IT2164/IT2561 Operating Systems

**Tutorial 10**

**File Management**

Attempt the following questions before you attend tutorial.

1. What are the THREE types of disk allocation methods? For each, list the advantages and disadvantages.
2. Contiguous allocation

Advantages

* Easy to implement
* Support fast sequential and direct access
* Minimal disk seek time

Disadvantages

* Suffers from external fragmentation
* Difficult to manage files without knowledge of file size or if file size changes frequently

1. Indexed allocation

Advantages

* Supports efficient direct access
* No external fragmentation
* No need to declare file size, file size can grow as long as there is space

Disadvantages

* Extra space required for index block
* Index block may be wasted for small files
* Suffers from internal fragmentation (for fixed-size blocks)

1. List allocation

Advantages

* Disk space need not be contiguous
* No external fragmentation
* No need to declare file size, file size can grow as long as there is space

Disadvantages

* Inefficient for direct access
* Extra space required for pointer
* Suffers from reliability problem if one of the pointers is corrupted
* Suffers from internal fragmentation

1. Suppose a UNIX disk block will hold 2048 disk addresses and a block is of size 4KB. Given that a UNIX disk block has 12 direct pointers, and one pointer for each of the single, double and triple indirect pointer blocks, calculate the following :
   1. the maximum-sized file using only direct pointers;

12 blocks x 4KB/block = 48KB

* 1. the maximum-sized file using direct and single-indirect pointer capability;

Direct data=48 KB

Single indirect data=2048×4 KB=8 MB

Total:

48 KB+8 MB=8.048 MB

(iii)the maximum-sized file using the above plus double-indirect pointer

Double indirect data=2048×2048×4 KB=4 GB

Total:

48 KB+8 MB+4 GB=4.008 GB

capability;

* 1. the maximum-sized file using the above plus triple-indirect pointer capability.

Triple indirect data=2048×2048×2048×4 KB=8 TB

Total:

48 KB+8 MB+4 GB+8 TB=8.004 TB

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