1. What database models do you know?

* Hierarchical database – it is a database structured like a tree. Example of such database is the Registry of windows. Each piece of information is stored in the leaves of the tree as key-value pairs. All nodes of information are logically ordered in the tree branches.
* Network database – the main difference between Hierarchical and Network database model is while in Hierarchical database each node may have many child nodes but only one parent in Network type database each node may have many parents and many children. The nodes in Network type database represents entities, while branches represent the relations between the entities;
* Relational database – database which consists of tables with relationships between them;
* Object-oriented database – database represented like a collection of objects.

1. Which are the main functions performed by a Relational Database Management System (RDBMS)? – the main functions of RDBMS are: creating, changing and deleting tables in database as well as creating relationships between the tables; implementing CRUD operations with the data in tables. *C* stands for create, *R* stands for read, *U* stands for update and *D* stands for delete. RDBMS should be able to write new data, retrieve it, change it and delete it. RDBMS should support SQL database language. As an option it should support transactions – they should be ACID – atomic, consistent, isolated and durable.
2. Define what is "table" in database terms – database tables represent data. They have named columns. Each column keeps concrete type of data. Database rows represents an entity. All rows have same structure.
3. Explain the difference between a primary and a foreign key – primary key in database table is unique row value. It could be represented as value in one column – in this way each rows in this column must have different values. It can be represented and as unique combination of values in two or more columns in one row. In this way each row must have unique combination of values of designated columns. Foreign key is representing the relationship between tables. If one row is related to other row in subtable the main table row would have as a value the primary key of the subable row – this is the foreign key.
4. Explain the different kinds of relationships between tables in relational databases – there are three types of relations between tables in database: one to many – e.g. relation between router and computers in network, each router may be connected to many computers but each computer is connected (normally) to one router; many to many – e.g. relation between drivers and cars each car may be driven by many drivers and each driver may drive many cars; one to one – this is typical inheritance representation in databases.
5. When is a certain database schema normalized? What are the advantages of normalized databases – a databse is normalized when there are no duplicate records in it. The main advantage of normalization is decrease of data volume.
6. What are database integrity constraints and when are they used – primary key constrain – ensures that primary keys in each row of the table are of different values; unique key constrain – ensures there are no duplicate data in the table, e.g. each row represents unique data; foreign key constrain – ensures that the value in the foreign key column is a key from another table; check constraint – ensures data meets certain criteria;
7. Point out the pros and cons of using indexes in a database – indexes speed up the searching of values in database tables. They slow down adding, deleting and altering of database values.
8. What's the main purpose of the SQL language – operating the tables by create, change and delete them as well as CRUD operations over data in the tables.
9. What are transactions used for? Give an example – transactions are several operation over database values executed as one operations. Each transaction can pass or not. If transaction pass the database state is changed but is again consistent. If transaction not pass it rollbacks all changes and database state remains unchanged, i.e. consistent again.
10. What is a NoSQL database – usually no structured database as key-value model; json model; XML model; object model and so on.
11. Explain the classical non-relational data models – supports all the features of SQL database but is non-relational and stores all the data in document based model.
12. Give few examples of NoSQL databases and their pros and cons:

* Redis – ultra fast in memory database. Distributes as single dll;
* MogoDB – JSON based database. Cross-platform document oriented.
* CouchDB, Cassandra and many thers…