

DATABASE / BACKEND

FULLSTACKAPP (1.SEMESTER)

<https://github.com/cnls/FullStackApp>

WEBPROJECT (2.SEMESTER)

<https://github.com/cnls/WebProject>

DataMapper
MVC
Login
Session
PreparedStatement

SQL SCRIPT

Script
Save script / .sql file
Import:
SQL file / Execute
Export:
Server -> Data export

EER DIAGRAM

Models / New
Save model / .mwb file
Model <-> Database
Database -> Reverse engineer
Database -> Forward engineer
Database -> Synchronize model
No data in model...
Database to model
Model to database
Update database to model

SQL

DDL (Data definition language)
CREATE / ALTER / DROP
DML (Data manipulation language)
INSERT / UPDATE / DELETE
DQL (Data query language)
SELECT
DTL (Data transaction language)
START TRANSACTION / COMMIT

Tables / Columns / Data types

Where / Aggregate / Order / Group

Relations / Keys

Primary key Uniquely identifies each row
Foreign key Refers to primary key in other table

NORMALIZATION

Optimal organization of data in tables

- Reduce data redundancy
- Improve data integrity

Reorganize tables and columns to comply with normal forms

NORMAL FORMS

1NF

All columns must contain single values

All column values must belong to same group

No repeating groups

Each row is uniquely identifiable

*****NOT 1NF*****

employee

| emp_name | emp_address | emp_phone |
|----------------|-------------|------------------------|
| Victor Johnson | Europe | 8911112337 |
| John Williams | London | 8812655443, 9956434567 |
| William Smith | Paris | 7655449321 |

*****NOT 1NF*****

employee

| emp_name | emp_address | emp_phone1 | emp_phone2 |
|----------------|-------------|------------|------------|
| Victor Johnson | Europe | 8911112337 | |
| John Williams | London | 8812655443 | 9956434567 |
| William Smith | Paris | 7655449321 | |

*****1NF*****

employee

| emp_name | emp_city | emp_continent | emp_phone |
|----------------|----------|---------------|------------|
| Victor Johnson | Paris | Europe | 8911112337 |
| John Williams | London | Europe | 8812655443 |
| John Williams | London | Europe | 9956434567 |
| William Smith | Paris | Europe | 7655449321 |

2NF

In 1NF

No partial dependency

*****NOT 2NF*****

employee

| emp_name | emp_city | emp_continent | emp_phone |
|----------------|----------|---------------|------------|
| Victor Johnson | Paris | Europe | 8911112337 |
| John Williams | London | Europe | 8812655443 |
| John Williams | London | Europe | 9956434567 |
| William Smith | Paris | Europe | 7655449321 |

*****2NF*****

employee

| emp_id | emp_name | emp_city | emp_continent |
|--------|----------------|----------|---------------|
| 1 | Victor Johnson | Paris | Europe |
| 2 | John Williams | London | Europe |
| 3 | William Smith | Paris | Europe |

phone

| emp_id | Phone |
|--------|------------|
| 1 | 8911112337 |
| 2 | 8812655443 |
| 2 | 9956434567 |
| 3 | 7655449321 |

3NF

In 2NF

No transitive dependency

NOT 3NF

employee

| emp_id | emp_name | emp_city | emp_continent |
|--------|----------------|----------|---------------|
| 1 | Victor Johnson | Paris | Europe |
| 2 | John Williams | London | Europe |
| 3 | William Smith | Paris | Europe |

3NF

employee

| emp_id | emp_name | city_id |
|--------|----------------|---------|
| 1 | Victor Johnson | 1 |
| 2 | John Williams | 2 |
| 3 | William Smith | 1 |

| city_id | City | Continent |
|---------|--------|-----------|
| 1 | Paris | Europe |
| 2 | London | Europe |

JDBC

Dependency

mysql : mysql-connector-java.5.1.45.jar

DESIGN PATTERNS

Architectural patterns

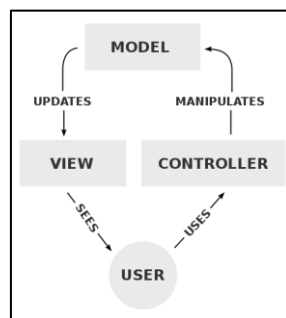
Data mapper

Interface includes functions for creating, reading, updating and deleting entities

Bidirectional transfer of data between a persistent data store and memory

MVC

Model – View – Controller



3 interconnected parts...

View: JSPs

Representation of information

Control: Servlets

Accepts input and converts it to commands for the model or view

Model: Entities

Manages the data, logic and rules

LOGIN

View

index.html / Link

```
<%@include file="includes/menu.jsp" %>
```

```
<% %> Expression
```

```
<% out.print("Something"); %>
```

```
<%= %> Output
```

```
<%= "Something" %>
```

Login.jsp / Form

Username / Password / Origin

User.jsp / Check

Session

Control

Switch

Origin

HTTP

REQUEST / RESPONSE

Parameter

```
request.getParameter(String);
```

Session

```
request.getSession().getAttribute(String);  
request.getSession().setAttribute(String, Object);
```

Redirect

Sends response to browser (URL changes to new)
response.sendRedirect(String page);

Forward

Forwards request to server (URL remains the same)
request.getRequestDispatcher(String page).forward(request, response);

SQL INJECTION / CROSS SIDE SCRIPTING

Problems

SQL / Javascript can be inserted into SQL string from inputs

SQL Injection

```
' or 1=1; -- //
```

Cross Side Scripting

```
<script>alert("Hello");</script>
```

Solution

PreparedStatement - Precompiled SQL statement

Use ? for values in SQL statement

Set values with index

```
PreparedStatement.setString(1, String);  
PreparedStatement.setInt(1, int);
```