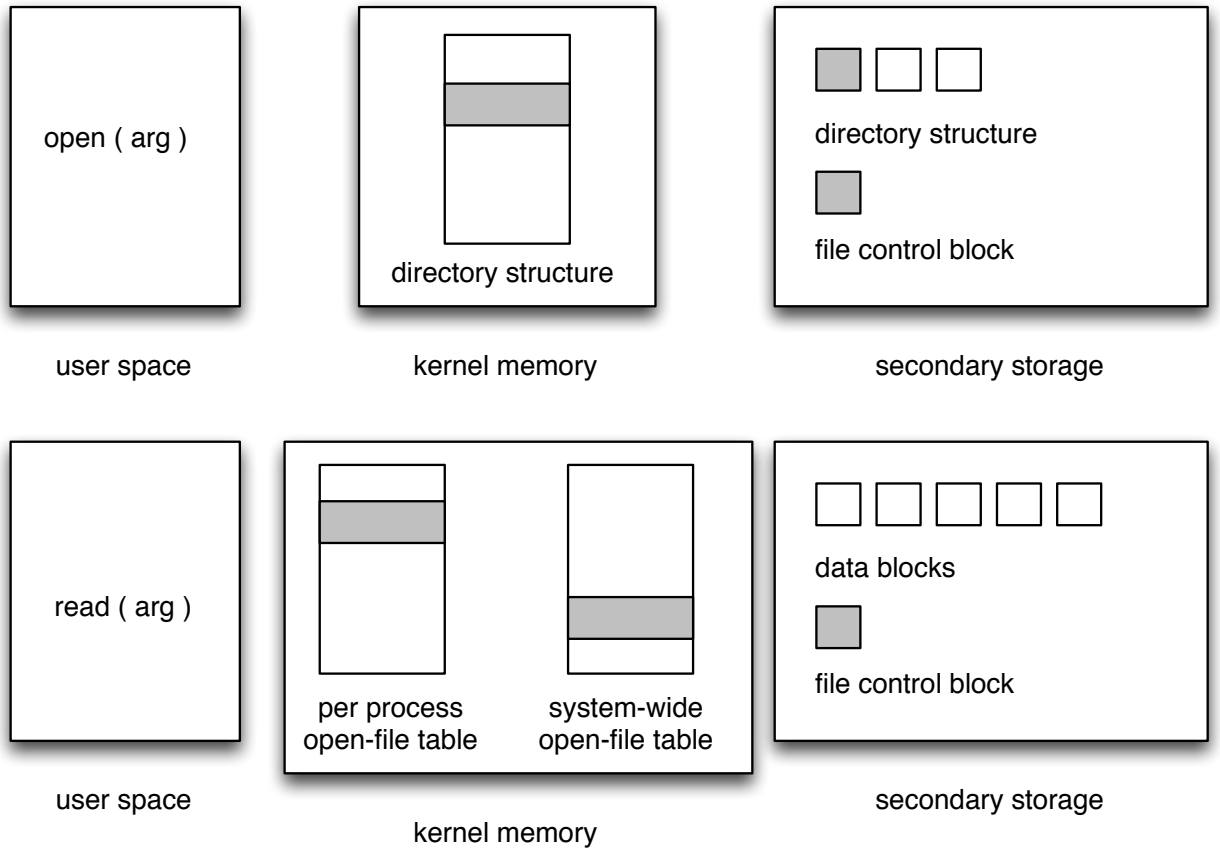
CSCI 315 Operating Systems Design
Fall 2014 - Prof. Felipe Perrone
Activity 22

This work is for individual write up, but you should work collaborative with other students in class.

1) Construct narratives to explain what the OS goes through when you use the system calls such `open(2)` and `read(2)`. Use the figure below to indicate any constructs that are created in user space, kernel memory, and secondary storage. Make sure to indicate how they might be connected to one another.

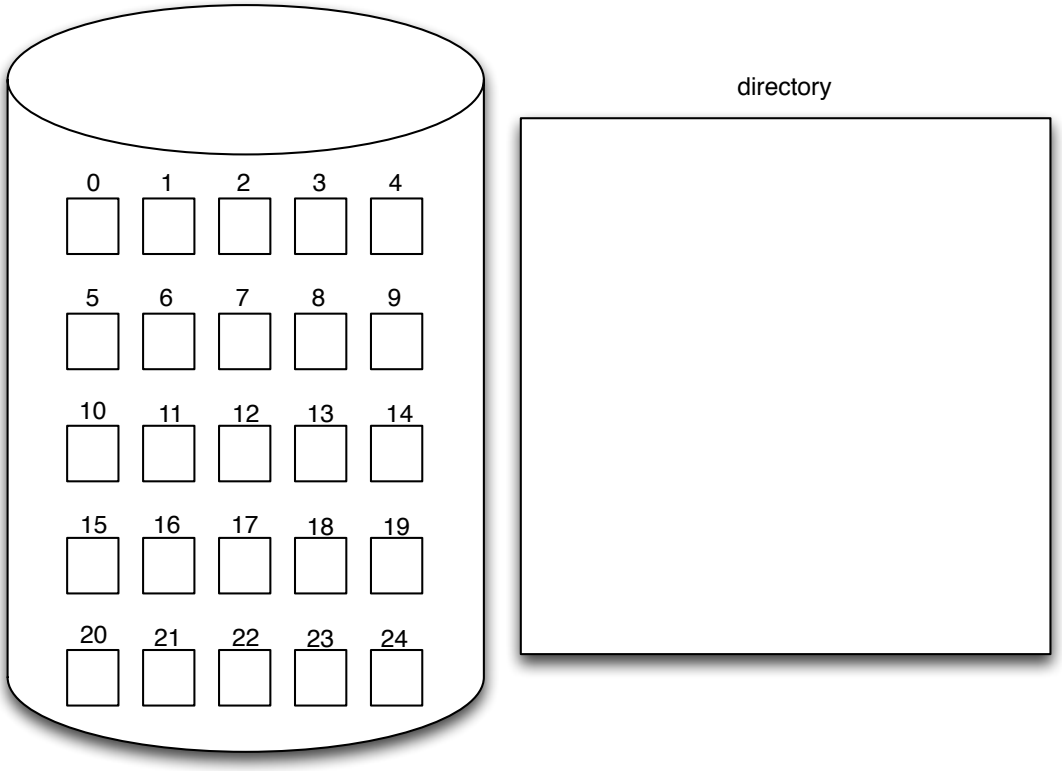


In your narrative, present the sequence of events that take place in the course of the system call, indicate the data types of the arguments passed in through their APIs, and explain how the values of these arguments facilitate the OS' operations in the data structures above.

2) Justify the need and/or the usefulness of two levels of open-file tables: one for each process and one for the whole system.

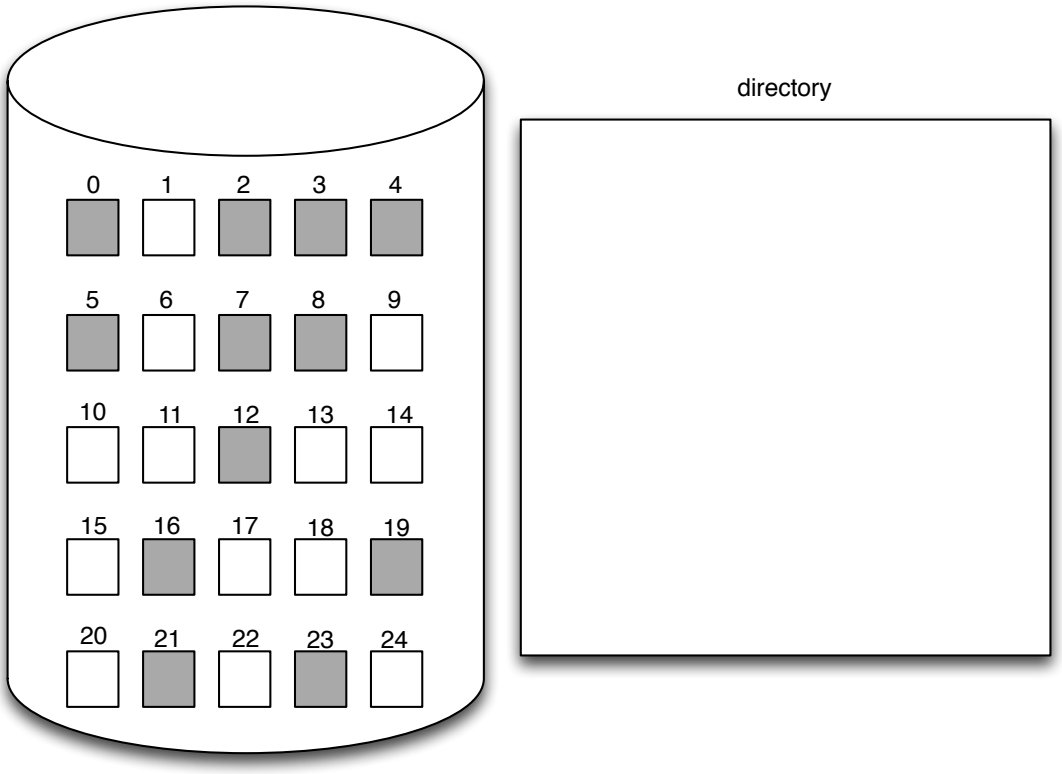
3) Justify the need for having directory structures both in disk and in secondary storage. Is that wasteful or useful?

4) Consider a system in which disk space is allocated in **physically *contiguous* blocks**. Indicate in the figure what the directory structure should look like for this type of system (hint: it's like a table, but you must identify what is in each one of its lines and columns). Build the directory to indicate two files as follows: a file called **`.bashrc`** with two blocks, a file called **`data`** with 6 blocks.



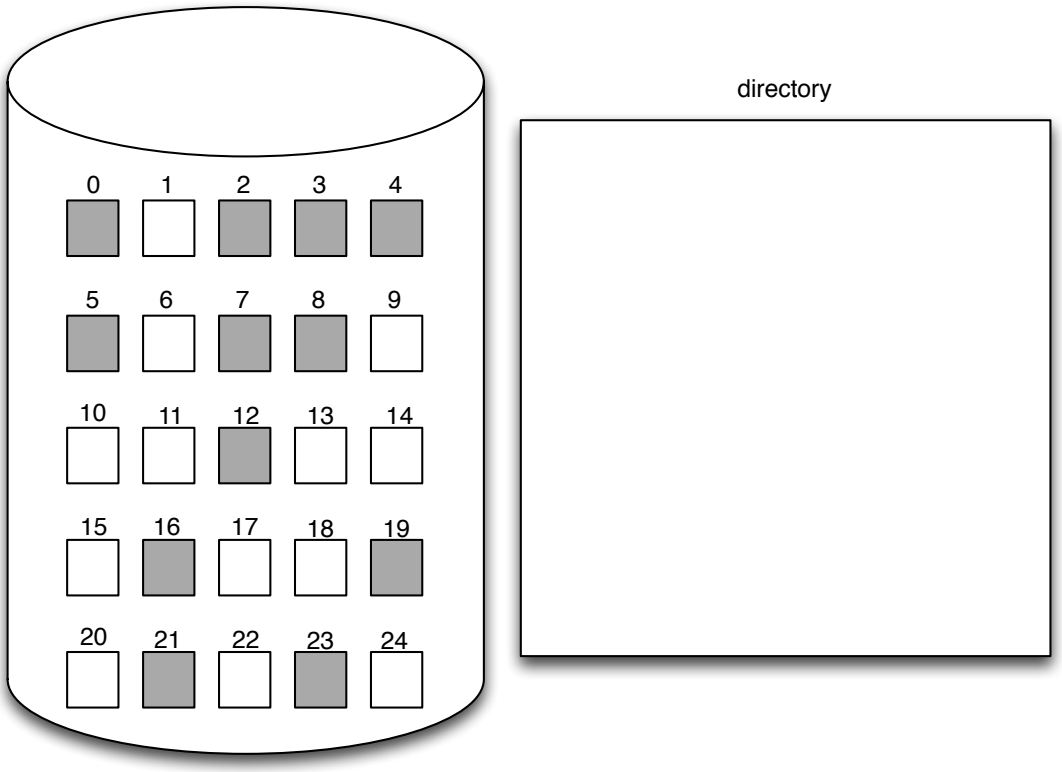
5) Identify what kind of advantages and disadvantages might come from **contiguous allocation**. (Think how well or unwell this scheme supports sequental and random file access.

6) Consider a system in which directories are organized with **linked allocation**. Indicate in the figure below what the directory structure should look like for this type of system. Build the directory to indicate two files as follows: a file called **`.bashrc`** with two blocks, a file called **`data`** with six blocks. Assume that all the shaded disk blocks are already allocated to other files. Make sure to indicate, in one of the diagrams below, any "additional" data structures that your directory organization might need.



7) Identify what kind of advantages and disadvantages might come from **linked allocation**. (Think how well or unwell this scheme supports sequental and random file access.

8) Consider a system in which directories are organized with **indexed allocation**. Indicate in the figure what the directory structure should look like for this type of system. Build the directory to indicate two files as follows: a file called **`.bashrc`** with two blocks, a file called **`data`** with six blocks. Assume that all the shaded disk blocks are already allocated to other files. Make sure to indicate, in one of the diagrams below, any "additional" data structures that your directory organization might need.



9) Identify what kind of advantages and disadvantages might come from **indexed allocation**. (Think how well or unwell this scheme supports sequental and random file access.

10) How does the ***FAT allocation scheme*** relate to *linked* and *indexed* allocation? Are there any benefits to random-access with this scheme?

11) So far, our exercizes have only covered *allocation* methods, but we need to consider also how we could keep track of the free space in secondary storate. Present **five** methods for free-space management and indicate their strengths and weaknesses.

12) Identify the cause(s) of **consistency problems** in the file system.

13) Describe an OS mechanism to check the consistency of a volume.