

2003 Paper 1 Question 11

Operating Systems

(a) Describe, with the aid of diagrams where appropriate, how Unix implements and manages:

(i) a hierarchical name space for files; [2 marks]

(ii) allocation of storage on disk; [2 marks]

(iii) file-system and file meta-data; [8 marks]

(iv) pipes. [4 marks]

(b) A system administrator decides to make a ‘versioned’ file-system in which there are a number of directories called `/root-dd-mm-yyyy`, each of which holds a copy of the file-system on day `dd`, month `mm` and year `yyyy`. The idea is that at any particular time only the most recent snapshot will be used as the ‘real’ filesystem root, but that all previous snapshots will be available by explicitly accessing the directory in question. In this way the system administrator hopes to allow resilience to mistaken edits or unintentional deletions by users, or to hardware problems such as a disk head crash.

To implement this, the system administrator arranges for a program to run every morning at 01:00 which recursively ‘copies’ the current snapshot to the new one. However to save disk space, hardlinks are used in place of actual copies. Once the ‘copy’ is complete, the new snapshot is used as the new root.

To what extent will this scheme provide the functionality the system administrator hopes for? What advantages and disadvantages does it have?

[4 marks]