Adam into an problem.

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Adam was developing a web application , the customer has provided requirement to design a web application which can handle 2 million records in the primary tables.

Adam was wondering how to develop select queries which can browse through 2 million records for data retrieval.

How do you think Adam would have solved the problem?

Adam created index for columns of the table which boosts the performance of the retrieval process.

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What is an Index?

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- Index is a feature which is added to the columns of a table for speeding up the retrieval of data.
- Indexes are created on one or more columns of a table.
- Indexes reduces disk I/O by using a rapid path access method to locate data quickly.

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Table Scan without Index

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Scenario: Assume in a student table there are 2.5 million records and Adam develops a query to retrieve student with Name "Jack" , assuming the record is the 1.5 Million'th record.

Student Name	Degree	Age	College	Specialization
Adam	BE	18	BEC	EEE
Steve	MSC	19	Temple	IT
.....	.....	.....	.....	.....
David	BE	18	Gandhi	IT
Jack	BSC	17	ASG	IT

For retrieving the Jack record the process needs to scan 1.5 million records.

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Table Scan with Index .

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Assume that the column student name is indexed in the student table.

Student Name	Degree	Age	College	Specialization
Adam	BE	18	BEC	EEE
Steve	MSC	19	Temple	IT
.....	.....	.....	.....	.....
David	BE	18	Gandhi	IT
Jack	BSC	17	ASG	IT

If data is retrieved using the student_name (indexed column) in where clause the process picks the data directly rather than scanning through the records.

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Creating index

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Creating index

Index can be created in two ways,

Automatically:

- System defined index is created automatically when you create a PRIMARY KEY or UNIQUE constraint in a table definition.

Manually:

- User defined index can be created on columns to speed up the retrieval of records using the indexed column.

How to create Index?

```
CREATE INDEX index_name ON table
    (column1[,column2]…);
```

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Index Application

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When should one use index?

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Index Application

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Index to be used when:

- When the table has huge volume of data.
- Data is retrieved based on few specified columns of the table.
- Index speed up the data retrieval process.

When should index not be created?

- If the table has small volume of data.
- If DML operations are performed frequently in a table, as index will degrade the performance of DML process.

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Creating Index Illustration

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Let us create the index for the student table.

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Creating Index Illustration

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Since the records are predominantly fetched based on the student name column. Let us index the student name column.

```
CREATE INDEX  studentName_Index ON
student (student_name);
```

Please try this queries in MySQL workbench.

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Points to remember

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- Index can be created for more than one columns of a table.
- The data retrieval will be optimized only if the query is done based on the indexed column.

Non optimized: Select * from student where city = 'Mumbai'

The above query would be slow as the student details are retrieved based on non indexed column.

Optimized: Select * from student where Studentname='Raj'

The above query would be fast as the student details are retrieved based on the index column student name.

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Deleting an Index

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Use the following command for deleting indexes from a table.

```
DROP INDEX index_name;
```

Example:

```
DROP INDEX studentName_Index;
```

Please try this queries in MySQL workbench.

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Generation of unique values

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In the GPS application the customer Id column in GPS_Customer_Info needs to be a sequential number.

How can this be auto generated?

Can I develop a own program for this?

AUTO_INCREMENT can be used for auto generating customer id.

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AUTO_INCREMENT

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- The AUTO_INCREMENT attribute can be used to generate a unique identity for new rows.
- This attribute is used to generate unique numbers mainly for ID columns

Example: student_id in Student Mgmt System, employee number in HR Mgmt.

- It is similar to a sequence in Oracle/Postgre SQL.

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Creating Sequence

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```
CREATE TABLE student (
 id INT AUTO_INCREMENT,
name char(45),
PRIMARY KEY(id)
);
```

Indicates that the id column needs to be auto incremented during each insertion of data.

Please try this in MySQL workbench .

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AUTO_INCREMENT usage

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Once the auto_increment is set for a column in a table, below are the ways to insert data into the table using auto_increment.

Method 1:

Insert into student (name) values (‘helen’);

Method 2:

Insert into student values(0,’helen’);

Method 3:

Insert into student values(null,’helen');

All these statements just insert the next value in the auto increment sequence into the id column

Please try this in MySQL workbench .

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