VauLSMorg

09 IBLS - I/O, BIOS, Loader, & Systemd
Aneka Soal Ujian Sistem Operasi
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1. **2016-1b**

   Diketahui sebuah disk dengan 100 silinder (0 - 99) menggunakan algoritma penjadwalan C-LOOK dengan antrian (queue) terpisah untuk "menulis" (W) dan "membaca" (R) sebagai berikut:

   - antrian "R":
     selama tidak kosong, hanya antrian ini yang akan dilayani (kecuali jumlah "W" tertentu).
   - antrian "W":
     hanya dilayani, jika antrian "R" kosong. Kecuali:
   - antrian "W" menumpuk lebih dari 10:
     maka antrian "R" harus menunggu hingga satu siklus C-LOOK penuh.
   - UP:
     Untuk pergerakan antar silinder (UP), diperlukan 1 unit waktu.
   - RETURN, RtoW, WtoR:
     Untuk balik (return), switch dari R ke W atau dari W ke R, diperlukan 5 unit waktu.
   - Sekali heads bergerak, permintaan baru tidak akan mengubah tujuan dari heads (hingga heads sampai tujuan).
   - Saat T=0, posisi heads pada silinder 0.
   - Abaikan "rotational latency".

   Permintaan akses sebagai berikut:

Time(t)	000	020	040	060	080	100	120	140	160	180	200
R	50	20	40	60	80	-	50	-	-	-	-
W	-	-	-	-	20	-	-	-	-	-	-

   Lengkapi table berikut (tersedia 2 baris contoh pengisian):

Silinder	Time	R-QUEUE	W-QUEUE	QUEUE	NEXT
00	000	50	-	R-QUEUE	UP
50	050	20:40	-	R-QUEUE	RETURN
Waktu Total					

2. **2016-2a**

This following is a part of script `/etc/init.d/sudo`:

```
### part of /etc/init.d/sudo
N=/etc/init.d/sudo
case "$1" in
   start)
      # make sure privileges don't persist across reboots
      if [ -d /var/lib/sudo ]
      then
         find /var/lib/sudo -exec touch -d @0 '{}' \;
      fi
      ;;
   stop|reload|restart|force-reload|status)
      ;;
   *)
      echo "Usage: $N {start|stop|restart|force-reload|status}" >&2
      exit 1
      ;;
esac
exit 0
```

Print the output when the system runs:

(a) `/etc/init.d/sudo stop`

(b) `/etc/init.d/sudo dodol`

3. **2016-2b**

Consider 24 disks (@ 1TB) in a RAID 6+1 formation: D01, D02, D03, D04,.... D23, D24.

(a) Draw the RAID 6+1 diagram! Do not forget to give proper labels to show the RAID6/RAID1 parts.

(b) What is that storage capacity (TB) of the RAID 6+1 above?

(c) What is the Read speed up?

(d) What is the Write speed up?

4. **2017-1a**

Circle or cross: "T" if True – "F" if False.

DISCLAIMER: These following are logical (not physical) numbers! Consider a disk with 10000 cylinders (cyl. 0 to 9999) and 2 surfaces. Each track has 100000 sectors. Each sector size is 1000 bytes. The spin rate is 6000 RPM (Revolutions Per Minute). A seek takes 1 milliseconds per cylinder moved. The initial disk head position is at cylinder 0. Assume that 1 GBytes = 1000 Mbytes = 1000000 KBytes = 1000000000 Bytes.

T / F The spin rate 6000 RPM is known in SI (Systeme Internationale) as 100 Hz.

T / F Each full disk rotation will take 10 ms.

T / F There will be 100 Mbytes data in each track.

T / F The maximum theoretical transfer rate will be 100 Mbytes/10 ms = 10 GBytes/ second.

T / F Each surfaces of that disk will have 5000 tracks.

T / F The total disk capacity will be 10000 GBytes.

5. **2017-1b**

Circle or cross: "T" if True – "F" if False.

T / F Unified Extensible Firmware Interface (UEFI) is the successor to BIOS (Basic Input/Output System).

T / F UEFI can prevent boot-time viruses from loading (secure boot).

T / F Both BIOS and UEFI support Master Boot Record (MBR) partitioning scheme.

T / F UEFI supports partitioning scheme that changes border of a homeland territory.

T / F UEFI is a specification. Therefore each implementation may be different.

T / F The POST (Power On Self Test) checks if the Operating System is ready to run.

T / F GRUB (GRand Unified Bootloader) is an operating system independent boot loader.

T / F There are 3 GRUB versions: GRUB 1, GRUB 1.5, and GRUB 2.

T / F Major Linux distributions are adopting "systemd".

T / F The task of "systemd" is much more than "init system" because it also handles device management, power management, mount points, cron, encryption, syslog, network config, etc.

6. **2017-2**

In the past, the (01) initializes and tests the PC hardware components, and loads a boot loader or an operating system from a mass memory device. (02) is the initial set of diagnostic tests performed by the computer right after it's powered on. (03) is a specification for a software program that connects a computer's firmware to its operating system. (04) is a special boot sector of a disk and located at cylinder 0, head 0, and sector 1. (05) allows for a nearly unlimited amount of partitions where each partition will have its own (06). (07) is a program which enables the user to select which installed operating system or kernel to load at system boot time. (08) is an init system used in Linux distributions to bootstrap the user space. (09) is a computer program which is held in non-volatile memory devices such as ROM, EPROM, or flash memory. (10) can be used for "memory to memory" copying or moving of data within memory.

[ ] BIOS = Basic Input Output System

[ ] DMA = Direct Memory Access

[ ] FIRMWARE

[ ] GPT = GUID Partition Table

[ ] GRUB = GNU GRand Unified Boot loader

[ ] GUID = Globally Unique Identifier

[ ] MBR = Master Boot Record

[ ] POST = Power On Self Test

[ ] SYSTEMD

[ ] UEFI = Unified Extensible Firmware Interface

7. **2018-1**

The two main jobs of a computer are (01) and (02). The two conflicting trends of I/O-device technology: on one hand, increasing (03) of software and hardware interfaces; on the other hand, increasingly (04) of I/O devices. If devices share a common set of wires, the shared connection is called a (05). Direct Media Interface is a link between the (06) and (07) on a computer (08). Serial Advanced Technology Attachment (SATA) is a (09) interface to connect mass storage devices such as (10) drives, (11) drives, and (12) drives. (13) channels can transfer data to and from devices with much less (14) overhead. A (15) is a memory area that stores data being transferred between devices. A (16) is a region of fast memory that holds copies of data. A (17) is a buffer that holds output for a device that cannot accept interleaved data streams (eg. a printer). (18) is a specification that defines a software interface between an operating system and platform firmware. A (19) (eg. (20)) is a program that loads an operating system into the memory.

Match the number of the sentence above with these following phrases:

[ ] boot loader	[ ] buffer	[ ] bus	[ ] bus	[ ] cache
[ ] CPU	[ ] DMA	[ ] GRUB	[ ] hard disk	[ ] I/O
[ ] motherboard	[ ] northbridge	[ ] optical	[ ] processing	[ ] solid-state
[ ] southbridge	[ ] spool	[ ] standardization	[ ] UEFI	[ ] variety

8. **2018-2**

(01) Nonvolatile Memory (NVM) Devices is frequently used in a disk-drive-like container, in which called a (02). Until today (2018), (03) are cheaper per megabyte than (04). (05) scheduling is generally used in NVMs, because NVMs do not contain (06). (07) provides access to storage across a network, whereas (08) is a private network connecting servers and storage units. (09) is a specification – therefore each (10) may be different. A (11) is performed immediately after a device is powered on. (12) is an operating system independent boot loader. (13) is a system and service manager for Linux operating systems. In the past, the (14) initializes and tests the PC hardware components, and loads a boot loader or an operating system from a mass memory device. (15) can be used for "memory to memory" copying or moving of data within memory. (16) allows for a nearly unlimited amount of partitions where each partition will have its own (17). Direct Media Interface is a link between the (18) and (19) on a computer (20).

Match the number of the sentence above with these following phrases:

[ ] BIOS	[ ] DMA	[ ] First Come First Served	[ ] Flash-memory-based	[ ] GPT
[ ] GRUB	[ ] GUID	[ ] Hard disk drives	[ ] implementation	[ ] motherboard
[ ] moving disk heads	[ ] NAS	[ ] northbridge	[ ] POST	[ ] SAN
[ ] solid-state disk	[ ] solid-state disk	[ ] southbridge	[ ] systemd	[ ] UEFI

9. **2019-1 (66%)**

Consider a disk with 10000 cylinders (cyl. 0 to 9999) and 2 surfaces. Each track has 10000 sectors. Each sector size is 2000 bytes. The spin rate is 6000 RPM (Revolutions Per Minute). A seek takes 1 milliseconds per cylinder moved. The initial disk head position is at cylinder 0, sector 0. Assume that 1 GBytes = 1000 Mbytes = 1000000 KBytes = 1000000000 Bytes.

(a) (60%) How many tracks are there on each surface?

(b) (88%) What is the capacity of a track (in MBytes)?

(c) (63%) What is the total capacity of the disk (in GBytes)?

(d) (75%) How long is one revolution (in ms)?

(e) (48%) What is the maximum theoretical transfer rate of the disk (in MB/s)?

10. **2019-2 (72.5%)**

DISCLAIMER: These following are logical (not physical) numbers! Consider a disk with 10000 cylinders (cyl. 0 to 9999) and 4 surfaces. Each track has 10000 sectors. Each sector size is 1000 bytes. The spin rate is 6000 RPM (Revolutions Per Minute). Assume that 1 Tbytes = 1000 GBytes = 1000000 Mbytes, etc.

(a) (83%) Each surface of the disk will have _____ tracks.

(b) (74%) The spin rate 6000 RPM is known in SI (Systeme Internationale) as _____ Hz.

(c) (83%) Each full disk rotation will take _____ ms.

(d) (96%) There will be _____ Mbytes data in each track.

(e) (61%) The maximum theoretical transfer rate will be _____ GBytes/ second.

(f) (45%) There will be _____ Mbytes data in each cylinder.

(g) (67%) The total disk capacity will be _____ GBytes.