Courses B0B36DBS, A7B36DBS: Database Systems

Practical Class 04:

SQL: DDL

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Tables

- **CREATE TABLE**
  - Creates schema for a new table
Columns

• **Column** definition

• **Data types** for (not only) columns
  - Precise numeric: INT, SMALLINT, BIGINT, DECIMAL
  - Approximate numeric: FLOAT, DOUBLE PRECISION
  - Logical: BOOLEAN
  - Character: CHAR, VARCHAR
  - Temporal: DATE, TIME, DATETIME
  - ...
Constraints

- **Column-level** integrity constraints
Exercise 1

• Create a schema for the following table:
  ▪ **Library**(Name, Street, City, PostCode)
  ▪ Choose appropriate data types
  ▪ Define PRIMARY KEY and NOT NULL constraints
    – Use column-level constraints only
Constraints

- **Table-level** integrity constraints
Exercise 2

• Create a schema for the following table:
  ▪ **User(Card, FirstName, LastName, Email, DateOfBirth)**
    – Card is a 16 digit long user card identification number
    – Date of birth is just optional
  ▪ Describe all basic integrity constraints
    – Use table-level constraints only
  ▪ Check email addresses for correctness
    – I.e. verify they correspond to a general pattern of e-mail addresses (using predicate LIKE)
Exercise 3

• Create a schema for the following table:
  - Phone(User, Number)
    - User ⊆ User.Card
      - Phone numbers are always 9 digits long
  - Describe referential integrity
    - Use a column-level constraint for this purpose
Exercise 4

- Create schemata for the following tables:
  - **Title(IdTitle, ISBN, Title)**
    - IdTitle is an artificially generated integer identifier
    - ISBN identifiers are at most 17 characters long
    - Represent both the relational keys
  - **Author(IdAuthor, Name, YearOfBirth, YearOfDeath)**
    - Both years of birth and death are optional
    - Check mutual consistency of their values
  - **Authorship(Title, Author)**
    - Use table-level constraints for the referential integrity
Tables

- **ALTER TABLE**
  - Modifies schema of a given table

```
ALTER TABLE table-name
```

- **ALTER COLUMN**
  - `SET DEFAULT` with literal
  - `DROP DEFAULT`

- **ADD**
  - COLUMN
  - CONSTRAINT

- **DROP**
  - COLUMN
  - CONSTRAINT
Exercise 5

- Alter schema of a table for libraries:
  - Add IdLibrary as a new identifier of libraries
Exercise 6

- Create a schema for the following table:
  - Book(Library, Signature, Title, DateOfAcquisition)
    - Library ⊆ Library.IdLibrary
    - Title ⊆ Title.IdTitle
Constraints

• Referential actions
Exercise 7

• Create a schema for the following table:
  
  ▪ **Loan(\text{User}, \text{Library}, \text{Signature}, \text{TimeBorrowed}, \text{IdLoan}, \text{DateReturned})**
  \[ \text{User} \subseteq \text{User.Card} \]
  \[ \text{(Library, Signature)} \subseteq \text{Book.(Library, Signature)} \]
  
  ▪ Return date is filled in when successfully returned
  
  ▪ Add suitable referential actions
  
  – When a book / user is...
    
    • ... updated then the corresponding loans will be updated too
    • ... removed then the corresponding loans will be preserved
PostgreSQL

- PostgreSQL
  - Open-source ORDBMS
  - [https://www.postgresql.org/](https://www.postgresql.org/)
  - pgAdmin4
    - Administration and development platform
    - [https://www.pgadmin.org/](https://www.pgadmin.org/)