

**PRAKTIKUM SISTEM OPERASI**  
**MODUL 1**  
**Pengenalan Sistem Pengembangan OS**  
**Dengan PC Simulator “BOCHS”**



**DISUSUN:**

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**INFORMATIKA**  
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**UNIVERSITAS MUHAMMADIYAH SURAKARTA**

**2020**

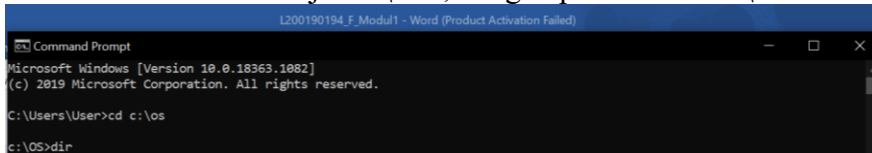
## Langkah Kerja

### Menuju ke direktori kerja.

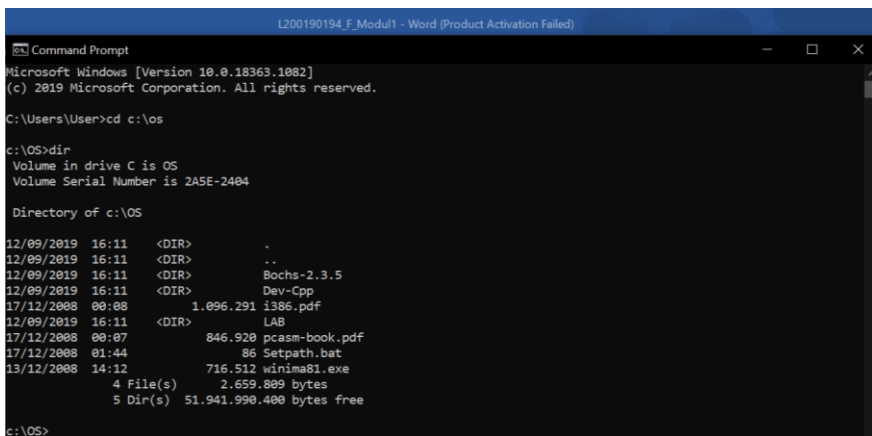
- a. Jalankan program 'Command Prompt' atau 'cmd'.



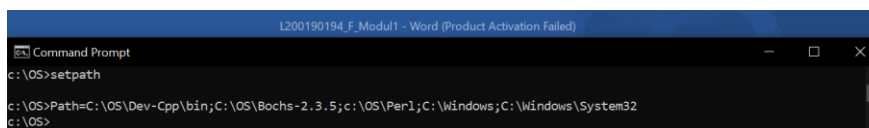
- b. Masuk ke direktori kerja 'C:\OS', dengan perintah 'cd c:\OS' <ENTER>.



- c. Masukkan perintah dir, untuk melihat isi direktori di dalam folder tersebut.

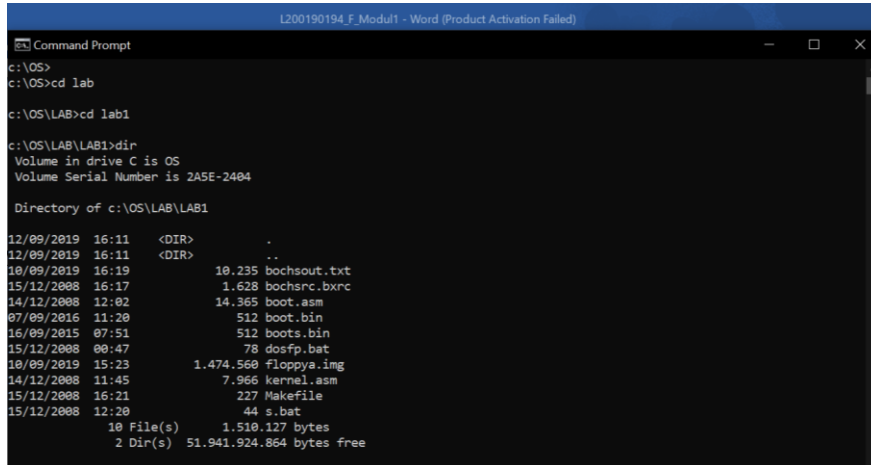


- d. Jalankan file setpath dengan ketik 'setpath' <ENTER>.



## Melihat isi direktori kerja

- Jalankan 'Command Prompt' atau 'cmd'.
- Masuk ke direktori kerja pada 'C:\OS\LAB\LAB1' dengan cara ketik 'cd lab\lab1' <ENTER>, kemudian ketik 'dir' untuk membuka isi direktori.

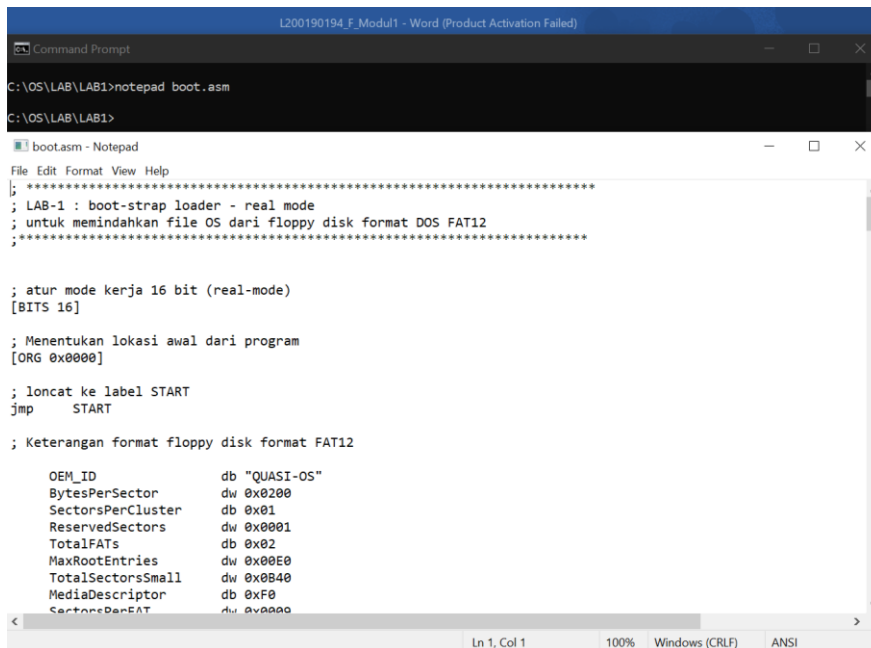


```
Command Prompt
c:\OS>
c:\OS>cd lab
c:\OS\LAB>cd lab1
c:\OS\LAB\LAB1>dir
Volume in drive C is OS
Volume Serial Number is 2A5E-2404

Directory of c:\OS\LAB\LAB1

12/09/2019  16:11    <DIR>        .
12/09/2019  16:11    <DIR>        ..
10/09/2019  16:19             10,235 bochsout.txt
15/12/2008  16:17             1,628 bochsrc.bxrc
14/12/2008  12:02             14,365 boot.asm
07/09/2016  11:20              512 boot.bin
16/09/2015  07:51              512 boots.bin
15/12/2008  00:47              78 dosfp.bat
10/09/2019  15:23         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)      1,510,127 bytes
                2 Dir(s)  51,941,924,864 bytes free
```

- Ketikkan 'notepad boot.asm' <ENTER> untuk membuka file boot.asm. Jika benar, akan muncul seperti gambar di bawah ini :



```
Command Prompt
C:\OS\LAB\LAB1>notepad boot.asm
C:\OS\LAB\LAB1>

bootasm - Notepad
File Edit Format View Help
; *****
; LAB-1 : boot-strap loader - real mode
; untuk memindahkan file OS dari floppy disk format DOS FAT12
; *****

; atur mode kerja 16 bit (real-mode)
[BITS 16]

; Menentukan lokasi awal dari program
[ORG 0x0000]

; loncat ke label START
jmp     START

; Keterangan format floppy disk format FAT12

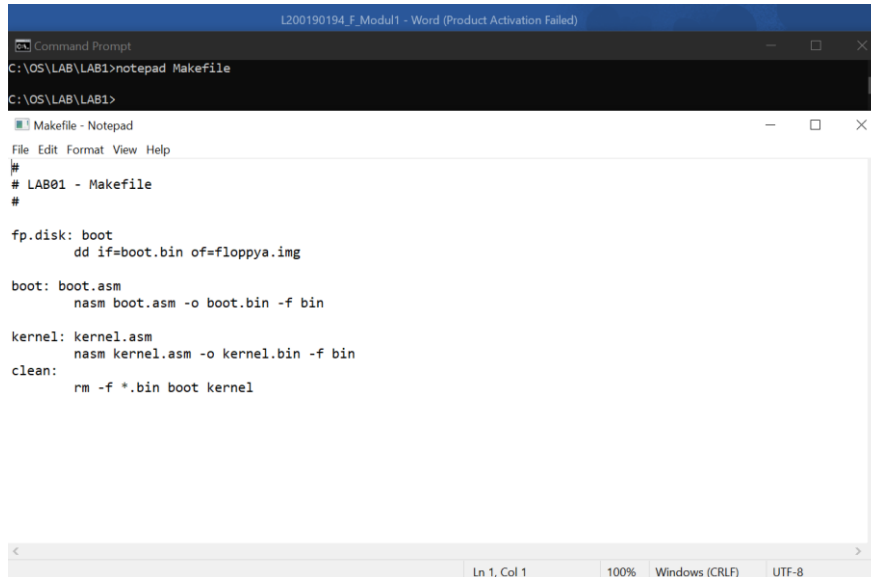
OEM_ID          db "QUASI-OS"
BytesPerSector   dw 0x0200
SectorsPerCluster dw 0x01
ReservedSectors  dw 0x0001
TotalFATs        db 0x02
MaxRootEntries   dw 0x00E0
TotalSectorsSmall dw 0x0B40
MediaDescriptor  db 0xF0
SectorsPerFAT    dw 0x0000

Ln 1, Col 1    100% Windows (CRLF) ANSI
```

Jangan lakukan modifikasi terhadap program diatas dan tutup kembali program 'notepad'-nya.

## Sekilas tentang Makefile

- a. Membuka file 'Makefile' dari 'Command Prompt' atau 'cmd' dari direktori 'C:\OS\LAB\LAB1' dengan cara ketikkan 'notepad m' dan tekan tombol 'Tab' hingga muncul 'notepad Makefile' lalu <ENTER>. Lalu akan muncul seperti gambar dibawah ini :



```
Command Prompt
C:\OS\LAB\LAB1>notepad Makefile
C:\OS\LAB\LAB1>

Makefile - Notepad
File Edit Format View Help
#
# LAB01 - Makefile
#

fp.disk: boot
    dd if=boot.bin of=floppya.img

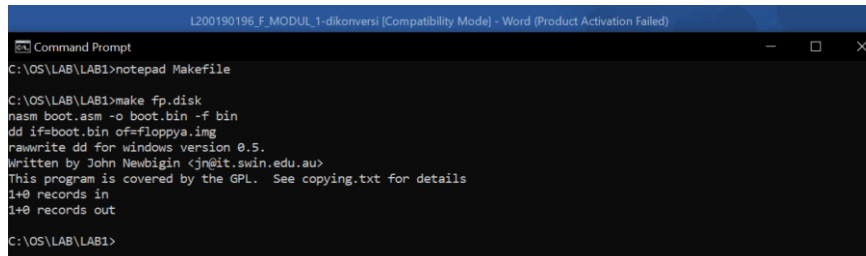
boot: boot.asm
    nasm boot.asm -o boot.bin -f bin

kernel: kernel.asm
    nasm kernel.asm -o kernel.bin -f bin

clean:
    rm -f *.bin boot kernel
```

Jangan memodifikasi isi file dan tutup program 'notepad'nya

- b. Kembali ke 'cmd', pada direktori 'C:\OS\LAB\LAB1' ketikkan 'make fp.disk' lalu <ENTER> untuk melakukan kompilasi terhadap source code program 'boot.asm', sebagai outputnya file 'boot.bin' dan isinya disalin ke dalam bootsector file image floppy 'floppya.img'.



```
Command Prompt
C:\OS\LAB\LAB1>notepad Makefile
C:\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.
Written by John Newbigin <jn@it.swin.edu.au>
This program is covered by the GPL. See copying.txt for details
1+0 records in
1+0 records out
C:\OS\LAB\LAB1>
```

## Mengenal 'BOOT DISK'

- a. Hapus file 'floppya.img' jika sudah ada pada direktori kerja dengan 'cmd'.

Ketik 'del floppya.img /P' <ENTER> lalu tekan 'Y' <ENTER>.

```
Command Prompt
C:\OS\LAB\LAB1>del floppya.img /p
C:\OS\LAB\LAB1>floppya.img, Delete (Y/N)? y
```

- b. Ketik 'dir' untuk memastikan bahwa file 'floppy.img' sudah terhapus.

```
Command Prompt
C:\OS\LAB\LAB1>del floppya.img /p
C:\OS\LAB\LAB1>floppya.img, Delete (Y/N)? y

C:\OS\LAB\LAB1>dir
Volume in drive C is OS
Volume Serial Number is 2A5E-2404

Directory of C:\OS\LAB\LAB1

28/09/2020  14:41    <DIR>          .
28/09/2020  14:41    <DIR>          ..
28/09/2020  14:07             10,215 bochsout.txt
15/12/2008  16:17             1,628 bochsarc.bxrc
14/12/2008  12:02             14,365 boot.asm
28/09/2020  14:38              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)            35,547 bytes
               2 Dir(s)  51,553,402,880 bytes free

C:\OS\LAB\LAB1>
```

- c. Jika sudah ketikkan 'bximage' untuk menampilkan window seperti dibawah.

```
Command Prompt - bximage
C:\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 $
=====

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

- d. Kita akan membuat floppy image, ketikkan 'fd' <ENTER>.

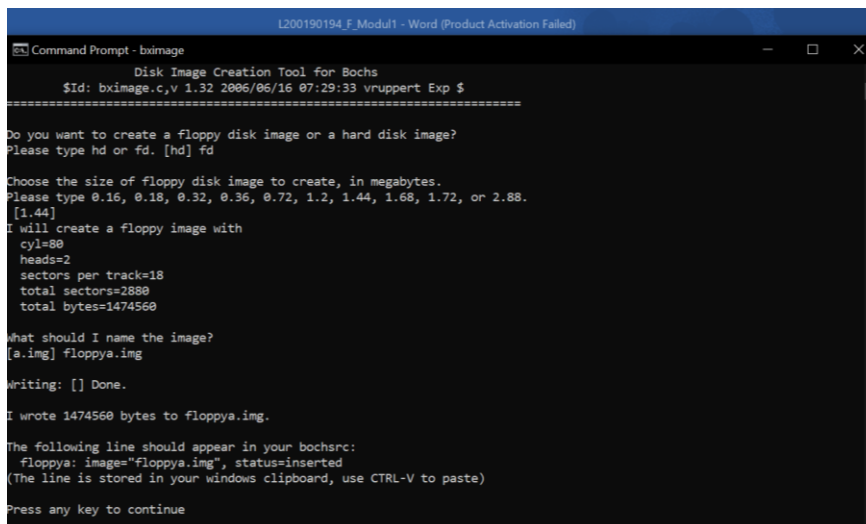
```
Command Prompt - bximage
C:\OS\LAB\LAB1>bximage

=====
bximage
Disk Image Creation Tool for Bochs
$Id: bximage.c,v 1.32 2006/06/16 07:29:33 vruppert Exp $
=====

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]
```

Tekan <ENTER> lalu ketikkan 'floppya.img' dan <ENTER>



```
Command Prompt - bimage
Disk Image Creation Tool for Bochs
$Id: bimage.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

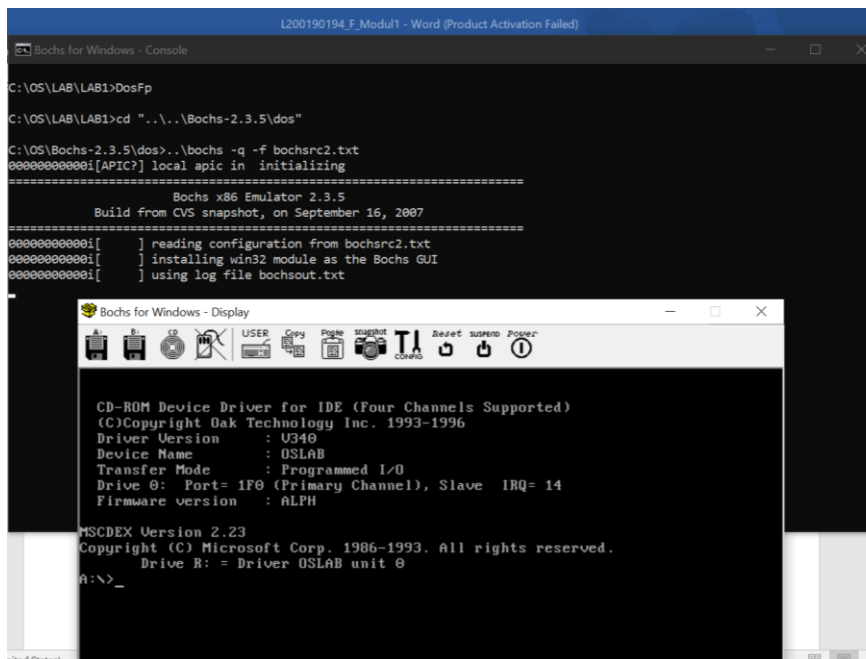
Writing: [] Done.

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
```

- e. Tekan keyboard bebas dan jalankan PC-Simulator dari 'Command Prompt' dengan perintah 'DosFp'<ENTER>. Dan akan muncul tampilan seperti ini

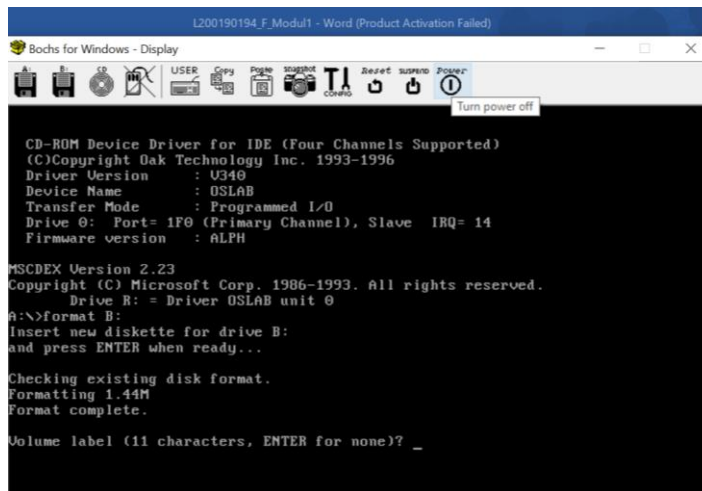


```
Bochs for Windows - Console
C:\OS\LAB\LAB1>DosFp
C:\OS\LAB\LAB1>cd "..\..\Bochs-2.3.5\dos"
C:\OS\Bochs-2.3.5\dos>..\bochs -q -f bochsrc2.txt
00000000000i[APIC?] local apic in initializing
=====
Bochs x86 Emulator 2.3.5
Build from CVS snapshot, on September 16, 2007
=====
00000000000i[ ] reading configuration from bochsrc2.txt
00000000000i[ ] installing win32 module as the Bochs GUI
00000000000i[ ] using log file bochsout.txt

Bochs for Windows - Display
CD-ROM Device Driver for IDE (Four Channels Supported)
(C)Copyright Oak Technology Inc. 1993-1996
Driver Version : V340
Device Name : OSLAB
Transfer Mode : Programmed I/O
Drive 0: Port= 1F0 (Primary Channel), Slave IRQ= 14
Firmware version : ALPH

MSCDEX Version 2.23
Copyright (C) Microsoft Corp. 1986-1993. All rights reserved.
Drive R: = Driver OSLAB unit 0
A:\>_
```

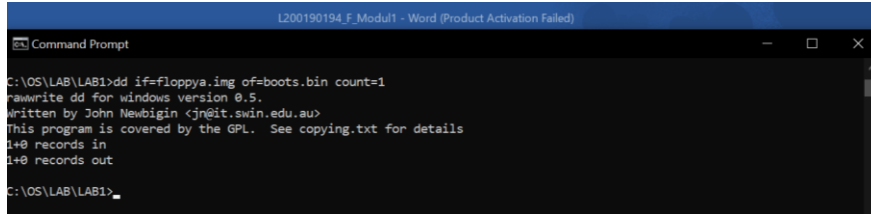
- f. Selanjutnya dari prompt 'A:\>' ketikkan 'format B:' <ENTER>[2x].



Lalu klik tombol power yang berada di kanan atas

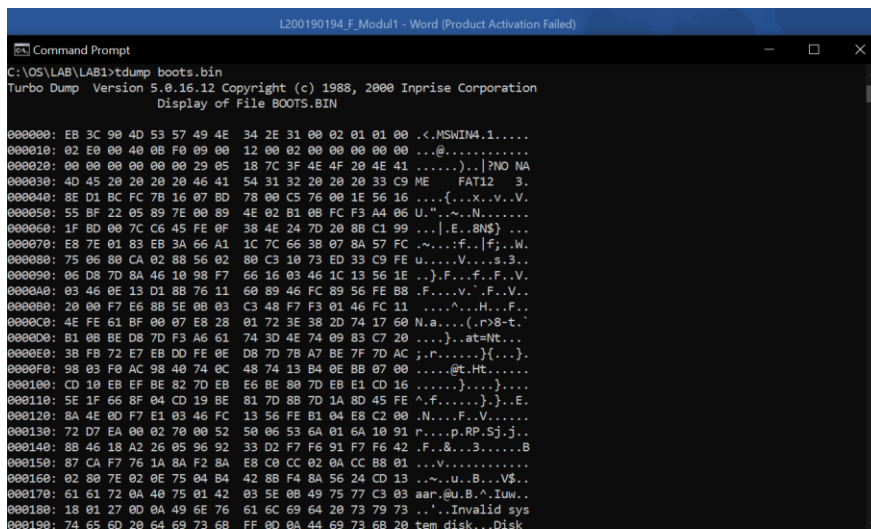
## Melihat data dalam boot sector

- Pada 'cmd' ketikkan 'dd if=floppya.img of=boots.bin count=1' <ENTER> untuk menyalin byte data dari 'floppya.img' ke dalam file 'boots.bin' sebanyak satu sektor mulai dari sektor 0.



```
L200190194.F_Modul1 - Word (Product Activation Failed)
Command Prompt
C:\OS\LAB\LAB1>dd if=floppya.img of=boots.bin count=1
rawwrite dd for windows version 0.5.
Written by John Newbigin <jn@it.swin.edu.au>
This program is covered by the GPL. See copying.txt for details
1+0 records in
1+0 records out
C:\OS\LAB\LAB1>
```

- Ketik 'tdump boots.bin' <ENTER>, akan muncul seperti ini.



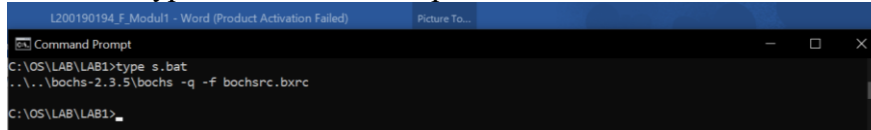
```
L200190194.F_Modul1 - Word (Product Activation Failed)
Command Prompt
C:\OS\LAB\LAB1>tdump boots.bin
Turbo Dump Version 5.0.16.12 Copyright (c) 1988, 2000 Inprise Corporation
Display of File BOOTS.BIN

000000: EB 3C 90 4D 53 57 49 4E 34 2E 31 00 02 01 01 00 .<.MSWIN4.1....
000010: 02 E0 00 40 08 F0 09 00 12 00 02 00 00 00 00 00 ...@.....
000020: 00 00 00 00 00 00 29 05 18 7C 3F 4E 4F 28 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 78 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 88 C1 99 ...|.E..8N$} ...
000070: E8 7E 01 83 EB 3A 66 A1 1C 7C 66 3B 07 8A 57 FC ...|.f...|f;|.W.
000080: 75 06 80 CA 02 88 56 02 80 C3 10 73 ED 33 C9 FE u....V....s.B.
000090: 06 D8 7D 8A 46 10 98 F7 66 16 03 46 1C 13 56 1E ...|.F...f...F.V.
0000A0: 03 46 0E 13 D1 8B 76 11 60 89 46 FC 89 56 FE B8 .F...v...F.V..
0000B0: 20 00 F7 E6 8B 5E 0B 03 C3 48 F7 F3 01 46 FC 11 ....^...H...F..
0000C0: 4E FE 61 BF 00 07 E8 28 01 72 3E 38 2D 74 17 60 N.a...(.r>8-t..
0000D0: B1 0B BE D8 7D F3 A6 61 74 3D 4E 74 09 83 C7 20 ...).at=Nt....
0000E0: 38 FB 72 E7 EB DD FE 0E D8 7D 7B A7 BE 7F 7D AC ;.r.....}{...
0000F0: 98 03 F0 AC 98 40 74 0C 48 74 13 B4 0E BB 07 00 ....@.Ht.....
000100: CD 10 EB EF BE 82 7D EB E6 BE 80 7D EB E1 CD 16 .....}.....
000110: 5E 1F 66 8F 04 CD 19 BE 81 7D 8B 7D 1A 8D 45 FE ^.f.....}.E.
000120: 8A 4E 0D F7 E1 03 46 FC 13 56 FE B1 04 E8 C2 00 .N....F.V.....
000130: 72 D7 EA 00 02 70 00 52 50 06 53 6A 01 6A 10 91 r....p.RP.Sj.j..
000140: 8B 46 18 A2 26 05 96 92 33 D2 F7 F6 91 F7 F6 42 .F.&...3.....B
000150: 87 CA F7 76 1A 8A F2 8A E8 C0 CC 02 0A CC B8 01 ...V.....
000160: 02 80 7E 02 0E 75 04 B4 42 8B F4 8A 56 24 CD 13 ...u..B...V$..
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 68 73 68 FF 0D 0A 44 69 73 68 70 tem disk...Disk
```



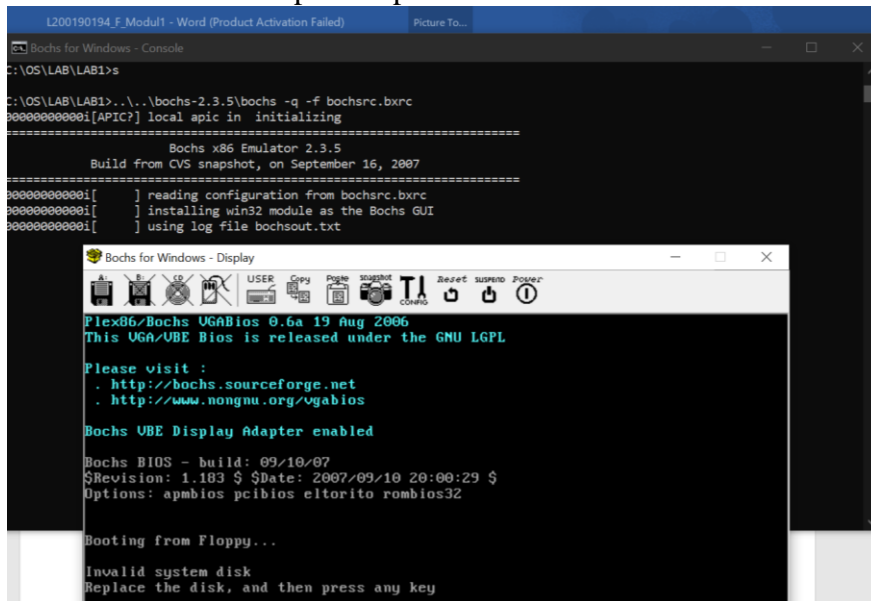
## ‘Boot’ PC-Simulator dengan file image ‘floppya.img’

- a. Ketikkan ‘type s.bat’ <ENTER> pada ‘cmd’.



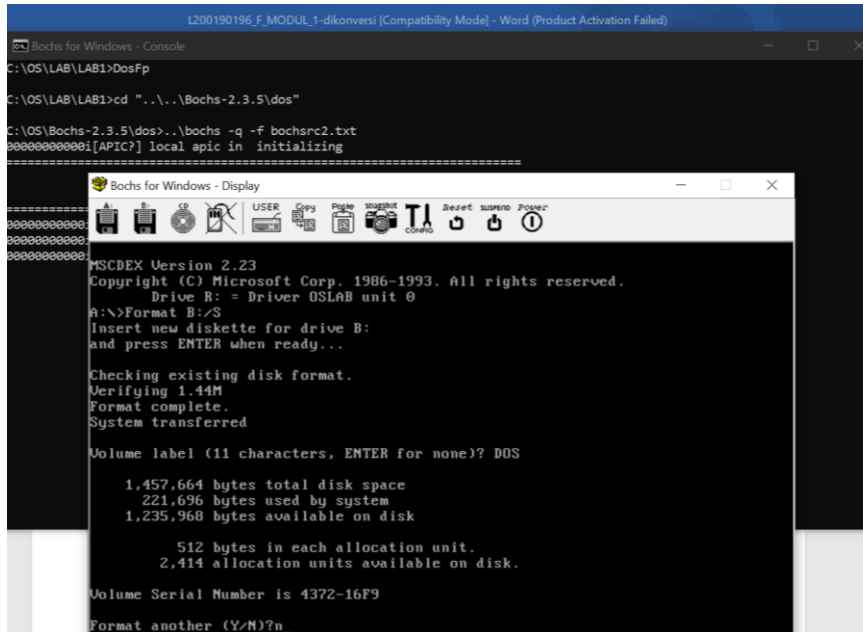
Selanjutnya ketik ‘s’ <ENTER> yang akan nampak seperti ini.

Lalu akan muncul tampilan seperti di bawah.

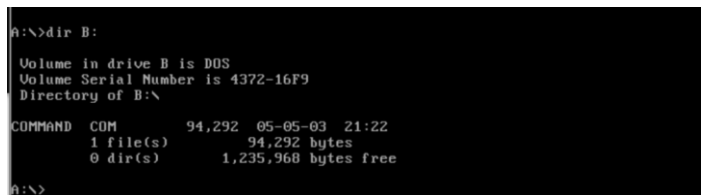


Hal diatas merupakan tampilan gagal booting karena ‘floppya.img’ belum terisi ‘system file’ atau ‘kernel’. Klik tombol power lalu panggil ‘DosFp’ dari ‘cmd’.

- b. Format ‘floppya.img’ dengan ketik ‘format B:/S’ <ENTER> pada ‘Boschs for Windows – Display’ direktori ‘A:|>’ dan beri nama jika perlu, contoh ‘DOS’.



- c. Pastikan bahwa floppy pada drive 'B:' terisi dengan 'system file' dengan ketikkan 'dir B:'.



- d. Matikan PC-Simulator dengan klik tombol power dan coba ketik 's' lalu <ENTER> pada 'cmd'. Jika berhasil akan seperti gambar di bawah.

