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Assignment 3 Task 1

(1) SELECT DISTINCT manufacturer
FROM REPAIR;

An attribute manufacturer is indexed. Therefore, the system will horizontally traverse a leaf level of B*-Tree that implements and index on an attribute manufacturer.
Total number of blocks read is equal to the total number of blocks at leaf level of an index on attribute manufacturer.

Total number of blocks read = 5

(2) SELECT registration
FROM REPAIR
WHERE manufacturer = 'Toyota' AND model = 'Corolla';

The condition manufacturer = ‘Toyota’ can be satisfied using manufacturer index. The system will vertically traverse the manufacturer index to find a set of rows that satisfy the condition manufacturer = ‘Toyota’ (Assume Set A) (height of tree)

$$1 + \log_{20}(50) + 1000/50$$

The system then conducts a full table scan based on the manufacturer index where the condition model = ‘Corolla’ is satisfied.

1000/50

Total number of blocks read = $1 + \log_{20}(50) + 1000/50 + 1000/50$

(3) SELECT registration
FROM REPAIR
WHERE TO_CHAR(repair-date,'YYYY') = '2012';

A “where” clause specified, however attribute repair-date pertaining to ‘YYYY’ is not indexed. The system will do a full table scan to get the output.

Total number of blocks read = 1000

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(4) SELECT COUNT(*)
FROM REPAIR
WHERE manufacturer = 'Honda';

An attribute manufacturer is indexed hence processing read block cost will be the height of the manufacturer index.

Total number of blocks read = $1 + \log_{20}(100) = 2$ blocks

(5) SELECT *
FROM REPAIR
WHERE registration = 'PKR856' AND
at-address ='15 Station St. Cooma' AND
repair-date = '15-DEC-2010';

Attributes registration, at-address and repair-date make up the primary key and hence are indexed. Next, the system will vertically traverse the index to find a leaf-level block with a key [‘PKR856’, ‘15 Station St. Cooma’, ‘15-DEC-2010’]. Next, a pointer associated with the key is used to access the relational table REPAIR.

The total number of read block operation = height of primary key index + 1

Total number of blocks read = $1 + \log_{20}(5000) + 1 = 4$ blocks

(6) SELECT at-address, repair-date
FROM REPAIR
WHERE TO_CHAR(repair-date,'YYYY') = '2013;

At-address, repair-date can be found on leaf level on primary key index as they are part of the composite primary key. The system will traverse through the leaf level of the primary key index.

Total number of blocks read 100 blocks

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(7) SELECT MAX(registration)
FROM REPAIR;

No “where” clause found. An attribute registration is indexed. Therefore, the system will access a leaf level of B*-Tree that implements an index on an attribute registration. As the indexes are in ascending order, the system will retrieve the data from the last leaf block.

Total number of blocks read is equal to the total number of blocks read to find the maximum value of a key at leaf level of an index on attribute registration.

Total number of blocks read = 1

(8) SELECT TO_CHAR(repair-date,'YYYY'), COUNT(*)
FROM REPAIR
GROUP BY TO_CHAR(repair-date,'YYYY');

Group by clause found on repair-date. Repair-date is indexed as primary key. Hence, the system will traverse through the leaf level of the primary key index.

Total number of blocks read = 100

(9) SELECT manufacturer
FROM REPAIR
WHERE time–spent > 20;

A “where” clause found however attribute time-spent is neither a primary nor an indexed attribute. Therefore, the system will conduct a full table scan to retrieve the data.

Total number of blocks read = 1000

(10) SELECT *
FROM REPAIR
ORDER BY manufacturer;

There is no “where” clause found. The output needs to be ordered by manufacturer, and attribute manufacturer is indexed. The system will horizontally traverse at the leave level of the manufacturer index, which are sorted by manufacturer in ascending order. Which each key, the system will make use of the row identifier to access the row from the data file.

Total number of read block operations = total number of leaf block of manufacturer index + total number of records

Total number of blocks read = 5 + 1000