

PRAKTIKUM SISTEM OPERASI

MODUL 1: PENGENALAN SISTEM PENGEMBANGAN OS DENGAN

PC SIMULATOR ‘BOCHS’



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PROGRAM STUDI TEKNIK INFORMATIKA

FAKULTAS KOMUNIKASI DAN INFORMATIKA

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LANGKAH KERJA

Menuju ke direktori kerja

- Jalankan program cmd
- Masuk ke direktori kerja 'C:\OS', dengan perintah 'cd os'
- Masukan perintah dir, untuk melihat direktori di dalam folder tersebut
- Jalankan file setpath, ketik 'setpath'

```
Select Bochs for Windows - Console
Microsoft Windows [Version 10.0.19044.1889]
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C:\Users\User-Id>cd OS

C:\Users\User-Id\OS>dir
Volume in drive C has no label.
Volume Serial Number is 5C8C-BEAA

Directory of C:\Users\User-Id\OS

14/09/2022  21:19  <DIR>          .
14/09/2022  21:19  <DIR>          ..
14/09/2022  21:19  <DIR>          Bochs-2.3.5
14/09/2022  21:19  <DIR>          Dev-Cpp
17/12/2008  00:08             1.096.291 i386.pdf
14/09/2022  21:19  <DIR>          LAB
17/12/2008  00:07             846.920 pcasm-book.pdf
17/12/2008  01:44                86 Setpath.bat
13/12/2008  14:12             716.512 winima81.exe
               4 File(s)          2.659.809 bytes
               5 Dir(s)          53.775.872.000 bytes free

C:\Users\User-Id\OS>setpath

C:\Users\User-Id\OS>Path=C:\OS\Dev-Cpp\bin;C:\OS\Bochs-2.3.5;c:\OS\Perl;C:\Windows;C:\Windows\System32
C:\Users\User-Id\OS>cd lab

C:\Users\User-Id\OS\LAB>cd lab1
```

Melihat isi direktori kerja

- Masuk ke direktori kerja pada 'C:\OS\LAB\LAB1'

```
Select Bochs for Windows - Console
C:\Users\User-Id\OS>Path=C:\OS\Dev-Cpp\bin;C:\OS\Bochs-2.3.5;c:\OS\Perl;C:\Windows;C:\Windows\System32
C:\Users\User-Id\OS>cd lab

C:\Users\User-Id\OS\LAB>cd lab1

C:\Users\User-Id\OS\LAB\LAB1>dir
Volume in drive C has no label.
Volume Serial Number is 5C8C-BEAA

Directory of C:\Users\User-Id\OS\LAB\LAB1

14/09/2022  21:19  <DIR>          .
14/09/2022  21:19  <DIR>          ..
23/09/2020  16:49             10.216 bochsout.txt
15/12/2008  16:17             1.628 bochsrc.bxrc
14/12/2008  12:02             14.365 boot.asm
14/09/2022  21:29                512 boot.bin
16/09/2015  07:51                512 boots.bin
15/12/2008  00:47                78 dosfp.bat
14/09/2022  21:29             1.474.560 floppy.img
14/12/2008  11:45                7.966 kernel.asm
15/12/2008  16:21                227 Makefile
15/12/2008  12:20                44 s.bat
               10 File(s)          1.510.108 bytes
                2 Dir(s)          53.782.085.632 bytes free

C:\Users\User-Id\OS\LAB\LAB1>make fp.disk
nasm boot.asm -o boot.bin -f bin
dd if=boot.bin of=floppya.img
rawwrite dd for windows version 0.5.
```

- b) Hapuslah file 'floppya.img' jika sudah ada pada direktori kerja anda, dari 'Command Prompt' (lakukan dari direktori kerja) ketik 'del floppya.img /P' lanjutkan dengan tekan Y dan <ENTER>. Pastikan bahwa file sudah benar benar terhapus dengan perintah 'dir'. Selanjutnya panggil 'bximage'.

```
Select Bochs for Windows - Console
1+0 records out

C:\Users\User-Id\OS\LAB\LAB1>del floppya.img

C:\Users\User-Id\OS\LAB\LAB1>dir
Volume in drive C has no label.
Volume Serial Number is 5C8C-BEAA

Directory of C:\Users\User-Id\OS\LAB\LAB1

18/09/2022  22:22    <DIR>          .
18/09/2022  22:22    <DIR>          ..
23/09/2020  16:49             10.216 bochsout.txt
15/12/2008  16:17             1.628 bochsrc.bxrc
14/12/2008  12:02             14.365 boot.asm
18/09/2022  22:21             512 boot.bin
16/09/2015  07:51             512 boots.bin
15/12/2008  00:47              78 dosfp.bat
14/12/2008  11:45             7.966 kernel.asm
15/12/2008  16:21             227 Makefile
15/12/2008  12:20              44 s.bat
                9 File(s)          35.548 bytes
                2 Dir(s)  53.799.419.904 bytes free

C:\Users\User-Id\OS\LAB\LAB1>bximage
=====
                        bximage
          Disk Image Creation Tool for Bochs
    $Id: bximage.c,v 1.32 2006/06/16 07:29:33 vruppert Exp $
=====

    $Id: bximage.c,v 1.32 2006/06/16 07:29:33 vruppert Exp $
=====

Do you want to create a floppy disk image or a hard disk image?
Please type hd or fd. [hd] fd

Choose the size of floppy disk image to create, in megabytes.
Please type 0.16, 0.18, 0.32, 0.36, 0.72, 1.2, 1.44, 1.68, 1.72, or 2.88.
[1.44]
I will create a floppy image with
  cyl=80
  heads=2
  sectors per track=18
  total sectors=2880
  total bytes=1474560

What should I name the image?
[a.img] floppya.img

Writing: [] Done.

I wrote 1474560 bytes to floppya.img.

The following line should appear in your bochsrc:
  floppya: image="floppya.img", status=inserted
(The line is stored in your windows clipboard, use CTRL-V to paste)

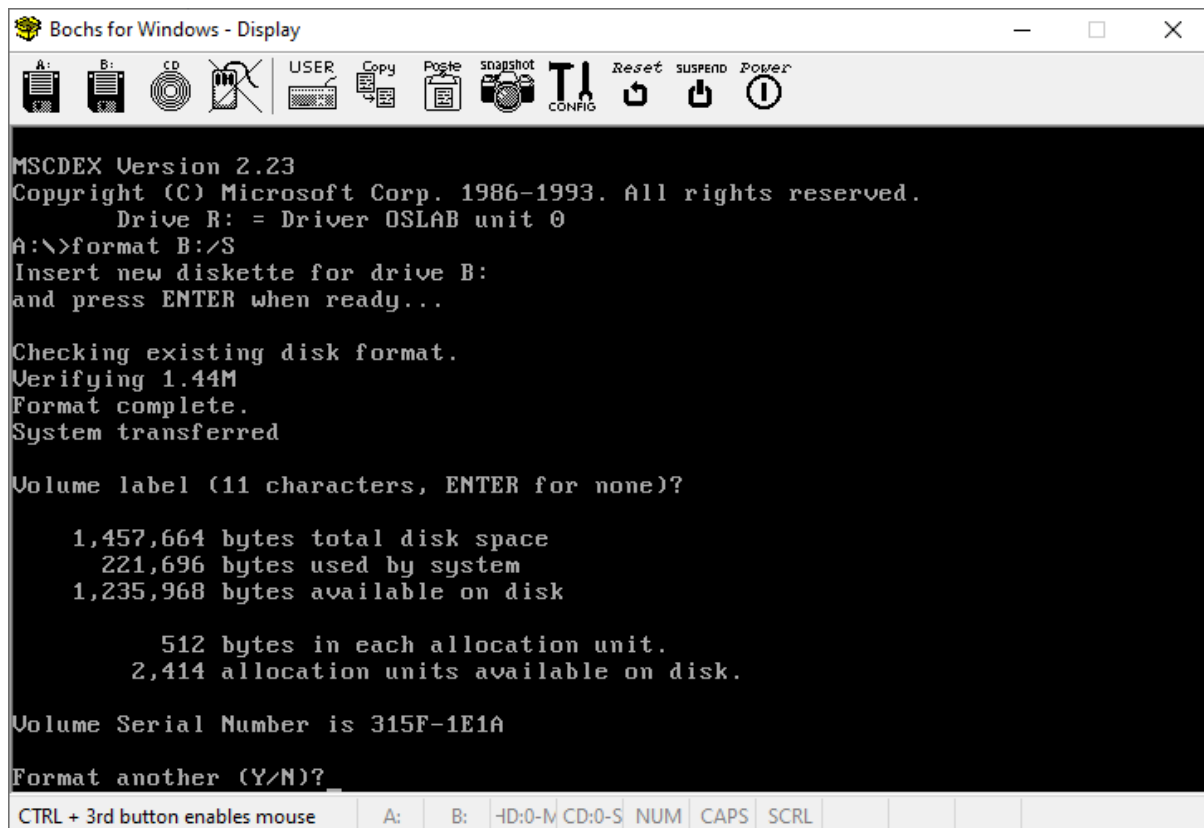
Press any key to continue

C:\Users\User-Id\OS\LAB\LAB1>DosFp
```

- c) Jalankan PC-Simulator dari cmd dengan perintah 'DosFp'.

```
C:\Users\User-Id\OS\LAB\LAB1>DosFp
C:\Users\User-Id\OS\LAB\LAB1>cd "..\..\Bochs-2.3.5\dos"
C:\Users\User-Id\OS\Bochs-2.3.5\dos>..\bochs -q -f bochsrc2.txt
00000000000i[APIC?] local apic in  initializing
=====
                Bochs x86 Emulator 2.3.5
                Build from CVS snapshot, on September 16, 2007
=====
00000000000i[      ] reading configuration from bochsrc2.txt
00000000000i[      ] installing win32 module as the Bochs GUI
00000000000i[      ] using log file bochsout.txt
# In bx_win32_gui_c::exit(void)!
=====
Bochs is exiting with the following message:
[WGUI ] POWER button turned off.
=====
C:\Users\User-Id\OS\Bochs-2.3.5\dos>cd "C:\os\lab\lab1"
```

- d) Pada konfigurasi PC-Simulator file 'floppya.img' terpasang pada 'drive B:'. Selanjutnya dari promp 'A:>'ketika 'Format B:'<ENTER> [2X],



- e) Tutup kembali PC-Simulator dengan klik pada tombol power.

- f) Ketik 'tdump boots.bin' lalu tekan enter maksud dari perintah ini adalah memindahkan data pada file 'boots.bin' ke dalam memory kerja 'tdump'.

```
C:\OS\LAB\LAB1>tdump boots.bin
Turbo Dump Version 5.0.16.12 Copyright (c) 1988, 2000 Inprise Corporation
Display of File BOOTS.BIN

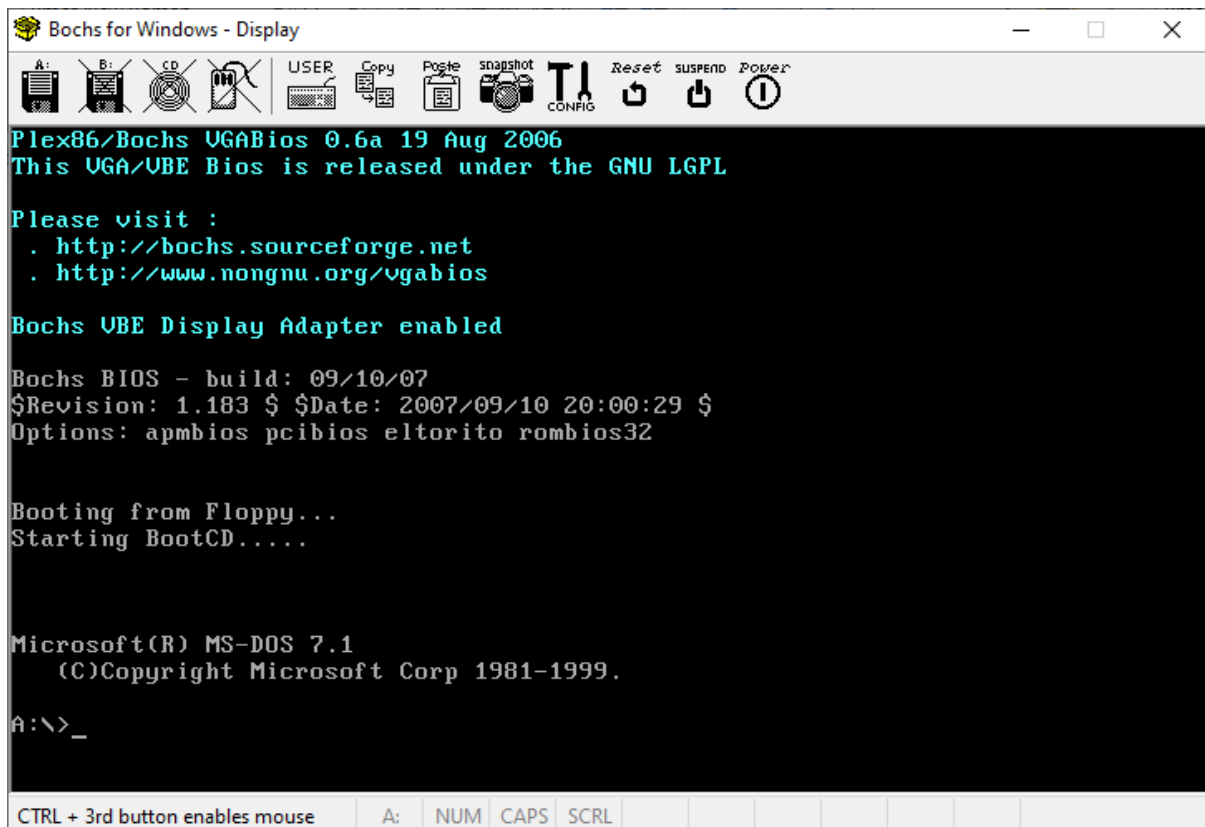
000000: EB 3C 90 4D 53 57 49 4E 34 2E 31 00 02 01 01 00 .<.MSWIN4.1....
000010: 02 E0 00 40 0B F0 09 00 12 00 02 00 00 00 00 00 ...@.....
000020: 00 00 00 00 00 00 29 E7 0F 15 2C 4E 4F 20 4E 41 .....),,NO NA
000030: 4D 45 20 20 20 20 46 41 54 31 32 20 20 20 33 C9 ME FAT12 3.
000040: 8E D1 BC FC 7B 16 07 BD 78 00 C5 76 00 1E 56 16 ....{...x..v..V.
000050: 55 BF 22 05 89 7E 00 89 4E 02 B1 0B FC F3 A4 06 U"...~..N.....
000060: 1F BD 00 7C C6 45 FE 0F 38 4E 24 7D 20 8B C1 99 ...|.E..8N$} ...
000070: E8 7E 01 83 EB 3A 66 A1 1C 7C 66 3B 07 8A 57 FC .~...:f..|f;..W.
000080: 75 06 80 CA 02 88 56 02 80 C3 10 73 ED 33 C9 FE u....V....s.3..
000090: 06 D8 7D 8A 46 10 98 F7 66 16 03 46 1C 13 56 1E ..}.F...f..F..V.
0000A0: 03 46 0E 13 D1 8B 76 11 60 89 46 FC 89 56 FE B8 .F...v..`F..V..
0000B0: 20 00 F7 E6 8B 5E 0B 03 C3 48 F7 F3 01 46 FC 11 ....^...H...F..
0000C0: 4E FE 61 8F 00 07 E8 28 01 72 3E 38 2D 74 17 60 N.a....(.r>8-t..
0000D0: B1 0B BE D8 7D F3 A6 61 74 3D 4E 74 09 83 C7 20 ....}.at=Nt...
0000E0: 3B FB 72 E7 EB DD FE 0E D8 7D 7B A7 BE 7F 7D AC ;.r.....}{...}.
0000F0: 98 03 F0 AC 98 40 74 0C 48 74 13 B4 0E BB 07 00 .....@t.Ht.....
000100: CD 10 EB EF BE 82 7D EB E6 BE 80 7D EB E1 CD 16 .....}......}....
000110: 5E 1F 66 8F 04 CD 19 BE 81 7D 8B 7D 1A 8D 45 FE ^.f.....}.}..E.
000120: 8A 4E 0D F7 E1 03 46 FC 13 56 FE B1 04 E8 C2 00 .N....F..V.....
000130: 72 D7 EA 00 02 70 00 52 50 06 53 6A 01 6A 10 91 r....p.RP.Sj.j..
000140: 8B 46 18 A2 26 05 96 92 33 D2 F7 F6 91 F7 F6 42 .F..&...3.....B
000150: 87 CA F7 76 1A 8A F2 8A E8 C0 CC 02 0A CC B8 01 ...V.....
000160: 02 80 7E 02 0E 75 04 B4 42 8B F4 8A 56 24 CD 13 .~...u..B...V$.
000170: 61 61 72 0A 40 75 01 42 03 5E 0B 49 75 77 C3 03 aar.@u.B.^Iuw..
000180: 18 01 27 0D 0A 49 6E 76 61 6C 69 64 20 73 79 73 ..'..Invalid sys
000190: 74 65 6D 20 64 69 73 6B FF 0D 0A 44 69 73 6B 20 tem disk...Disk
0001A0: 49 2F 4F 20 65 72 72 6F 72 FF 0D 0A 52 65 70 6C I/O error...Repl
0001B0: 61 63 65 20 74 68 65 20 64 69 73 6B 2C 20 61 6E ace the disk, an
0001C0: 64 20 74 68 65 6E 20 70 72 65 73 73 20 61 6E 79 d then press any
0001D0: 20 6B 65 79 0D 0A 00 00 49 4F 20 20 20 20 20 20 key....IO
0001E0: 53 59 53 4D 53 44 4F 53 20 20 20 53 59 53 7F 01 SYSMSDOS SYS..
0001F0: 00 41 BB 00 07 60 66 6A 00 E9 3B FF 00 00 55 AA .A...`fj...;..U.
```

- g) Salah satu file dalam direktori kerja adalah file 's.bat', berisi dua baris perintah untuk memanggil PC-Simulator 'Bochs'. Lihat isi file 's.bat' dengan perintah 'type s.bat' <ENTER>.

```
Command Prompt

C:\OS\LAB\LAB1>type s.bat
..\..\bochs-2.3.5\bochs -q -f bochsrc.bxrc
```

- h) Selanjutnya masukan perintah 's', akan ditampilkan windows 'Bochs for windows – display'.



The screenshot shows a window titled "Bochs for Windows - Display". The window has a toolbar with icons for A:, B:, CD, USER, Copy, Paste, Snapshot, CONFIG, Reset, Suspend, and Power. The main display area shows the following text:

```
Plex86/Bochs UGABios 0.6a 19 Aug 2006
This UGA/UBE Bios is released under the GNU LGPL

Please visit :
. http://bochs.sourceforge.net
. http://www.nongnu.org/ugabios

Bochs UBE Display Adapter enabled

Bochs BIOS - build: 09/10/07
$Revision: 1.183 $ $Date: 2007/09/10 20:00:29 $
Options: apmbios pcibios eltorito rombios32

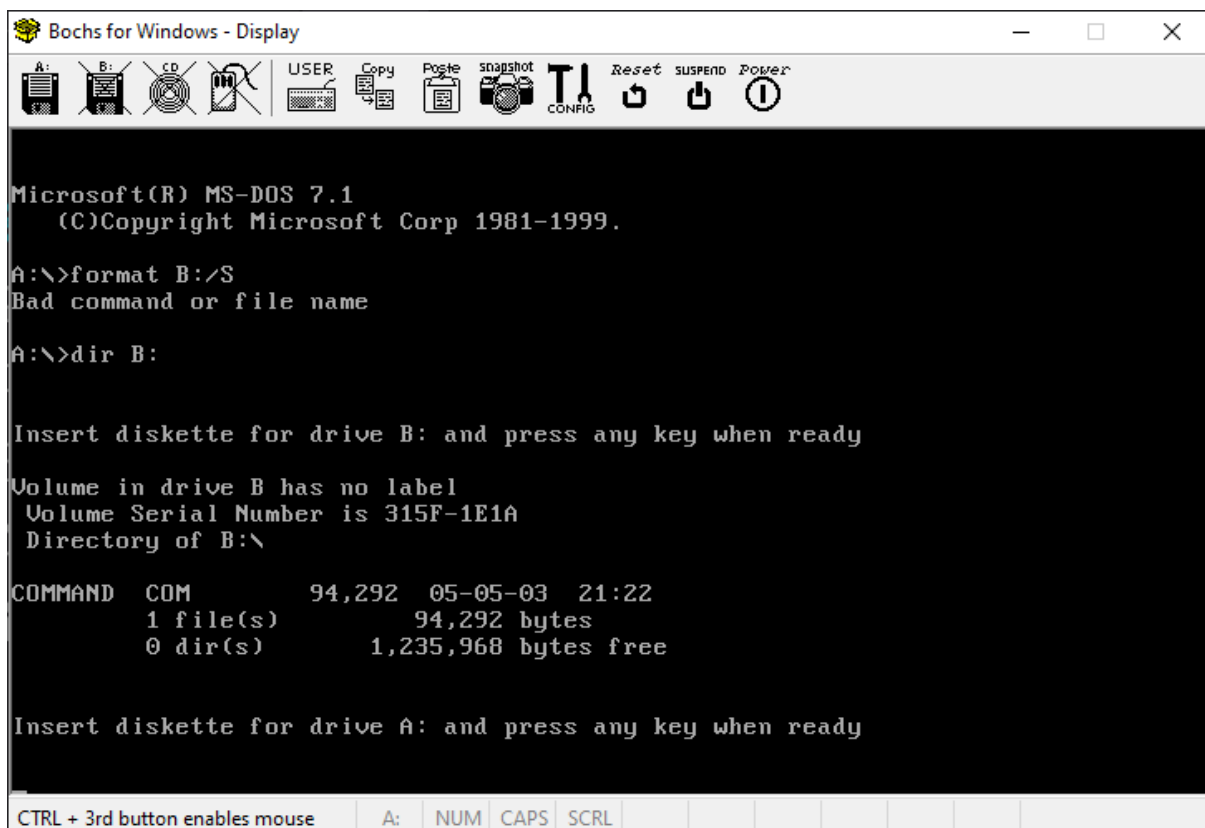
Booting from Floppy...
Starting BootCD.....

Microsoft(R) MS-DOS 7.1
(C)Copyright Microsoft Corp 1981-1999.

A:\>_
```

At the bottom of the window, there is a status bar that says "CTRL + 3rd button enables mouse" and a keyboard layout indicator showing "A: NUM CAPS SCRL".

- i) Yang terakhir, matikan PC-Simulator (klik tombol Power Off).



The screenshot shows the same "Bochs for Windows - Display" window. The main display area now shows the MS-DOS command prompt:

```
Microsoft(R) MS-DOS 7.1
(C)Copyright Microsoft Corp 1981-1999.

A:\>format B:/S
Bad command or file name

A:\>dir B:

Insert diskette for drive B: and press any key when ready

Volume in drive B has no label
Volume Serial Number is 315F-1E1A
Directory of B:\

COMMAND  COM          94,292  05-05-03  21:22
          1 file(s)      94,292 bytes
          0 dir(s)      1,235,968 bytes free

Insert diskette for drive A: and press any key when ready
```

The status bar at the bottom remains the same, showing "CTRL + 3rd button enables mouse" and the keyboard layout indicator.

TUGAS

1. Apa yang dimaksud dengan kode 'ASCII', buatlah tabel kode ASCII lengkap cukup kode ASCII yang standar tidak perlu extended, tuliskan kode ASCII dengan format angka decimal, binary, dan hexadecimal serta karakter dan symbol yang dikodekan!

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.

Des	Hex	Biner	Karakter	Deskripsi
0	00	00000000	NUL	Batal
1	01	00000001	SOH	Mulai dari Header
2	02	00000010	STX	Awal Teks
3	03	00000011	ETX	Akhir Teks
4	04	00000100	EOT	Akhir Transmisi
5	05	00000101	ENQ	Penyelidikan
6	06	00000110	ACK	Mengakui
7	07	00000111	BEL	lonceng
8	08	00001000	BS	Menghapus
9	09	00001001	HT	Tab Horizontal
10	0A	00001010	LF	Umpan Garis
11	0B	00001011	VT	Tab Vertikal
12	0C	00001100	FF	Formulir Pakan
13	0D	00001101	CR	Kereta kembali
14	0E	00001110	JADI	Shift Out
15	0F	00001111	SI	Shift In
16	10	00010000	DLE	Escape Link Data
17	11	00010001	DC1	Kontrol Perangkat 1
18	12	00010010	DC2	Kontrol Perangkat 2
19	13	00010011	DC3	Kontrol Perangkat 3
20	14	00010100	DC4	Kontrol Perangkat 4

Des	Hex	Biner	Karakter	Deskripsi
21	15	00010101	NAK	Pengakuan Negatif
22	16	00010110	SYN	Sinkronisasi
23	17	00010111	ETB	Akhir Blok Transmisi
24	18	00011000	BISA	Membatalkan
25	19	00011001	EM	Akhir Media
26	1A	00011010	SUB	Pengganti
27	1B	00011011	ESC	Melarikan diri
28	1C	00011100	FS	Pemisah File
29	1D	00011101	GS	Pemisah Grup
30	1E	00011110	RS	Record Separator
31	1F	00011111	AS	Pemisah Unit
32	20	00100000	ruang	Ruang
33	21	00100001	!	Exclamation mark
34	22	00100010	"	Double quote
35	23	00100011	#	Number
36	24	00100100	\$	Dollar sign
37	25	00100101	%	Percent
38	26	00100110	&	Ampersand
39	27	00100111	'	Single quote
40	28	00101000	(Left parenthesis
41	29	00101001)	Right parenthesis
42	2A	00101010	*	Asterisk
43	2B	00101011	+	Plus
44	2C	00101100	,	Comma
45	2D	00101101	-	Minus
46	2E	00101110	.	Period
47	2F	00101111	/	Slash
48	30	00110000	0	Zero
49	31	00110001	1	One
50	32	00110010	2	Two

Des	Hex	Biner	Karakter	Deskripsi
51	33	00110011	3	Three
52	34	00110100	4	Four
53	35	00110101	5	Five
54	36	00110110	6	Six
55	37	00110111	7	Seven
56	38	00111000	8	Eight
57	39	00111001	9	Nine
58	3A	00111010	:	Colon
59	3B	00111011	;	Semicolon
60	3C	00111100	<	Less than
61	3D	00111101	=	Equality sign
62	3E	00111110	>	Greater than
63	3F	00111111	?	Question mark
64	40	01000000	@	At sign
65	41	01000001	A	Capital A
66	42	01000010	B	Capital B
67	43	01000011	C	Capital C
68	44	01000100	D	Capital D
69	45	01000101	E	Capital E
70	46	01000110	F	Capital F
71	47	01000111	G	Capital G
72	48	01001000	H	Capital H
73	49	01001001	I	Capital I
74	4A	01001010	J	Capital J
75	4B	01001011	K	Capital K
76	4C	01001100	L	Capital L
77	4D	01001101	M	Capital M
78	4E	01001110	N	Capital N
79	4F	01001111	O	Capital O
80	50	01010000	P	Capital P

Des	Hex	Biner	Karakter	Deskripsi
81	51	01010001	Q	Capital Q
82	52	01010010	R	Capital R
83	53	01010011	S	Capital S
84	54	01010100	T	Capital T
85	55	01010101	U	Capital U
86	56	01010110	V	Capital V
87	57	01010111	W	Capital W
88	58	01011000	X	Capital X
89	59	01011001	Y	Capital Y
90	5A	01011010	Z	Capital Z
91	5B	01011011	[Left square bracket
92	5C	01011100	\	Backslash
93	5D	01011101]	Right square bracket
94	5E	01011110	^	Caret / circumflex
95	5F	01011111	_	Underscore
96	60	01100000	`	Grave / accent
97	61	01100001	a	Small a
98	62	01100010	b	Small b
99	63	01100011	c	Small c
100	64	01100100	d	Small d
101	65	01100101	e	Small e
102	66	01100110	f	Small f
103	67	01100111	g	Small g
104	68	01101000	h	Small h
105	69	01101001	i	Small i
106	6A	01101010	j	Small j
107	6B	01101011	k	Small k
108	6C	01101100	l	Small l
109	6D	01101101	m	Small m
110	6E	01101110	n	Small n

Des	Hex	Biner	Karakter	Deskripsi
111	6F	01101111	o	Small o
112	70	01110000	p	Small p
113	71	01110001	q	Small q
114	72	01110010	r	Small r
115	73	01110011	s	Small s
116	74	01110100	t	Small t
117	75	01110101	u	Small u
118	76	01110110	v	Small v
119	77	01110111	w	Small w
120	78	01111000	x	Small x
121	79	01111001	y	Small y
122	7A	01111010	z	Small z
123	7B	01111011	{	Left curly bracket
124	7C	01111100		Vertical bar
125	7D	01111101	}	Right curly bracket
126	7E	01111110	~	Tilde
127	7F	01111111	DEL	Delete

2. Daftar perintah Bahasa Assembly untuk mesin intel keluarga x86 lengkap!

Daftar Assembly Directive

Assembly Directive	Keterangan
EQU	Pendefinisian konstanta
DB	Pendefinisian data dengan ukuran satuan 1 byte
DW	Pendefinisian data dengan ukuran satuan 1 word
DBIT	Pendefinisian data dengan ukuran satuan 1 bit
DS	Pemesanan tempat penyimpanan data di RAM
ORG	Inisialisasi alamat mulai program
END	Penanda akhir program
CSEG	Penanda penempatan di code segment
XSEG	Penanda penempatan di external data segment
DSEG	Penanda penempatan di internal direct data segment

ISEG	Penanda penempatan di internal indirect data segment
BSEG	Penanda penempatan di bit data segment
CODE	Penanda mulai pendefinisian program
XDATA	Pendefinisian external data
DATA	Pendefinisian internal direct data
IDATA	Pendefinisian internal indirect data
BIT	Pendefinisian data bit
#INCLUDE	Mengikutsertakan file program lain

Daftar Instruksi

Instruksi	Keterangan Singkatan
ACALL	Absolute Call
ADD	Add
ADDC	Add with Carry
AJMP	Absolute Jump
ANL	AND Logic
CJNE	Compare and Jump if Not Equal
CLR	Clear
CPL	Complement
DA	Decimal Adjust
DEC	Decrement
DIV	Divide
DJNZ	Decrement and Jump if Not Zero
INC	Increment
JB	Jump if Bit Set
JBC	Jump if Bit Set and Clear Bit
JC	Jump if Carry Set
JMP	Jump to Address
JNB	Jump if Not Bit Set
JNC	Jump if Carry Not Set
JNZ	Jump if Accumulator Not Zero
JZ	Jump if Accumulator Zero
LCALL	Long Call
LJMP	Long Jump
MOV	Move from Memory

MOVC	Move from Code Memory
MOVX	Move from Extended Memory
MUL	Multiply
NOP	No Operation
ORL	OR Logic
POP	Pop Value From Stack
PUSH	Push Value Onto Stack
RET	Return From Subroutine
RETI	Return From Interrupt
RL	Rotate Left
RLC	Rotate Left through Carry
RR	Rotate Right
RRC	Rotate Right through Carry
SETB	Set Bit
SJMP	Short Jump
SUBB	Subtract With Borrow
SWAP	Swap Nibbles
XCH	Exchange Bytes
XCHD	Exchange Digits
XRL	Exclusive OR Logic