1)   Disk scheduling
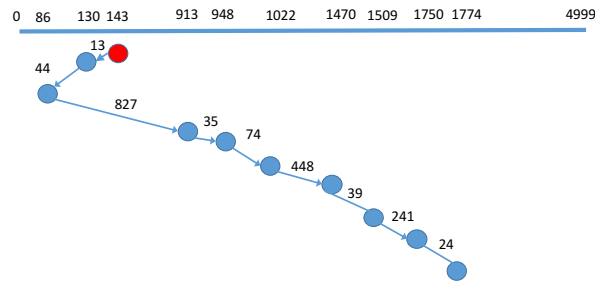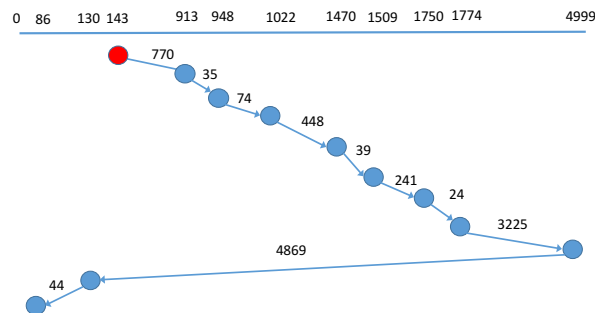
a)

FCFS: 7081
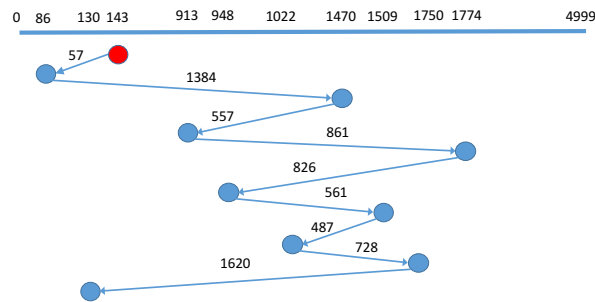
b)

SSTF: 1745

c)

SCAN: 9769

d)

C-SCAN: 4986

e)

C-LOOK: 1675
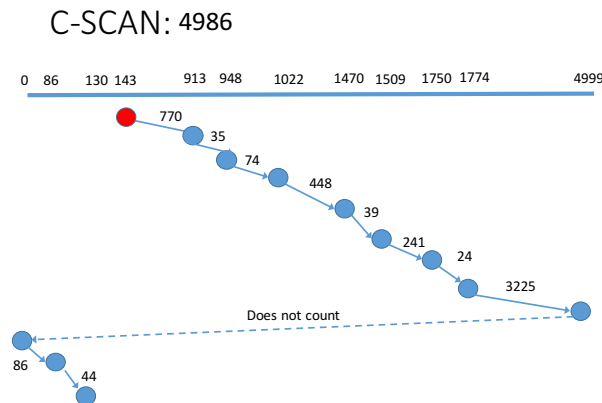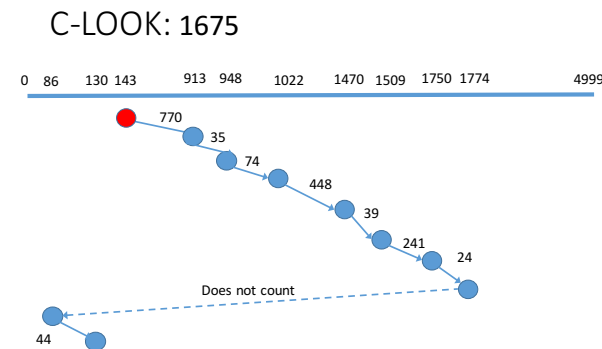

2) Read-ahead and caching using fadvise

- FADV_RANDOM : Applications that perform random accesses to a file (read-ahead and caching undesirable). For example, a text editor.
- FADV_SEQUENTIAL : Applications that perform sequential accesses to a file (read-ahead desirable). For example, a video player.
- FADV_WILLNEED : Applications which use portions of the same file multiple times (caching desirable). For example, a database index.
- FADV_DONTNEED : Applications which do not expect to use the data after writing (write-back desirable). For example, a logging or backup application.

3) Direct I/O

a) Direct I/O performs only one copy (disk to user space buffer) as opposed to two (disk to file buffer cache + file buffer cache to user space). However, Direct I/O cannot benefit from read-ahead or caching.

b) For example, databases manage data caching at the application level, so they do not need the file system to implement this service for them. Using the file buffer cache would add CPU and memory overhead due to double copying.