

VE482 Homework 1

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Ex. 1 — Revisions

Ex. 2 — Personal Research

1. When the computer is powered on, the CPU executed a program contained in ROM (like BIOS) at a predefined address. The program (BIOS as example) searches for devices installed on the computer and loads them and tries a power-on self-test. If no error occurs, it locate boot loader software held on a storage device. It loads and executes the first boot software (often an OS) it finds, giving it control of the PC. The role of BIOS is a bridge between the PC and the operating system.
2. Hybrid kernels combine micro kernels and monolithic kernels.
Exo kernels are small and give more direct access to the hardware.

Ex. 3 — Course application

1. a) Disable all interrupts should only be allowed in kernel mode because the process of interrupt is in kernel mode.
b) Read the time-of-day clock should only be allowed in kernel mode because it needs I/O with the hardware (CMOS).
c) Set the time-of-day clock should only be allowed in kernel mode because it needs I/O with the hardware (CMOS).
d) Change the memory map should only be allowed in kernel mode because memory management is in kernel mode.
2. Since there are four logic cores in the system, three programs can be executed in parallel, 20 ms is needed.

Ex. 4 — Simple problem

The RAM needed to support a 25 lines by 80 rows character monochrome text screen is $25 \times 80 / 8 = 250$ B. It costs $250 \times 5 / 1024 = \$1.22$.

The RAM needed to support a 1024 x 768 pixel 24-bit color bitmap is $1024 \times 768 \times 24 / 8 = 2304$ KB. It costs $2304 \times 5 = \$11570$.

Now the cost if RAM is about \$10/ GB.

Ex. 5 — Command lines on a Unix system

```
1  # 1. Create a new user
2  useradd newuser
3  # 2. List all the currently running processes
4  ps -e
5  # 3. Display the characteristics of the CPU and the available memory
6  top
7  # 4. Redirect some random output into two different files
8  cat /dev/urandom | head -n 10 | tee 1.txt > 2.txt
9  # 5. Concatenate the two previous files
10 cat 1.txt 2.txt > 3.txt
11 # 6. Read the content of the resulting file as hexadecimal values (in other words
    ↳ find a command to read a file as hexadecimal values)
12 od -t x 3.txt
13 # 7. Use a single command to find all the files in /usr/src with the word
    ↳ semaphore in their name and containing the word ddekit sem down
14 grep -lwr --include='*semaphore*' 'ddekit_sem_down' /usr/src
```

The shell file is named “ex5/ex5.sh”.