Lecture (13)
Database II

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Agenda

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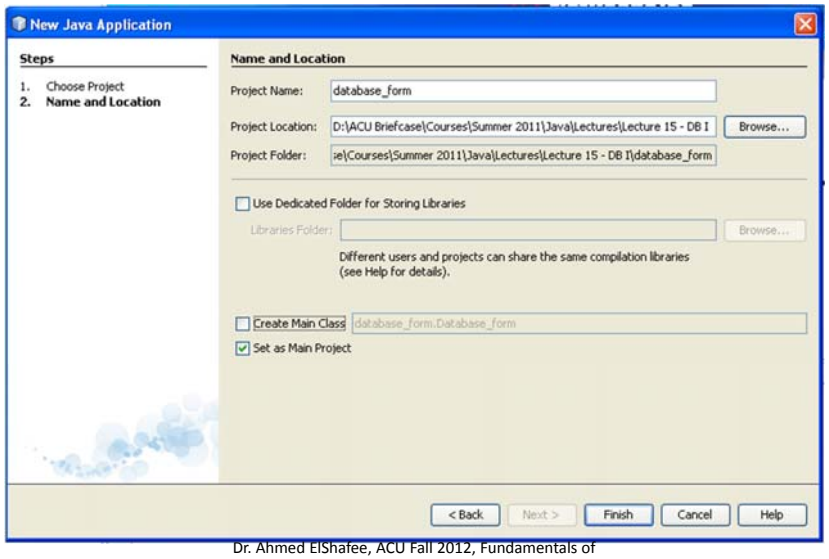
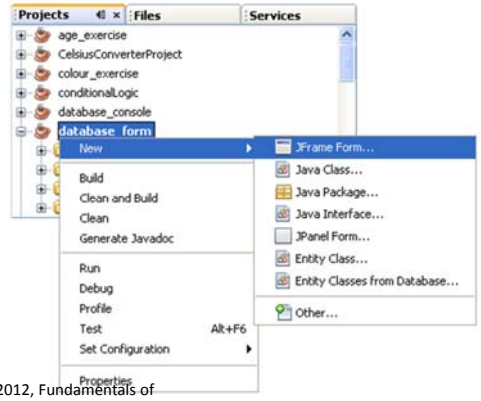
Databases and Java Forms

- In this section, you'll create a form with buttons and text fields.
- The buttons will be used to scroll forwards and backwards through the records in a database table.
- We'll also add buttons to perform other common database tasks.
- The form you'll design will look something like this:

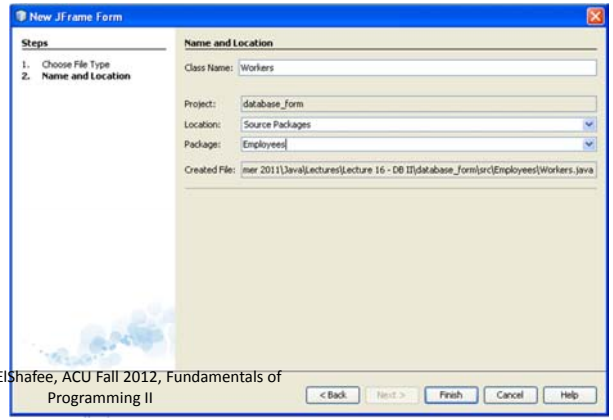
- Start a new project for this by clicking **File > New Project** from the NetBeans menu.
- When the dialogue box appears, select **Java > Java** Application.
- On step one of the dialogue box, type **database_form** as the Project Name.
- Uncheck the box at the bottom for **Create Main Class.**
- Click the Finish button to create an empty project.



- In the Project area on the left locate your **database_form project, and right click** the entry.
- From the menu that appears select **New > JFrame Form:**

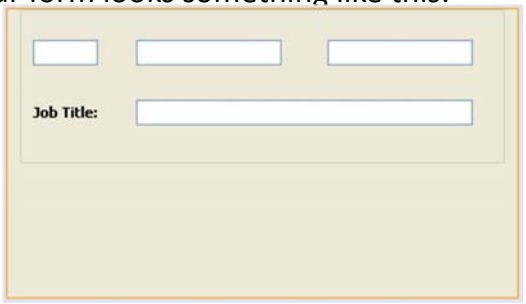


- When the dialogue box appears, type **Workers** for the Class name, and **Employees** as the package name.
- When you click **Finish,** you should see a **blank form** appear in the main NetBeans window.

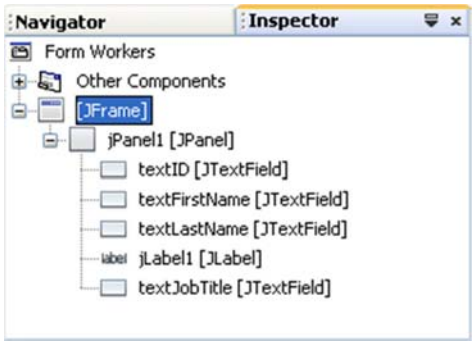


- Add a Panel to your form. Then place four Text Fields on the panel.
- Delete the default text for the Text Fields, leaving them all blank.
- Change the default variable names for the Text Fields to the following:
- **textID**
- **textFirstName**
- **textLastName**
- **textJobTitle**

- Add a label to your panel.
- Position it just to the left of the job title Text Field.
- Enter “Job Title” as the text for the label.
- Arrange the Text Fields and the Label
- so that your form looks something like this:



- Now have a look at the Inspector area to the left of NetBeans. (If you can’t see it, click **Window > Inspector** from the NetBeans menu.)
- It should match :



- What we want to do now is to have the first record from the database table appear in the text fields when the form first loads.
- To do that, we can call a method from the form’s Constructor.
- First, though, we can add **MySql Jconnector JAR** file to the project, just like last time.
- This will prevent any “Driver Not Found” errors. So, in the Projects area, right click the Libraries entry for your project. From the menu that appears, select **Add JAR/Folder.**
- When the dialogue box appears, locate the **mysql-connector-java-5.1.15-bin.jar** file**.**
- Then click Open to add it to your project.

- In the main NetBeans window, click the Source button at the top to get to your code.
- Now add the following import statements near the top:

import java.sql.Connection;

import java.sql.DriverManager;

import java.sql.SQLException;

import java.sql.Statement;

import java.sql.ResultSet;

import javax.swing.JOptionPane;

- Inside of the Class, add the following variable declarations:

Connection con;

Statement stmt;

ResultSet rs;

- Just below the Workers Constructor, add the following method:

public void DoConnect( ) {

}

- Now add a call to this method from the Constructor:

public Workers() {

initComponents();

DoConnect();

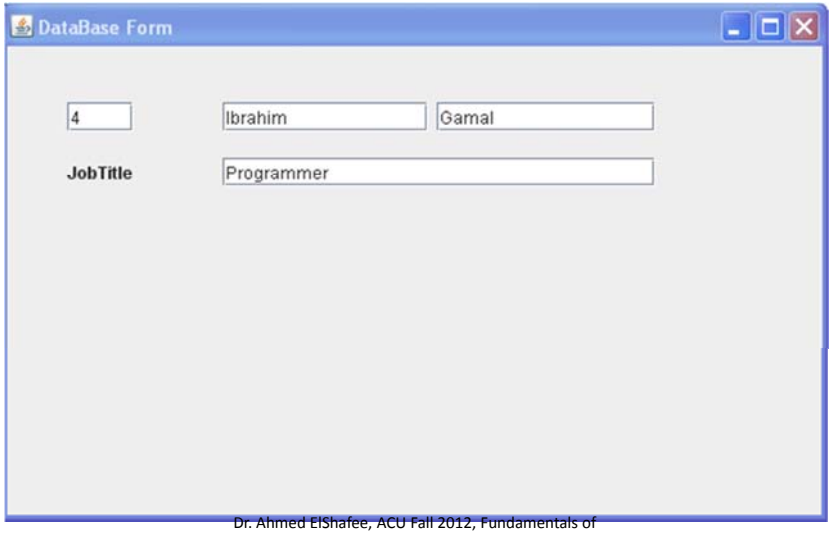
- Your code window will then look like this:

```
package Employees;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.SQLException;
import java.sql.Statement;
import java.sql.ResultSet;
import javax.swing.JOptionPane;

public class Workers extends javax.swing.JFrame {

    Connection con=null;
    Statement stmt=null;
    ResultSet rs=null;

    public Workers() {
        initComponents();
        DoConnect();
    }

    public void DoConnect() {

    }
```


- When the form loads, our **DoConnect** method will be called.
- We can add code here to connect to the database, and display the first record in the text fields.

```
public void DoConnect( ) {
        try{
            String uName = "root";
            String uPass = "root";
            String host = "jdbc:mysql://localhost:3306/Employees";
            con = DriverManager.getConnection( host, uName, uPass );
            stmt =con.createStatement( ResultSet.TYPE_SCROLL_SENSITIVE,ResultSet.CONCUR_UPDATABLE);
            String SQL = "SELECT * FROM Workers";
            rs = stmt.executeQuery( SQL );
            //while()
            rs.next( );
            {
             int id_col = rs.getInt("ID");
             String id_string=Integer.toString(id_col);
             String first_name = rs.getString("First_Name");
             String last_name = rs.getString("Last_Name");
             String job = rs.getString("Job_Title");
             jTextField1.setText(id_string);
             jTextField2.setText(first_name);
             jTextField3.setText(last_name);
             jTextField4.setText(job);
            }
        }
        catch(SQLException err){
        JOptionPane.showMessageDialog(Workers.this,err.getMessage());
        }
}
```

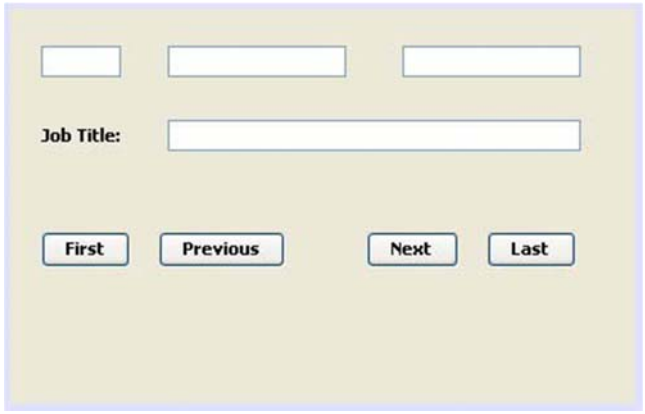
Run,…



- **Database Scrolling Buttons**
- What we'll do now is to add four buttons to the form.
- The buttons will enable us to move forward through the records, move back, move to the last record, and move to the first record.
- add a new panel to your form. Enlarge it and then add for buttons to the panel.
- Change the variable names of the buttons to the following:

  btnNext, btnPrevious, btnLast, btnFirst
- Change the text on each button the **Next, Previous, Last, First**.

- Form now look like that



- You need to do two things with the Next button:
- first, check if there is a next record to move to;
- and second, if there is a next record, display it in the Text Fields.

```
try {
if ( rs.next( ) ) {
}
else {
rs.previous( );
JOptionPane.showMessageDialog(Workers.this, "End of File");
}
}
```

```
catch (SQLException err) {
JOptionPane.showMessageDialog(Workers.this,
    err.getMessage());
}
```

- In the curly brackets for the IF Statement we can add the code to display the record in the Text Fields


```
private void btnNextActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:

    try {

        if ( rs.next( ) )
        {
            int id_col = rs.getInt("ID");
            String id = Integer.toString(id_col);
            String first = rs.getString("First_Name");
            String last = rs.getString("Last_Name");
            String job = rs.getString("Job_Title");
            jTextField1.setText(id);
            jTextField2.setText(first);
            jTextField3.setText(last);
            jTextField4.setText(job);
        }
        else {
                rs.previous( );
                JOptionPane.showMessageDialog(Workers.this, "End of File");
        }
    }
    catch (SQLException err) {
        JOptionPane.showMessageDialog(Workers.this, err.getMessage());
    }
}
```


Move Backward through the Database

- The code for the Previous button is similar to the **Next** button.
- But instead of using **rs.Next,** you use **rs.Previous.**
- Return to the Design window and double click your **Previous button** to create a code stub.


```
private void btnPreviousActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    try {

        if ( rs.previous( ) )
        {
            int id_col = rs.getInt("ID");
            String id = Integer.toString(id_col);
            String first = rs.getString("First_Name");
            String last = rs.getString("Last_Name");
            String job = rs.getString("Job_Title");
            jTextField1.setText(id);
            jTextField2.setText(first);
            jTextField3.setText(last);
            jTextField4.setText(job);
        }
        else {
                rs.next( );
                JOptionPane.showMessageDialog(Workers.this, "End of File");
        }
    }
    catch (SQLException err) {
        JOptionPane.showMessageDialog(Workers.this, err.getMessage());
    }
}
```

Moving to the First and Last Records

- Moving to the first and last records of your database is a lot easier.

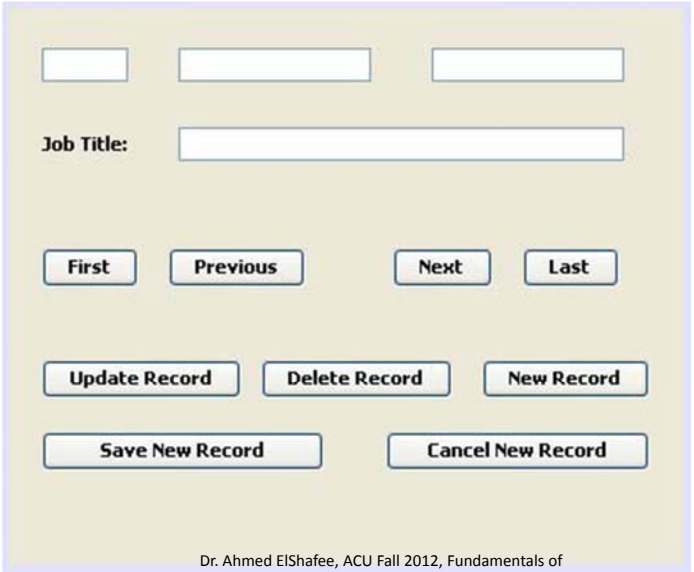
```
private void btnLastActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
        try {
            rs.last();
            int id_col = rs.getInt("ID");
            String id = Integer.toString(id_col);
            String first = rs.getString("First_Name");
            String last = rs.getString("Last_Name");
            String job = rs.getString("Job_Title");
            jTextField1.setText(id);
            jTextField2.setText(first);
            jTextField3.setText(last);
            jTextField4.setText(job);
        }
    catch (SQLException err) {
        JOptionPane.showMessageDialog(Workers.this, err.getMessage());
    }
}
```


- For moving to the first record

```
private void btnFirstActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    try {
            rs.first();
            int id_col = rs.getInt("ID");
            String id = Integer.toString(id_col);
            String first = rs.getString("First_Name");
            String last = rs.getString("Last_Name");
            String job = rs.getString("Job_Title");
            jTextField1.setText(id);
            jTextField2.setText(first);
            jTextField3.setText(last);
            jTextField4.setText(job);
        }
    catch (SQLException err) {
        JOptionPane.showMessageDialog(Workers.this, err.getMessage());
    }
}
```


Updating a Record

- The ResultSet has Update methods that allow you to update records not only in the ResultSet itself, but in the underlying database.
- Now add a new panel to the form. Add a new button to the panel. Change the default variable name to **btnUpdateRecord.**
- Change the text on the button **to Update Record**.

- 

- Add the following buttons

Button Variable Name: btnNewRecord

Button Text: New Record

Button Variable Name: btnDeleteRecord

Button Text: Delete Record

Button Variable Name: btnSaveRecord

Button Text: Save New Record

- Double click your Update button to create a code stub.
- The first thing to do is get the text from the Text Fields:

```
String first = textFirstName.getText( );
String last = textLastName.getText( );
String job = textJobTitle.getText( );
String ID = textID.getText( );
```

- If we want to update an ID field, however, we need to convert the String to an Integer:

```
int newID = Integer.parseInt( ID );
```


- Now that we have all the data from the Text Fields, we can call the relevant update methods of the ResultSet object:

```
rs.updateString( "First_Name", first );
```

- The one above uses **updateString**.
- But you need the field type from your database table here.
- We have three strings (First_Name, Last_Name, Job_Title) and one integer value (ID).
- So we need three **updateString** methods and one **updateInt.**
- In between the round brackets of the update methods, you need the name of a column from your database (though this can be its Index value instead).
- After a comma you type the replacement data.

- The update methods just update the ResultSet, however. To commit the changes to the database, you issue an **updateRow** command**:**

```
rs.updateRow( );
```

- You need try catch statement, just in case something goes wrong.

- code

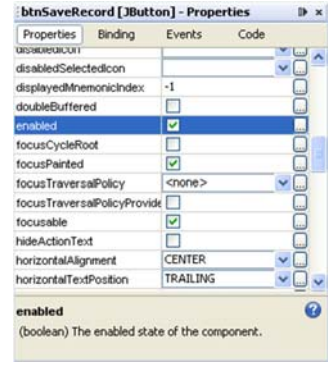
```
private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    String first = jTextField2.getText( );
    String last = jTextField3.getText( );
    String job = jTextField4.getText( );
    String ID = jTextField1.getText( );
    int newID = Integer.parseInt( ID );
    try {
        rs.updateInt( "ID", newID );
        rs.updateString( "First_Name", first );
        rs.updateString( "last_Name", last );
        rs.updateString( "Job_Title", job );
        rs.updateRow( );
        JOptionPane.showMessageDialog(Workers.this, "Updated");
    }
    catch (SQLException err) {
        System.out.println(err.getMessage());
    }

}
```


- Run your program and try it out. Change some data in a Text Field
- Then click your Update button.
- Scroll past the record then go back.
- The change should still be there. Now close down your program and run it again.
- You should find that the changes are permanent.

Adding a New Record

- We have three buttons that refer to new records: **New Record**, **Save New Reco**rd, and **Cancel New Record**
- The New Record button will only clear the Text Fields,
- and ready them for new data to be entered.
- We can also disable some other buttons, including the **New Record button**.
- Another thing we can do is to make a note of which record is currently loaded.
- If a user changes his or her mind, we can enable all the buttons again by clicking the **Cancel button**.
- Clicking the Save **New Record button** will do the real work of saving the data to the database.

- Click on your Save New Record button to select it.
- In the Properties area on the right, locate the Enabled property:
- Uncheck the box to the right of **enabled.** The **Save New Record** will be **disabled.**
- Do the same for the **Cancel New Record** button.
- The **Cancel New Record** will be **disabled**.
- When your form loads, it will look like this:



- Even if you had code for these two buttons, nothing would happen if you clicked on either of them.
- When the New Record button is clicked, we can disable the following buttons:
- **First** **Previous**
- **Next** **Last**
- **Update Record**
- **Delete Record**
- **New Record**

- The **Save** and **Cancel** buttons, however, can be enabled.
- If the user clicks **Cancel**, we can switch the buttons back on again.
- Double click your **New Record** button to create a code stub.
- Add the following lines of code:

```
private void btnNewRecordActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    btnFirst.setEnabled( false );
    btnPrevious.setEnabled( false) ;
    btnNext.setEnabled( false );
    btnLast.setEnabled( false );
    btnUpdateRecord.setEnabled( false );
    btnDelete.setEnabled( false );
    btnNewRecord.setEnabled( false );
    btnSaveRecord.setEnabled( true );
    btnCancelNewRecord.setEnabled( true );
}
```


- So seven of the buttons get turned off using the **setEnabled** property.
- Two of the buttons get turned on.
- We can do the reverse for the **Cancel** button.
- Switch back to Design view.
- Double click your **Cancel New Record** button to create a code stub.
- Add the following:


```
private void btnCancelNewRecordActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    btnFirst.setEnabled( true );
    btnPrevious.setEnabled( true ) ;
    btnNext.setEnabled( true );
    btnLast.setEnabled( true );
    btnUpdateRecord.setEnabled( true );
    btnDelete.setEnabled( true );
    btnNewRecord.setEnabled( true );
    btnSaveRecord.setEnabled( false );
    btnCancelNewRecord.setEnabled( false );
}
```

- Now run your program and test it out.
- Click the New Record button and the form will look like this:

- Click the Cancel New Record button and the form will look like this:

- Another thing we need to do is to record which row is currently loaded.
- In other words, which row number is currently loaded in the Text Fields.
- We need to do this because the Text Fields are going to be cleared.
- If the Cancel button is clicked, then we can reload the data that was erased.
- Add the following Integer variable to the top of your code, just below your Connection, Statement, and ResultSet lines:

int curRow = 0;


```
public class Workers extends javax.swing.JFrame {

    Connection con;
    Statement stmt;
    ResultSet rs;
    int curRow = 0;

    public Workers() {
        initComponents();
        DoConnect();
    }
```

- Now go back to your New Record code.
- To get which row the Cursor is currently pointing to there is a method called **getRow.**
- This allows you to store the row number that the Cursor is currently on:

curRow = rs.getRow( );

- We'll use this row number in the Cancel New Record code.
- The only other thing we need to do for the New Record button is to clear the Text Fields. This is quite simple:

textFirstName.setText("");

textLastName.setText("");

textJobTitle.setText("");

textID.setText("");

- Because we've used a method of the **ResultSet**, we need to wrap everything up in a **try … catch block.**


```
private void btnNewRecordActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    try{
    curRow = rs.getRow();
    btnFirst.setEnabled( false );
    btnPrevious.setEnabled( false) ;
    btnNext.setEnabled( false );
    btnLast.setEnabled( false );
    btnUpdateRecord.setEnabled( false );
    btnDelete.setEnabled( false );
    btnNewRecord.setEnabled( false );
    btnSaveRecord.setEnabled( true );
    btnCancelNewRecord.setEnabled( true );
    jTextField1.setText("");
    jTextField2.setText("");
    jTextField3.setText("");
    jTextField4.setText("");

    }
    catch(SQLException err){}
}
```


- For the Cancel button, we need to get the row that was previously loaded and put the data back in the Text Fields.
- To move the Cursor back to the row it was previously pointing to, we can use the **absolute method:**

rs.absolute(curRow);

- The absolute method moves the Cursor to a fixed position in the ResultSet.
- We want to move it the value that we stored in the variable **curRow.**
- Now that Cursor is pointing at the correct row, we can load the data into the Text Fields:

textFirstName.setText(rs.getString("First_Name"));

textLastName.setText(rs.getString("Last_Name"));

textJobTitle.setText(rs.getString("Job_Title"));

textID.setText(Integer.toString(rs.getInt("ID")));

- code

```
private void btnCancelNewRecordActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    try{
    rs.absolute( curRow );
    btnFirst.setEnabled( true );
    btnPrevious.setEnabled( true ) ;
    btnNext.setEnabled( true );
    btnLast.setEnabled( true );
    btnUpdateRecord.setEnabled( true );
    btnDelete.setEnabled( true );
    btnNewRecord.setEnabled( true );
    btnSaveRecord.setEnabled( false );
    btnCancelNewRecord.setEnabled( false );
    jTextField1.setText(Integer.toString(rs.getInt("ID")));
    jTextField2.setText(rs.getString("First_Name"));
    jTextField3.setText(rs.getString("Last_Name"));
    jTextField4.setText(rs.getString("Job_Title"));
    }
    catch(SQLException err)()
}
```


- When you've finished adding the code for the **New and Cancel button**s, run your program and try it out.
- Before clicking the **New Record b**utton, the form will look like this

- Click the New Record button to see the Text Fields cleared:

- Clicking the Cancel button will reload the data:

Saving a New Record

- Before you can save a new record, you have to move the Cursor to something called the **Insert Row.** This creates a blank record in the **ResultSet**.
- You then add the data to the **ResultSet**:
- After adding the data to the **ResultSet**, the final line inserts a new row.
- However, to commit any changes to the database what we'll do is to close our Statement object and our **ResultSet** object. We can then reload everything.
- If we don't do this, there's a danger that the new record won't get added, either to the **ResultSet** or the database. (This is due to the type of Driver we've used.)

- The code to reload everything is the same as the code you wrote when the form first loads
- You're not doing anything different, here: just selecting all the records again and putting the first one in the Text Fields.

- Code

```
private void btnSaveRecordActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
   try{
    rs.moveToInsertRow( );

    rs.updateInt("ID", Integer.parseInt((jTextField1.getText())));
    rs.updateString("First_Name", jTextField2.getText());
    rs.updateString("Last_Name", jTextField3.getText());
    rs.updateString("Job_Title", jTextField4.getText());
    rs.insertRow( );

    stmt.close( );
    rs.close( );

    stmt = con.createStatement(ResultSet.TYPE_SCROLL_SENSITIVE,
    ResultSet.CONCUR_UPDATABLE);
    String sql = "SELECT * FROM Workers";
    rs = stmt.executeQuery(sql);
    rs.next( );
    int id_col = rs.getInt("ID");
    String id = Integer.toString(id_col);
    String first2 = rs.getString("First_Name");
    String last2 = rs.getString("Last_Name");
    String job2 = rs.getString("Job_Title");
    jTextField1.setText(id);
    jTextField2.setText(first2);
    jTextField3.setText(last2);
    jTextField4.setText(job2);
    }
    catch(SQLException err){}
}
```


Deleting a Record

- Deleting a row can be straightforward: Just use **deleteRow** method of the ResultSet:

rs.deleteRow( );

- the **Driver** we are using, the **ClientDriver**, leaves a blank row in place of the data that was deleted.
- If you try to move to that row using your **Next** or **Previous** buttons, the **ID Text Field** will have a 0 in it, and all the others will be blank.

- To solve this problem we'll first delete a row then, again, close the **Statement** object and the **ResultSet** objects.
- We can then reload all the data in the **Text Fields**.
- That way, we won't have any blank rows.


```
private void btnDeleteActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    try{
    rs.deleteRow( );
            stmt.close( );
    rs.close( );

    stmt = con.createStatement(ResultSet.TYPE_SCROLL_SENSITIVE,
    ResultSet.CONCUR_UPDATABLE);
    String sql = "SELECT * FROM Workers";
    rs = stmt.executeQuery(sql);
    rs.next( );
    int id_col = rs.getInt("ID");
    String id = Integer.toString(id_col);
    String first2 = rs.getString("First_Name");
    String last2 = rs.getString("Last_Name");
    String job2 = rs.getString("Job_Title");
    jTextField1.setText(id);
    jTextField2.setText(first2);
    jTextField3.setText(last2);
    jTextField4.setText(job2);
    }
    catch(SQLException err){}
}
```


Lectutre1301

- Check lab manual

Lectutre1302

- Check lab manual

Thanks,

See you next Week, isA