

Consider an employee table with columns *age* and *sal* and we are interested in analyzing the performance of the following five types of queries.

1. Scans : fetch all records in the table.
2. Point : fetch one record using the primary key.
3. Range : fetch all records where the age is greater than some constant.
4. Insert: insert a new record.
5. Delete: delete a record using the primary key.

Count the worst case number of IOs of each of these queries for (1) heap file storage, (2) sorted file storage, (3) heap+tree, (4) heap+hash, and (5) clustered file. Let  $B$  be the number of data pages,  $R$  be the number of records per page,  $S$  be the number of records returned by a range query, and  $F$  be the fanout of the tree index.

## 1 Heap File

Query	IOs	Algorithm Notes
Scans		
Point		
Range		
Insert		
Delete		

## 2 Sorted File

Query	IOs	Algorithm Notes
Scans		
Point		
Range		
Insert		
Delete		

### 3 Heap File with B+ Tree Index

Query	IOs	Algorithm Notes
Scans		
Point		
Range		
Insert		
Delete		

### 4 Heap File with Hash Index

Query	IOs	Algorithm Notes
Scans		
Point		
Range		
Insert		
Delete		

### 5 Clustered File

Query	IOs	Algorithm Notes
Scans		
Point		
Range		
Insert		
Delete		