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FACULTY OF ENGINEERING & TECHNOLOGY

BCS-501 Operating System

Lecturer-38

Manisha Verma
Assistant Professor
Computer Science & Engineering

Allocation Methods

Allocation Methods-Indexed

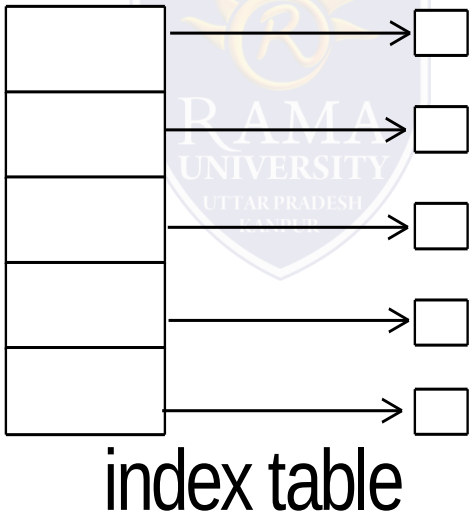
Example of Indexed Allocation

Free-Space Management

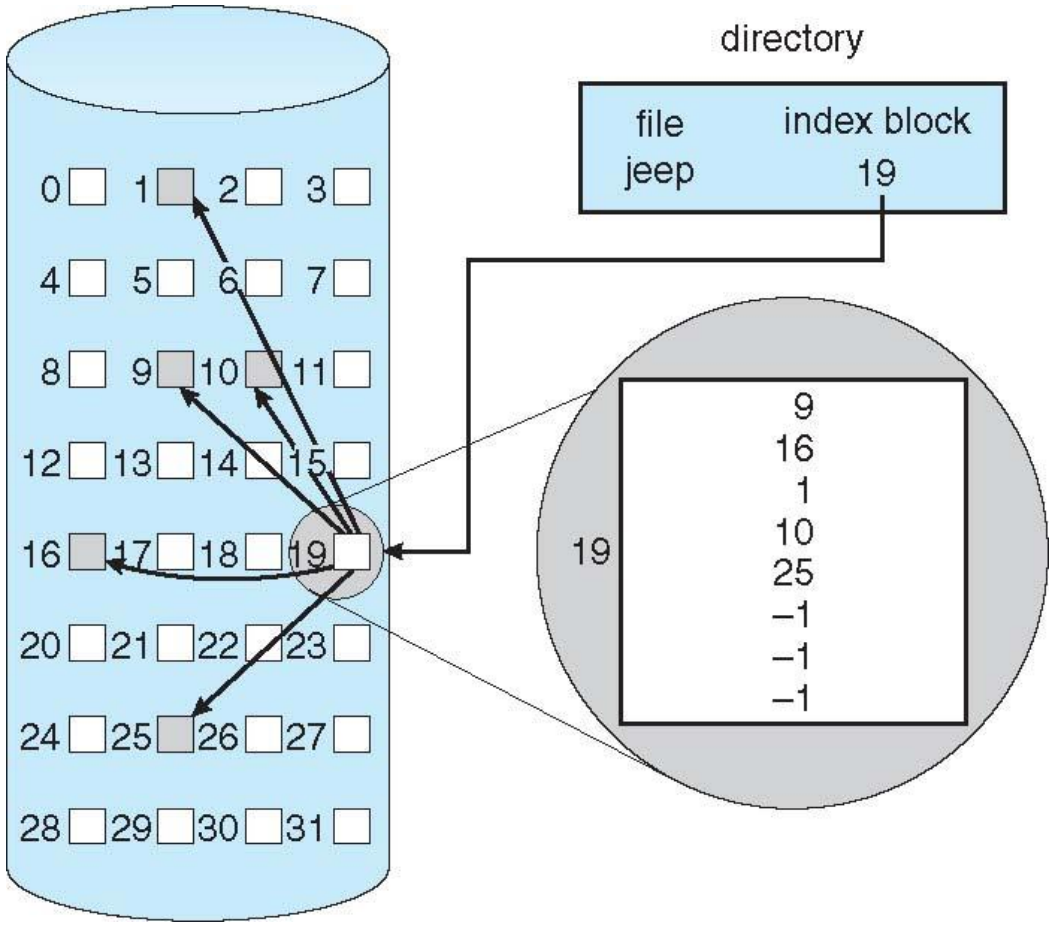
Allocation Methods-Indexed

- Indexed allocation
  - Each file has its own index block(s) of pointers to its data blocks

- Logical view



Example of Indexed Allocation



Indexed Allocation (Cont.)

•Need index table

•Random access

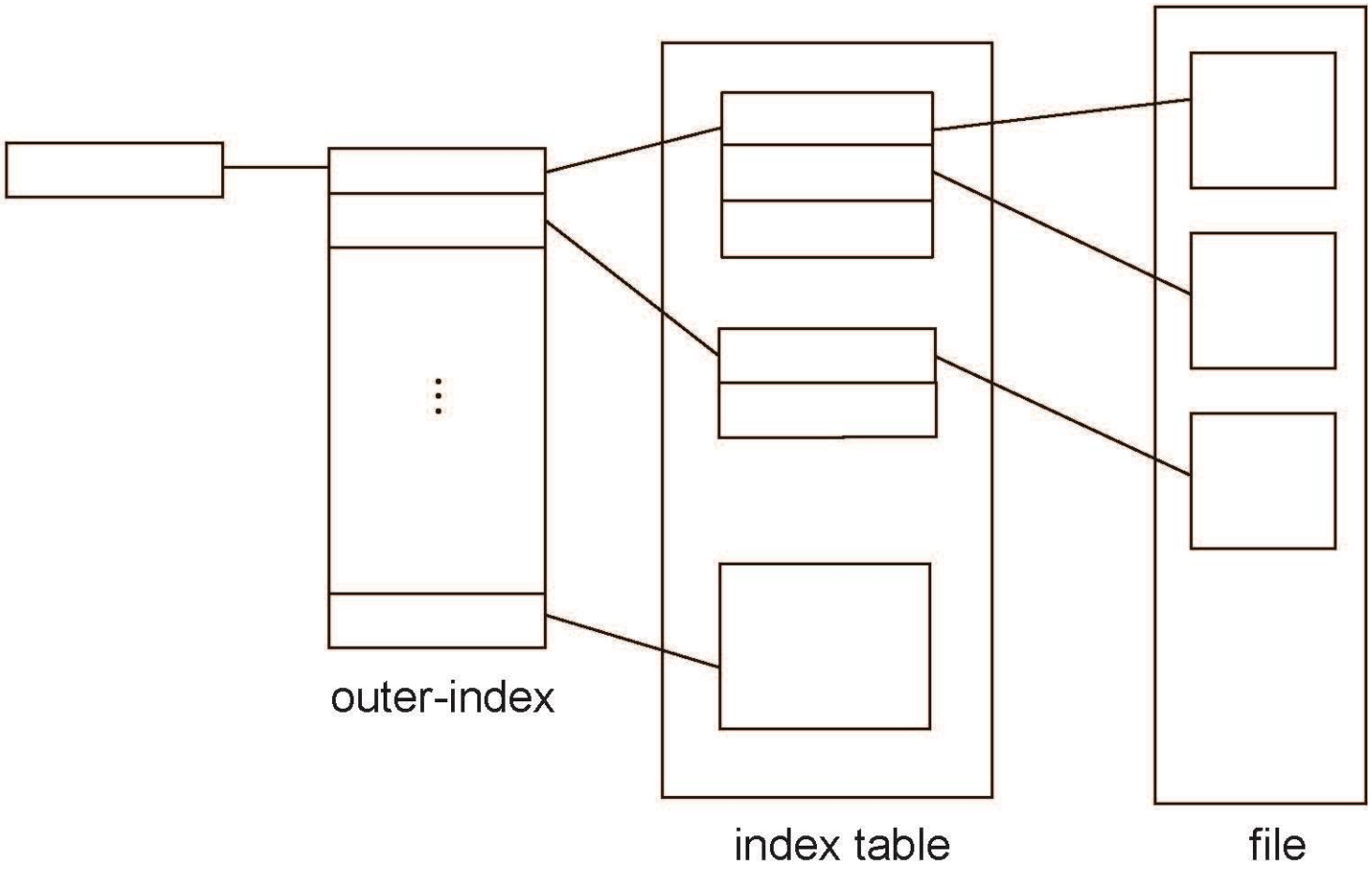
•Dynamic access without external fragmentation, but have overhead of index block

•Mapping from logical to physical in a file of maximum size of 256K bytes and block size of 512 bytes. We need on ly 1 block for index table

•Mapping from logical to physical in a file of unbounded length (block size of 512 words)

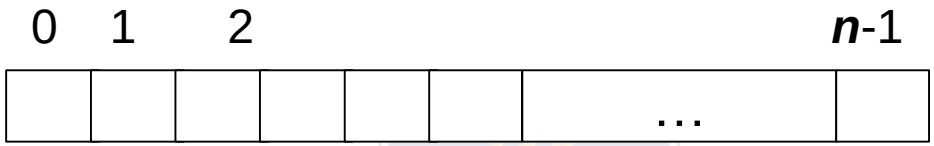
•Linked scheme – Link blocks of index table (no limit on size)
•Two-level index (4K blocks could store 1,024 four-byte pointers in outer index -> 1,048,567 data blocks and file siz e of up to 4GB)

Indexed Allocation – Mapping (Cont.)



Free-Space Management

File system maintains free-space list to track available blocks/clusters
(Using term “block” for simplicity)
Bit vector or **bit map** (***n*** blocks)



bit[i] =32

1 ⇒ block[***i***] free

0 ⇒ block[***i***] occupied

Block number calculation:-
(number of bits per word) *(number of 0-value words) +
offset of first 1 bit

CPUs have instructions to return offset within word of first “1” bit

continue…

Bit map requires extra space

Example:

block size = 4KB = 2^{12} bytes
disk size = 2^{40} bytes (1 terabyte)
n = $2^{40}/2^{12} = 2^{28}$ bits (or 32MB)
if clusters of 4 blocks -> 8MB of memory

Easy to get contiguous files.

MCQ

The three major methods of allocating disk space that are in wide use are _____

A. contiguous
B. linked
C. Indexed
D. all of the mentioned

In contiguous allocation _____

A. each file must occupy a set of contiguous blocks on the disk
B. each file is a linked list of disk blocks
C. all the pointers to scattered blocks are placed together in one location
D. none of the mentioned

In linked allocation _____

A. each file must occupy a set of contiguous blocks on the disk
B. each file is a linked list of disk blocks
C. call the pointers to scattered blocks are placed together in one location
D. none of the mentioned

On systems where there are multiple operating system, the decision to load a particular one is done by _____

A. boot loader
B. bootstrap
C. process control block
D. file control block

In indexed allocation _____

A. each file must occupy a set of contiguous blocks on the disk
B. each file is a linked list of disk blocks
C. all the pointers to scattered blocks are placed together in one location
D. none of the mentioned