CSE3241: Operating System and System Programming

Class-23

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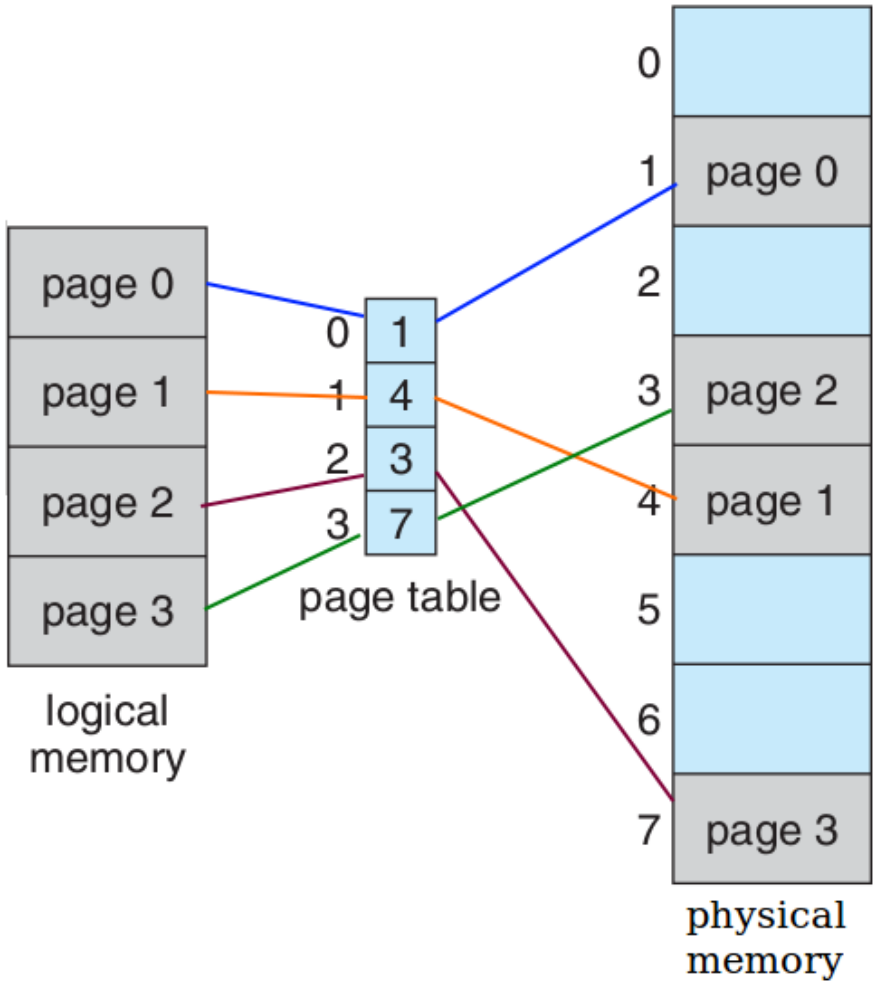
Structure of the Page Table

- Some page tables are:
  1. One-Level Page Table
  2. Hierarchical Page Table
  3. Inverted Page Table
  4. Hashed Page Table

- For a large logical address space, One-level page table becomes excessively large.

- Logical Memory: 4GB
  - Page: 4KB
    - Page Table: 1MB
  - Page: 4B
    - Page Table: 4MB

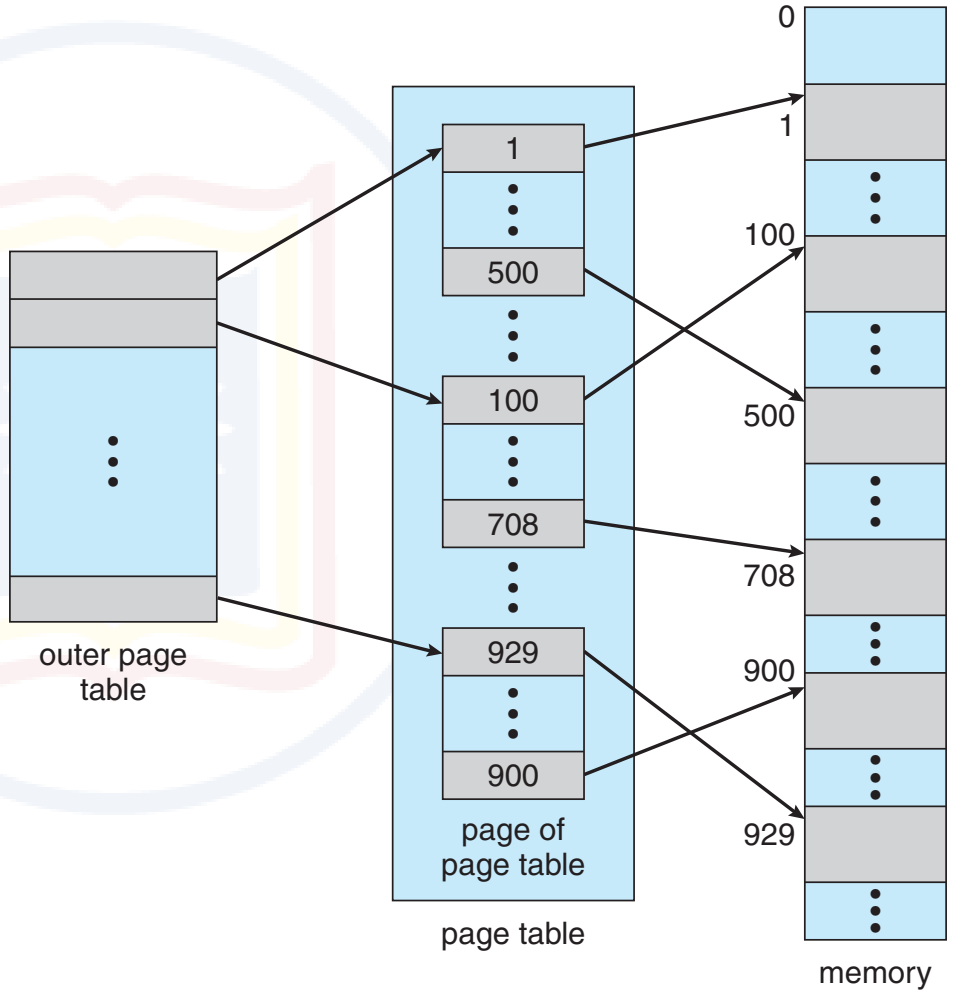
One-level Page-Table



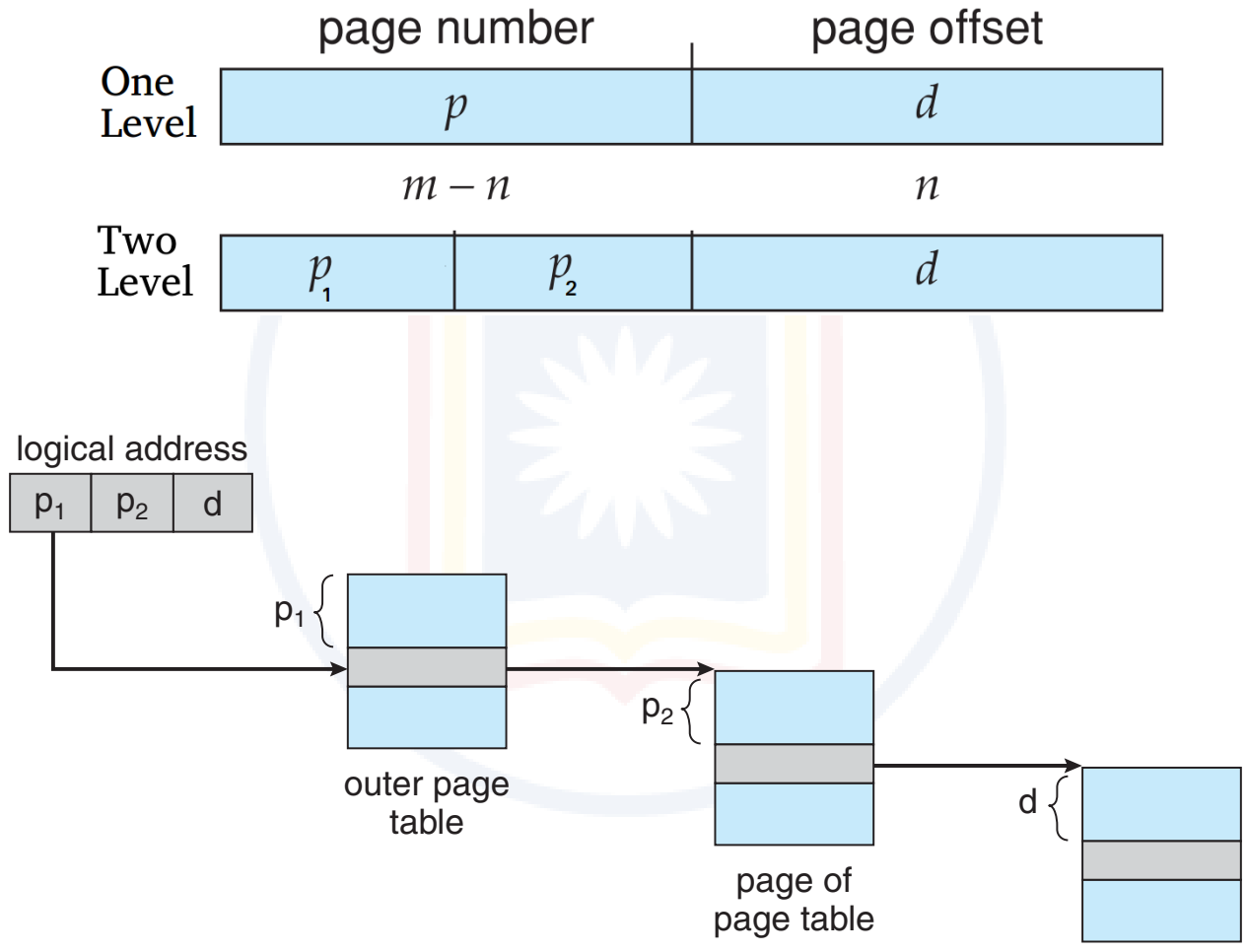
Hierarchical Paging [1]

- The page table is paged (i.e. divided).
  - There are multiple page tables.
  - One page table is for keeping information about frames.
  - Other page table(s) are for keeping information about pages of other page table.
- Also known as a forward-mapped page table.
- Example: Two-level page table.

Two-level Page Table

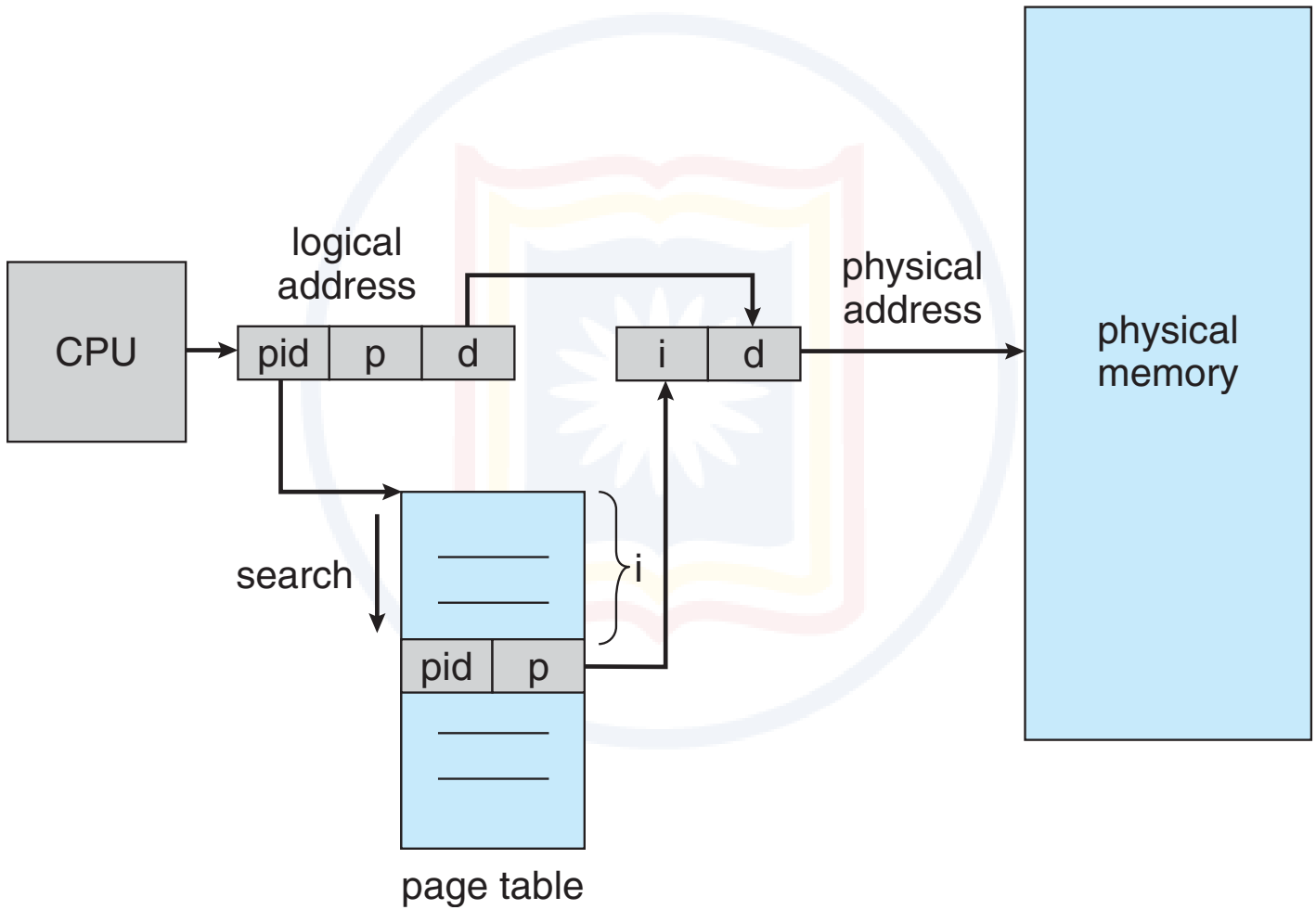


Address Translation for a Two-Level Page Table [1]



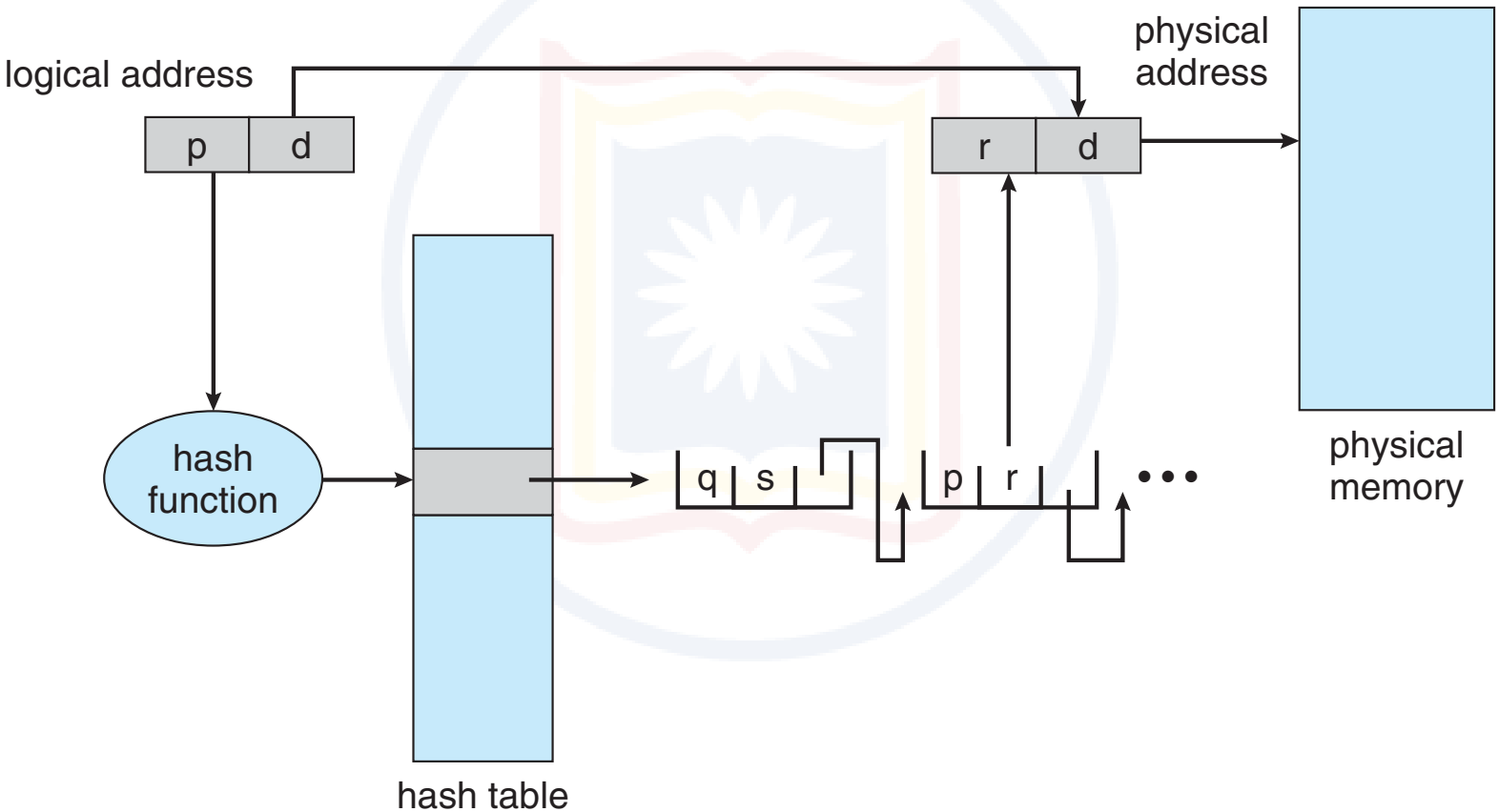
Inverted Page Table [1]

- Logical address contains: PID, p, d.



Hashed Page Table [1]

- Each entry in the hash table contains a linked-list of elements.
- Each element consists of: p, f, pointer to the next element.



References


P. B. Galvin A. Silbeschatz and G. Gagne.
Operating System Concepts.
John Wiley & Sons, 9 edition, 2012.