We will differentiate between sql and nosql based on 4 things. These things are structure, nature, scalability and last but not the least property.

Lets start with sql. Full form of sql is structured query language. It is considered as RDMS. RDMS is Relational Database Management System. Structure of sql is there is tables and tables have row and column. Schema is predefined before using it. That means before using the table we create schema, which column will contain which kind of property and property name. There is relations between tables.

Nature is generally, a single server contains all the related data of a particular item. The data can be in separated way in multiple tables. But they will be situated in the same server. There is relation between the tables. That means data is concentrated / centralized.

We can scale database using two way. One is vertical and another one is horizontal. In vertical, ram and storage is increased for more data or to scale up data. In horizontal, we do shading. To do shading different columns or lets say property may located in different server. But sql is concentrated. So horizontal scaling is not well supported in sql. It is better to use vertical scaling to scale up data.

It follows ACID property. Full form of A is for atomicity, C is for consistency, I is for isolation and D is for durability. ACID property makes sure data integrity  and data consistency.

Now lets move to the nosql. It is also called as non relational or not only sql. It contains unstructured data. There are 4 kinds of DB it can contain. They are: key value DB, document DB, column wise DB, graph DB.

In key value pair, there is a key for each item and the value can be anything like string, integer or json. This value is opaque. That means we can not do query using value. We can do query only using key. DynamoDB follow this structure.

In document DB, there is a key and value for each item. Value can be json or xml. Main difference with key value pair is the value is not opaque. We can do query using both key and value. MongoDB follows this type of structure.

In column-wise DB, there is a key and value for each item. Value has multiple column value pair. Here column means property. For each item the number of columns is not fixed. The number of columns can be more or less.

In graph DB data is stored in node, edge manner. Edge is the property and value is the node. Social network and recommendation system use such kind of DB. There is direct relation between nodes. So it faster. In relational database there is relation between columns but to search we have to scan all rows until we find our expected data. It is easy to search in graph DB.

Nosql is decentralised or distributed in nature. Because different nodes contains different data.

We can scale up horizontally. We can add as much node as possible.

Nosql follows BASE property. BA stands for basically available, S stands for safe state and E stands for eventual consistency. As the data is distributed in manner, if something happens in one node other nodes can provide the data. So the data is highly available. Safety state means state of nodes can be changed without any interaction. There is a clock associated with each node. In each time multiple nodes sync with each other. One node may contain a latest data and other one may contain still data. After syncing all the nodes get updated. Eventual consistency means when you do query you might get steal data. But after some times you get the latest data.

We can use sql if you need flexible query functionality. Lets say now we are joining 3 tables to get the result. In future we will need joining 5 tables. We can do this using sql. If you need basic search query or in advance you know which column you need search capability, you can use nosql in such scenarios. If you need relational data or some kind of hierarchy in data you can choose sql over nosql. If you need data integrity you can pick sql. So in financial institution, sql is used. Nosql is used for big data where you can afford to loose some data. Because sql follows ACID property but nosql does not. If you need availability of data you can use sql but for high availability with some kind of inconsistency you should use nosql.

====================

Questions

====================

1. Deeply understand ACID property.

2. Deeply understand BASE property.

3. When to choose sql and when to choose nosql?