Modern Education Society's Wadia College of Engineering, Pune

210256: DATA STRUCTURES and ALGORITHM LABORATORY (2019 C0URSE)

NAME OF STUDENT:	**CLASS:**
SEMESTER/YEAR:	**ROLL NO:**
DATE OF PERFORMANCE:	**DATE OF SUBMISSION:**
EXAMINED BY:	**EXPERIMENT NO: F24**

TITLE: Create index sequential file and maintain data as specified

AIM/PROBLEM STATEMENT: Company maintains employee information as employee ID, name, designation, and salary. Allow user to add delete information of particular employee. If employee does not exist an appropriate message is displayed. If it is, then system displays the employee details. Use index sequential file to maintain the data

OBJECTIVES:

1. To understand file handling.
2. To understand working of index sequential file.

OUTCOMES:

1. To apply appropriate file handling techniques on given data
2. To use index sequential file.

PRE-REQUISITE:

1. Knowledge of C++ programming
2. Basic knowledge of sequential file

THEORY:

File is a collection of records related to each other. The file size is limited by the size of memory and storage medium.

There are two important features of file:

1. **File Activity:** File activity specifies percent of actual records which proceed in a single run.
2. **File Volatility:** File volatility addresses the properties of record changes. It helps to increase the efficiency of disk design than tape.

File Organization

File organization ensures that records are available for processing. It is used to determine an efficient file organization for each base relation.

Types of File Organization-

1. Sequential access file organization
2. Indexed sequential access file organization
3. Direct access file organization

1. **Sequential access file organization**

- Storing and sorting in contiguous block within files on tape or disk is called as **sequen tial access file organization**.
- In sequential access file organization, all records are stored in a sequential order. The records are arranged in the ascending or descending order of a key field.
- Sequential file search starts from the beginning of the file and the records can be added at the end of the file.
- In sequential file, it is not possible to add a record in the middle of the file without rewriting the file.

This method can be implemented in two ways:

Pile File Method:

- It is a quite simple method. In this method, we store the record in a sequence, i.e., one after another. Here, the record will be inserted in the order in which they are inserted into tables.
- In case of updating or deleting of any record, the record will be searched in the memory blocks. When it is found, then it will be marked for deleting, and the new record is inserted.

Sorted File Method:

- In this method, the new record is always inserted at the file's end, and then it will sort the sequence in ascending or descending order. Sorting of records is based on any primary key or any other key.
- In the case of modification of any record, it will update the record and then sort the file, and lastly, the updated record is placed in the right place.

2. Direct access file organization

- Direct access file is also known as random access or relative file organization.
- In direct access file, all records are stored in direct access storage device (DASD), such as hard disk. The records are randomly placed throughout the file.
- The records does not need to be in sequence because they are updated directly and rewritten back in the same location.
- This file organization is useful for immediate access to large amount of information. It is used in accessing large databases.
- It is also called as hashing.

3. Indexed sequential access file organization

- Indexed sequential access file combines both sequential file and direct access file orga nization.
- In indexed sequential access file, records are stored randomly on a direct access device such as magnetic disk by a primary key.
- This file has multiple keys. These keys can be alphanumeric in which the records are ordered is called primary key.
- The data can be access either sequentially or randomly using the index. The index is stored in a file and read into memory when the file is opened.

Working:

Each record of a file has a key field which uniquely identifies that record.

- ✓ An index consists of keys and addresses (physical disc locations).
- ✓ An indexed sequential file is a sequential file (i.e. sorted into order of a key field) which has an index.
- ✓ A full index to a file is one in which there is an entry for every record.
- ✓ Indexed sequential files are important for applications where data needs to be accessed ----- >>> **sequentially** or **randomly** using the index
- ✓ An indexed sequential file allows fast access to a specific record.
  Example: A company may store details about its employees as an indexed sequential file. Sometimes the file is accessed....
  -- >> sequentially. For example, when the whole of the file is processed to produce payslips at the end of the month.

  -- >> randomly. Maybe an employee changes address, or a female employee gets married and changes her surname.

Primitive Operations on Index Sequential files:

• **Write (add, store):** User provides a new key and record, IS file inserts the new record and key.

• **Sequential Access (read next):** IS file returns the next record (in key order)

• **Random access (random read, fetch):** User provides key, IS file returns the record or "not there"

• **Rewrite (replace):** User provides an existing key and a new record, IS file replaces existing record with new**.**

• **Delete:** User provides an existing key, IS file deletes existing record

QUESTIONS:

1. Explain direct sequential file.
2. Explain advantage and disadvantages of the index sequential file