Example Questions (Homework)

1. Describe elements of a relational database!

A relational database consists of tables. Those tables are connected using different keys. These connections are called relations. Most systems also support views (saved querys) and stored procedures.

2. What is referential integrity?

Related tables are connected using keys. One table defines a primary key that another table will refer to. The database watches operations that are performed on related tables. These operations might create conflicts that you will have to deal with. Referential integrity is the integrity between the key constraints (relations) between tables. Not all database software systems support referential integrity.

Using such relations brings up questions about what should be done when data is deleted from or inserted into either one of these tables. Think about a table "Customer" and a table "Invoices". What happens to the invoices when you delete a customer? Will they be deleted too (cascading delete)? Will you change the properties of the invoices (updating delete)? Or will you stop anyone from deleting the customer as long as there are invoices at all? These are questions that you have to deal with when implementing a database.

3. What is redundancy? Make an example!

Redundancy means that you have the same value more than once. It is not unique over a set of database table entries. Redundancy affects the quality of your database in a negative way and should be reduced by normalizing your tables. No example – you should give one! This is trivial.

4. What database column type would you use in order to save a time span (not a point in time)?

A time span can be saved as an integer or a timestamp/datetime. Using an integer is easy but there is one problem with it – there is no unit for the measurement. If you save the duration of 5 minutes, how would you save that with an integer? Would you save the value "5" or would you save 300 Seconds? The unit is very important and by using a timestamp instead you get a more precise result because the unit is already defined.

Note that you are using a timestamp which usually saves a point in time differently when representing a time span. If you save 04.05.2009 that is a point in time but if you save a value referring to another date that is a time span.

5. Describe it in a Database system of your choice (SQLServer, MySql, Postgres)

To save 5 minutes you would save it as "01.01.1900, 00:05:00". The 01.01.1900 is the "empty" or "null" value of a datetime in SQL server.

6. What is the difference between char and varchar datatypes in a database table?

A char-column saves a string of a predefined length. If the string inserted is shorter than the predefined length the leftover space will be filled up with special characters. A varchar is more flexible and adjusts to the inserted string. A char(500) will always use the space of 500 units, a varchar(500) will only use as much space as the string that was inserted.

7. What is the difference between varchar and nvarchar?

An nvarchar in SQL Server is a varchar value that accepts Unicode characters.

8. What datatype would you use in order to save a monetary value? Why?

A monetary (MONEY) value is a value such as a price or the cost of something (eg. $5.30 or 3.50€). It should always be represented by a datatype that can represents a decimal fraction with a fixed length such as DECIMAL or NUMERIC. You should not use floating point values such as double or float as they might produce rounding errors. Some databases offer a "CURRENCY" datatype. Use it!

9. What do the parameters of the decimal datatype stand for?

E.g. DECIMAL(8,4) : The first value is defines the full length of the value. The second value defines the number of numbers behind the comma. The maximum value of DECIMAL(8,4) is 9999,9999.

10. What is the Year 2038 problem?

The unix timestamp uses a 32 bit integer representing the seconds that have passed since the 1. January 1970. In the year 2038 the 32 bit will cause an overflow as it cannot store any more seconds

thus resetting the datetime to a date prior to the 1. January 1970. This might cause problems that are real (not fake as the Y2K Problem)

11. What do you have to look out for when choosing a datatype to be used as an automatically incremented primary key?

You should always consider if the table might one day contain too much data. It there is more than several million entries in a table the primary key should be a bigint as a normal int might cause an overflow

12. Name 4 database systems!

Microsoft SQL Server, MySQL, Postgre SQL, IBM DB2, Oracle

13. What does a database system consist of?

Language, Processor, Repository. Most systems also provide a bunch of tools.

14. What is an integrated development environment („IDE")?

An IDE Is a software system that provides centralized access to a bunch of functions that are required to create programs. The simplest IDE contains a text editor and a compiler. Modern IDEs also provide tools for engineering, modeling, configuration and testing.

15. Describe the differences between bigint, smallint, and int

- **Smallint: 16 Bit Integer,**
   Values: −32.768 to 32.767
- **Int: 32 Bit Integer,**
  Values −2.147.483.648 to 2.147.483.647
- **Biging: 64 Bit Integer,**
  Values −9.223.372.036.854.775.808 to 9.223.372.036.854.775.807

Author I: M.Sc. Johannes Hofmeister
Author II: Dip.-Inf. (FH) Johannes Hoppe