Practical MySQL

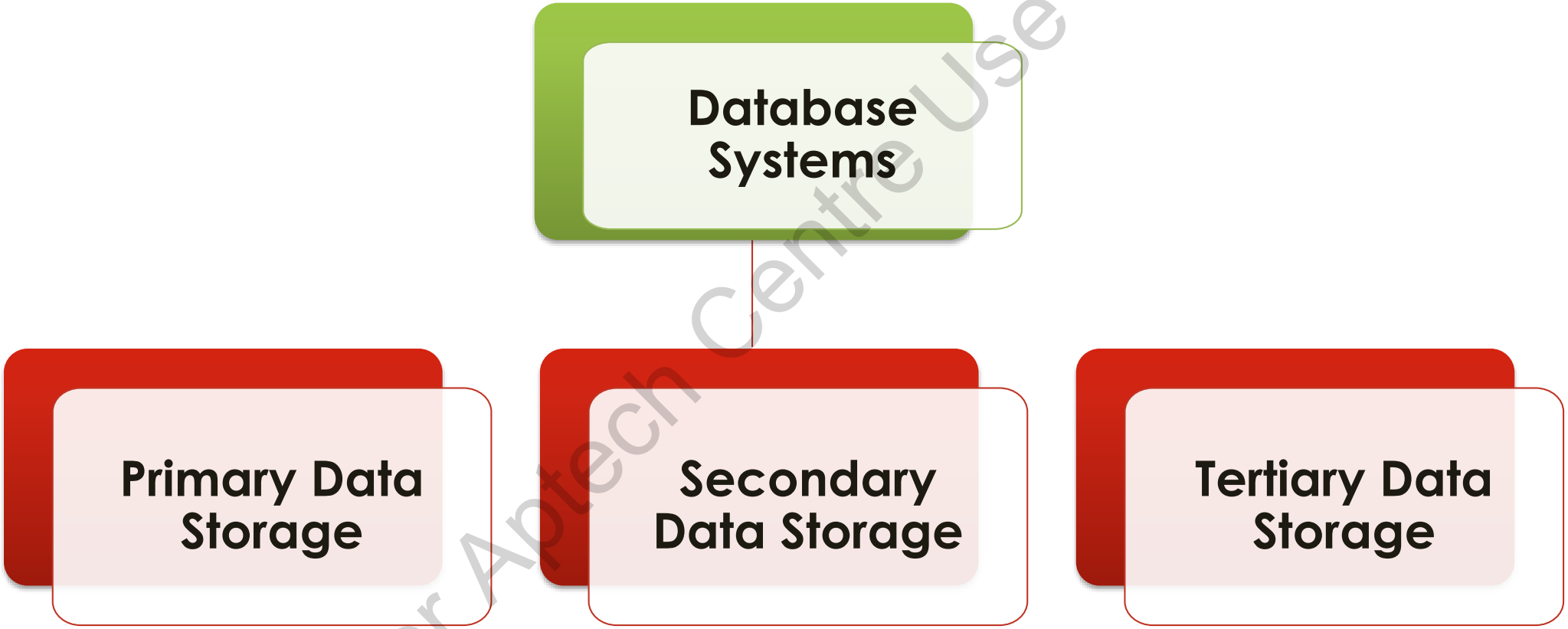
Session 12

Concept of Storage System and Management

Session Overview

- Outline the types of data storage
- Explain different types of storage
- Describe demand paging and thrashing
- Explain process management in DBMS
- Define paging and segmentation

Storage Systems in DBMS



Primary Data Storage

Main Memory

- Main memory is used to operate the data available by the storage medium. It handles the instructions of the machine.
- This is capable to handle gigabytes of data. However, it is small to carry the large database.

Cache

- Cache is the costliest and smallest storage media maintained by computer hardware.

Secondary Data Storage

Memory devices or Flash Memory	It is used to store data in USB keys that can be plugged into the USB. It is possible to retrieve the data lost during a power cut or system crash if it is stored in USB.
Magnetic disk	It is an online storage media that is used to store data for a longer period. In this type of storage, the user can store the entire database.

Tertiary Data Storage

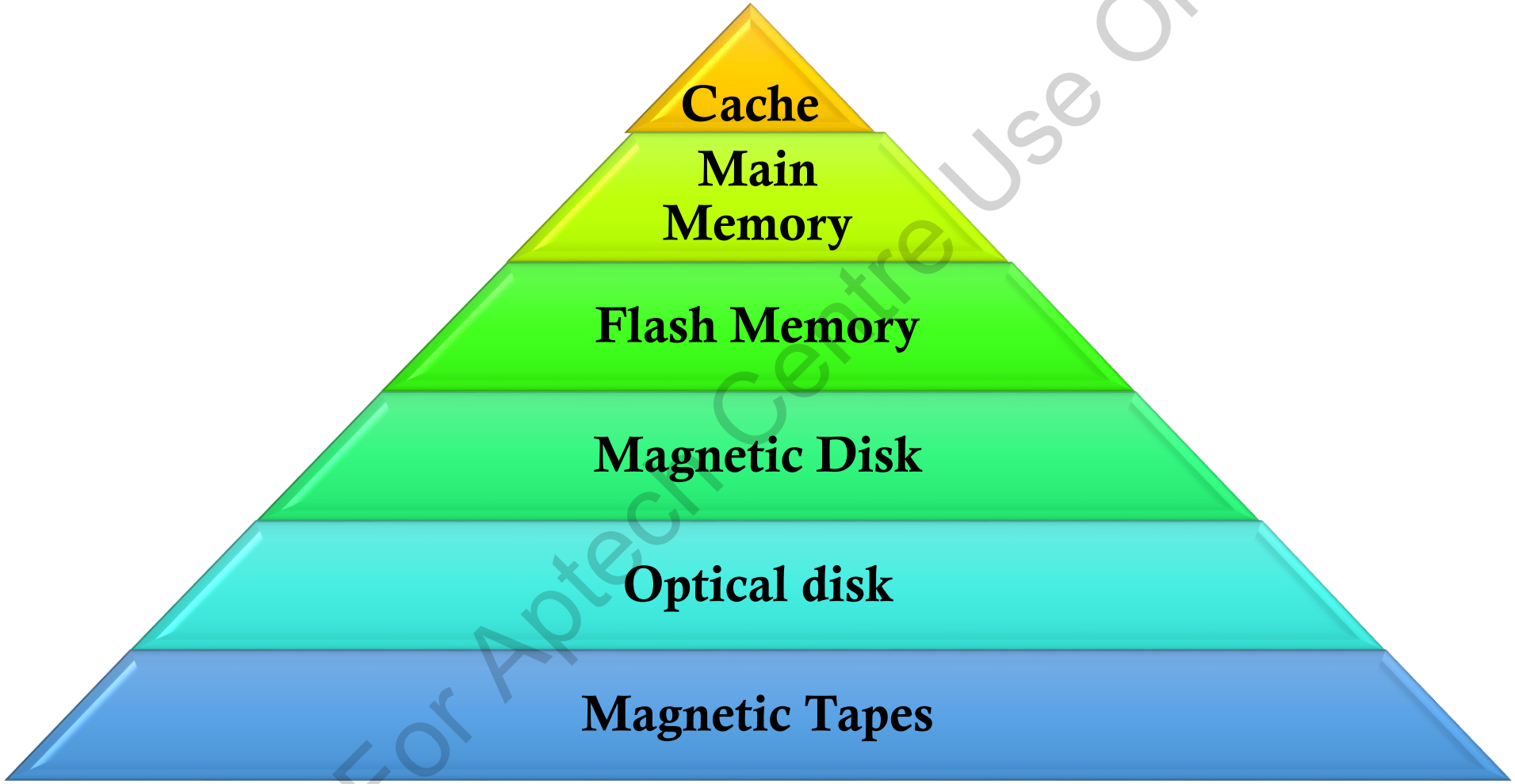
Optical Storage

It can store data in gigabytes or megabytes. For example, a CD can store 600 megabytes of data. Similarly, a DVD can store 5.0 or 7.5 gigabytes of data.

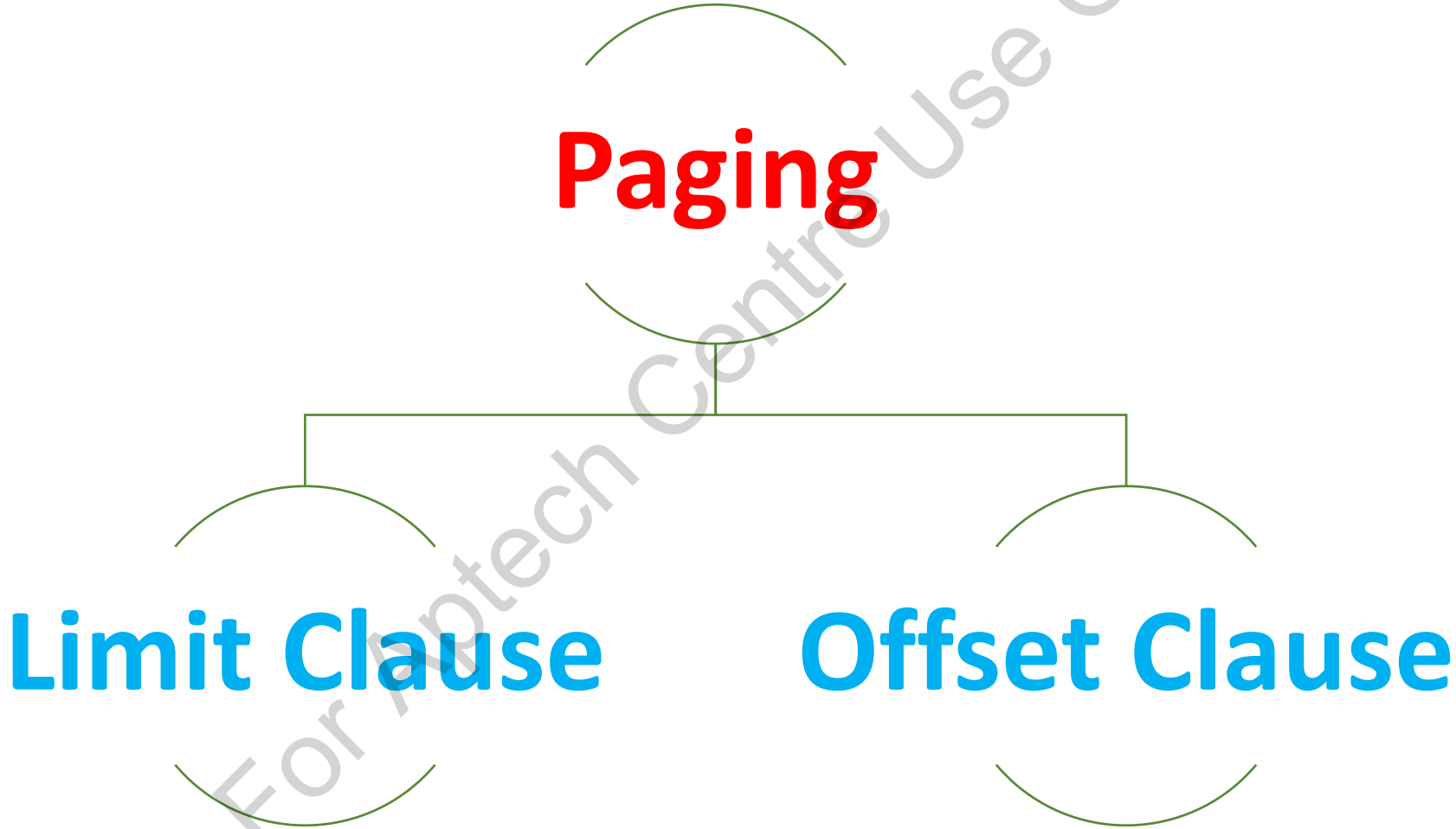
Tape Storage

It is the cheapest storage media that is slower in processing. It can be used to archive or back up the data.

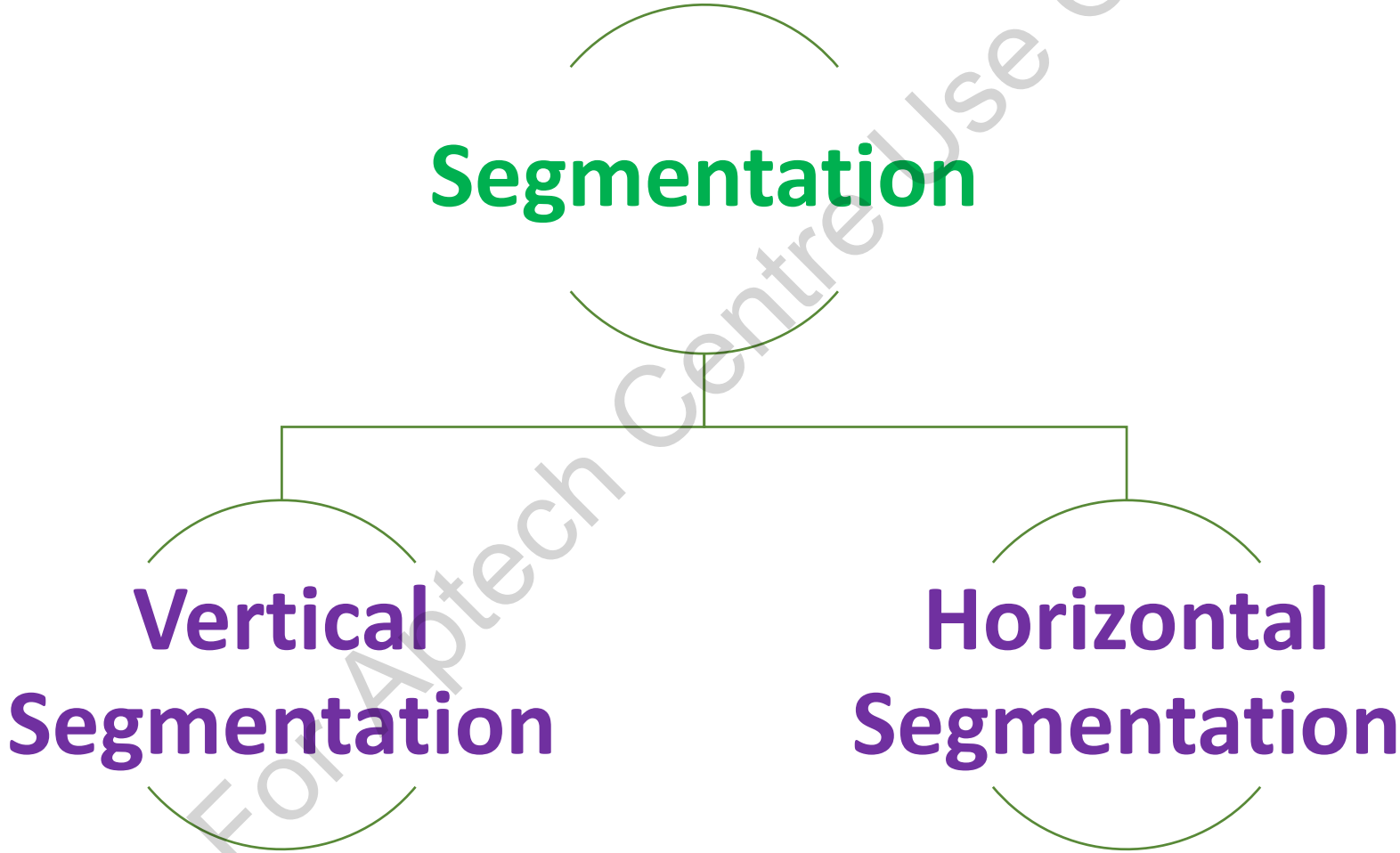
Storage Hierarchy



Memory Management - Paging and Segmentation [1-2]



Memory Management - Paging and Segmentation [2-2]



Virtual Memory

Virtual Memory can be defined as a storage allocation scheme in which secondary memory is addressed.

Reasons why Operating Systems use Virtual memory:

Virtual memory can be used to read the Data faster. While reading the Data, one cannot assure that Physical Cache works faster. The virtual Cache is used to share the code without keeping several copies of the same code. Without Virtual Memory, one cannot perform more than one operation in the Main Memory.

Virtual Memory ensures Data security. By providing position independence to the Data, the user can store Data at any position in the Main memory.

In memory fragmentation and errors, virtual memory debugs, and checks unallocated memory and NULL pointers.

Demand Paging

STEP 1

If the CPU fails to find the page it is referring to, then it generates an interrupt, indicating a memory access fault.

STEP 2

The OS puts the interrupted process to blocked. To continue with execution, the OS must bring the required page to the memory.

STEP 3

OS will search the page in the logical address space.

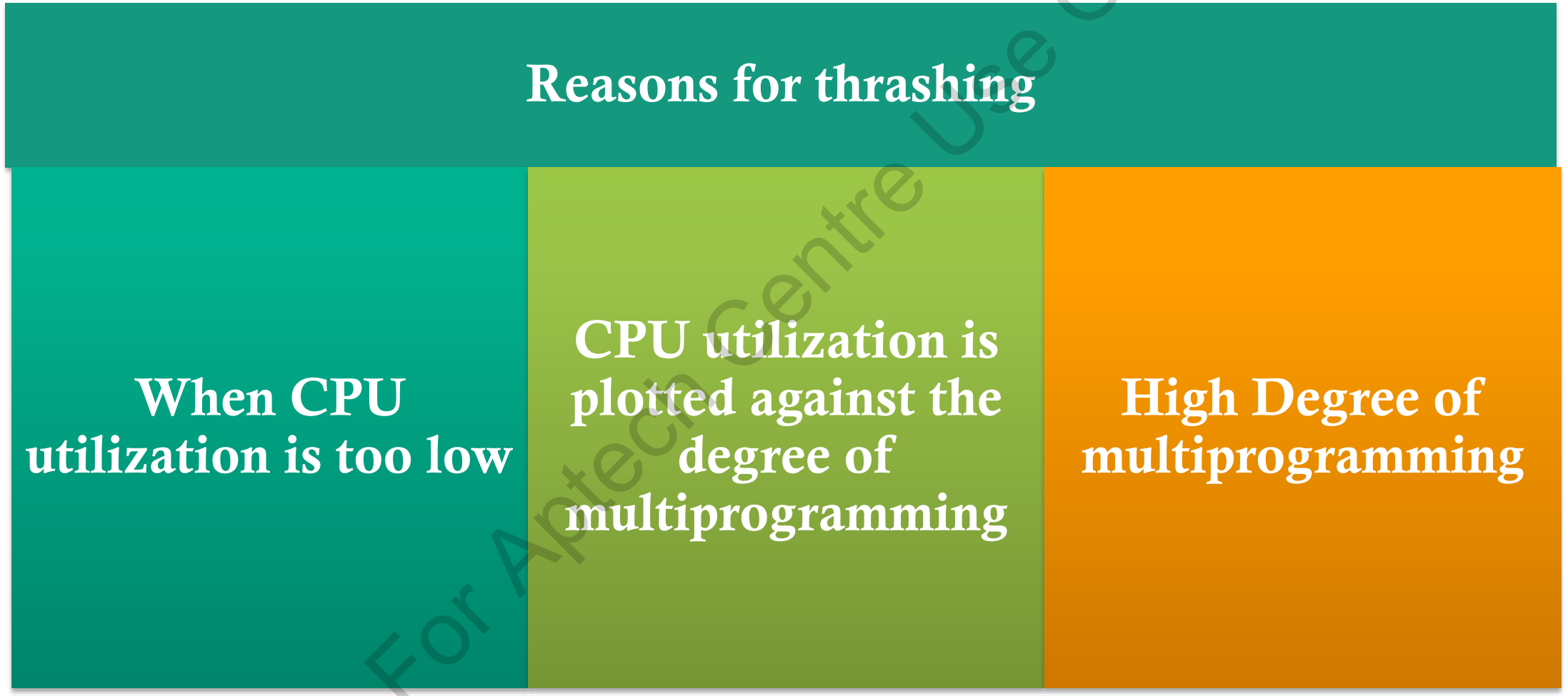
STEP 4

The page is brought from Logical address to Physical address. Page replacement algorithm is used in this process.

STEP 5

After bringing the page from Logical to Physical address, it is updated.

Thrashing



Storage Engines

Transactional

Non-Transactional

Different storage engines in MySQL include:

InnoDB

MyISAM

CSV

Merge

Archive storage

Types of Storage Engines

InnoDB: It is an ACID-compliant storage engine that covers many aspects such as multi-version concurrency.

MyISAM: It is the original Storage engine used in MySQL. The primary disadvantage of MyISAM is that it does not support transactions. It provides table-level locking and is mostly used in Web and Data warehousing.

CSV: It stores the data in CSV files. It is flexible and easily integrated into other applications.

Merge: Merge is used to manage large amount of data. It groups identical MyISAM in series and considers them as one object. It is suitable in Data warehousing environment.

Archive Storage: It is optimized for high-speed inserting and does not support transactions. It compresses the inserted Data and is ideal for storing and retrieving large amount of historical and archived data.

Summary

- The storage management concept refers to the process that improves the performance of Data Storage Resources.
- Main memory operates the Data using the storage medium. It handles the instructions of the machine.
- Tertiary Storage stores a huge amount of Data. They are external to the Computer System and not a part of the local Computer System.
- Paging is the process of dividing a large Dataset into smaller parts.
- `OFFSET` is used to view a specific number of rows.
- Segmentation is a powerful tool used to create a variable within their SQL Database.
- Thrashing is the situation when the system is spending a major portion of its time in servicing the page faults.
- Transactional and Non-Transactional are two different storage engine types in MySQL.