

## Curso: Programação Orientada a Objetos com Java

### Projeto JavaFX com JDBC

#### Objetivo geral:

- Introduzir o aluno ao desenvolvimento de aplicações JavaFX com JDBC
- Permitir que o aluno conheça os fundamentos e a utilização das ferramentas, de modo que ele possa depois prosseguir estudando, de forma confortável, as especificidades que desejar

**REQUISITOS:** OO & Lambda & JDBC & JavaFX

**PROJETO:** <https://github.com/Gabriel7812/Java/tree/main/Projects/desktop-application-JavaFX-JDBC-master>

#### Github project

##### Checklist:

- Gitignore: Java

#### Local project created

##### Checklist:

- User libraries: JavaFX, MySQLConnector
- Run configurarions -> VM arguments:  
--module-path C:\java-libs\javafx-sdk\lib --add-modules=javafx.fxml,javafx.controls
- Git:
  - git init
  - git remote add origin <https://github.com/acenelio/workshop-javafx-jdbc.git>
  - git pull origin master
- Gitignore:
  - # build folders
  - bin/
  - target/
  - nbproject/private/
  - build/
  - nbbuild/
  - dist/
  - nbdist/

#### Main view

##### Checklist:

- Create FXML "MainView" (package "gui")
- Load FXML in Main
- Update Main.java

```

@Override
public void start(Stage primaryStage) {
    try {
        FXMLLoader loader = new FXMLLoader(getClass().getResource("/gui/MainView.fxml"));
        Parent parent = loader.load();

        Scene mainScene = new Scene(parent);
        primaryStage.setScene(mainScene);
        primaryStage.setTitle("Sample JavaFX application");
        primaryStage.show();
    } catch (IOException e) {
        e.printStackTrace();
    }
}

```

## Main view design

### Checklist:

- Design MainView.fxml
- Customize menu items
- Update Main.java

```

<?xml version="1.0" encoding="UTF-8"?>

<?import javafx.scene.control.Menu?>
<?import javafx.scene.control.MenuBar?>
<?import javafx.scene.control.MenuItem?>
<?import javafx.scene.control.ScrollPane?>
<?import javafx.scene.layout.VBox?>

<ScrollPane maxHeight="-Infinity" maxWidth="-Infinity" minHeight="-Infinity" minWidth="-Infinity"
prefHeight="400.0" prefWidth="600.0" xmlns="http://javafx.com/javafx/10.0.1"
xmlns:fx="http://javafx.com/fxml/1">
    <content>
        <VBox prefHeight="326.0" prefWidth="513.0">
            <children>
                <MenuBar>
                    <menus>
                        <Menu mnemonicParsing="false" text="Registration">
                            <items>
                                <MenuItem mnemonicParsing="false" text="Seller" />
                                <MenuItem mnemonicParsing="false" text="Departments" />
                            </items>
                        </Menu>
                        <Menu mnemonicParsing="false" text="Help">
                            <items>
                                <MenuItem mnemonicParsing="false" text="About" />
                            </items>
                        </Menu>
                    </menus>
                </MenuBar>
            </children>
        </VBox>
    </content>
</ScrollPane>

```

## Main view controller

### Checklist:

- Create controller
- In view, associate controller, ids, events

## About view

### Checklist:

- Include util classes to the project (Alerts.java, Constraints.java)  
<https://github.com/acenelio/javafx5/blob/master/src/gui/util/Alerts.java>  
<https://github.com/acenelio/javafx5/blob/master/src/gui/util/Constraints.java>
- Create About.fxml (VBox)
- In Main.java, expose mainScene reference
- In MainViewController.java, create loadView method

## DepartmentList view design

### Checklist:

- Create DepartmentList.fxml (VBox)
- In MainViewController.java, load DepartmentList

```
<?xml version="1.0" encoding="UTF-8"?>

<?import javafx.geometry.Insets?>
<?import javafx.scene.control.Button?>
<?import javafx.scene.control.Label?>
<?import javafx.scene.control.TableColumn?>
<?import javafx.scene.control.TableView?>
<?import javafx.scene.control.ToolBar?>
<?import javafx.scene.layout.VBox?>
<?import javafx.scene.text.Font?>

<VBox maxHeight="-Infinity" maxWidth="-Infinity" minHeight="-Infinity" minWidth="-Infinity"
prefHeight="400.0" prefWidth="600.0" xmlns="http://javafx.com/javafx/10.0.1"
xmlns:fx="http://javafx.com/fxml/1">
    <children>
        <Label text="Department Registration">
            <font>
                <Font name="System Bold" size="14.0" />
            </font>
            <padding>
                <Insets left="5.0" top="5.0" />
            </padding>
        </Label>
        <ToolBar prefHeight="40.0" prefWidth="200.0">
            <items>
                <Button fx:id="btNew" mnemonicParsing="false" text="New" />
            </items>
        </ToolBar>
        <TableView prefHeight="200.0" prefWidth="200.0">
            <columns>
                <TableColumn prefWidth="75.0" text="Id" />
                <TableColumn prefWidth="75.0" text="Name" />
            </columns>
        </TableView>
    </children>
</VBox>
```

## DepartmentList controller

### Checklist:

- Create model.entities.Department.java  
<https://github.com/acenelio/demo-dao-jdbc/blob/master/src/model/entities/Department.java>
- Create DepartmentListController.java
- In view, associate controller, ids, events

## DepartmentService

### Checklist:

- Create model.services.DepartmentService.java with findAll method
- In DepartmentListController:
  - Create DepartmentService dependency with set method
  - Create ObservableList<Department>
  - Create updateTableViewData method

## Initializing action as parameter

### Checklist:

- Add a Consumer<T> parameter to loadView method
- After loading view, call accept from the Consumer
- Add a consumer instance on loadView calls

## Adding database access

### Prerequisites:

- MySQL server installed and running
- Database created and instantiated  
<https://github.com/acenelio/demo-dao-jdbc/blob/master/database.sql>
- Data access layer implemented (DAO pattern):  
<https://github.com/acenelio/demo-dao-jdbc>

### Checklist:

- Add model.entities.Seller.java
- Add db.properties do project
- Add data access packages to project:
  - db
  - model.dao
  - model.dao.impl
- In DepartmentService, add DepartmentDao dependency with Factory call

## DepartmentForm (dialog) design

### Checklist:

- Create gui.util.Utils.java with currentStage method
- Create DepartmentForm.fxml (AnchorPane)
  - GridPane 3x3 (anchors: 20 top, 20 left)
  - Id text box: not editable
  - Label error: **red**
  - HBox (spacing: 5)
- In DepartmentListController, create createDialogForm method
- Call createDialogForm on "new" button action

```
<?xml version="1.0" encoding="UTF-8"?>

<?import javafx.scene.control.Button?>
<?import javafx.scene.control.Label?>
<?import javafx.scene.control.TextField?>
<?import javafx.scene.layout.AnchorPane?>
<?import javafx.scene.layout.ColumnConstraints?>
<?import javafx.scene.layout.GridPane?>
<?import javafx.scene.layout.HBox?>
<?import javafx.scene.layout.RowConstraints?>

<AnchorPane prefHeight="139.0" prefWidth="532.0" xmlns="http://javafx.com/javafx/10.0.1"
xmlns:fx="http://javafx.com/fxml/1">
    <children>
        <GridPane layoutX="33.0" layoutY="32.0" prefHeight="95.0" prefWidth="499.0"
AnchorPane.leftAnchor="20.0" AnchorPane.topAnchor="20.0">
            <columnConstraints>
                <ColumnConstraints hgrow="SOMETIMES" maxWidth="161.0" minWidth="10.0" prefWidth="63.0" />
                <ColumnConstraints hgrow="SOMETIMES" maxWidth="270.0" minWidth="10.0" prefWidth="160.0" />
                <ColumnConstraints hgrow="SOMETIMES" maxWidth="245.0" minWidth="10.0" prefWidth="243.0" />
            </columnConstraints>
            <rowConstraints>
                <RowConstraints minHeight="10.0" prefHeight="30.0" vgrow="SOMETIMES" />
                <RowConstraints minHeight="10.0" prefHeight="30.0" vgrow="SOMETIMES" />
                <RowConstraints minHeight="10.0" prefHeight="30.0" vgrow="SOMETIMES" />
            </rowConstraints>
            <children>
                <Label text="Id" />
                <Label text="Name" GridPane.rowIndex="1" />
                <Label textFill="RED" GridPane.columnIndex="2" GridPane.rowIndex="1" />
                <TextField editable="false" GridPane.columnIndex="1" />
                <TextField GridPane.columnIndex="1" GridPane.rowIndex="1" />
                <HBox prefHeight="100.0" prefWidth="200.0" spacing="5.0" GridPane.columnIndex="1"
GridPane.rowIndex="2">
                    <children>
                        <Button mnemonicParsing="false" text="Save" />
                        <Button mnemonicParsing="false" text="Cancel" />
                    </children>
                </HBox>
            </children>
        </GridPane>
    </children>
</AnchorPane>
```

## DepartmentFormController

### Checklist:

- Create DepartmentFormController.java
- In view, associate controller, ids, events

## Passing a Department object to DepartmentForm view

### Checklist:

- In DepartmentFormController
  - Create a Department dependency with set method
  - Create updateFormData method
- In DepartmentListController
  - Update onBtNewAction method
  - Update createDialogForm method

## Saving a new Department

### Checklist:

- In Utils, implement tryParseToInt method
- In DepartmentService, create saveOrUpdate method
- In DepartmentFormController
  - Create a DepartmentService dependency with set method
  - Implement onBtSaveAction
  - Implement onBtCancelAction
- In DepartmentListController, inject DepartmentService instance

## Observer design pattern to update tableview

### Checklist:

- Create interface gui.listeners.DataChangeListener
- In DepartmentFormController (subject)
  - Create List<DataChangeListener> dependency with subscribe method
  - Notify subscribers when needed
- In DepartmentListController (observer)
  - Implement DataChangeListener interface
  - Subscribe for DepartmentFormController

## Validation exception

### Checklist:

- Create model.exceptions.ValidationException
- In DepartmentFormController
  - In getFormData method, implement verifications and throw ValidationException
  - Implement setErrorMessages method
  - In onBtSaveAction, catch ValidationException

## Update department

### References:

<https://stackoverflow.com/questions/32282230/fxml-javafx-8-tableview-make-a-delete-button-in-each-row-and-delete-the-row-a>

### Checklist:

- In DepartmentListController
  - Create new attribute: `TableColumn<Department, Department> tableColumnEDIT;`
  - Create `initEditButtons` method
  - In `updateTableViewData`, call `initEditButtons`
- In DepartmentList.fxml
  - Include new table column
  - Associate id

```
private void initEditButtons() {
    tableColumnEDIT.setCellValueFactory(param -> new ReadOnlyObjectWrapper<>(param.getValue()));
    tableColumnEDIT.setCellFactory(param -> new TableCell<Department, Department>() {
        private final Button button = new Button("edit");

        @Override
        protected void updateItem(Department obj, boolean empty) {
            super.updateItem(obj, empty);

            if (obj == null) {
                setGraphic(null);
                return;
            }

            setGraphic(button);
            button.setOnAction(
                event -> createDialogForm(
                    obj, "/gui/DepartmentForm.fxml", Utils.currentStage(event)));
        }
    });
}
```

## Remove department

### References:

<https://stackoverflow.com/questions/32282230/fxml-javafx-8-tableview-make-a-delete-button-in-each-row-and-delete-the-row-a>

### Checklist:

- In Alerts, create `showConfirmation` method
- In DepartmentService, create `remove` method
- In DepartmentListController
  - Create new attribute: `TableColumn<Department, Department> tableColumnREMOVE;`
  - Create `initRemoveButtons` method
    - Catch `DbIntegrityException`
  - In `updateTableViewData`, call `initRemoveButtons`
- In DepartmentList.fxml
  - Include new table column
  - Associate id

```

public static Optional<ButtonType> showConfirmation(String title, String content) {
    Alert alert = new Alert(AlertType.CONFIRMATION);
    alert.setTitle(title);
    alert.setHeaderText(null);
    alert.setContentText(content);
    return alert.showAndWait();
}

private void initRemoveButtons() {
    tableColumnREMOVE.setCellValueFactory(param -> new ReadOnlyObjectWrapper<>(param.getValue()));
    tableColumnREMOVE.setCellFactory(param -> new TableCell<Department, Department>() {
        private final Button button = new Button("remove");

        @Override
        protected void updateItem(Department obj, boolean empty) {
            super.updateItem(obj, empty);

            if (obj == null) {
                setGraphic(null);
                return;
            }

            setGraphic(button);
            button.setOnAction(event -> removeEntity(obj));
        }
    });
}

```

## Deleting .settings folder

### Checklist:

- .gitignore: .settings/
- Delete .settings/ folder

## SellerList

### Checklist:

- Clone SellerService
  - Replace: Department -> Seller
- Clone SellerListController
  - Replace: Department -> Seller
  - Comment createDialogForm
- Clone SellerList.fxml
  - Replace: Department -> Seller
- Update MainViewController.onMenuItemSellerAction



## Seller TableView

### References:

<https://stackoverflow.com/questions/47484280/format-of-date-in-the-javafx-tableview>

### Checklist:

- gui.utils.Util.java
  - formatTableColumnDate method
  - formatTableColumnDouble method
- SellerListController
  - TableColumn attributes (Email, BirthDate, BaseSalary)
  - Update initializeNodes
- SellerListView
  - TableColumn (Email, BirthDate, BaseSalary)
  - Associate fx:id

```
public static <T> void formatTableColumnDate(TableColumn<T, Date> tableColumn, String format) {
    tableColumn.setCellFactory(column -> {
        TableCell<T, Date> cell = new TableCell<T, Date>() {
            private SimpleDateFormat sdf = new SimpleDateFormat(format);

            @Override
            protected void updateItem(Date item, boolean empty) {
                super.updateItem(item, empty);
                if (empty) {
                    setText(null);
                } else {
                    setText(sdf.format(item));
                }
            }
        };

        return cell;
    });
}
```

```
public static <T> void formatTableColumnDouble(TableColumn<T, Double> tableColumn, int decimalPlaces) {
    tableColumn.setCellFactory(column -> {
        TableCell<T, Double> cell = new TableCell<T, Double>() {

            @Override
            protected void updateItem(Double item, boolean empty) {
                super.updateItem(item, empty);
                if (empty) {
                    setText(null);
                } else {
                    Locale.setDefault(Locale.US);
                    setText(String.format("%. "+decimalPlaces+"f", item));
                }
            }
        };

        return cell;
    });
}
```

## SellerForm

### Checklist:

- Clone SellerFormController
  - Replace: Department -> Seller
- Clone SellerForm view
  - Replace: Department -> Seller
- SellerListController
  - Uncomment createDialogForm

## TextField & DatePicker

### References:

<https://stackoverflow.com/questions/26831978/javafx-datepicker-getvalue-in-a-specific-format>

### Checklist:

- gui.utils.Util.java
  - formatDatePicker method
- TextField & DatePicker attributes (Email, BirthDate, BaseSalary)
- Label error attributes (Email, BirthDate, BaseSalary)
- Edit SellerFormView
- Bugfix: SellerDaoJDBC.instantiateSeller
  - obj.setBirthDate(new java.util.Date(rs.getTimestamp("BirthDate").getTime()));
- Update: initializeNodes
- Update: updateFormData

```
public static void formatDatePicker(DatePicker datePicker, String format) {
    datePicker.setConverter(new StringConverter<LocalDate>() {

        DateTimeFormatter dateFormatter = DateTimeFormatter.ofPattern(format);

        {
            datePicker.setPromptText(format.toLowerCase());
        }

        @Override
        public String toString(LocalDate date) {
            if (date != null) {
                return dateFormatter.format(date);
            } else {
                return "";
            }
        }

        @Override
        public LocalDate fromString(String string) {
            if (string != null && !string.isEmpty()) {
                return LocalDate.parse(string, dateFormatter);
            } else {
                return null;
            }
        }
    });
}
```

## Department ComboBox

### Checklist:

- Update controller:
  - DepartmentService dependency
    - attribute
    - set method
  - ComboBox<Department> comboBoxDepartment
  - ObservableList<Department> obsList
    - loadAssociatedObjects
  - initializeComboBoxDepartment
  - updateFormData
- Update view:
  - ComboBox
  - fx:id

```
private void initializeComboBoxDepartment() {
    Callback<ListView<Department>, ListCell<Department>> factory = lv -> new ListCell<Department>() {
        @Override
        protected void updateItem(Department item, boolean empty) {
            super.updateItem(item, empty);
            setText(empty ? "" : item.getName());
        }
    };

    comboBoxDepartment.setCellFactory(factory);
    comboBoxDepartment.setButtonCell(factory.call(null));
}
```

## Saving Seller

### Checklist:

- Update: getFormData
- Update: setErrorMessages

## Building JAR file

### Checklist:

- Build JAR file
  - Right click project name -> Export -> Java/Runnable JAR file -> Next
  - Select Main class
  - Select destination folder
  - Library handling: **3rd option**
- Pack files
  - JAR file
  - db.properties
  - MySQL Connector
  - JavaFX SDK
  - Java SDK

## Installation

### Checklist:

- Install Java: <https://www.oracle.com/technetwork/java/javase/downloads/index.html>
  - Setup **JAVA\_HOME** (ex: C:\Program Files\Java\jdk-11.0.3)
- Copy JavaFX
  - Setup **PATH\_TO\_FX** (ex: C:\java-libs\javafx-sdk\lib)
  - Place MySQL Connector in lib folder
- Copy JAR & db.properties

### Run app:

```
java --module-path %PATH_TO_FX% --add-modules javafx.controls,javafx.fxml -cp myapp.jar application.Main
```

## Bat File (optional)

```
java --module-path %PATH_TO_FX% --add-modules javafx.controls,javafx.fxml -cp myapp.jar application.Main
```

## Windows Shortcut (optional)

### Target:

```
"C:\Program Files\Java\jdk-11.0.3\bin\java.exe" --module-path %PATH_TO_FX% --add-modules javafx.controls,javafx.fxml -cp myapp.jar application.Main
```

### Start in:

```
C:\appfolder
```