REFLECTION WORKSHOP

# Create a new project

File - > New Project -> Maven Project - > Set the lines below -> Next -> Set project name and location -> Finish

*GroupId: ro.teamnet.zth*

*ArtifcatId: ZTH*

*Version: 1.0-SNAPSHOT*

# Update pom.xml

In pom.xml file you will copy the code below:

<dependencies>

<dependency>

<groupId>mysql</groupId>

<artifactId>mysql-connector-java</artifactId>

<version>5.1.35</version>

</dependency>

<dependency>

<groupId>junit</groupId>

<artifactId>junit</artifactId>

<version>4.11</version>

<scope>test</scope>

</dependency>

</dependencies>

<build>

<plugins>

<plugin>

<groupId>org.apache.maven.plugins</groupId>

<artifactId>maven-compiler-plugin</artifactId>

<configuration>

<source>1.7</source>

<target>1.7</target>

</configuration>

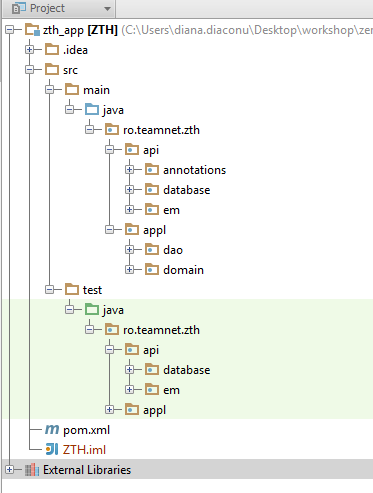
</plugin>

</plugins>

</build>

1. Create packages and folders

* in *src/main/java* create package *ro.teamnet.zth.api*;
* in package *ro.teamnet.zth.api* create the following folders: annotations, database, em;
* in *src/main/java* create package *ro.teamnet.zth.appl;*
* in package *ro.teamnet.zth.appl* create 2 folders: dao, domain;
* in *src/test/java* create package *ro.teamnet.zth.api* and *ro.teamnet.zth.appl*;
* in *ro.teamnet.zth.api* create the following folders: database, em;



1. Create annotations

Create in *src/main/java/ro/teamnet/zth/api/annotations* 3 annotations: “Table”, “Column”, “Id”.

**@Table** annotation:

* will be annotated with @Target(TYPE) and @Retention(RUNTIME);
* will have one method name() with default value “”;

**Example**:

@Target(TYPE)

@Retention(RUNTIME)

public @interface Table {

String name() default “”;

}

**@Column** annotation:

* will be annotated with @Target(FIELD) and @Retention(RUNTIME);
* will have one method name() with default value “”;

**@Id** annotation:

* will be annotated with @Target(FIELD) and @Retention(RUNTIME);
* will have one method name() with default value “id”;

# Create entities

In *src/main/java/ro/teamnet/zth/appl/domain* you will create 2 entities*: Departament.java* and *Location.java.*

1. **Location.java**

* create a public class *Location.java* with the following private fields: id (Long), streetAddress (String), postalCode (String), city (String), stateProvince (String);
* generate getters and setters for fields above(ALT+INSERT -> Getter and Setter -> select all fields -> OK;
* override methods equals() and toString() (ALT+INSRT-> select equals()/toString()

-> select all fields -> OK

* annotate columns defined with the correct annotation

*Example*:

@Id(name = "location\_id")

private Long id;

! OBS: You need to set “name” with the name of DB field for Location entity

1. **Department.java**

* create a public class *Department.java,* with the following private fields: id (Long), departmentName (String), location (Location);
* create getters and setters for fields above;
* override methods equals() and toString() (ALT+INSRT-> select equals()/toString()

-> select all fields -> OK

* annotate columns defined with the correct annotation

*Example*:

@Id(name = "department\_id")

private Long id;

! OBS: You need to set “name” with the name of DB field for Location entity

1. **[HOMEWORK]** – Create *JOBS.java* and *EMPLOYEES.java* mapped on database columns.
2. Create utilities classes

* create in *src/main/java/ro/teamnet/zth/api/em* an enum *QueryType* with 4 values: *SELECT, INSERT, UPDATE, DELETE;*
* create in same folder a class *ColumnInfo* with following private fields: *columnName (type String), columnType (type Class), dbName (type String), isId (type boolean), value (type Object).* Create getters and setters for these fields.
* create in same folder class *Condition* with fallowing private fields: *columnName (type String), value (type Object).* Create getters and setters for these fields*;*

1. Create EntityUtils.java file (is a helper file used for getting information from a table by annotations)

Create in *src/main/java/ro/teamnet/zth/api/em* a public class *EntityUtils.java* with the following methods:

* create a private constructor *EntityUtiles()*, which will throw a new *UnsupportedOperationException()*;
* create a public static method *getTableName (Class entity)* which will return the name of the DB table. In this method you will return DB table name from annotation (@Table) or entity name if there is no annotation. You will do that using reflection;
* create a public static method *getColumns* (Class entity) which will return a list of ColumnInfo. In this method you will return a list of information about columns annotated @Column. Steps:
* get all declared fields from class;
* go throw each field and verify if it is annotated with @Column or @Id and populate ColumnInfo list;
* return list;
* create a public static method *castFromSqlType*(Object value, Class<?> wantedType), where value is the value from DB and wantedType is the type of value which you want to use. The return type is Object. This class is used because in DB field “id’ is BigDecimal and we may want different type. Steps:
* if value is BigDecimal and wantedType is Integer then you will return an Interger;
* if value is different from BigDecimal then the method will return that value;
* create a public static method *getFieldsByAnnotations*(Class clazz, Class annotation), where clazz is for example Department and annotation is @Column. The return type is a list of fields. Steps:
* get declared fields for class “clazz”;
* search fields with annotation “annotation” and add field in list;
* return list;
* create a public static method *getSqlValue*(Object object), which will return an Object, sql value;

1. Create test class for EntityUtils.java

In *src/test/java/ro/teamnet/zth/api/em,* create a *EntityUtilsTest.java* which will test all the methods defined in *EntityUtiles.java.*

*Example:*

*@Test*

*public void testGetTableNameMethod() {*

*Department department = new Department();*

*String tableName = EntityUtils.getTableName(Department.class);*

*assertEquals("Table name should be departments!", "departments", tableName);*

*}*

1. Create database connection files
2. Create in *src/main/java/ro/teamnet/zth/api/database* an interface named *DProperties* with following fields: IP, PORT, SID, USER, PASS. The value for this fields are:

String IP = "127.0.0.1";

String PORT = "3306";

String SCHEMA = "ZTH\_XX";

String USER = "zth";

String PASS = "parola";

String DRIVER\_CLASS = "com.mysql.jdbc.Driver";

1. Create in same folder a class *DBManager* with following fields and methods:

* create a private constructor with no params which will throw UnsupportedOperationException();
* create a constant field *CONNECTION\_STRING=* *"jdbc:mysql://" + DBProperties.IP + "/" + DBProperties.SCHEMA;*"*,* where IP and SCHEMA will be taken from *DProperties* file.
* create a private static method *registerDriver()* for registering your driver. (Ex: Class.forName(DBProperties.DRIVER\_CLASS) )
* create a public static method *getConnection()* with the fallowing properties:
* method will return an object of type Connection;
* first you’ll have to register your driver;
* for connection object use *USER* and *PASS* from DProperties file;
* create a public static method *checkConnection(Connection connection)* in which you’ll make a simple query to DB (*SELECT 1 FROM DUAL*) for checking the connection.

# 10. Test methods from DBManager.java

Create in *src/test/java/ro/teamnet/zth/api/database*  a public class *DBManagerTest.java* which will test all the methods implemented in DBManager.java.

# Create utility class used for generating sql query

Create in *src/main/java/ro/teamnet/zth/api/em* a public class *QueryBuilder.java* with following fields and methods:

* create private fields *tableName(type Object), queryColumns(type List<ColumnInfo>), queryType(type QueryType), conditions(type List<Condition>);*
* create a public method *addCondition(Condition condition)* which will return a *QueryBuilder* and will set all conditions necessary for a query;
* create a public method *setTableName(Object tableName)* which will return a *QueryBuilder* and will set table name necessary for a query;
* create a public method *addQueryColumns(List<ColumnInfo> queryColumns)* which will return a *QueryBuilder* and will set all columns necessary for a query;
* create a public method *setQueryType(QueryType queryType)* which will return a *QueryBuilder* and will set the type of the query;
* create 4 private methods *createSelectQuery()*, *createDeleteQuery(), createUpdateQuery(), createInsertQuery().* In these methods you will create sql statements according to the name of the method.
* create public method *createQuery()* which will return a String. In this method you will check the query type and call one of the methods defined above;