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Java 19: Deep dive relation

2024/25 – Sascha Stojanovic

What are we doing today?

- Last lesson
 - we installed MySQL-Server
 - Created a db “my_database”
 - And added 2 Tables ”Product” and “User”
- Today we going to look at these tables or “Relations” in more detail
- And we analyse the DDL (data definition language) cmd “Create table...” in more detail

Relation

- A relation is the name of the table we created in our database
- Why is the naming “relation” more accurate then “table”, even the cmd says Create TABLE!!!!

```
CREATE TABLE Course (  
  CourseName char(255) NOT NULL,  
  CourseNumber int(5) ZEROFILL NOT NULL PRIMARY KEY,  
  CreditHours int,  
  Department char(255) NOT NULL  
);
```

Relation				
Name der Relation				
Attribut				
Schlüssel-Attribut				
Tupel	COURSE	CourseName	CourseNumber	CreditHours
		Department		
		Introduction to CS	CS1310	4
		Data Structures	CS3320	4
		Discrete Mathematics	MATH2410	3
		Databases	CS3380	3
				CS

Datatypes in SQL

- `varchar(255)` or `char(255)` => String or char with 255 letters
- `int` or `int(2)` or `integer(2)` => int, What do you think is this for “(2)”?
- `Bool` and `Boolean` => Boolean but for `bool` true is nonzero and false is 0
- `Date` => The supported range is from '1000-01-01' to '9999-12-31'
- `Float/double` or `float(size, d)` => without size and decimal it shows the default behaviour and with

Dynamik

- A Relation is not static by dynamic => it changes consistently
 - Tupel values can change
 - Tupels can be added
 - Tupels can be deleted
 - Attributes...

COURSE	CourseName	CourseNumber	CreditHours	Department
	Introduction to CS	CS1310	4	CS
	Data Structures	CS3320	4	CS
	Discrete Mathematics	MATH2410	3	MATH
	Databases	CS3380	3 4	CS
	Algorithms	CS3390	4	CS

Primary Key & Unique Key

- Every relation has a Primary Key which is a single attribute or a group of attributes to identify a tuple
- Using “AUTO_INCREMENT” a unique primary key is created automatically without u giving it
- Unique Keys has a similar effect like a primary key => all values in a column are different
 - Do you have an idea when to use it?

```
CREATE TABLE Course (  
    CourseName char(255) NOT NULL,  
    CourseNumber int(5) ZEROFILL NOT NULL PRIMARY KEY,  
    CreditHours int,  
    Department char(255) NOT NULL  
);  
  
CREATE TABLE Enrollment (  
    StudentID int NOT NULL,  
    CourseID int NOT NULL,  
    EnrollmentDate date NOT NULL,  
    PRIMARY KEY (StudentID, CourseID)  
);  
  
CREATE TABLE Users (  
    UserID INT AUTO_INCREMENT NOT NULL,  
    UserName VARCHAR(255) NOT NULL,  
    Email VARCHAR(255) NOT NULL,  
    PRIMARY KEY (UserID)  
);  
  
CREATE TABLE Persons (  
    ID int NOT NULL UNIQUE,  
    LastName varchar(255) NOT NULL,  
    FirstName varchar(255),  
    Age int  
);
```

Null and Not Null

- By default an attribute of a tuple can hold a Null – Value => it does not need to be filled in a insert cmd but can be added
 - Do you know an example?
- Primary Keys are always “Not Null” because every tuple needs a unique identifier

Exercise I => Identify: Relation, Attributes, PK, Null & Not Null and Datatypes and write Create Table ..

Each book is assigned a unique identifier, enabling librarians to track it seamlessly among thousands of titles. This number ensures that no two books are mistaken for one another, helping maintain accurate records and simplifying book retrieval.

The core details of each book are crucial for categorization and user assistance. Titles and authors are essential pieces of text data, allowing readers to search for specific works or a particular author's collection. Both attributes are mandatory when cataloging a new book because they define the essence of the item rather than any logistical aspect.

Books belong to various genres—like mystery, science fiction, or biography. These genre labels are important textual identifiers for librarians to organize the library shelves logically and for readers to discover new stories based on interest.

The library also tracks additional specifics like publication date and edition number. These elements inform librarians about the book's release history and exist to support cataloging accuracy and reader familiarity with the book's timeline.

ISBN numbers serve a technical yet important function in precise identification, assisting in standardizing entries across digital systems. However, because of the library's historic collection, some older books might lack this detail, allowing flexibility.

Exercise II => Identify: Relation, Attributes, PK, Null & Not Null and Datatypes and write Create Table ..

At ActiveLife Fitness Center, new members are welcomed every day, each eager to embark on their fitness journey. To keep everything running smoothly, the fitness center employs a digital database system to manage member details. Let's explore how this system works and what makes it effective.

Every member receives a unique identification number upon registration, ensuring they can be distinctly identified from other members. This identification not only aids internal management but also enables personalized service experiences.

Members provide essential information like their full name and membership start date. Such details are crucial for maintaining accurate records and operational logistics—ensuring communication and service delivery are efficient.

To tailor workout programs, the fitness center records additional personal attributes like date of birth and membership type, revealing age group statistics and preferred program choices. This data is pivotal for offering customized services aligned with each member's fitness goals.

While immediate contact methods like phone numbers are encouraged, they remain optional. This approach respects member privacy and gives them control over their preferred communication channels with the fitness center.