PREPARATION

Question:

What is the database index? What are the advantages and disadvantages?

Explain the Index structure we mentioned as one of the tools to increase query performance and briefly mention its types. Also, briefly describe the two main index types we talked about in class.

What are indexes?
Indexes are a powerful tool used in the background of a database to speed up querying. Indexes power queries by providing a method to quickly lookup the requested data. Simply put, an index is a pointer to data in a table. An index in a database is very similar to an index in the back of a book.
Advantages:

1. The most important use for an index is in finding a record or set of records matching a WHERE clause.

It could fasten Update and Delete command by means of where clause in non-clustered index.

1. When there are no indexes, the database will scan the table and then sort the rows to process the query. However, the index will provide the database with already sorted list of table's columns. The database can simply scan the index from the first record to the last record and retrieve the rows in sorted order.
2. We can use a GROUP BY clause to group records and aggregate values, e.g. for counting the number of customers (table) in a country (column). To process a query with a GROUP BY clause, the database will quite often sort the results on the columns included in the GROUP BY. The following query counts the number of customers from every country with the same UnitPrice value. SELECT Count(*) FROM Products GROUP BY UnitPrice.
3. Index is the best tool for the database to use to enforce uniqueness in data of a column. Each time an application adds or modifies a row in the table, the database needs to search all existing records to ensure none of values in the new data duplicate existing values. Indexes, as we should know by now, will improve this search time.

Disadvantages:

1. Indexes are stored on the disk, and the amount of space required will depend on the size of the table, and the number and types of columns used in the index. Disk space is generally cheap enough to trade for application performance, particularly when a database serves a large number of users. (To see the space required for a table, use the sp_spaceused system stored procedure in a query window.)
2. If the data is modified on regular intervals then database engine requires updating all the indexes, thus too many indexes will slows down the performance.

https://specialties.bayt.com/en/specialties/q/59171/what-are-advantages-and-disadvantages-of-indexing-in-database/

https://www.codecademy.com/articles/sql-indexes

SPEECH

Indexes are a powerful tool used in the background of a database to speed up querying. Indexes power queries by providing a method to quickly lookup the requested data. Simply put, an index is a pointer to data in a table. An index in a database is very similar to an index in the back of a book.

When we should mention to advantages; the most important use for an index is in finding a record or set of records matching a WHERE clause. It could fasten Update and Delete command by means of where clause in non-clustered index.

Firstly, when there are no indexes, the database will scan the table and then sort the rows to process the query. However, the index will provide the database with already sorted list of table's columns. The database can simply scan the index from the first record to the last record and retrieve the rows in sorted order.

Secondly, we can use a GROUP BY clause to group records and aggregate values, e.g. for counting the number of customers (table) in a country (column). To process a query with a GROUP BY clause, the database will quite often sort the results on the columns included in the GROUP BY. The following query counts the number of customers from every country with the same UnitPrice value. SELECT Count(*) FROM Products GROUP BY UnitPrice.

Lastly, Index is the best tool for the database to use to enforce uniqueness in data of a column. Each time an application adds or modifies a row in the table, the database needs to search all existing records to ensure none of values in the new data duplicate existing values. Indexes, as we should know by now, will improve this search time.

On the other hand, we have disadvantages. Indexes are stored on the disk, and the amount of space required will depend on the size of the table, and the number and types of columns used in the index. Disk space is generally cheap enough to trade for application performance, particularly when a database serves a large number of users. If the data is modified on regular intervals then database engine requires updating all the indexes, thus too many indexes will slows down the performance.