Report-engine tutorial

Version

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# What is report-engine?

Report Engine is a set of JAVA classes for reports and pivot tables with support for columns, groupings, totals/subtotals. It accepts input from memory, files and databases, or you can write your custom input and exports the report in a multitude of formats (HTML, RTF, PDF, TXT, SVG etc.)

# How to build report-engine project?

## Using Maven

* First and foremost you need Apache Maven installed on your computer. If you don’t have it just follow the instructions [here](http://maven.apache.org/download.html).
* Add report-engine dependency to your project

<dependency>

<groupId>net.sf.reportengine</groupId>

<artifactId>reportengine</artifactId>

<version></version>

</dependency>

## What is a flat report?

This is a normal tabular report (don't get confused by its name) whose layout will look like:

|  |  |  |
| --- | --- | --- |
| Report title | | |
| **Header 1** | **Header 2** | **Header 3** |
| data 11 | data 12 | data 13 |
| data 21 | data 22 | data 23 |
| data 31 | data 32 | data 33 |
| data 41 | data 42 | data 43 |

## The code structure of a report

Each report needs three elements: input, column configuration and output. Let’s have a look at the report below:

FlatReport flatReport = **new** FlatReport();

//input configuration

IReportInput input = **new** StreamReportInput(**new** FileInputStream("input.txt"));

flatReport.setIn(input);

//output configuration

IReportOutput output = **new** ExcelOutput(**new** FileOutputStream("output.xls"));

flatReport.setOut(output);

//columns configuration

flatReport.addDataColumn(**new** DefaultDataColumn("Country", 0));

flatReport.addDataColumn(**new** DefaultDataColumn("City", 1));

flatReport.addDataColumn(**new** DefaultDataColumn("Population", 2));

//start execution

flatReport.execute();

## The input

The main input classes are:

* ***StreamReportInput***- handles input from streams (any kind) and reads data columns separated by a specific user-defined separator (comma, tab, semicolon, etc.)

IReportInput input = **new** StreamReportInput(

**new** FileInputStream("input.txt"), "\t");

flatReport.setIn(input);

* ***DbQueryReportInput*** - executes a query and takes the result as input for your reports

1. If you already have a database connection you can use it like:

java.sql.Connection dbConnection = ...

DbQueryReportInput dbReportInput = **new** DbQueryReportInput();

dbReportInput.setConnection(connection);

dbReportInput.setSqlStatement(

"select id, country, region, city, population from DB\_TABLE");

1. if you don’t have the connection, report-engine can create one for you given the right parameters:

DbQueryReportInput dbReportInput = **new** DbQueryReportInput();

dbReportInput.setDbConnString("jdbc:hsqldb:mem:countriesDB");

dbReportInput.setDbDriverClass("org.hsqldb.jdbcDriver");

dbReportInput.setDbUser("sa");

dbReportInput.setDbPassword("secret");

dbReportInput.setSqlStatement(

"select id, country, region, city, population from DB\_TABLE");

* **MemoryReportInput** - takes an array of objects as input. This was mainly created for unit tests

Object[][] REPORT\_DATA = **new** Object[][]{

**new** String[]{"a","b","c","d"},

**new** String[]{"1","2","3","4"},

**new** String[]{"x","y","z","t"}}

IReportInput reportInput = **new** MemoryReportInput(REPORT\_DATA);

* If these classes don’t cover your needs you can always write your own input by implementing the *IReportInput* interface or, even better, the AbstractReportInputInterface as instructed [here](#_Writing_a_custom)

## Report Output

The predefined output formats for your reports are:

* *HtmlReportOutput* - fast html output

HtmlOuputhtmlOut **= new** HtmlOutput(**new** FileOutputStream("employees.html")

* *ExcelReportOutput* – creates an excel output

ExcelOuput output = **new** ExcelOutput(**new** FileOuputStream("employees.xls"));

* *StaxReportOutput* - xml output based on STax (streaming xml) technology
* *XsltReportOutput -* output based on an XSLT template - can result in HTML, TXT, SVG, etc.
* *XslFoReportOutput* - output based on XSL-FO framework - can result in PDF, PNG, TXT, ghostscript. Actually, everything supported by [apache fop project](http://xmlgraphics.apache.org/fop/trunk/output.html).

XslFoOutput pdfOutput = **new** XslFoOutput(

**new** FileOutputStream("employees.pdf"));

XslFoOutput pngOutput = **new** XslFoOutput(

**new** FileOutputStream("employees.png"), MimeConstants.*MIME\_PNG*);

* *XmlDOMReportOutput* - xml output based on DOM
* Of course you can always write your own report output by implementing the *IReportOutput* interface as [here](#_Writing_a_custom)

## Report Columns Configuration

There are two kinds of columns accepted by a flat report: data columns and group columns.

### Data columns

Data columns are normal report columns displaying data and total results. For each column there are a few parameters to set:

* + header
  + values to be displayed
  + calculator-only if totals are needed

What is the header?

It’s the string that will appear in the column header section of the report. In the example below the **Year, Month, Amount** are column headers.

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Month | | Amount |
| 2011 | Aug. | 500 | |
| 2011 | Sept. | 300 | |
| 2011 | Oct. | 134 | |

#### How can I tell report-engine what values to display on a particular column?

Report-engine can be instructed to get data from a specific **input** column or the user can define its own way of getting data for each input data row. For the moment we will discuss only the default implementation. To customize your own data columns please consult the section

The default implementation for a data column (net.sf.reportengine.config.DefaultDataColumn) has an inputColumnIndex attribute which tells report-engine which column from your input should be displayed in that column. Using inputColumnIndex you instruct report-engine to display your data on the desired position. For instance, assuming an input like the one above, I may decide to show the Year column as the third in the final report and show the Month column as the first in the report. To do that I will add my columns in the following order:

//show Month first with data from column 1 (second input column)

//the column will be displayed first because it is added first in the report

report.addDataColumn( column month having inputColumnIndex = 1)

//show Amount second with data from column 2 (third input column)

//the values in the Amount will be displayed second because this

//column is added second

report.addDataColumn(column amount having inputColumnIndex = 2)

//show the Year last with data from the column 0 (first)

report.addDataColumn(column year having inputColumnIndex = 0)

As you can see, report-engine uses column indexes starting from zero, so zero is our first input column. Also please note that, for report-engine, the order in which you define your columns is very important because **it defines the output order of your columns**.

#### What is the calculator?

The calculator compiles all values of a column in order to get a SUM or an Average or whatever computation comes to your mind. You can use an existing calculator (SUM, AVG, MIN, MAX, COUNT, FIRST, LAST) or you can create your own by implementing the ICalculator interface.

#### How to set these properties to a column?

* by using the setter methods

DefaultDataColumn column = **new** DefaultDataColumn();

column.setHeader("Month");

column.setInputColumnIndex(0);

column.setCalculator(Calculator.*SUM*);

* or by using one of the available constructors

DefaultDataColumn column = **new** DefaultDataColumn("Month",0,Calculator.*SUM*);

DefaultDataColumn column = **new** DefaultDataColumn("Month",0);

DefaultDataColumn column = **new** DefaultDataColumn(0);

### Your first report

It’s now time to build our first report: my expenses report. We will use as input [a file](http://svn.code.sf.net/p/reportengine/code/samples/expenses.csv) containing the list of my expenses during several months. Our initial target is to create just a simple html report containing all input column and nothing more.

**import** java.io.FileInputStream;

**import** java.io.FileNotFoundException;

**import** java.io.FileOutputStream;

**import** java.io.InputStream;

**import** net.sf.reportengine.FlatReport;

**import** net.sf.reportengine.config.DefaultDataColumn;

**import** net.sf.reportengine.config.IDataColumn;

**import** net.sf.reportengine.in.StreamReportInput;

**import** net.sf.reportengine.out.HtmlOutput;

/\*\*

\* this is my first report

\*

\*/

**public** **class** FirstReport {

**public** **static** **void** main(String[] args) {

**try** {

FlatReport flatReport = **new** FlatReport();

flatReport.setReportTitle("Mothly Expenses report");

//the input: a file containing data separated by commas

InputStream fileStream = **new** FileInputStream("expenses.csv");

StreamReportInput reportInput = **new** StreamReportInput(fileStream,",");

flatReport.setIn(reportInput);

//the output

HtmlOutput output = **new** HtmlOutput(**new** FileOutputStream("xpenses.html"));

flatReport.setOut(output);

//data columns configuration

flatReport.addDataColumn(**new** DefaultDataColumn("Month", 0));

flatReport.addDataColumn(**new** DefaultDataColumn("Spent on",1));

flatReport.addDataColumn(**new** DefaultDataColumn("Amount", 2));

//report execution

flatReport.execute();

} **catch** (FileNotFoundException e) {

e.printStackTrace();

}

}

}

The always up to date source code can be found [here](http://svn.code.sf.net/p/reportengine/code/samples/src/main/java/net/sf/reportengine/samples/flat/FirstReport.java)

### The result should be:

|  |  |  |
| --- | --- | --- |
| My first expenses report | | |
| **Month** | **Spent on** | **Amount** |
| August | food | 500 |
| August | transportation | 300 |
| September | food | 567 |
| September | transportation | 154 |

### Group columns

As the name suggests, group columns are helpful when grouping data for totals display purposes. At each change in the values of a group column the totals are displayed. One of the differences between group columns and data columns is the possibility to add totals: on group column you cannot add totals.

Let’s check the following example: My list of monthly expenses

|  |  |  |  |
| --- | --- | --- | --- |
| August |  | food | 500$ |
| August |  | transportation | 300$ |
| September |  | food | 567$ |
| September |  | transportation | 154$ |
| September |  | entertainment | 200$ |

If we declare the first column as a group column then report-engine will make sure to display totals, averages (or whatever you’ve set ) at each change in the values of the first column… something like

|  |  |  |  |
| --- | --- | --- | --- |
| August |  | food | 500$ |
| August |  | transportation | 300$ |
| **Total August** |  |  | **800$** |
| September |  | food | 567$ |
| September |  | transportation | 154$ |
| September |  | entertainment | 200$ |
| **Total September** |  |  | **921$** |

Please note that calculators are added to data columns not to group columns.

### Your first report containing a group Column

**import** java.io.FileInputStream;

**import** java.io.FileNotFoundException;

**import** java.io.FileOutputStream;

**import** java.io.InputStream;

**import** net.sf.reportengine.FlatReport;

**import** net.sf.reportengine.config.DefaultDataColumn;

**import** net.sf.reportengine.config.DefaultGroupColumn;

**import** net.sf.reportengine.config.IDataColumn;

**import** net.sf.reportengine.config.IGroupColumn;

**import** net.sf.reportengine.core.calc.Calculators;

**import** net.sf.reportengine.in.StreamReportInput;

**import** net.sf.reportengine.out.HtmlOutput;

/\*\*

\* The first report containing a group column.

\* The month column is declared as a group column so

\* after each change in this column the totals will

\* be displayed.

\*/

**public** **class** FirstGroupReport {

**public** **static** **void** main(String[] args) **throws** Exception{

FlatReport flatReport = **new** FlatReport();

flatReport.setShowTotals(**true**);

flatReport.setShowGrandTotal(**true**);

flatReport.setReportTitle("Mothly Expenses");

//define the input

InputStream fileInput = **new** FileInputStream("expenses.csv");

StreamReportInput reportInput = **new** StreamReportInput(fileInput,",");

flatReport.setIn(reportInput);

//define the output

HtmlOutput output = **new** HtmlOutput(

**new** FileOutputStream("xpenses.htm"));

flatReport.setOut(output);

//group column configuration

flatReport.addGroupColumn(**new** DefaultGroupColumn("Month",

0, //input col. idx

0 //group priority

));

//data columns configuration

flatReport.addDataColumn(**new** DefaultDataColumn("Spent on",1));

flatReport.addDataColumn(**new** DefaultDataColumn("Amount",

2,

Calculators.*SUM*));

//start executing the report

flatReport.execute();

}}

The full-code of the above report can be found [here](http://svn.code.sf.net/p/reportengine/code/samples/src/main/java/net/sf/reportengine/samples/flat/FirstGroupReport.java).

Let me draw your attention on the following lines of code:

//group column configuration

flatReport.addGroupColumn(**new** DefaultGroupColumn("Month", 0, 0));

This actually declares the Month column as a group column, but now, let’s look how the totals are calculated:

//data columns configuration

flatReport.addDataColumn(**new** DefaultDataColumn("Spent on",1));

**flatReport.addDataColumn(**

**new DefaultDataColumn("Amount", 2, Calculators.*SUM*));**

As you can see the third column, besides the header and the index of the input column, has a Calculators.SUM attached. This is to tell report-engine that all values on this column will be summed.

It’s time to see the attributes of a group column: header, input column index and group level. The first two are exactly as the data column’s header and input column index. The third (group level) tells report-engine that among group columns this has the highest priority (priority 0). More on this later…

### More on totals and groupings

Now, let’s see a more complex example: my yearly expenses report, a report having 2 group columns and 2 columns having totals.

Here’s a list of my expenses over the years:

2011 August food 500

2011 August transportation 300

2011 September food 567

2011 September transportation 154

2011 September entertainment 200

2012 January food 205

2012 January transportation 100

2012 February food 301

2012 March entertainment 302

…and I want to build a report that will show the totals on the last column at each change in the year and month. For this I will declare in my report the first and the second columns (year and month) as group columns and I will add a SUM calculator on the last column (last is actually 3 as the count starts from 0).

**import** java.io.FileInputStream;

**import** java.io.FileNotFoundException;

**import** java.io.FileOutputStream;

**import** java.io.InputStream;

**import** net.sf.reportengine.FlatReport;

**import** net.sf.reportengine.config.DefaultDataColumn;

**import** net.sf.reportengine.config.DefaultGroupColumn;

**import** net.sf.reportengine.core.calc.Calculator;

**import** net.sf.reportengine.in.StreamReportInput;

**import** net.sf.reportengine.out.HtmlOutput;

/\*\*

\* **yearly expenses report**

\*/

**public** **class** YearlyExpenses {

**public** **static** **void** main(String[] args) {

**try** {

FlatReport flatReport = **new** FlatReport();

flatReport.setReportTitle("Yearly expenses report");

//the input

InputStream fileStream = **new** FileInputStream("yearlyExpenses.txt");

StreamReportInput reportInput = **new** StreamReportInput(fileStream,"\t");

flatReport.setIn(reportInput);

flatReport.setShowGrandTotal(**true**);

flatReport.setShowTotals(**true**);

//the output

HtmlOutput reportOutput = **new** HtmlOutput(

**new** FileOutputStream("out.html"));

flatReport.setOut(reportOutput);

//groups configuration

flatReport.addGroupColumn(**new** DefaultGroupColumn("Year",

0, //input column index

0 ));//group priority

flatReport.addGroupColumn(**new** DefaultGroupColumn("Month",

1, //input column index

1. )); //group priority

//data columns

flatReport.addDataColumn(**new** DefaultDataColumn("Spent on", //header

2, //input col idx

Calculator.*COUNT*));

flatReport.addDataColumn(**new** DefaultDataColumn("Amount",//header

3, //input index

Calculator.*SUM*));

//the one and only execute

flatReport.execute();

} **catch** (FileNotFoundException e) {

e.printStackTrace();

}}}

The full source code can be found [here](http://svn.code.sf.net/p/reportengine/code/samples/src/main/java/net/sf/reportengine/samples/flat/YearlyExpenses.java)

If you check carefully the first data column (“Spent on” column) you’ll notice that a Calculators.COUNT has been added. This will count the number of items on which I spent money on during the month/year.

The output should be:

|  |  |  |  |
| --- | --- | --- | --- |
| Yearly expenses report | | | |
| **Year** | **Month** | **Spent on** | **Amount** |
| 2011 | August | food | 500 |
| 2011 | August | transportation | 300 |
| **Total August** |  | **2** | **800** |
| 2011 | September | food | 567 |
| 2011 | September | transportation | 154 |
| 2011 | September | entertainment | 200 |
| **Total September** |  | **3** | **921** |
| **Total 2011** |  | **5** | **1721** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| **Grand Total** |  | **9** | **2629** |

Let’s explain the groupings made:

flatReport.addGroupColumn(**new** DefaultGroupColumn("Year",

0, //input column index

0 ));//group priority

flatReport.addGroupColumn(**new** DefaultGroupColumn("Month",

1, //input column index

1));//group priority

I will not insist on the header (Year and Month), but I have to draw your attention on the second and third parameters. The second parameter (input column index) has been discussed before (see the data columns section) – represents the index of the input columns starting with zero. The third parameter – group level or priority – helps report-engine establish a hierarchy or precedence among group columns. So, in the example above the year takes precedence over the month groups. How is this translated into the report? When a change in the year happens then not only the totals for the year are shown but also the totals for the month as in the extract from the final result shown previously:

|  |  |  |  |
| --- | --- | --- | --- |
| **Total December** |  | **3** | **921** |
| **Total 2011** |  | **5** | **1721** |

# Pivot Tables /Crosstab reports

## What is a pivot table?

Pivot tables are particular types of reports where data is arranged both on x and y axis and especially at the intersection of x and y values.

## What is different?

Let’s go back to our first example: the monthly expenses report. As a flat report this used to look like this:

|  |  |  |
| --- | --- | --- |
|  | | |
| **Month** | **Spent on** | **Amount** |
| August | food | 500 |
| August | transportation | 300 |
| September | food | 567 |
| September | transportation | 154 |
| September | dinner | 200 |

Note that all values in the second column repeat themselves. Wouldn’t be easier to follow and compare data if those values were arranged in the header like below?

|  |  |  |  |
| --- | --- | --- | --- |
| **Month** | **food** | **transportation** | **entertainment** |
| August | 500 | 300 | 0 |
| September | 567 | 154 | 200 |

Absolutely! Think about a situation where you’d have much more data. Arranged in a pivot table all your data is much easier to follow and compare but this is only possible when the values in the column you want as header repeat themselves. Otherwise the column header would be much longer and it wouldn’t allow you to compare the values.

## What else I have to set up for a Pivot table?

The pivot table accepts all settings of a flat report (input, output, data columns, group columns) and it introduces two more settings: the header row and the crosstab data.

### The header rows

As previously seen, the header row is the list of distinct values that should be displayed in the header of the report:



Here’s how you configure a header row based on the values in the second column (column index = 1) to the report:

report.addHeaderRow(**new** DefaultCrosstabHeaderRow(1));

There is no limit on the rows that can be displayed in the header, still, if you add too many; your report will be hard to follow. Here’s a report with two header rows (in blue):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Males | | | Females | | |
| **Country** | under 20 | under 50 | under 80 | under 20 | under 50 under | 80 |
| Sweden | 1000 | 10 | 4 | 1 | 0 | 0 |
| Norway | 0 | 100 | 0 | 0 | 0 | 0 |
| Italy | 2000 | 0 | 0 | 0 | 0 | 0 |
| Romania | 0 | 0 | 0 | 0 | 200 | 0 |
| France | 300 | 0 | 3000 | 30 | 0 | 0 |

The order in which you add the header rows is very important. For instance for the report above the first header row is the one containing the Males, Females values and the second one would be the one containing “under 20”, “under 50” …

### The crosstab data

The crosstab data is the data shown in the report. It usually comes from an input column.

Here’s the initial data (the input)

|  |  |  |  |
| --- | --- | --- | --- |
| August |  | food | **500** |
| August |  | transportation | **300** |
| September |  | food | **567** |
| September |  | transportation | **154** |
| September |  | entertainment | **200** |

And now, the pivot table result



In order to configure the crosstab data to a report you just have to add an instance of DefaultCrosstabData to the report:

report.setCrosstabData(**new** DefaultCrosstabData(2));

The example above constructs a DefaultCrosstabData based on the third input column (column index 2)

## Your first Pivot table report

It’s time to create our first pivot table report:

**import** java.io.FileInputStream;

**import** java.io.FileNotFoundException;

**import** java.io.FileOutputStream;

**import** net.sf.reportengine.CrossTabReport;

**import** net.sf.reportengine.config.DefaultCrosstabData;

**import** net.sf.reportengine.config.DefaultCrosstabHeaderRow;

**import** net.sf.reportengine.config.DefaultDataColumn;

**import** net.sf.reportengine.in.IReportInput;

**import** net.sf.reportengine.in.StreamReportInput;

**import** net.sf.reportengine.out.HtmlOutput;

**import** net.sf.reportengine.out.IReportOutput;

/\*\*

\* this is my first pivot table report

\*/

**public** **class** FirstPivotTableReport {

**public** **static** **void** main(String[] args) {

**try**{

CrossTabReport report = **new** CrossTabReport();

//set up the input/output

IReportInput in = **new** StreamReportInput(

**new** FileInputStream("expenses.csv"));

report.setIn(input);

IReportOutput output = **new** HtmlOutput(

**new** FileOutputStream("xpenses.html"));

report.setOut(output);

//set up data column

report.addDataColumn(**new** DefaultDataColumn("Month", 0));

//set up the header rows (from the second column)

report.addHeaderRow(**new** DefaultCrosstabHeaderRow(1));

//set up the crosstab data

report.setCrosstabData(**new** DefaultCrosstabData(2));

//report execution

report.execute();

}**catch**(FileNotFoundException fnfExc){

fnfExc.printStackTrace();

}}}

The source code for the above report can be found [here](http://svn.code.sf.net/p/reportengine/code/samples/src/main/java/net/sf/reportengine/samples/pivot/FirstPivotTableReport.java)

## Totals and groupings for pivot reports

Everything a flat report supports is also available for Pivot tables: Grouping columns, totals, grand total. Now let’s see the yearly expenses flat report translated into a pivot table:

* the input

2011 August food 500

2011 August transportation 300

2011 September food 567

2011 September transportation 154

2011 September entertainment 200

2012 January food 205

2012 January transportation 100

2012 February food 301

2012 March entertainment 302

* then … the code

**import** java.io.FileInputStream;

**import** java.io.FileNotFoundException;

**import** java.io.FileOutputStream;

**import** net.sf.reportengine.CrossTabReport;

**import** net.sf.reportengine.config.DefaultCrosstabData;

**import** net.sf.reportengine.config.DefaultCrosstabHeaderRow;

**import** net.sf.reportengine.config.DefaultDataColumn;

**import** net.sf.reportengine.config.DefaultGroupColumn;

**import** net.sf.reportengine.core.calc.Calculator;

**import** net.sf.reportengine.in.IReportInput;

**import** net.sf.reportengine.in.StreamReportInput;

**import** net.sf.reportengine.out.HtmlOutput;

**import** net.sf.reportengine.out.IReportOutput;

/\*\*

\* my first pivot table with groupings and totals

\*/

**public** **class** YearlyExpensesPivotTable {

**public** **static** **void** main(String[] args) **throws** Exception {

CrossTabReport report = **new** CrossTabReport();

FileInputStream file = **new** FileInputStream("yearlyExpenses.txt");

IReportInput reportInput = **new** StreamReportInput(file, "\t");

report.setIn(reportInput);

FileOutputStream fileOut=**new** FileOutputStream("yrlyXpensesPivot.html");

IReportOutput output = **new** HtmlOutput(fileOut);

report.setOut(output);

//set up the group and data columns

report.addGroupColumn(**new** DefaultGroupColumn("Year", 0, 0));

report.addDataColumn(**new** DefaultDataColumn("Month", 1));

//set up the header rows, crosstab data

report.addHeaderRow(**new** DefaultCrosstabHeaderRow(2));

report.setCrosstabData(**new** DefaultCrosstabData(3, Calculators.*SUM*));

report.setShowTotals(**true**);

//the report execution

report.execute();

}}

The full source code for the report above can be found [here](http://svn.code.sf.net/p/reportengine/code/samples/src/main/java/net/sf/reportengine/samples/pivot/YearlyExpensesPivotTable.java)

* and finally … the result:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Month** | **food** | **transportation** | **entertainment** |
| 2011 | August | 500 | 300 | 0 |
| 2011 | September | 567 | 154 | 200 |
| **Total 2011** |  | **1067** | **454** | **200** |
| 2012 | January | 205 | 100 | 0 |
| 2012 | February | 301 | 0 | 0 |
| 2012 | March | 0 | 0 | 302 |
| **Total 2012** |  | **506** | **100** | **302** |

If you need grand totals you just have to add:

report.setShowGrandTotal(**true**);

And you’ll get:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year** | **Month** | **food** | **transportation** | **entertainment** | **Grand Total** |
| 2011 | August | 500 | 300 | 0 | 800 |
| 2011 | September | 567 | 154 | 200 | 921 |
| **Total 2011** |  | **1067** | **454** | **200** | **1721** |
| 2012 | January | 205 | 100 | 0 | 305 |
| 2012 | February | 301 | 0 | 0 | 301 |
| 2012 | March | 0 | 0 | 302 | 302 |
| **Total 2012** |  | **506** | **100** | **302** | **908** |
| **Grand Total** |  | **1573** | **554** | **502** | **2629** |

The main differences between flat reports with totals and pivot tables with totals is that in pivot tables you’ll see totals displayed on columns:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Males** | | | **Males** | **Females** | | | **Females** | **Grand Total** |
| **Region** | **Country** | **under 20** | **under 50** | **under 80** | **Total** | **under 20** | **under 50** | **under 80** | **Total** |  |
| North | Sweden | 1000 | 10 | 4 | 1014 | 1 | 0 | 0 | 1 | 1015 |
| North | Norway | 0 | 100 | 0 | 100 | 0 | 0 | 0 | 0 | 100 |
| **Total North** |  | **1000** | **110** | **4** | **1114** | **1** | **0** | **0** | **1** | **1115** |
| South | Italy | 2000 | 0 | 0 | 2000 | 0 | 0 | 0 | 0 | 2000 |
| **Total South** |  | **2000** | **0** | **0** | **2000** | **0** | **0** | **0** | **0** | **2000** |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Grand Total** |  | **3300** | **110** | **3004** | **6414** | **31** | **200** | **0** | **231** | **6645** |

# Advanced features

## Spring integration

Any report can be easily configured in spring, just remember what any report needs: input, columns configuration and output. A file input can be configured like:

<bean id=*"input"* class=*"net.sf.reportengine.in.StreamReportInput"*>

<constructor-arg>

<bean class=*"java.io.FileInputStream"*>

<constructor-arg type=*"java.lang.String"*>

<value>expenses.csv</value>

</constructor-arg>

</bean>

</constructor-arg>

<constructor-arg type=*"java.lang.String"*>

<value>,</value>

</constructor-arg>

</bean>

…and a html output can be configured like:

<bean id=*"output"* class=*"net.sf.reportengine.out.HtmlOutput"*>

<constructor-arg>

<bean class=*"java.io.FileOutputStream"*>

<constructor-arg type=*"java.lang.String"*>

<value>./springConfiguredReport.html</value>

</constructor-arg>

</bean>

</constructor-arg>

</bean>

…finally a data and a group column can be defined in spring like:

<bean class=*"net.sf.reportengine.config.DefaultDataColumn"*>

<property name=*"header"* value=*"Amount"*/>

<property name=*"inputColumnIndex"* value=*"2"*/>

<property name=*"calculator"*>

<bean id=*"net.sf.reportengine.core.calc.Calculators.SUM"* class=*"org.springframework.beans.factory.config.FieldRetrievingFactoryBean"*

/>

</property>

</bean>

<bean class=*"net.sf.reportengine.config.DefaultGroupColumn"*>

<property name=*"header"* value=*"Month"*/>

<property name=*"inputColumnIndex"* value=*"0"*/>

<property name=*"groupingLevel"* value=*"0"*/>

</bean>

In spring you can easily create lists of beans, here’s the final spring configuration for my report:

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

<beans>

<bean id=*"expensesReport"* class=*"net.sf.reportengine.FlatReport"*>

<property name=*"reportTitle"* value=*"Spring Configured Report"* />

<property name=*"showTotals"* value=*"true"* />

<property name=*"showGrandTotal"* value=*"true"*/>

<property name=*"showDataRows"* value=*"true"* />

<property name=*"in"* ref=*"input"*/>

<property name=*"out"* ref=*"output"*/>

<property name=*"groupColumns"*>

<list>

<bean class=*"net.sf.reportengine.config.DefaultGroupColumn"*>

<property name=*"header"* value=*"Month"*/>

<property name=*"inputColumnIndex"* value=*"0"*/>

<property name=*"groupingLevel"* value=*"0"*/>

</bean>

</list>

</property>

<property name=*"dataColumns"*>

<list>

<bean class=*"net.sf.reportengine.config.DefaultDataColumn"*>

<property name=*"header"* value=*"Spent On"*/>

<property name=*"inputColumnIndex"* value=*"1"*/>

</bean>

<bean class=*"net.sf.reportengine.config.DefaultDataColumn"*>

<property name=*"header"* value=*"Amount"*/>

<property name=*"inputColumnIndex"* value=*"2"*/>

<property name=*"calculator"*>

<bean id=*"net.sf.reportengine.core.calc.Calculators.SUM"* class=*"org.springframework.beans.factory.config.FieldRetrievingFactoryBean"* />

</property>

</bean>

</list>

</property>

</bean>

<bean id=*"input"* class=*"net.sf.reportengine.in.StreamReportInput"*>

<constructor-arg>

<bean class=*"java.io.FileInputStream"*>

<constructor-arg type=*"java.lang.String"*>

<value>expenses.csv</value>

</constructor-arg>

</bean>

</constructor-arg>

<constructor-arg type=*"java.lang.String"*><value>,</value></constructor-arg>

</bean>

<bean id=*"output"* class=*"net.sf.reportengine.out.HtmlOutput"*>

<constructor-arg>

<bean class=*"java.io.FileOutputStream"*>

<constructor-arg type=*"java.lang.String"*>

<value>./springConfiguredReport.html</value>

</constructor-arg>

</bean>

</constructor-arg>

</bean>

</beans>

The source code for the above spring configuration can be found [here](http://svn.code.sf.net/p/reportengine/code/samples/src/main/resources/application-context.xml).

The java code is very simple:

**import** net.sf.reportengine.FlatReport;

**import** org.springframework.context.ApplicationContext;

**import** org.springframework.context.support.ClassPathXmlApplicationContext;

/\*\*

\* this is my first spring configured flat report

\*/

**public** **class** SpringConfiguredFlatReport {

**public** **static** **void** main(String[] args) {

ApplicationContext context =

**new** ClassPathXmlApplicationContext("application-context.xml");

FlatReport report = (FlatReport)context.getBean("expensesReport");

report.execute();

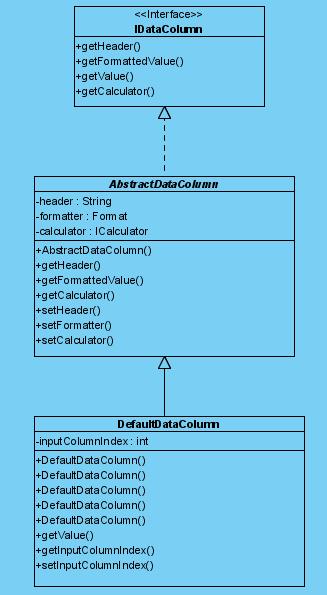
}

}

The source code for the above report can be found [here](http://svn.code.sf.net/p/reportengine/code/samples/src/main/java/net/sf/reportengine/samples/flat/SpringConfiguredFlatReport.java).

## Writing a custom data column

As you probably remember, report-engine doesn’t support only DefaultDataColumns. There’s a class hierarchy supporting the columns feature.



If you don’t want a special column you can always implement the the IDataColumn interface or, even better, extend the AbstractDataColumn abstract class. Let’s assume you want to append the values of two other columns into one. There no default implementation for this behavior but this is where you can extend the AbstractDataColumn and add your own implementation. Let’s assume you have the following 4 columns input

10 john 200 doe

17 jack 125 nicholson

22 tom 134 jones

34 bill 254 clinton

… but you need a list of only two columns where the first contains the full name (i.e. 2nd + 4th column) and the second column contains the sum of the first and the third

First let’s see the code for the full name (2nd + 4th column values)

**import** net.sf.reportengine.config.AbstractDataColumn;

**import** net.sf.reportengine.core.algorithm.NewRowEvent;

/\*\*

\* This custom column contains the appended values

\* of the second and the fourth columns

\*/

**public** **class** FullNameCustomDataColumn **extends** AbstractDataColumn {

/\*\*

\* Constructor for full name data column

\* **@param** header

\*/

**public** FullNameCustomDataColumn(){

**super**("Full Name");

}

@Override

**public** Object getValue(NewRowEvent newRowEvent) {

Object[] inputRow = newRowEvent.getInputDataRow();

String secondColumnValue = (String)inputRow[1];

String fourthColumnValue = (String)inputRow[3];

//append the second and fourth column values

**return** secondColumnValue + " " + fourthColumnValue;

//this is just for instructional purposes.

//One should use a String Builder/Buffer for such operations

}

}

You can find the code [here](http://svn.code.sf.net/p/reportengine/code/samples/src/main/java/net/sf/reportengine/samples/customColumns/FullNameCustomDataColumn.java).

The [SumCustomColumn](http://svn.code.sf.net/p/reportengine/code/samples/src/main/java/net/sf/reportengine/samples/customColumns/SumCustomColumn.java) is almost the same only that returns an integer. Now let’s see the code for the report:

**import** java.io.FileInputStream;

**import** java.io.FileNotFoundException;

**import** java.io.FileOutputStream;

**import** java.io.InputStream;

**import** net.sf.reportengine.FlatReport;

**import** net.sf.reportengine.config.DefaultDataColumn;

**import** net.sf.reportengine.in.StreamReportInput;

**import** net.sf.reportengine.out.HtmlOutput;

/\*\*

\* this report uses a custom column (full name column)

\*/

**public** **class** CustomColumnFlatReport {

**public** **static** **void** main(String[] args) {

**try** {

FlatReport flatReport = **new** FlatReport();

flatReport.setReportTitle("My custom columns report");

//the input

InputStream fileStream = **new** FileInputStream("names.txt");

StreamReportInput reportInput = **new** StreamReportInput(fileStream,"\t");

flatReport.setIn(reportInput);

//the output

FileOutputStream outFile= **new** FileOutputStream("customColsResult.html")

HtmlOutput reportOutput = **new** HtmlOutput(outFile);

flatReport.setOut(reportOutput);

//columns configuration

flatReport.addDataColumn(**new** FullNameCustomDataColumn());

flatReport.addDataColumn(**new** SumCustomColumn());

flatReport.execute();

} **catch** (FileNotFoundException e) {

e.printStackTrace();

}

}

}

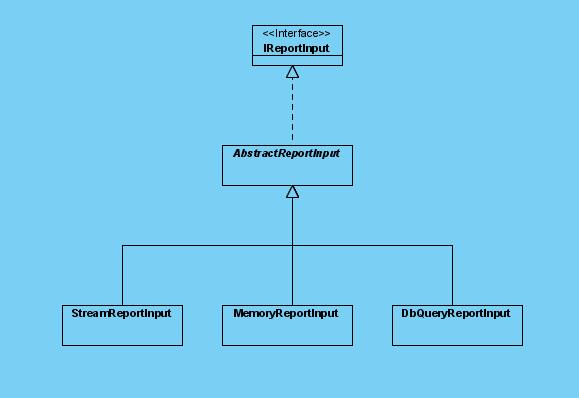
The code above can be found [here](http://svn.code.sf.net/p/reportengine/code/samples/src/main/java/net/sf/reportengine/samples/customColumns/CustomColumnFlatReport.java)

The final output will look like:

|  |  |
| --- | --- |
| My custom columns report | |
| **Full-name** | **Sum** |
| john doe | 210 |
| jack nicholson | 142 |
| tom jones | 156 |
| bill clinton | 288 |

## Writing a custom input/output for your reports

The hierarchy for input/output it’s almost the same. There’s always an interface defining the basic behavior then an abstract class with multiple children.



Basically your input class should be able to provide to its listeners data line by line. The methods of the IReportOutput interface are:

/\*\*

\* opens the input for reading

\*/

**public** **void** open();

/\*\*

\* closes the input and releases all resources used

\*/

**public** **void** close();

/\*\*

\* retrieves the next row of data

\* **@return** an array of data objects

\*/

**public** Object[] nextRow();

/\*\*

\* true if there are any rows left otherwise false

\* **@return** true if the input has more rows to return

\*/

**public** **boolean** hasMoreRows();

# Limitations

* Paging is dependent on the output format. For instance in PDF the report has pages according to your configurations but in Html there’s no split, still, when printing the paging is supported by the operating system print feature.
* Printing is fully handled by the to the application opening the final report.
* The final report is always a table with columns

# Useful links

* Reportengine website: http://reportengine.sourceforge.net
* The report engine source code can be found at: http://svn.code.sf.net/p/reportengine/code
* The samples presented in this tutorial can be found at : <http://svn.code.sf.net/p/reportengine/code/samples>
* Developer email: dragos dot balan at gmail dot com