Alexandria University
Faculty of Engineering
Computer and Systems Engineering Dept.

CS221: Object Oriented Programming

SIMPLE DBMS & JDBC

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DBMS:

A Computer Database is a structured collection of records or data that is stored in a computer system. On the other hand, a Database Management System (DBMS) is a complex set of software programs that controls the organization, storage, management, and retrieval of data in a database. DBMS are categorized according to their data structures or types. The DBMS accepts requests for data from the application program and instructs the operating system to transfer the appropriate data. Extensible Markup Language (XML) (encoding: ISO-8859-1) is a set of rules for encoding documents in machine readable form.

JDBC:

Java Database Connectivity (JDBC) provides Java developers with a standard API

that is used to access databases, regardless of the driver and database product.

JDBC presents a uniform interface to databases - change vendors and your applications only need to change their driver.

Design Patterns used:

- ✓ **Singleton pattern:**
  - ▪ **OurDriver.**
  - ▪ **OurJDBC.**
- ✓ **Object Pool pattern:**
  - ▪ **ConnectionManager.**
- ✓ **InterFace Pattern:**
  - ▪ **IConnection.**
  - ▪ **IDriver.**
  - ▪ **IResultSet.**
  - ▪ **IResultSetMetaData.**
  - ▪ **IStatement.**
- ✓ **Delegation Pattern:**
  - ▪ **RelationalCondition.**
- ✓ **Thread:**
  - ▪ **FutureThread.**
- ✓ **ChainOfResponsibility Pattern:**
  - ▪ **In handling errors and Exceptions.**

Design Decision:

o The user have to enter a valid path first then a valid URL in order to have a connection.

o The driver requests creating a connection.

o Connection is created by ConnectionManager (Pool).

o Connection creates statements.

o Statements execute queries using DBMS.

o Statements create & set ResultSet & ResultSetMetaData by getting the requested data through DBMS as a table.

o When Statement is executing a query there could be a limit for the execution time using a future thread.

o This time could be set by the driver, is its not set its zero by default.

User Manual:

- o **This is a simple GUI based application since its available only for developers helping them to manage their data bases.**
- o **The user have to write first path & URL of his workspace in order to request a connection.**
- o **If they are valid, a connection is created and then he can enter his queries.**
- o **Results, errors & warnings appear on a label and in a table.**
- o **If he wants to close the connection, he must write "close", so all unsaved operations are saved and connection is closed.**

Sample Runs:

E:\   Run

No columns in table

Enter a URL   Run

No columns in table

jdbc:xmldb:/localhost | Run

No columns in table

Enter your Query | Run

Connection is created.

No columns in table

create database bob | Run

You have made changes to the databases.

No columns in table

select * from 7 | Run

Selection is made successfully.

name	id	c
bebo	21	maths
koko	22	maths
mickey saeed	25	mn
bebo	21	maths
Arsany Atef	null	null

DELETE From 7; | Run |

You have made changes to 6 rows.

select * from 7 | Run |

Selection is made successfully.

name	id	c
bebo	21	maths
koko	22	maths
mickey saeed	25	mn
bebo	21	maths
Arsany Atef	null	null
bolbol	null	null

insert into 7 (name) values (bolbol); | Run |

You have made changes to 1 rows.

delete from 7 | Run |

You have made changes to 6 rows.
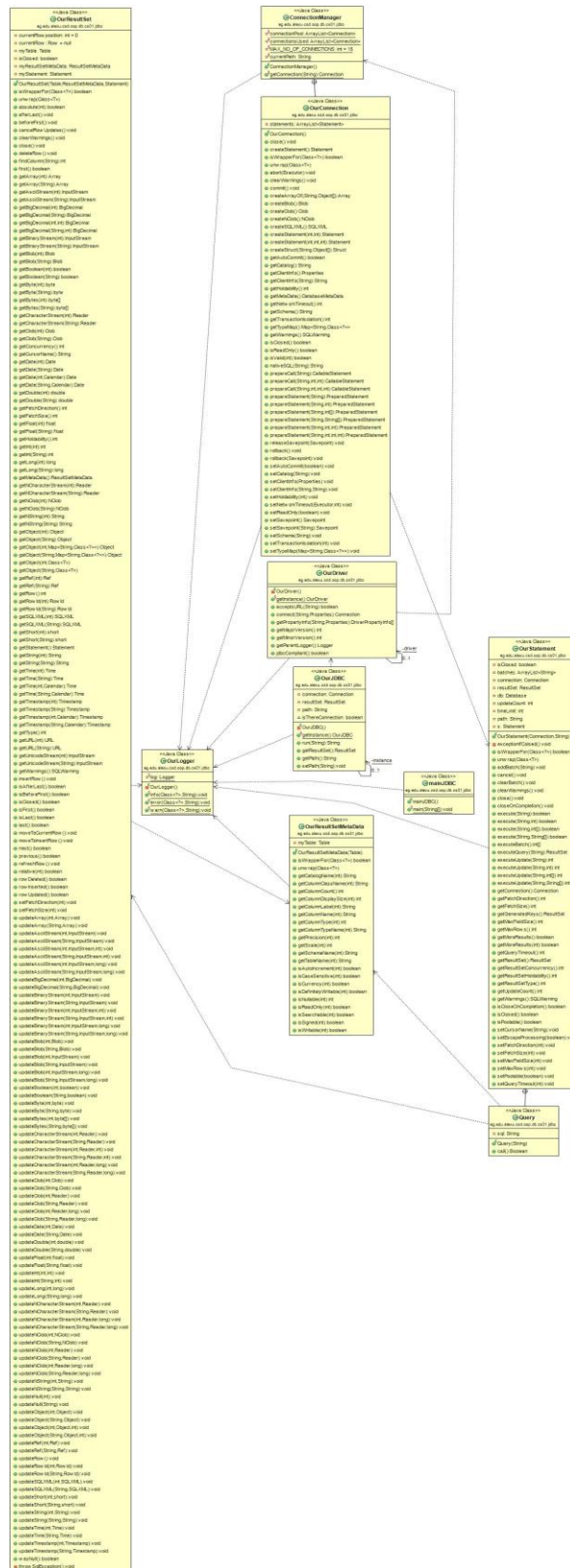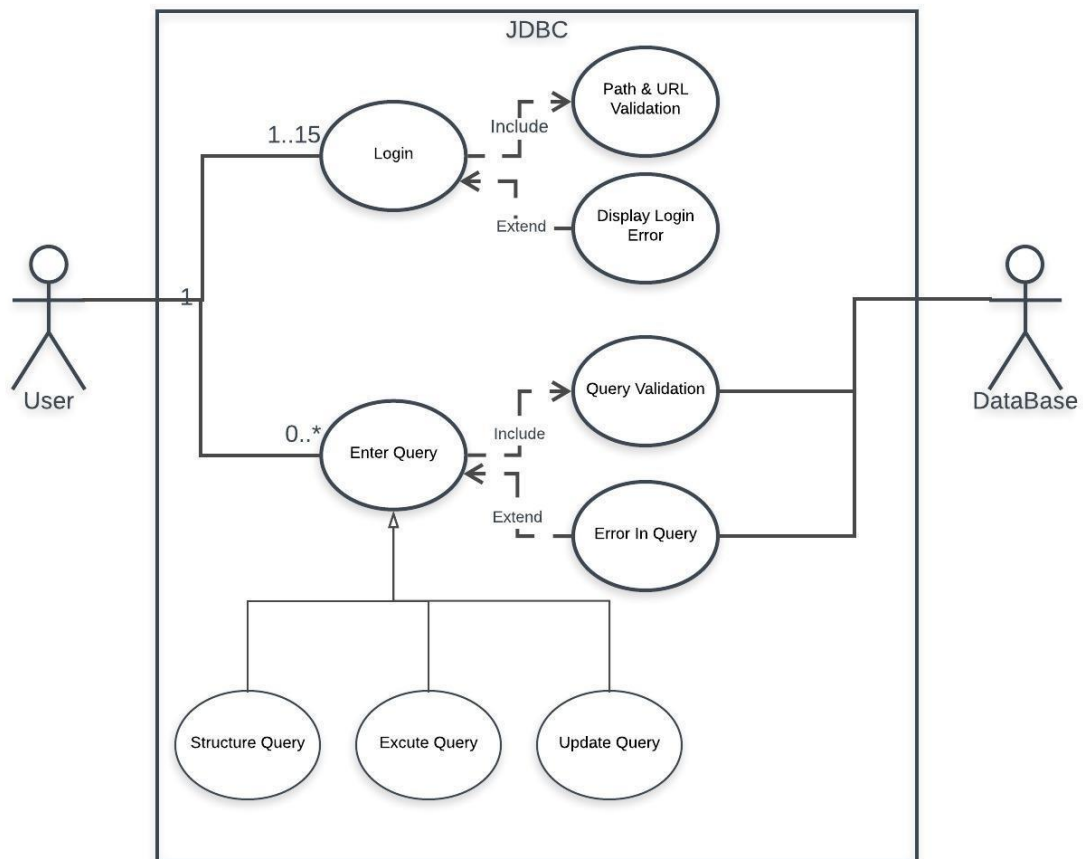
No columns in table
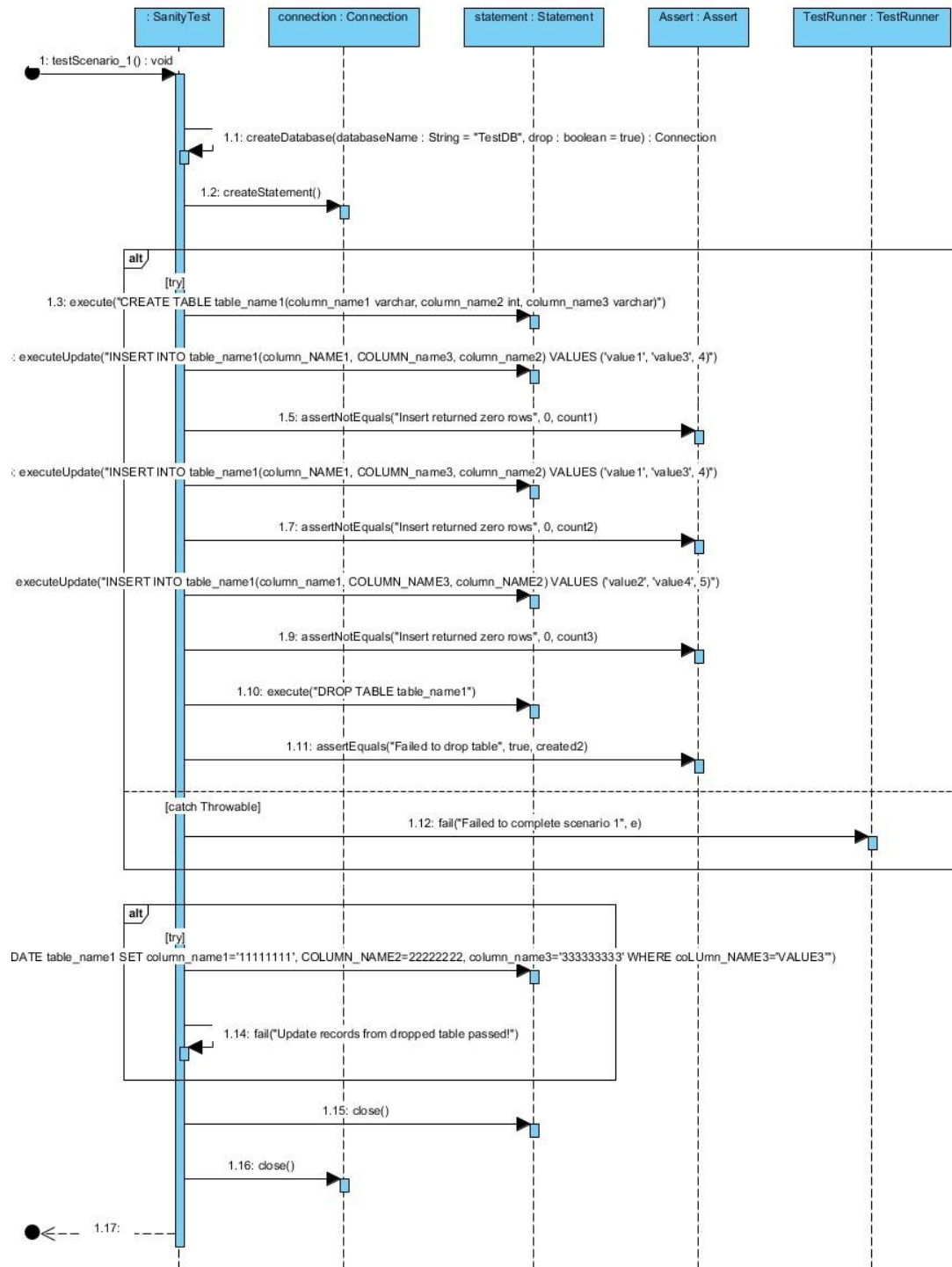
close

Run

Connection is closed.

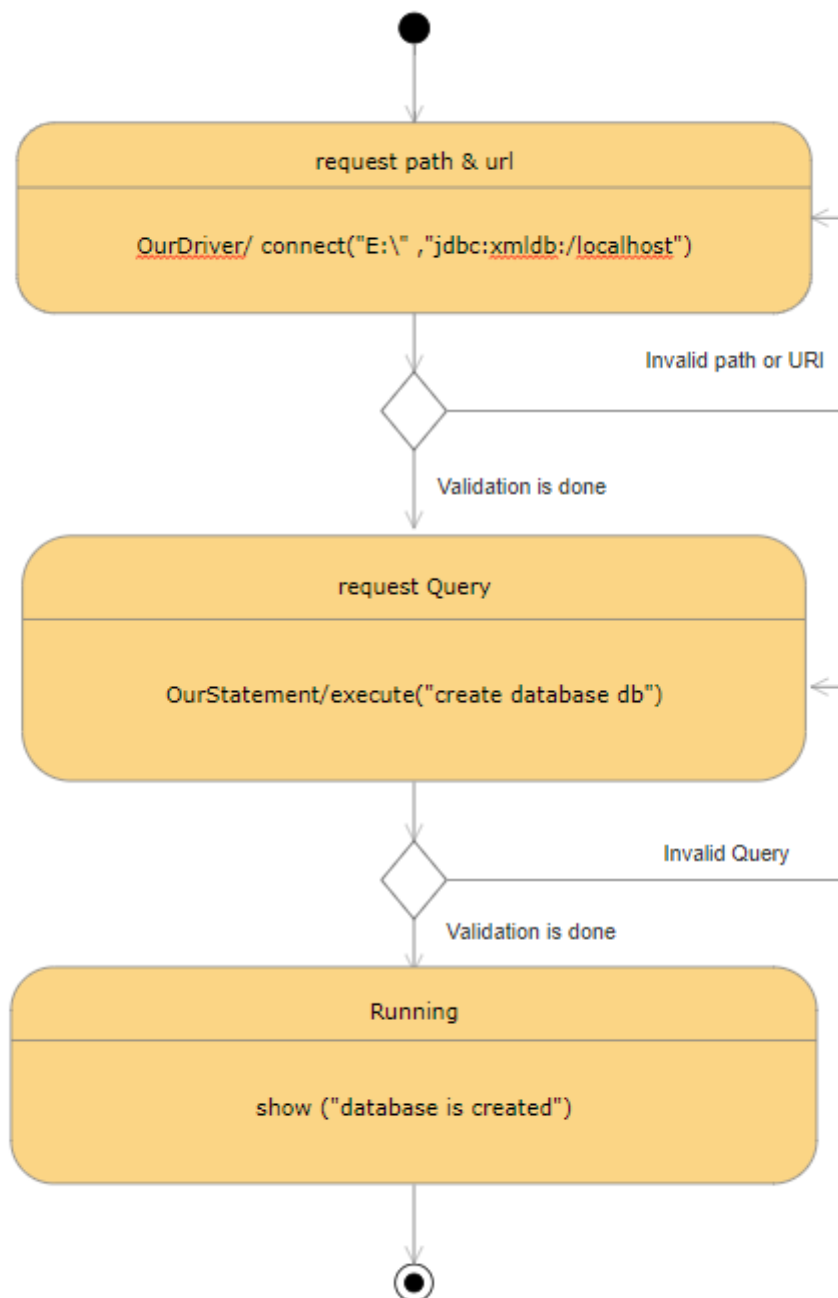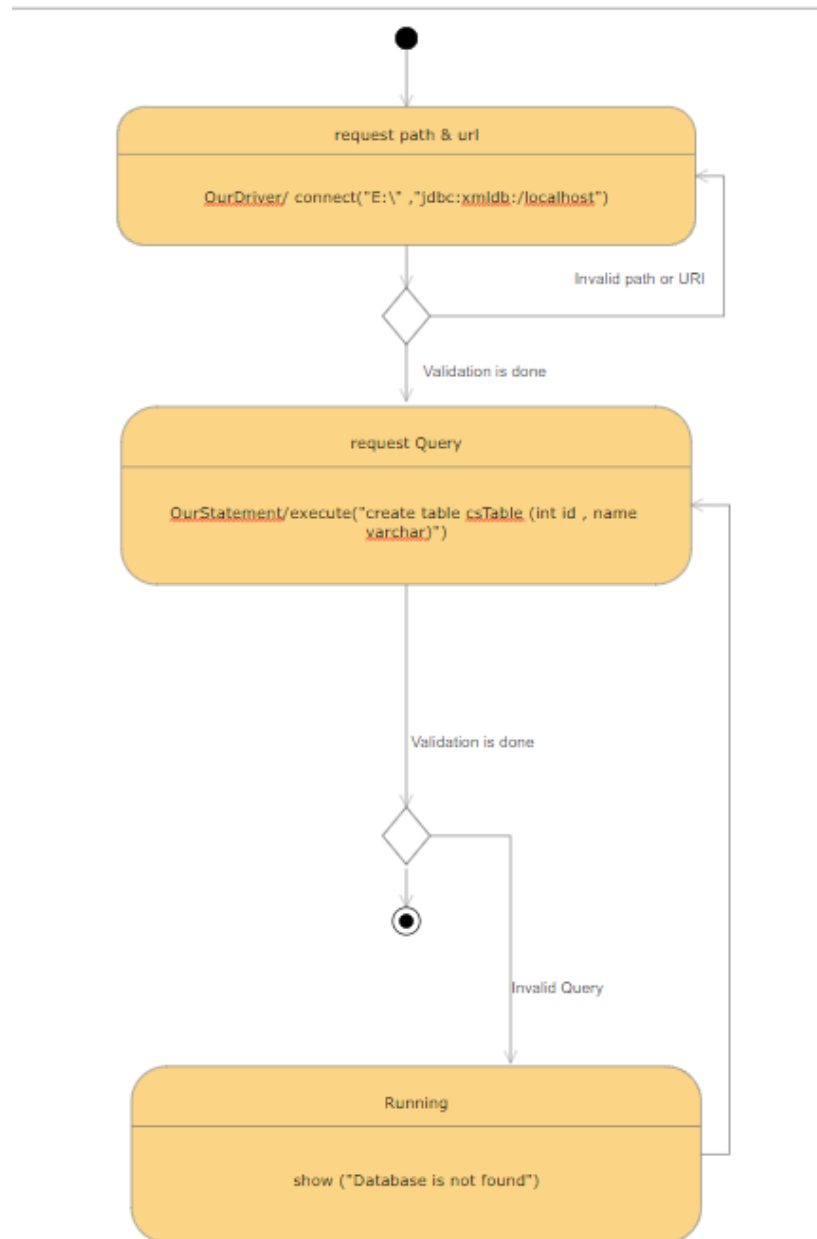No columns in table

Detailed Class Diagram:

Use Case Diagram:

Sequence Diagram:

State Diagram 1:

```
                              ●
                              │
                              ▼
   ┌──────────────────────────────────────────────────┐
   │              request path & url                    │
   ├──────────────────────────────────────────────────┤
   │                                                    │◄──┐
   │  OurDriver/ connect("E:\" ,"jdbc:xmldb:/localhost")│   │
   │                                                    │   │
   └──────────────────────────────────────────────────┘   │
                              │                             │
                              ▼                  Invalid path or URI
                            ◇─────────────────────────────┘
                              │
                              │ Validation is done
                              ▼
   ┌──────────────────────────────────────────────────┐
   │                  request Query                     │
   ├──────────────────────────────────────────────────┤
   │                                                    │◄──┐
   │   OurStatement/execute("create database db")       │   │
   │                                                    │   │
   └──────────────────────────────────────────────────┘   │
                              │                             │
                              ▼                   Invalid Query
                            ◇─────────────────────────────┘
                              │ Validation is done
                              ▼
   ┌──────────────────────────────────────────────────┐
   │                    Running                         │
   ├──────────────────────────────────────────────────┤
   │                                                    │
   │            show ("database is created")            │
   │                                                    │
   └──────────────────────────────────────────────────┘
                              │
                              ▼
                              ◉
```

State Diagram 2:

State diagram showing initial state transitioning to "request path & url" state with OurDriver/ connect("E:\" ,"jdbc:xmldb:/localhost"). A decision diamond labeled "Invalid path or URI" loops back; "Validation is done" proceeds to "request Query" state with OurStatement/execute("create table csTable (int id , name varchar)"). A second decision diamond labeled "Validation is done" leads to final state. "Invalid Query" leads to "Running" state with show ("Database is not found").

State Diagram 3:

request path & url

OurDriver/ connect("E:\" ,"jdbc:xmldb:/localhost")

Invalid path or URI

Validation is done

request Query

OurStatement/execute("DROP table csTable (int id , name varchar)")

Validation is done

Invalid Query

Running

show ("Database is not found")

Division of labour:

Abanoub Ashraf Ezzat:

- Gui
- ConnectionManager
- OurDriver
- OurLogger
- Executable Jar file

Arsany Atef:

- OurResultSet
- OurResultSetMetaData

Kirellos Malak:

- OurResultSet
- OurResultSetMetaData
- UML diagrams

Michael Saeed:

- OurStatement
- Gui
- UML diagrams
- Library Jar File
- OurJDBC