Bug Tracking System

Software Requirement Document

Layered architecture

Models:

User					
Parent Class :					
			getter	setter	compare param
userId	Private	String	Y	Y	Y
userName	Private	String	Y	Y	
userEmail	Private	String	Y	Y	
userType	Protected	UserTypeEnum	Y	Y	

Developer					
Parent Class : User					
			getter	setter	compare param

Tester					
Parent Class : User					
			getter	setter	compare param

ProjectManager					
Parent Class : User					
			getter	setter	compare param
lastLoggedIn	public	LocalDateTime	Y	Y	

Tables:

User - SYSUSER					
	Datatype	**NULL**	**Primary key**	**Foreign Key Reference**	
user_id	varchar(10)	not null	Y		
user_name	varchar(100)	not null	Y		
user_email	varchar(100)	not null			

user_type	enum	('Developer','Tester', 'ProjectManager')			

DEVELOPER					
	Datatype	**NULL**	**Primary key**	**Foreign Key Reference**	
dev_id	varchar(10)	not null	Y	**SYSUSER(user_id)**	
alloated_project				**PORJECT(project_id)**	

TESTER					
	Datatype	**NULL**	**Primary key**	**Foreign Key Reference**	
tester_id	varchar(10)	not null	Y	**SYSUSER**(user_id)	

PROJECTMANAGER					
	Datatype	**NULL**	**Primary key**	**Foreign Key Reference**	
pmo_id	varchar(10)	not null	Y	**SYSUSER**(user_id)	

PROJECT					
	Datatype	**NULL**	**Primary key**	**Foreign Key Reference**	
Project_id	varchar(10)	not null	**Y**		
project_name	varchar(100)	not null	**Y**		
proj_desc	varchar(1000)	not null			
startDate	datetime	not null			
EndDate	Datetime	not null			
proj_status	enum('inprogress', 'completed')				

CREDENTIALS					
	Datatype	**NULL**	**Primary key**	**Foreign Key Reference**	
cred_usrid	varchar(10)	not null		**SYSUSER**(user_id)	
cred_email	varchar(100)	not null		**SYSUSER**(user_email)	
cred_password	varchar(100)	not null			

lastLoggedIn	datetime				
lastLoggedOut	datetime				

Learnings

PreparedStatement Methods

In Java, `PreparedStatement` is an interface in the `java.sql` package that extends the `Statement` interface. It is used to execute parameterized SQL queries, which helps prevent SQL injection attacks and improves performance by precompiling the SQL statement. `PreparedStatement` is particularly useful when you need to execute the same SQL statement with different sets of parameters multiple times.
Here are some commonly used methods of the `PreparedStatement` interface in Java:

1. Setting Parameters:

- setString(int parameterIndex, String x): Sets the designated parameter to the given Java `String` value.
- setInt(int parameterIndex, int x): Sets the designated parameter to the given Java `int` value.
- setDouble(int parameterIndex, double x): Sets the designated parameter to the given Java `double` value.
- setDate(int parameterIndex, Date x): Sets the designated parameter to the given Java `Date` value.

Example:
PreparedStatement preparedStatement = connection.prepareStatement("INSERT INTO table_name (column1, column2) VALUES (?, ?)");
preparedStatement.setString(1, "value1");
preparedStatement.setInt(2, 42);

2. Executing Statements:

- execute(): Executes the SQL statement.
- executeQuery(): Executes a SQL SELECT query and returns a `ResultSet` object.
- executeUpdate(): Executes a SQL INSERT, UPDATE, or DELETE statement and returns the number of affected rows.

Example:
int rowsAffected = preparedStatement.executeUpdate();

3. Batch Processing:

- addBatch(): Adds a set of parameters to the batch.
- executeBatch(): Executes the batch of commands.

Example:

```
preparedStatement.addBatch();
int[] rowsAffected = preparedStatement.executeBatch();
```

4. Handling Generated Keys:

- getGeneratedKeys(): Retrieves any auto-generated keys created as a result of executing this `PreparedStatement` object.

Example:

```
ResultSet generatedKeys = preparedStatement.getGeneratedKeys();
```

These methods provide a convenient and secure way to work with parameterized SQL statements in Java, allowing you to create more flexible and efficient database interactions.

ResultSet Methods

In Java, a `ResultSet` is an interface in the `java.sql` package that provides methods for retrieving and manipulating the results of a database query. It represents a set of data returned by a database query, typically a SELECT statement. The data is organized in rows and columns, similar to a table.

Here are some key aspects and methods associated with the `ResultSet` interface:

1. Navigation:

- next(): Moves the cursor to the next row in the `ResultSet`. It returns `true` if there is a next row, and `false` if there are no more rows.

Example:

```
ResultSet resultSet = statement.executeQuery("SELECT * FROM table_name");
while (resultSet.next()) {
  // Process each row
}
```

2. Retrieving Data:

- getString(int columnIndex) / getString(String columnLabel): Retrieves the value of the specified column as a `String`.
- getInt(int columnIndex) / getInt(String columnLabel): Retrieves the value of the specified column as an `int`.
- getDouble(int columnIndex) / getDouble(String columnLabel): Retrieves the value of the specified column as a `double`.

Example:
String name = resultSet.getString("name");
int age = resultSet.getInt("age");

3. Positioning the Cursor:

- absolute(int row): Moves the cursor to the specified row number.
- relative(int rows): Moves the cursor a relative number of rows, either forward or backward.

4. Metadata:

- getMetaData(): Retrieves the `ResultSetMetaData` object, which contains information about the columns in the `ResultSet`.

Example:
ResultSetMetaData metaData = resultSet.getMetaData();
int columnCount = metaData.getColumnCount();

5. Closing:

- close(): Closes the `ResultSet` object. It is important to close the `ResultSet` when you are done with it to release resources.

Example:
resultSet.close();
The `ResultSet` interface provides a flexible and powerful way to interact with the results of a database query in a Java program. It allows you to iterate through the rows, retrieve data from columns, and perform various operations on the data retrieved from the database.

DataBase design patterns of Parent – Child relationship (Inheritance)

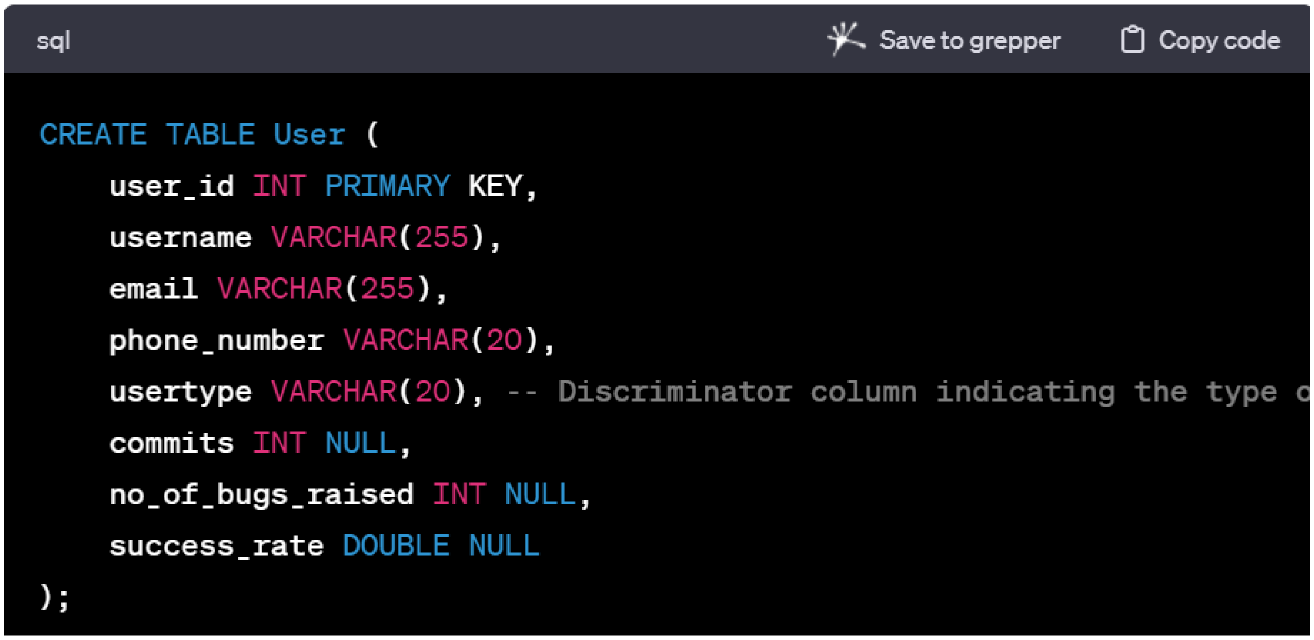
In the context of database design, when you have a parent class and a child class (representing an inheritance relationship), there are several approaches to modeling this in a relational database. Two common strategies are:

Single Table Inheritance (STI):

Table Structure: In STI, both the parent and child classes are represented by a single table. The table includes columns for all properties of both the parent and child classes. The child class columns that are specific to the child (and not present in the parent) are allowed to be nullable.
Advantages: Simplifies queries and joins as all data is in one table.
Disadvantages: Can result in a lot of NULL values for child-specific columns, and may lead to data redundancy.

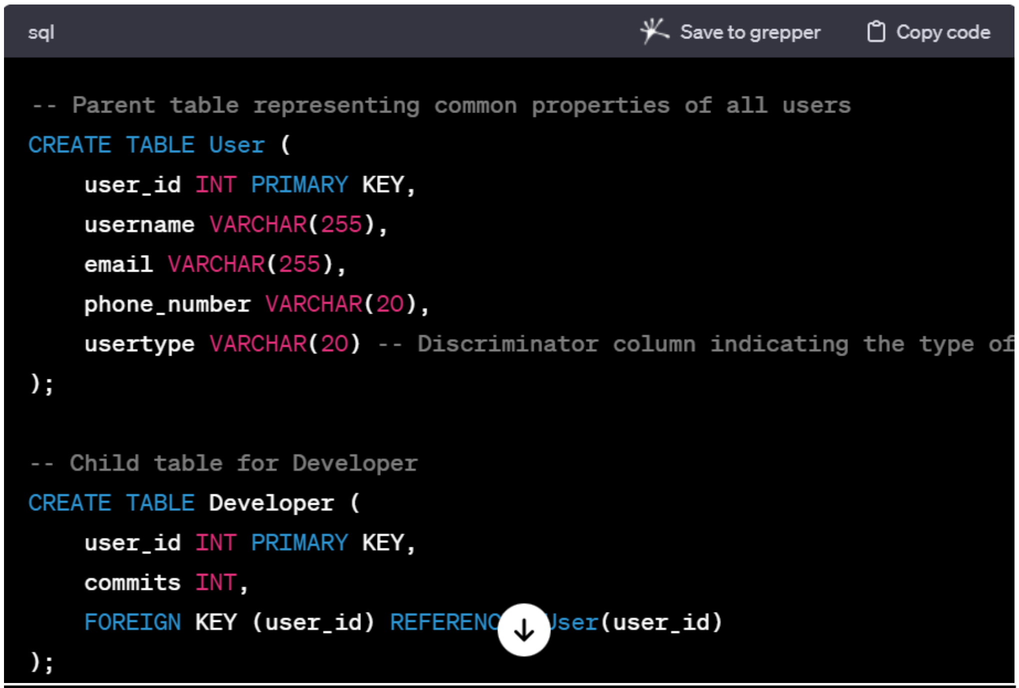
Class Table Inheritance (CTI):
Table Structure: In CTI, each class (both parent and child) is represented by its own table. The parent table contains common properties, and the child table contains only properties specific to the child class. There is usually a foreign key relationship between the parent and child tables.
Advantages: Reduces data redundancy and avoids NULL values for child-specific columns.
Disadvantages: Queries and joins might be more complex, and maintaining referential integrity can be more challenging.

Example – STI



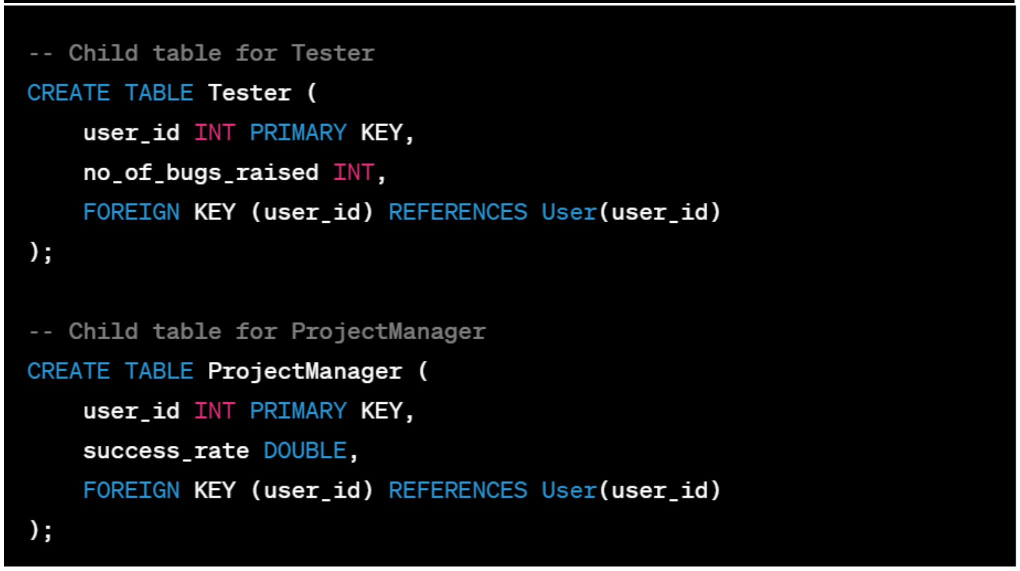
```sql
CREATE TABLE User (
    user_id INT PRIMARY KEY,
    username VARCHAR(255),
    email VARCHAR(255),
    phone_number VARCHAR(20),
    usertype VARCHAR(20), -- Discriminator column indicating the type o
    commits INT NULL,
    no_of_bugs_raised INT NULL,
    success_rate DOUBLE NULL
);
```

Example – CTI



```sql
-- Parent table representing common properties of all users
CREATE TABLE User (
    user_id INT PRIMARY KEY,
    username VARCHAR(255),
    email VARCHAR(255),
    phone_number VARCHAR(20),
    usertype VARCHAR(20) -- Discriminator column indicating the type of
);

-- Child table for Developer
CREATE TABLE Developer (
    user_id INT PRIMARY KEY,
    commits INT,
    FOREIGN KEY (user_id) REFERENC User(user_id)
);
```



```sql
-- Child table for Tester
CREATE TABLE Tester (
    user_id INT PRIMARY KEY,
    no_of_bugs_raised INT,
    FOREIGN KEY (user_id) REFERENCES User(user_id)
);

-- Child table for ProjectManager
CREATE TABLE ProjectManager (
    user_id INT PRIMARY KEY,
    success_rate DOUBLE,
    FOREIGN KEY (user_id) REFERENCES User(user_id)
);
```

```sql
-- Insert a Developer
INSERT INTO User (user_id, username, email, phone_number, usertype)
VALUES (1, 'dev_user', 'dev@example.com', '1234567890', 'Developer');
INSERT INTO Developer (user_id, commits) VALUES (1, 100);

-- Insert a Tester
INSERT INTO User (user_id, username, email, phone_number, usertype)
VALUES (2, 'tester_user', 'tester@example.com', '9876543210',
'Tester');
INSERT INTO Tester (user_id, no_of_bugs_raised) VALUES (2, 50);

-- Insert a ProjectManager
```

```
INSERT INTO User (user_id, username, email, phone_number, usertype)
VALUES (3, 'pm_user', 'pm@example.com', '5555555555',
'ProjectManager');
INSERT INTO ProjectManager (user_id, success_rate) VALUES (3, 0.95);
```

RelationShips in ER diagrams

[datesen.com - RelationShips in ER diagrams]

[datesen.com - Types of Relationships in detail]