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Platform:

JAVA

Links:

<http://jasperreports.sourceforge.net/tutorial/index.html>

<http://ireport.sourceforge.net/docs.html>

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A Tutorial on Reporting in JAVA using JasperReports, iReport and JFreeChart

This tutorial aims to get the reader acquainted with the three of the open source JAVA reporting tools, namely JasperReports[1], iReport[2] and JFreeChart[3].

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A. What is a Report?

A report is a nicely formatted way of presenting the data that you have entered. Reports are all about querying a database and displaying the results in a nice format. Data in the database may be displayed just as is, that is, in hundreds of pages. However, most of the time, reports are used to grasp information out of a bunch of data. This is mainly done by charts which are graphical representations of information. When the data is processed to fill out a report, calculations are done over the specific fields of the entries. The results appear as bars or pies in a chart or as text at the end of the report.

Many of the commercially available reporting tools have the following layout for a report page.



Figure 1: General Report Template

title appears only once at the very beginning of the report. Title of the report is written in this part. eg. “Employee Performance Report”

pageHeader appears at the top of each page. This part may contain date and time information and/or organization name.

columnHeader lists names of those specific fields which you want to display. eg. “Employee Name”, “Starting Hour”, “Finishing Hour”, “Hours Worked”, “Date”

detail is the part where those fields of the entries are shown. eg. “John Doe”, “09:00”, “18:00”, “9”, “16.07.2004”

columnFooter may display summation of any of the fields. eg. “Total Hours Worked: 180”

pageFooter appears at the bottom of each page. This part may contain page count information like “1/7”.

summary is the part where information inferred from the data in the “detail” part is displayed. For example, after listing the worked hours for each employee in “detail” part, total hours worked for each employee can be put in a pie to enable a better visual comparison between the employees.

B. How are JasperReports, iReport and JFreeChart related?

JasperReports

JasperReports is an engine that takes an XML file and forms a report out of that file using the data source specified in the XML file. A sample XML file is given in [Appendix A](#). This file defines exactly what appears where in the report. Writing this file by hand is not practical. This is where iReport comes into play.

For more information on JasperReports, see <http://jasperreports.sourceforge.net/tutorial/index.html>

iReport

iReport is a visual tool to obtain XML files for JasperReports. It provides a WYSIWYG environment to design reports. Sample.jrxml in [Appendix A](#) is obtained using iReport.

Anything that can be placed in a report (static text, geometric shapes, images, subreports, groups, texts and images coming from a data source) can be put together in drag'n'drop fashion according to the report template shown in [Figure 1](#).

For more information on JasperReports, see <http://ireport.sourceforge.net/docs.html>

JFreeChart

JFreeChart is a free Java class library for generating charts. Several chart types are supported such as pie charts (2D and 3D), bar charts (regular and stacked, with an optional 3D effect), line and area charts, scatter plots and bubble charts, time series, high/low/open/close charts and candle stick charts, combination charts, Pareto charts, Gantt charts, wind plots, meter charts and symbol charts, wafer map charts. This library is used to create the images of the charts which we want to embed into the report.

For more information on JasperReports, use keyword "The JFreeChart Class Library"

C. Creating a Sample Report with JasperReports, iReport and JFreeChart

A sample report which shows work hours of employees will be created. Report will be created based on the following database entries shown in [Figure 2](#). Any database can be used as long as you can obtain a reference to a java.sql.Connection.

ID	EmployeeName	HoursWorked	Date
1	John Doe	5.000	17.07.2004
2	Jane Doe	6.000	17.07.2004
3	Marc Smith	9.000	17.07.2004
4	John Doe	3.500	17.07.2004
5	Marc Smith	6.000	18.07.2004
6	Jane Doe	8.500	18.07.2004
7	John Doe	5.500	18.07.2004
8	Marc Smith	2.000	18.07.2004
9	John Doe	2.500	18.07.2004

Figure 2: Sample Table – "tutorial_table" in "tutorial_db"

We want to show the same data in the table, however in a different format, for example, all entries for each employee grouped together. We also want to display the total hours worked for each employee. And finally, to give a comparison among the employees, we want to display these information in a chart. [Figure 3](#) shows what we want to obtain.

Employee Work Hours Report	
Employee: Jane Doe	
Hours Worked	Date
6.0	2004-07-17
8.5	2004-07-18
Total: 14.5	
Employee: John Doe	
Hours Worked	Date
5.0	2004-07-17
3.5	2004-07-17
5.5	2004-07-18
2.5	2004-07-18
Total: 16.5	
Employee: Marc Smith	
Hours Worked	Date
9.0	2004-07-17
6.0	2004-07-18
2.0	2004-07-18
Total: 17.0	

Figure 3: Desired Final Report

Creating the XML File for JasperReports using iReport

Start by creating a new document in iReport. (File-New Document) In the report properties screen, specify the report name as "EmployeeReport" and confirm other default values.

Before proceeding further, bear the following in mind:

- Use Edit-Insert Element to insert different types of elements into the report. After selecting the element, you will see that the cursor turns into a "+" sign. Pressing the left button of the mouse and dragging it, specify the bounds of the inserted element. Double-clicking on the element opens the property dialog, use this dialog to edit element properties. Property names are mostly self-explanatory.
- Dynamic content of the report is provided by three things. 1. Parameters 2. Fields 3. Variables. All these three are added to the report as "Text Field"s through Edit-Insert element-Text field.
- To specify a text field's content to come from a Parameter, specify the Text field expression in the property dialog of the element like the following: `$P{parameterName}`

- Similarly, to specify a text field's content to come from a field, specify the Text field expression in the property dialog of the element like the following: $\$F\{\text{fieldName}\}$ fieldName can only be columns in a table of the database. In our case, fieldName can be any of "EmployeeName", "HoursWorked", "Date".
- Similarly, to specify a text field's content to come from a variable, specify the Text field expression in the property dialog of the element like the following: $\$V\{\text{variableName}\}$
- After specifying a text field's content to come from either a Parameter, a Field or a Variable, you should define the corresponding content name in "Report Fields", "Report Parameters" or "Report Variables" through "View-Report Fields", "View-Report Parameters" or "View-Report Variables".
- By defining a "Report parameter", we ensure that we will provide the JasperReport compiler with a Hashtable having an entry with key="parameterName" and value="parameterValue" prior to the compilation of the report.
- Similarly, by defining a "Report field", we ensure that resultset obtained by "Report Query" will contain a column named "fieldName".
- Variables are of two types: builtin variables or non-builtin variables. You will see examples of both in a few moments.

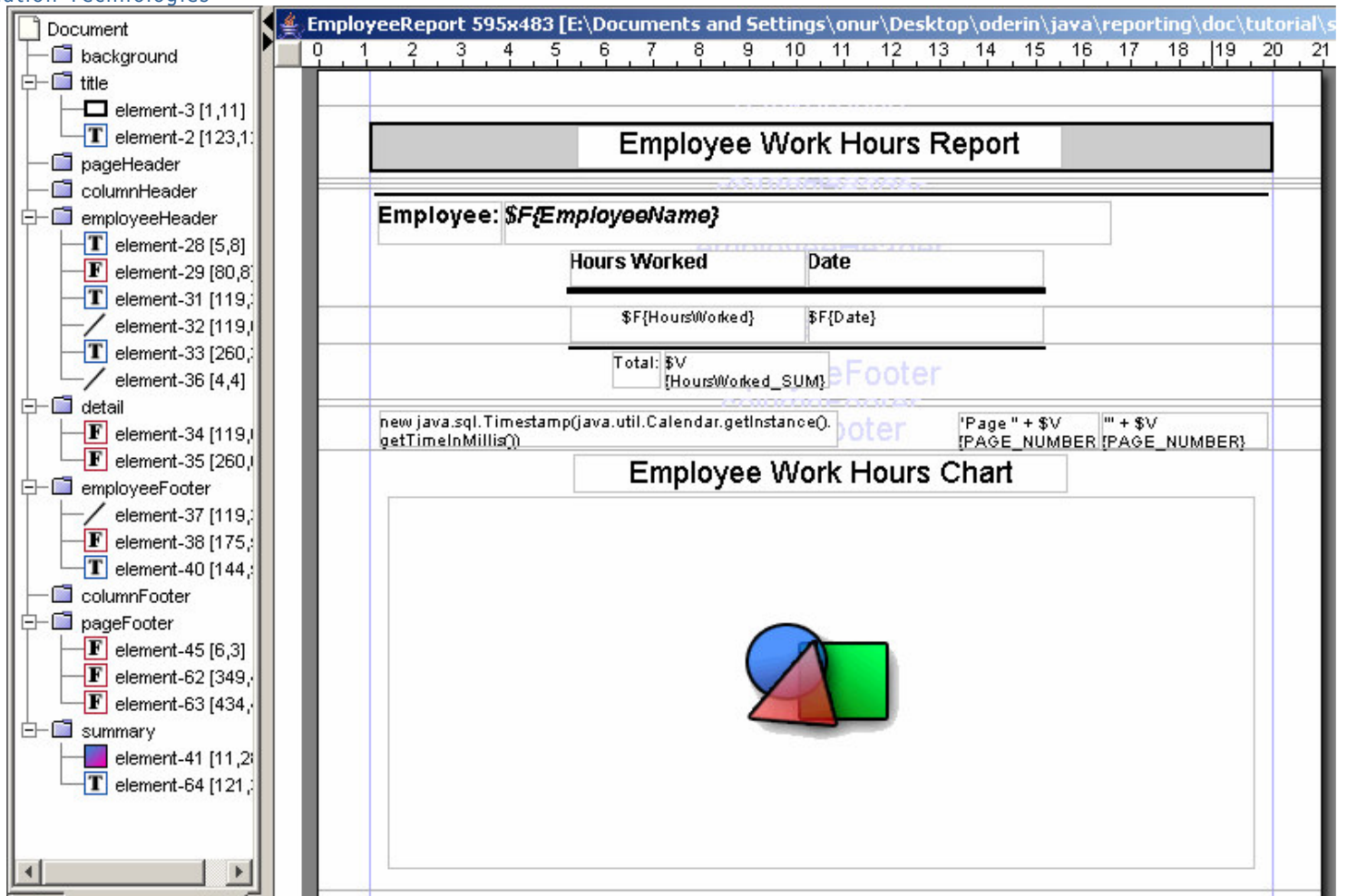
First, insert a static text as the title of report.



Specify title to be "Employee Work Hours Report". Using geometric shapes, the appearance of the report can be enhanced. However, for the time being, we won't bother with the aesthetics.

To add a group to the report, press the "Groups" icon. On the opened dialog, press New. Specify group name as "employee" and group expression as " $\$F\{\text{EmployeeName}\}$ ", press OK with other fields in default values. You will see that two new bands are added as "employeeHeader" and "employeeFooter".

According to the instructions given above, obtain the design in [Figure 4](#). Specify the Report Query through Edit-Report query as "SELECT * FROM tutorial_table ORDER BY EmployeeName". "Order by" is necessary because we created "employee" group with group expression " $\$F\{\text{EmployeeName}\}$ "



The screenshot displays the iReport design tool interface. On the left is a tree view of the report structure, including sections like 'title', 'employeeHeader', 'table', 'tfoot', and 'summary'. The main workspace shows the visual layout of the report, which includes:

- Title:** "Employee Work Hours Report"
- Employee Header:** "Employee: `#{EmployeeName}`"
- Table:** A table with two columns: "Hours Worked" and "Date". The data row contains `#{HoursWorked}` and `#{Date}`. A total row is present with the text "Total: `#{HoursWorked_SUM}`".
- Footer:** Contains a timestamp `new java.sql.Timestamp(java.util.Calendar.getInstance().getTimeInMillis())` and page numbering `'Page ' + #{PAGE_NUMBER} / ' + #{PAGE_NUMBER}`.
- Chart:** A section titled "Employee Work Hours Chart" containing a 3D pie chart with blue, red, and green segments.

Figure 4: Final iReport Design

Notice that you can refer to the final XML file in [Appendix A](#) whenever you have a question about forming the above design. Finally save your design and compile it, you will have a jrxml file.

Creating the Final Report using JasperReports

After obtaining the jrxml file, it is only a few steps to obtaining the final report. The following code segment taken from sample.java given in [Appendix B](#) is all to get the final report viewed in a PDF viewer.

```
// First, load JasperDesign from XML and compile it into JasperReport
JasperDesign jasperDesign = JasperManager.loadXmlDesign("path-to-your-jrxml-file\\sample.jrxml");
JasperReport jasperReport = JasperManager.compileReport(jasperDesign);

// Second, create a map of parameters to pass to the report.
Map parameters = new HashMap();
parameters.put("employeeChart", createEmployeeChartImage());

// Third, get a database connection
Connection conn = Database.getConnection();

// Fourth, create JasperPrint using fillReport() method
JasperPrint jasperPrint = JasperManager.fillReport(jasperReport, parameters, conn);

// You can use JasperPrint to create PDF
JasperManager.printReportToPdfFile(jasperPrint, "desired-path\\SampleReport.pdf");

// Or to view report in the JasperViewer
JasperViewer.viewReport(jasperPrint);

// Or create HTML Report
JasperExportManager.exportReportToHtmlFile(jasperPrint, "desired-path\\SampleReport.html");
```

Figure 5: From XML to the final report by JasperReports

One advantage of JasperReports is that it can export the final print to an HTML file which makes dynamic reporting possible in web pages. The last line in Figure 5 exports the report to an HTML file.

Creating Report Images using JFreeChart

Notice the createEmployeeChartImage() method in Figure 5. This part is where JFreeChart library is used. As stated earlier, this library can be used to obtain different types of charts. In JFreeChart library, mainly what is done is to create an appropriate dataset for the chart type. Then it is a one line code to create the chart with the dataset and another line to embed the chart image into the report. Following are sample codes to form different types of charts available with JFreeChart.

Pie Chart

The following code segment taken from sample.java given in [Appendix B](#) demonstrates the process of creating a java.awt.Image object from scratch.

```
// create a dataset
DefaultPieDataset data = new DefaultPieDataset();

// fill dataset with employeeData
for(java.util.Enumeration e = employeeData.keys(); e.hasMoreElements();)
{
String employeeName = (String)e.nextElement();
    data.setValue(employeeName, (Double)employeeData.get(employeeName));
}

// create a chart with the dataset
JFreeChart chart = ChartFactory.createPieChart("Employee Chart", data, true, true, true);

// create and return the image with the size specified in the XML design
return chart.createBufferedImage(500, 220);
```

Figure 6: Obtaining employee work hour chart as a Pie Chart

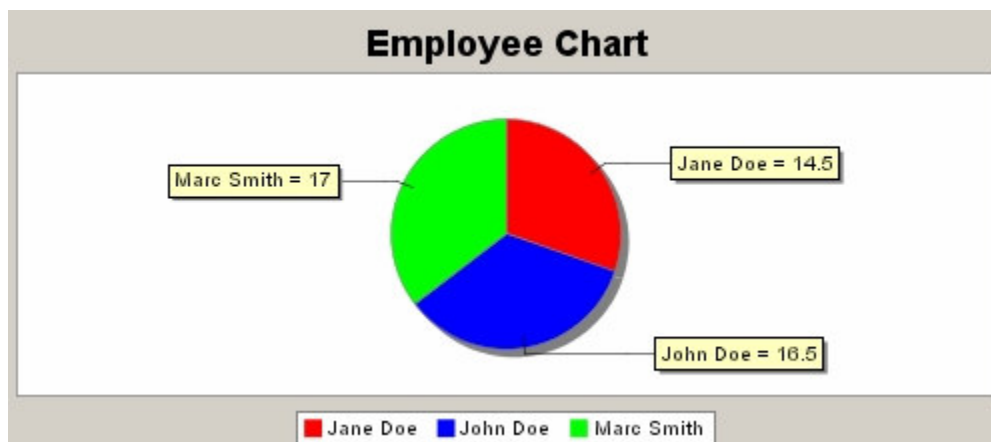


Figure 7: Employee Work Hour Pie Chart

Bar Chart

```

// create a dataset
DefaultCategoryDataset defaultCategoryDataset = new DefaultCategoryDataset();
String s = "Employee";

// fill dataset with employeeData
for(java.util.Enumeration e = employeeData.keys(); e.hasMoreElements();)
{
String employeeName = (String)e.nextElement();
defaultCategoryDataset.addValue((Double)employeeData.get(employeeName), s, employeeName);
}

// create a chart with the dataset
JFreeChart chart = ChartFactory.createBarChart3D
("Employee Chart", // Title
"Employee", // X-Axis label
"Total Hours Worked", // Y-Axis label
(CategoryDataset)defaultCategoryDataset, // Dataset
PlotOrientation.VERTICAL,
true, // Show legend
true,
true
);

// create and return the image with the size specified in the XML design
return chart.createBufferedImage(500, 220);

```

Figure 8: Obtaining employee work hour chart as a Pie Chart

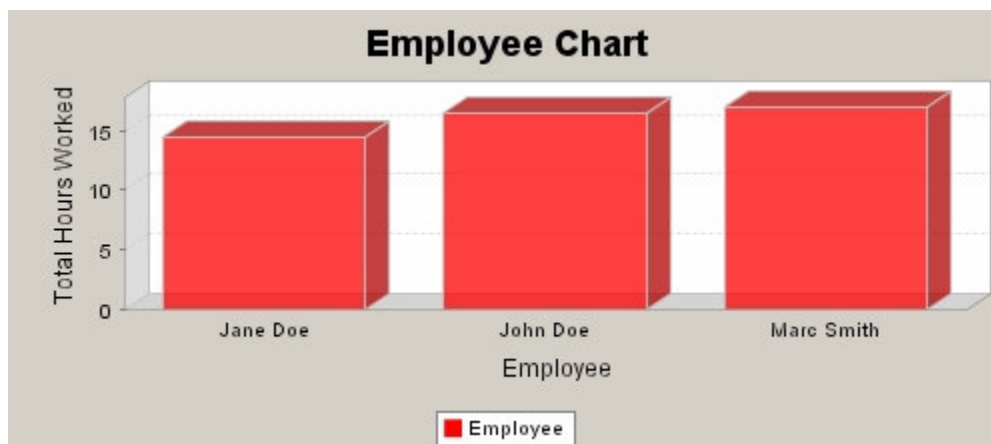


Figure 9: Employee Work Hour Bar Chart

Hints

- In order not to experience problems when displaying texts in the report, select the encoding of the XML file as UTF-8 and write local characters in their UTF-8 forms.

ç	\u00e7	c with cedilla
Ç	\u00c7	C with cedilla
ğ	\u011f	g with a line at top
Ğ	\u011e	G with a line at top
ı	\u0131	i without dot
İ	\u0130	I with a dot
ö	\u00f6	o with double dots
Ö	\u00d6	O with double dots
ş	\u015f	s with cedilla
Ş	\u015e	S with cedilla
ü	\u00fc	u with double dots
Ü	\u00dc	U with double dots

Table 1: List of non-Latin Turkish letters and their UTF-8 correspondants.

- On a Windows system, after the installation of iReport, if iReport fails to create .iReport/config.xml under your home directory, create the directory named .iReport under your home directory in a command prompt yourself by “mkdir .iReport”.

References

- <http://jasperreports.sourceforge.net>
- <http://ireport.sourceforge.net>
- <http://www.jfree.org/jfreechart/>

Useful Links

- <http://jasperreports.sourceforge.net/tutorial/index.html>
- <http://ireport.sourceforge.net/docs.html>

Appendix A

Sample JasperReport XML File – sample.jrxml

```
<?xml version="1.0" encoding="UTF-8" ?>
<!-- Created with iReport - A designer for JasperReports -->
<!DOCTYPE jasperReport PUBLIC "-//JasperReports/DTD Report Design//EN"
"http://jasperreports.sourceforge.net/dtds/jasperreport.dtd">
<jasperReport
    name="EmployeeReport"
    columnCount="1"
    printOrder="Vertical"
    orientation="Portrait"
    pageWidth="595"
    pageHeight="842"
```

```

columnWidth="535"
columnSpacing="0"
leftMargin="30"
rightMargin="30"
topMargin="20"
bottomMargin="20"
whenNoDataType="NoPages"
isTitleNewPage="false"
isSummaryNewPage="false">
<property name="ireport.scriptlethandling" value="2" />
<parameter name="employeeChart" isForPrompting="false" class="java.awt.Image"/>
<queryString><![CDATA[SELECT * FROM tutorial_table ORDER BY EmployeeName]]></queryString>
<field name="ID" class="java.lang.Byte"/>
<field name="EmployeeName" class="java.lang.String"/>
<field name="HoursWorked" class="java.lang.Double"/>
<field name="Date" class="java.util.Date"/>
<variable name="HoursWorked_SUM" class="java.lang.Double" resetType="Group" resetGroup="employee"
calculation="Nothing">
  <variableExpression><![CDATA[($V{HoursWorked_SUM}.doubleValue() != 0.0)?(new
Double($V{HoursWorked_SUM}.doubleValue() + $F{HoursWorked}.doubleValue()):($F{HoursWorked})]]></variableExpression>
  <initialValueExpression><![CDATA[new java.lang.Double(0.0)]]></initialValueExpression>
</variable>
  <group name="employee" isStartNewColumn="false" isStartNewPage="false" isResetPageNumber="false"
isReprintHeaderOnEachPage="false" minHeightToStartNewPage="0" >
    <groupExpression><![CDATA[$F{EmployeeName}]]></groupExpression>
    <groupHeader>
    <band height="70" isSplitAllowed="true" >
      <staticText>
        <reportElement
          mode="Opaque"
          x="5"
          y="8"
          width="74"
          height="26"
          forecolor="#000000"
          backcolor="#FFFFFF"
          key="element-28"
          stretchType="NoStretch"
          positionType="FixRelativeToTop"
          isPrintRepeatedValues="true"
          isRemoveLineWhenBlank="false"
          isPrintInFirstWholeBand="false"
          isPrintWhenDetailOverflows="false"/>
        <textElement textAlignment="Left" verticalAlignment="Top" rotation="None"
lineSpacing="Single">
          <font fontName="Arial" pdfFontName="Helvetica" size="14" isBold="true"
isItalic="false" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
        </textElement>
        <text><![CDATA[Employee:]]></text>
        </staticText>
        <textField isStretchWithOverflow="false" pattern="" isBlankWhenNull="false" evaluationTime="Now"
hyperlinkType="None" >
          <reportElement
            mode="Opaque"
            x="80"
            y="8"
            width="360"

```

```
height="26"
forecolor="#000000"
backcolor="#FFFFFF"
key="element-29"
stretchType="NoStretch"
positionType="FixRelativeToTop"
isPrintRepeatedValues="true"
isRemoveLineWhenBlank="false"
isPrintInFirstWholeBand="false"
isPrintWhenDetailOverflows="false"/>
<textElement textAlignment="Left" verticalAlignment="Top" rotation="None"
lineSpacing="Single">
    <font fontName="Arial" pdfFontName="Helvetica" size="14" isBold="true"
isItalic="true" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
    </textElement>
    <textFieldExpression
class="java.lang.String"><![CDATA[EmployeeName]]></textFieldExpression>
    </textField>
    <staticText>
    <reportElement
mode="Opaque"
x="119"
y="37"
width="140"
height="22"
forecolor="#000000"
backcolor="#FFFFFF"
key="element-31"
stretchType="NoStretch"
positionType="FixRelativeToTop"
isPrintRepeatedValues="true"
isRemoveLineWhenBlank="false"
isPrintInFirstWholeBand="false"
isPrintWhenDetailOverflows="false"/>
    <textElement textAlignment="Left" verticalAlignment="Top" rotation="None"
lineSpacing="Single">
    <font fontName="Arial" pdfFontName="Helvetica" size="12" isBold="true"
isItalic="false" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
    </textElement>
    <text><![CDATA[Hours Worked]]></text>
    </staticText>
    <line direction="TopDown">
    <reportElement
mode="Opaque"
x="119"
y="61"
width="280"
height="0"
forecolor="#000000"
backcolor="#FFFFFF"
key="element-32"
stretchType="NoStretch"
positionType="FixRelativeToTop"
isPrintRepeatedValues="true"
isRemoveLineWhenBlank="false"
isPrintInFirstWholeBand="false"
isPrintWhenDetailOverflows="false"/>
```

```
isPrintWhenDetailOverflows="false"/>
<graphicElement stretchType="NoStretch" pen="4Point" fill="Solid" />
</line>
<staticText>
  <reportElement
    mode="Opaque"
    x="260"
    y="37"
    width="140"
    height="22"
    forecolor="#000000"
    backcolor="#FFFFFF"
    key="element-33"
    stretchType="NoStretch"
    positionType="FixRelativeToTop"
    isPrintRepeatedValues="true"
    isRemoveLineWhenBlank="false"
    isPrintInFirstWholeBand="false"
    isPrintWhenDetailOverflows="false"/>
  <textElement textAlignment="Left" verticalAlignment="Top" rotation="None"
lineSpacing="Single">
    <font fontName="Arial" pdfFontName="Helvetica" size="12" isBold="true"
isItalic="false" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
  </textElement>
  <text><![CDATA[Date]]></text>
</staticText>
<line direction="TopDown">
  <reportElement
    mode="Opaque"
    x="4"
    y="4"
    width="528"
    height="0"
    forecolor="#000000"
    backcolor="#FFFFFF"
    key="element-36"
    stretchType="NoStretch"
    positionType="FixRelativeToTop"
    isPrintRepeatedValues="true"
    isRemoveLineWhenBlank="false"
    isPrintInFirstWholeBand="false"
    isPrintWhenDetailOverflows="false"/>
  <graphicElement stretchType="NoStretch" pen="2Point" fill="Solid" />
</line>
</band>
</groupHeader>
<groupFooter>
<band height="33" isSplitAllowed="true" >
  <line direction="TopDown">
    <reportElement
      mode="Opaque"
      x="119"
      y="3"
      width="281"
      height="0"
      forecolor="#000000"
```

```
        bgcolor="#FFFFFF"
        key="element-37"
        stretchType="NoStretch"
        positionType="FixRelativeToTop"
        isPrintRepeatedValues="true"
        isRemoveLineWhenBlank="false"
        isPrintInFirstWholeBand="false"
        isPrintWhenDetailOverflows="false"/>
    <graphicElement stretchType="NoStretch" pen="2Point" fill="Solid" />
</line>
<textField isStretchWithOverflow="false" pattern="" isBlankWhenNull="false" evaluationTime="Now"
hyperlinkType="None" >
        <reportElement
            mode="Opaque"
            x="175"
            y="5"
            width="98"
            height="22"
            forecolor="#000000"
            bgcolor="#FFFFFF"
            key="element-38"
            stretchType="NoStretch"
            positionType="FixRelativeToTop"
            isPrintRepeatedValues="true"
            isRemoveLineWhenBlank="false"
            isPrintInFirstWholeBand="false"
            isPrintWhenDetailOverflows="false"/>
        <textElement textAlignment="Left" verticalAlignment="Top" rotation="None"
lineSpacing="Single">
            <font fontName="Arial" pdfFontName="Helvetica" size="10" isBold="false"
isItalic="false" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
            </textElement>
            <textFieldExpression
class="java.lang.Double"><![CDATA[{$V{HoursWorked_SUM}}]></textFieldExpression>
            </textField>
            <staticText>
                <reportElement
                    mode="Opaque"
                    x="144"
                    y="5"
                    width="29"
                    height="22"
                    forecolor="#000000"
                    bgcolor="#FFFFFF"
                    key="element-40"
                    stretchType="NoStretch"
                    positionType="FixRelativeToTop"
                    isPrintRepeatedValues="true"
                    isRemoveLineWhenBlank="false"
                    isPrintInFirstWholeBand="false"
                    isPrintWhenDetailOverflows="false"/>
                <textElement textAlignment="Left" verticalAlignment="Top" rotation="None"
lineSpacing="Single">
                    <font fontName="Arial" pdfFontName="Helvetica" size="10" isBold="false"
isItalic="false" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
                    </textElement>
                    <text><![CDATA[Total:]]></text>
```

```
        </staticText>
    </band>
</groupFooter>
</group>
<background>
    <band height="0" isSplitAllowed="true" >
        </band>
</background>
<title>
    <band height="43" isSplitAllowed="true" >
        <rectangle radius="0" >
            <reportElement
                mode="Opaque"
                x="1"
                y="11"
                width="534"
                height="28"
                forecolor="#000000"
                backcolor="#CCCCCC"
                key="element-3"
                stretchType="NoStretch"
                positionType="FixRelativeToTop"
                isPrintRepeatedValues="true"
                isRemoveLineWhenBlank="false"
                isPrintInFirstWholeBand="false"
                isPrintWhenDetailOverflows="false"/>
            <graphicElement stretchType="NoStretch" pen="2Point" fill="Solid" />
        </rectangle>
        <staticText>
            <reportElement
                mode="Opaque"
                x="123"
                y="12"
                width="288"
                height="26"
                forecolor="#000000"
                backcolor="#FFFFFF"
                key="element-2"
                stretchType="NoStretch"
                positionType="FixRelativeToTop"
                isPrintRepeatedValues="true"
                isRemoveLineWhenBlank="false"
                isPrintInFirstWholeBand="false"
                isPrintWhenDetailOverflows="false"/>
            <textElement textAlignment="Center" verticalAlignment="Top" rotation="None"
lineSpacing="Single">
                <font fontName="Arial" pdfFontName="Helvetica" size="18" isBold="false"
isItalic="false" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
            </textElement>
            <text><![CDATA[Employee Work Hours Report]]></text>
        </staticText>
    </band>
</title>
<pageHeader>
    <band height="3" isSplitAllowed="true" >
        </band>
```

```
</pageHeader>
<columnHeader>
  <band height="3" isSplitAllowed="true" >
    </band>
  </columnHeader>
<detail>
  <band height="22" isSplitAllowed="true" >
    <textField isStretchWithOverflow="false" pattern="" isBlankWhenNull="false" evaluationTime="Now"
hyperlinkType="None" >
      <reportElement
        mode="Opaque"
        x="119"
        y="0"
        width="140"
        height="22"
        forecolor="#000000"
        backcolor="#FFFFFF"
        key="element-34"
        stretchType="NoStretch"
        positionType="FixRelativeToTop"
        isPrintRepeatedValues="true"
        isRemoveLineWhenBlank="false"
        isPrintInFirstWholeBand="false"
        isPrintWhenDetailOverflows="false"/>
      <textElement textAlignment="Center" verticalAlignment="Top" rotation="None"
lineSpacing="Single">
        <font fontName="Arial" pdfFontName="Helvetica" size="10" isBold="false"
isItalic="false" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
        </textElement>
        <textFieldExpression
class="java.lang.Double"><![CDATA[{$F{HoursWorked}}]></textFieldExpression>
        </textField>
        <textField isStretchWithOverflow="false" pattern="" isBlankWhenNull="false" evaluationTime="Now"
hyperlinkType="None" >
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            y="0"
            width="140"
            height="22"
            forecolor="#000000"
            backcolor="#FFFFFF"
            key="element-35"
            stretchType="NoStretch"
            positionType="FixRelativeToTop"
            isPrintRepeatedValues="true"
            isRemoveLineWhenBlank="false"
            isPrintInFirstWholeBand="false"
            isPrintWhenDetailOverflows="false"/>
          <textElement textAlignment="Left" verticalAlignment="Top" rotation="None"
lineSpacing="Single">
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isItalic="false" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
            </textElement>
            <textFieldExpression class="java.util.Date"><![CDATA[{$F{Date}}]></textFieldExpression>
            </textField>
          </band>
        </detail>
```



```
<columnFooter>
  <band height="4" isSplitAllowed="true" >
    </band>
</columnFooter>
<pageFooter>
  <band height="26" isSplitAllowed="true" >
    <textField isStretchWithOverflow="false" pattern="" isBlankWhenNull="false" evaluationTime="Now"
hyperlinkType="None" >
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        mode="Opaque"
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        y="3"
        width="272"
        height="22"
        forecolor="#000000"
        backcolor="#FFFFFF"
        key="element-45"
        stretchType="NoStretch"
        positionType="FixRelativeToTop"
        isPrintRepeatedValues="true"
        isRemoveLineWhenBlank="false"
        isPrintInFirstWholeBand="false"
        isPrintWhenDetailOverflows="false"/>
      <textElement textAlignment="Left" verticalAlignment="Top" rotation="None"
lineSpacing="Single">
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isItalic="false" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
      </textElement>
      <textFieldExpression class="java.sql.Timestamp"><![CDATA[new
java.sql.Timestamp(java.util.Calendar.getInstance().getTimeInMillis())]]></textFieldExpression>
      </textField>
      <textField isStretchWithOverflow="false" pattern="" isBlankWhenNull="false" evaluationTime="Now"
hyperlinkType="None" >
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          x="225"
          y="4"
          width="84"
          height="22"
          forecolor="#000000"
          backcolor="#FFFFFF"
          key="element-62"
          stretchType="NoStretch"
          positionType="FixRelativeToTop"
          isPrintRepeatedValues="true"
          isRemoveLineWhenBlank="false"
          isPrintInFirstWholeBand="false"
          isPrintWhenDetailOverflows="false"/>
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lineSpacing="Single">
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isItalic="false" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
        </textElement>
        <textFieldExpression class="java.lang.String"><![CDATA["Page " + ${PAGE_NUMBER} + " /
"]]></textFieldExpression>
        </textField>
        <textField isStretchWithOverflow="false" pattern="" isBlankWhenNull="false"
evaluationTime="Report" hyperlinkType="None" >
          <reportElement
```

```
mode="Opaque"
x="309"
y="4"
width="99"
height="22"
forecolor="#000000"
backcolor="#FFFFFF"
key="element-63"
stretchType="NoStretch"
positionType="FixRelativeToTop"
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isRemoveLineWhenBlank="false"
isPrintInFirstWholeBand="false"
isPrintWhenDetailOverflows="false"/>
<textElement textAlignment="Left" verticalAlignment="Top" rotation="None"
lineSpacing="Single">
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isItalic="false" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
    </textElement>
    <textFieldExpression class="java.lang.String"><![CDATA["" +
${PAGE_NUMBER}]]></textFieldExpression>
    </textField>
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</pageFooter>
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evaluationTime="Now" hyperlinkType="None">
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                backcolor="#FFFFFF"
                key="element-41"
                stretchType="NoStretch"
                positionType="FixRelativeToTop"
                isPrintRepeatedValues="true"
                isRemoveLineWhenBlank="false"
                isPrintInFirstWholeBand="false"
                isPrintWhenDetailOverflows="false"/>
            <graphicElement stretchType="NoStretch" pen="None" fill="Solid" />
            <imageExpression
class="java.awt.Image"><![CDATA[${P{employeeChart}}]]></imageExpression>
            </image>
            <staticText>
                <reportElement
                    mode="Opaque"
                    x="121"
                    y="3"
                    width="293"
                    height="23"
                    forecolor="#000000"
                    backcolor="#FFFFFF"
                    key="element-64"
                    stretchType="NoStretch"
```

```
                positionType="FixRelativeToTop"
                isPrintRepeatedValues="true"
                isRemoveLineWhenBlank="false"
                isPrintInFirstWholeBand="false"
                isPrintWhenDetailOverflows="false"/>
            <textElement textAlignment="Center" verticalAlignment="Top" rotation="None"
lineSpacing="Single">
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isItalic="false" isUnderline="false" isPdfEmbedded="false" pdfEncoding="Cp1252" isStrikeThrough="false" />
                </textElement>
                <text><![CDATA[Employee Work Hours Chart]]></text>
                </staticText>
            </band>
        </summary>
</jasperReport>
```

Appendix B

Sample JasperReports JAVA File - sample.java

```
/*
 * Sample.java
 *
 * Created on July 19, 2004, 12:49 PM
 */

package com.medyanet.kumas.raporlama.dokuma.performans;

import org.jfree.data.DefaultPieDataset;
import org.jfree.chart.ChartFactory;
import org.jfree.chart.JFreeChart;
import org.jfree.chart.ChartFrame;

import org.jfree.data.XYDataset;
import org.jfree.data.XYSeries;
import org.jfree.data.XYSeriesCollection;
import org.jfree.chart.plot.PlotOrientation;

import org.jfree.data.CategoryDataset;
import org.jfree.data.DefaultCategoryDataset;

import dori.jasper.engine.design.JasperDesign;
import dori.jasper.engine.JasperManager;
import dori.jasper.engine.JasperReport;
import dori.jasper.engine.JasperPrint;
import dori.jasper.engine.JasperPrintManager;
import dori.jasper.view.JasperViewer;

import java.util.HashMap;
import java.util.Map;
import java.sql.*;

/**
```

```
*
* @author onur
*/
public class Sample {

    /** Creates a new instance of Sample */
    public Sample() {
    }

    /**
     * @param args the command line arguments
     */
    public static void main(String[] args)
    {
        try
        {
            // First, load JasperDesign from XML and compile it into JasperReport
            JasperDesign jasperDesign = JasperManager.loadXmlDesign("path-to-your-jrxml-file\\sample.jrxml");
            JasperReport jasperReport = JasperManager.compileReport(jasperDesign);

            // Second, create a map of parameters to pass to the report.
            Map parameters = new HashMap();
            parameters.put("employeeChart", createEmployeeChartImage());

            // Third, get a database connection
            Connection conn = Database.getConnection();

            // Fourth, create JasperPrint using fillReport() method
            JasperPrint jasperPrint = JasperManager.fillReport(jasperReport, parameters, conn);

            // You can use JasperPrint to create PDF
            JasperManager.printReportToPdfFile(jasperPrint, "desired-path\\SampleReport.pdf");

            // Or to view report in the JasperViewer
            JasperViewer.viewReport(jasperPrint);
        }
        catch(Exception e)
        {
            e.printStackTrace();
        }
    }

    private static java.awt.Image createEmployeeChartImage()
    {
        // employeeData contains employee names as keys and total work hours as values.
        java.util.Hashtable employeeData = getEmployeeData();

        // create a dataset...
        DefaultPieDataset data = new DefaultPieDataset();

        // fill dataset with employeeData
        for(java.util.Enumeration e = employeeData.keys(); e.hasMoreElements();)
        {
            String employeeName = (String)e.nextElement();
            data.setValue(employeeName, (Double)employeeData.get(employeeName));
        }
    }
}
```

```
// create a chart with the dataset
JFreeChart chart = ChartFactory.createPieChart("Employee Chart", data, true, true, true);

// create and return the image
return chart.createBufferedImage(500, 220);
}
}
```