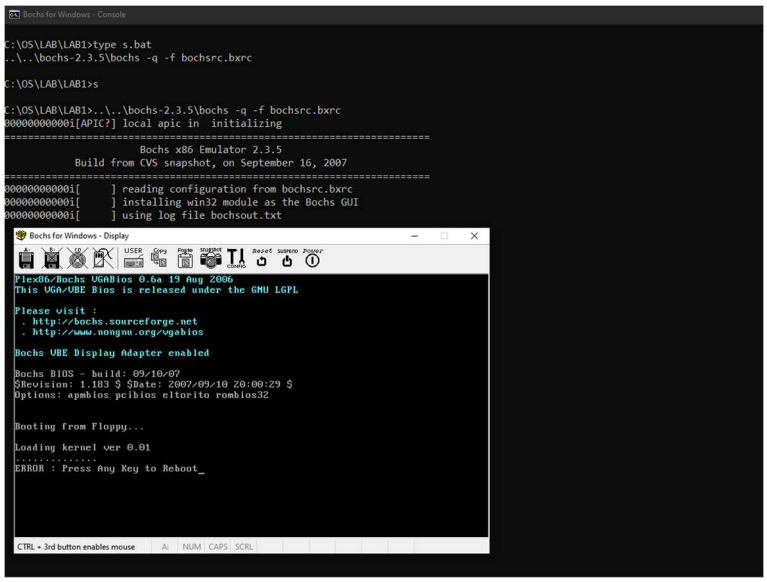
Gambar 1.11 Bochs PC-Simulator

5. Dump data dari image boot.bin dengan tdump



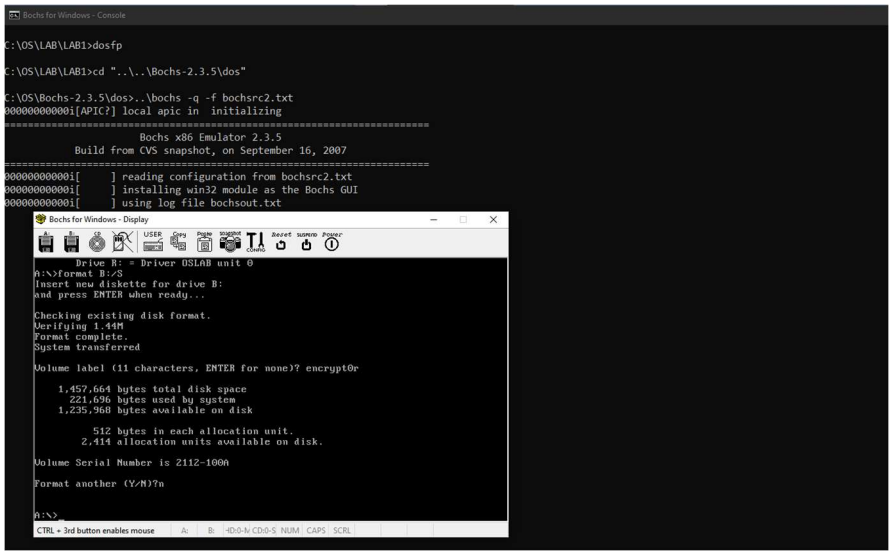
Gambar 1.14 Melihat data bootsector dengan program tdump

6. Booting dari floppya.img dengan s.bat

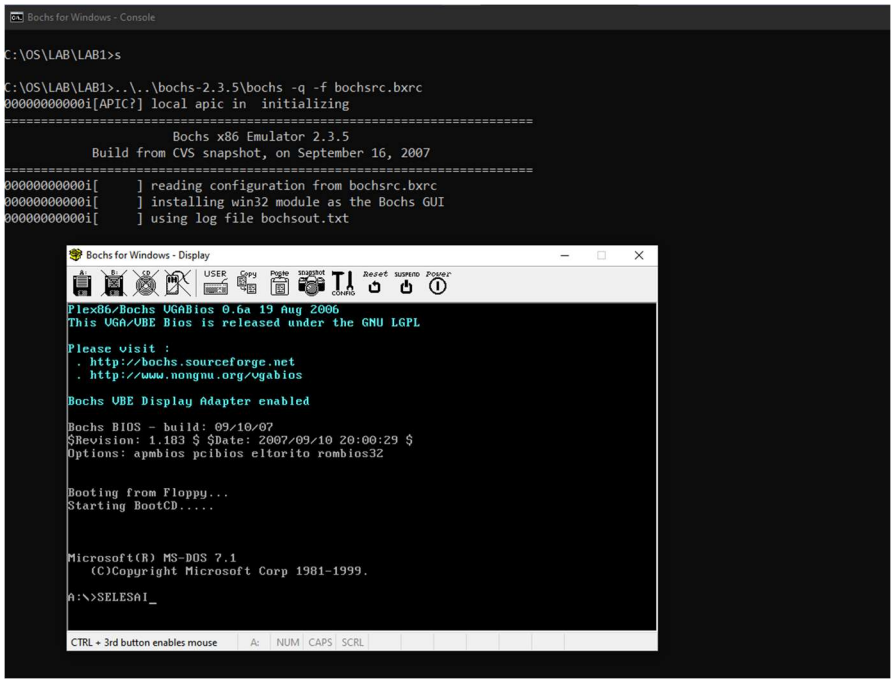


Gambar 1.15 isi File ‘s.bat’

7. Memformat floppya.img dan mengisi SystemFile dengan DosFp



8. Booting ulang dari floppya.img yang sudah terisi System File dengan s.bat



9. Selesai

B. Tugas

1. ASCII (American Standard Code for Information Interchange) merupakan Kode Standar Amerika untuk Pertukaran Informasi atau sebuah standar internasional dalam pengkodean huruf dan simbol seperti Unicode dan Hex tetapi ASCII lebih bersifat universal. Dalam bahasa komputer 0 dan 1 tidak ada cara lain untuk mewakili huruf dan karakter yang bukan nomer. Semuanya harus menggunakan 0 dan 1. Salah satu jalan untuk berbahasa dengan komputer dengan cara menggunakan tabel ASCII. Tabel ASCII merupakan tabel atau daftar yang bersi semua huruf dalam alfabet romawi ditambah beberapa karakter tambahan. Dalam tabel ini setiap karakter akan selalu diwakili oleh sejumlah kode yang sama.

Tabel Kode ASCII

0	00	NUL	26	1A	SUB	52	34	4	78	4E	N	104	68	h
1	01	SOH	27	1B	ESC	53	35	5	79	4F	O	105	69	i
2	02	STX	28	1C	FS	54	36	6	80	50	P	106	6A	j
3	03	ETX	29	1D	GS	55	37	7	81	51	Q	107	6B	k
4	04	EOT	30	1E	RS	56	38	8	82	52	R	108	6C	l
5	05	ENQ	31	1F	US	57	39	9	83	53	S	109	6D	m
6	06	ACK	32	20	space	58	3A	:	84	54	T	110	6E	n
7	07	BEL	33	21	!	59	3B	;	85	55	U	111	6F	o
8	08	BS	34	22	"	60	3C	<	86	56	V	112	70	p
9	09	HT	35	23	#	61	3D	=	87	57	W	113	71	q
10	0A	LF	36	24	$	62	3E	>	88	58	X	114	72	r
11	0B	VT	37	25	%	63	3F	?	89	59	Y	115	73	s
12	0C	FF	38	26	&	64	40	@	90	5A	Z	116	74	t
13	0D	CR	39	27	'	65	41	A	91	5B	[	117	75	u
14	0E	SO	40	28	(	66	42	B	92	5C	\	118	76	v
15	0F	SI	41	29	)	67	43	C	93	5D	]	119	77	w
16	10	DLE	42	2A	*	68	44	D	94	5E	^	120	78	x
17	11	DC1	43	2B	+	69	45	E	95	5F	_	121	79	y
18	12	DC2	44	2C	,	70	46	F	96	60	`	122	7A	z
19	13	DC3	45	2D	-	71	47	G	97	61	a	123	7B	{
20	14	DC4	46	2E	.	72	48	H	98	62	b	124	7C	|
21	15	NAK	47	2F	/	73	49	I	99	63	c	125	7D	}
22	16	SYN	48	30	0	74	4A	J	100	64	d	126	7E	~
23	17	ETB	49	31	1	75	4B	K	101	65	e	127	7F	DEL
24	18	CAN	50	32	2	76	4C	L	102	66	f			
25	19	EM	51	33	3	77	4D	M	103	67	g			

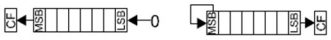
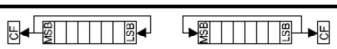
2. INSTRUKSI ASSEMBLY PADA INTEL KELUARGA x86

Intel Assembler 80186 and higher

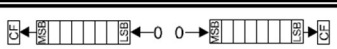
CodeTable 1/2

TRANSFER				Flags								
Name	**Comment**	**Code**	**Operation**	**O**	**D**	**I**	**T**	**S**	**Z**	**A**	**P**	**C**
MOV	Move (copy)	MOV Dest,Source	Dest:=Source									
XCHG	Exchange	XCHG Op1,Op2	Op1:=Op2 , Op2:=Op1									
STC	Set Carry	STC	CF:=1									1
CLC	Clear Carry	CLC	CF:=0									0
CMC	Complement Carry	CMC	CF:= ¬CF									±
STD	Set Direction	STD	DF:=1 (string op's downwards)		1							
CLD	Clear Direction	CLD	DF:=0 (string op's upwards)		0							
STI	Set Interrupt	STI	IF:=1			1						
CLI	Clear Interrupt	CLI	IF:=0			0						
PUSH	Push onto stack	PUSH Source	DEC SP, [SP]:=Source									
PUSHF	Push flags	PUSHF	O, D, I, T, S, Z, A, P, C 286+: also NT, IOPL									
PUSHA	Push all general registers	PUSHA	AX, CX, DX, BX, SP, BP, SI, DI									
POP	Pop from stack	POP Dest	Dest:=[SP], INC SP									
POPF	Pop flags	POPF	O, D, I, T, S, Z, A, P, C 286+: also NT, IOPL	±	±	±	±	±	±	±	±	±
POPA	Pop all general registers	POPA	DI, SI, BP, SP, BX, DX, CX, AX									
CBW	Convert byte to word	CBW	AX:=AL (signed)									
CWD	Convert word to double	CWD	DX:AX:=AX (signed)	±				±	±	±	±	±
CWDE	Conv word extended double	CWDE 386	EAX:=AX (signed)									
IN *i*	Input	IN Dest, Port	AL/AX/EAX := byte/word/double of specified port									
OUT *i*	Output	OUT Port, Source	Byte/word/double of specified port := AL/AX/EAX									

i for more information see instruction specifications Flags: ±=affected by this instruction ?=undefined after this instruction

ARITHMETIC				Flags								
Name	**Comment**	**Code**	**Operation**	**O**	**D**	**I**	**T**	**S**	**Z**	**A**	**P**	**C**
ADD	Add	ADD Dest,Source	Dest:=Dest+Source	±				±	±	±	±	±
ADC	Add with Carry	ADC Dest,Source	Dest:=Dest+Source+CF	±				±	±	±	±	±
SUB	Subtract	SUB Dest,Source	Dest:=Dest-Source	±				±	±	±	±	±
SBB	Subtract with borrow	SBB Dest,Source	Dest:=Dest-(Source+CF)	±				±	±	±	±	±
DIV	Divide (unsigned)	DIV Op	Op=byte: AL:=AX / Op AH:=Rest	?				?	?	?	?	?
DIV	Divide (unsigned)	DIV Op	Op=word: AX:=DX:AX / Op DX:=Rest	?				?	?	?	?	?
DIV 386	Divide (unsigned)	DIV Op	Op=doublew.: EAX:=EDX:EAX / Op EDX:=Rest	?				?	?	?	?	?
IDIV	Signed Integer Divide	IDIV Op	Op=byte: AL:=AX / Op AH:=Rest	?				?	?	?	?	?
IDIV	Signed Integer Divide	IDIV Op	Op=word: AX:=DX:AX / Op DX:=Rest	?				?	?	?	?	?
IDIV 386	Signed Integer Divide	IDIV Op	Op=doublew.: EAX:=EDX:EAX / Op EDX:=Rest	?				?	?	?	?	?
MUL	Multiply (unsigned)	MUL Op	Op=byte: AX:=AL*Op if AH=0 ♦	±				?	?	?	?	±
MUL	Multiply (unsigned)	MUL Op	Op=word: DX:AX:=AX*Op if DX=0 ♦	±				?	?	?	?	±
MUL 386	Multiply (unsigned)	MUL Op	Op=double: EDX:EAX:=EAX*Op if EDX=0 ♦	±				?	?	?	?	±
IMUL *i*	Signed Integer Multiply	IMUL Op	Op=byte: AX:=AL*Op if AL sufficient ♦	±				?	?	?	?	±
IMUL	Signed Integer Multiply	IMUL Op	Op=word: DX:AX:=AX*Op if AX sufficient ♦	±				?	?	?	?	±
IMUL 386	Signed Integer Multiply	IMUL Op	Op=double: EDX:EAX:=EAX*Op if EAX sufficient ♦	±				?	?	?	?	±
INC	Increment	INC Op	Op:=Op+1 (Carry not affected !)	±				±	±	±	±	
DEC	Decrement	DEC Op	Op:=Op-1 (Carry not affected !)	±				±	±	±	±	
CMP	Compare	CMP Op1,Op2	Op1-Op2	±				±	±	±	±	±
SAL	Shift arithmetic left (≡ SHL)	SAL Op,Quantity		*i*				±	±	?	±	±
SAR	Shift arithmetic right	SAR Op,Quantity		*i*				±	±	?	±	±
RCL	Rotate left through Carry	RCL Op,Quantity		*i*								±
RCR	Rotate right through Carry	RCR Op,Quantity		*i*								±
ROL	Rotate left	ROL Op,Quantity		*i*								±
ROR	Rotate right	ROR Op,Quantity		*i*								±

i for more information see instruction specifications ♦ then CF:=0, OF:=0 else CF:=1, OF:=1

LOGIC				Flags								
Name	**Comment**	**Code**	**Operation**	**O**	**D**	**I**	**T**	**S**	**Z**	**A**	**P**	**C**
NEG	Negate (two-complement)	NEG Op	Op:=0-Op if Op=0 then CF:=0 else CF:=1	±				±	±	±	±	±
NOT	Invert each bit	NOT Op	Op:=¬Op (invert each bit)									
AND	Logical and	AND Dest,Source	Dest:=Dest∧Source	0				±	±	?	±	0
OR	Logical or	OR Dest,Source	Dest:=Dest∨Source	0				±	±	?	±	0
XOR	Logical exclusive or	XOR Dest,Source	Dest:=Dest (exor) Source	0				±	±	?	±	0
SHL	Shift logical left (≡ SAL)	SHL Op,Quantity		*i*				±	±	?	±	±
SHR	Shift logical right	SHR Op,Quantity		*i*				±	±	?	±	±

Intel Assembler 80186 and higher

CodeTable 2/2

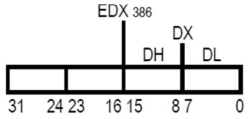
MISC				Flags								
Name	Comment	Code	Operation	O	D	I	T	S	Z	A	P	C
NOP	No operation	NOP	No operation									
LEA	Load effective address	LEA Dest,Source	Dest := address of Source									
INT	Interrupt	INT Nr	interrupts current program, runs spec. int-program			0	0					

JUMPS (flags remain unchanged)							
Name	Comment	Code	Operation	Name	Comment	Code	Operation
CALL	Call subroutine	CALL Proc		RET	Return from subroutine	RET	
JMP	Jump	JMP Dest					
JE	Jump if Equal	JE Dest	(≡ JZ)	JNE	Jump if not Equal	JNE Dest	(≡ JNZ)
JZ	Jump if Zero	JZ Dest	(≡ JE)	JNZ	Jump if not Zero	JNZ Dest	(≡ JNE)
JCXZ	Jump if CX Zero	JCXZ Dest		JECXZ	Jump if ECX Zero	JECXZ Dest	386
JP	Jump if Parity (Parity Even)	JP Dest	(≡ JPE)	JNP	Jump if no Parity (Parity Odd)	JNP Dest	(≡ JPO)
JPE	Jump if Parity Even	JPE Dest	(≡ JP)	JPO	Jump if Parity Odd	JPO Dest	(≡ JNP)

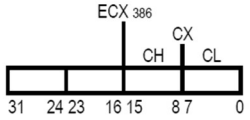
JUMPS Unsigned (Cardinal)				JUMPS Signed (Integer)			
JA	Jump if Above	JA Dest	(≡ JNBE)	JG	Jump if Greater	JG Dest	(≡ JNLE)
JAE	Jump if Above or Equal	JAE Dest	(≡ JNB ≡ JNC)	JGE	Jump if Greater or Equal	JGE Dest	(≡ JNL)
JB	Jump if Below	JB Dest	(≡ JNAE ≡ JC)	JL	Jump if Less	JL Dest	(≡ JNGE)
JBE	Jump if Below or Equal	JBE Dest	(≡ JNA)	JLE	Jump if Less or Equal	JLE Dest	(≡ JNG)
JNA	Jump if not Above	JNA Dest	(≡ JBE)	JNG	Jump if not Greater	JNG Dest	(≡ JLE)
JNAE	Jump if not Above or Equal	JNAE Dest	(≡ JB ≡ JC)	JNGE	Jump if not Greater or Equal	JNGE Dest	(≡ JL)
JNB	Jump if not Below	JNB Dest	(≡ JAE ≡ JNC)	JNL	Jump if not Less	JNL Dest	(≡ JGE)
JNBE	Jump if not Below or Equal	JNBE Dest	(≡ JA)	JNLE	Jump if not Less or Equal	JNLE Dest	(≡ JG)
JC	Jump if Carry	JC Dest		JO	Jump if Overflow	JO Dest	
JNC	Jump if no Carry	JNC Dest		JNO	Jump if no Overflow	JNO Dest	
				JS	Jump if Sign (= negative)	JS Dest	
				JNS	Jump if no Sign (= positive)	JNS Dest	

General Registers:

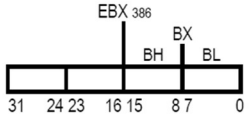
Accumulator



Data mul, div, IO



Count loop, shift



BaseX data ptr

Example:

```
                .DOSSEG                 ; Demo program
                .MODEL SMALL
                .STACK 1024
Two             EQU 2                   ; Const
                .DATA
VarB            DB ?                    ; define Byte, any value
VarW            DW 1010b                ; define Word, binary
VarW2           DW 257                  ; define Word, decimal
VarD            DD 0AFFFFh              ; define Doubleword, hex
S               DB "Hello !",0          ; define String
                .CODE
main:           MOV AX,DGROUP           ; resolved by linker
                MOV DS,AX               ; init datasegment reg
                MOV [VarB],42           ; init VarB
                MOV [VarD],-7           ; set VarD
                MOV BX,Offset[S]        ; addr of "H" of "Hello !"
                MOV AX,[VarW]           ; get value into accumulator
                ADD AX,[VarW2]          ; add VarW2 to AX
                MOV [VarW2],AX          ; store AX in VarW2
                MOV AX,4C00h            ; back to system
                INT 21h
                END main
```

Flags: [-][-][-][-][O][D][I][T][S][Z][-][A][-][P][-][C]

Control Flags (how instructions are carried out):

D: Direction	1 = string op's process down from high to low address
I: Interrupt	whether interrupts can occur. 1= enabled
T: Trap	single step for debugging

Status Flags (result of operations):

C: Carry	result of unsigned op. is too large or below zero. 1 = carry/borrow
O: Overflow	result of signed op. is too large or small. 1 = overflow/underflow
S: Sign	sign of result. Reasonable for Integer only. 1 = neg. / 0 = pos.
Z: Zero	result of operation is zero. 1 = zero
A: Aux. carry	similar to Carry but restricted to the low nibble only
P: Parity	1 = result has even number of set bits