NCReport: The Definitive Guide

NCReport Report Generator System V2.13

Norbert Szabo

November 4, 2014

NCReport: The Definitive Guide
by Norbert Szabo

Edition 2
Published 2014
Copyright © 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 NociSoft Software Solution / Helta Kft.

This document is essentially a comprehensive user documentation about NCReport Reporting System. It also contains installation instructions, tutorials and information about the contents of the distribution.

Contents

List of Figures

List of Tables

Preface

What is report generator?

A report generator is a computer program whose purpose is to take data from a source such as a database, XML stream or a spreadsheet, and use it to produce a document in a format which satisfies a particular human readership.

What is NCReport?

NCReport is a report generator, report writer tool, report engine with GUI designer primarily for Qt applications, though it is by no means limited to Qt environment. The software tool enables applications to print data driven reports, tables, lists, rich text documents or even any paginated graphical contents from one or more data sources. The system consists of at least two parts: Report engine and designer GUI application. The report engine is also available as command line executable. The report engine can be used and integrated into any Qt applications independently. NCReport has already been used and integrated by a growing community of commercial users and professionals.

Features

NCReport provides the following features and functions:

- XML report definition (report template)
- Metric based, band oriented system
- Wide range of data source types: SQL Database, Text, QAbstractItemModel, XML, any user defined data source class
- Output formats: Preview, Printer, Postscript, PDF, SVG, Image, HTML, Text
- Fast private preview window system
- Internal or external SQL database connections
- Items: Label (simple text), Field, HTML/Rich text, Line, Rectangle, Ellipse, Image, Barcode, Custom content item
- Page header/footer
- Report header/footer
- Unlimited level of grouping with group headers and footers
- Variables for totals and aggregate functions, system variables
- Static and dynamic images
- Static and dynamic HTML contents
- Barcode rendering with at least 50 types of available barcodes thanks to the Zint barcode library.
- Template mode, expression and script evaluations in fields

- Parameters from application side
- Zones
- HTML Text Document printout mode
- Pure Qt4/Qt5 compatible code
- Conditional Field or Label formatting

Why NCReport?

Present software applications often use various data sources and SQL databases. In most cases they must have the ability of printing or representing data in several output formats therefore they must be able to generate reports. Data-center application's report generation function is almost always a required feature. If you want to make your application to be able to do this, NCReport is a great choice. NCReport project contains thousands of development hours and it maintained continuously. If this reporting tool is integrated into your application, you will save huge amount of development time and you don't need to develop any printing function for your application. This is true primarily for softwares written by Qt toolkit.
Another goal that this system is fully portable native C++ multi-platform solution.

About this Documentation

This book is designed to be the clear, concise, normal reference to the NCReport reporting software. This we can use as the official documentation for NCReport.

We hope to answer, definitively, all the questions you might have about all the elements, features and entities in NCReport. In particular, we cover the following subjects:

- The general nature of NCReport. We quickly get you up to speed on how the pieces fit together.
- How to create NCReport reports. Where should you start and what should you do?
- Understanding all of the report elements. Each element is extensively documented, including the intended semantics and the purpose of all its attributes. An example of proper usage is given for every element.
- How to run NCReport reports. After you've created one, what do you do with it?
- How to integrate NCReport library into a Qt application.

Getting this Documentation

If you want to hold this book in your hand and flip through its pages, unfortunately it is not yet possible unless you print it for yourself. You can also get this book in electronic form, as PDF, from our web site: http://www.nocisoft.com/download

Getting Examples from This Documentation

All of the examples are included on our web site. You can get the most up-to-date information about this documentation from our web site: http://www.nocisoft.com/ncreport

Request for Comments

Please help us improve future editions of this book by reporting any errors, inaccuracies, bugs, misleading or confusing statements, and plain old typos that you find. An online errata list is maintained at http://tracker.ncreport.org Email your bug reports and comments to us at office@nocisoft.com

Part I

Introduction

Chapter 1

About NCReport

This chapter provides an overview of NCReport, starting with its history. It includes a description of NCReport V2.10. or above.

1.1 A Short NCReport History

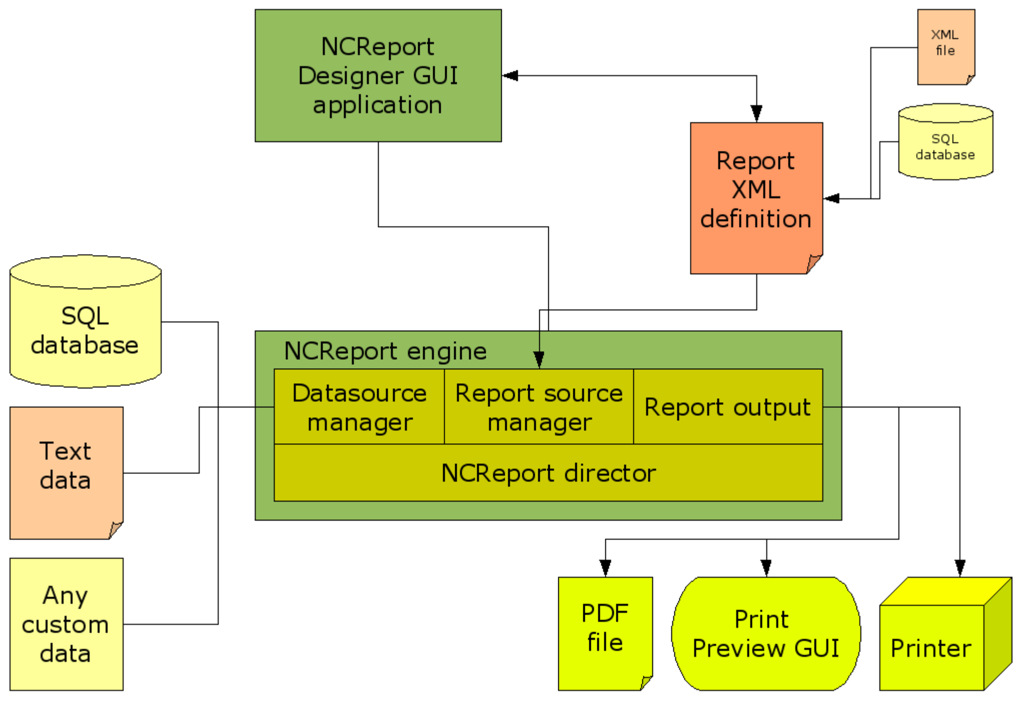
NCReport's history is more than 10 years old. The project has been started in 2002 as a joint project of a Qt3 application and later the tool become a unique GPL project. The reason why the system was started to plan the urgent needs of data printing as a very missing function in Qt/C++ programming environment. In 2007 the full project has been rewritten into a new commercial project by following the well formatted fully object oriented design concept. This version was named 2.0 version.

1.2 How NCReport works

What does NCReport do exactly? In few words NCReport generates ready to print documents from raw data by a template. As a first step an XML report definition as a template must be created. This is a scenario for the report engine that describes what content must exactly render and how should it look like, where the data come from and so on. This report definition can come from local or remote file or from SQL database depending on what report source was defined. Report source manager is a part of the report engine that handles and loads report definition from it's origin. The report designer application as a separated GUI application designed for creating report XML definitions. When running a report first the report engine parses report definition and opens the specified data source(s). If SQL data source is defined a valid SQL database connection must be alive (in case of non built-in database connection is defined) After the data source(s) successfully opened SQL query is run by the report director. The report engine begins to process data row by row by specified data source assigned to the first detail section. While report is processing, the report director manages the rendering of different sections and the items inside. The result is rendered to the specified output such as: *printer, print preview, postscript, PDF, SVG, Image, HTML, Text*

The following diagram illustrates how the report generator works in general.

Figure 1.1 Structure of NCReport



1.3 About report definition XML file

NCReport uses Extensible Markup Language (XML) format for report definition. This is a universal standard file format, which simplifies also the human reading and processing the report definition templates.

1.4 Measurements

NCReport's report definition XML files contain the position and size information in metric measurement. The position and size values are stored in millimeters, so to modify the report element geometry in XML structure is easy even without the designer tool.

Chapter 2

Install

2.1 Installing NCReport

2.1.1 Requirements

- Linux or any Unix like operation systems or Microsoft Windows™ or MacOS 10.4 or above.
- At least 512Mb of memory and a 1GHz CPU.
- 40Mb of free disk space

NCReport is officially supported on Windows 2000/XP/Vista, on Linux >=2.6 and on MacOSX >=10.4. It is also possible to use it on other platforms that are supported by Qt but with limited or without support from us.

NCReport has been tested with:

- Qt4.5-Qt4.8 under Windows 7/XP/Vista
- Qt4.5-Qt4.8 under Linux (Ubuntu 10.04, 12.04)
- Qt4.7-Qt4.8 MacOS 10.6
- Qt5.0-Qt5.3 under Windows XP/7/8.1, Linux and MacOS 10.9

2.1.2 Install Binary package on Linux

1. Make sure that the appropriate Qt version binaries are already installed on your Linux system. The required version is specified in the downloaded package.
2. Unpack the NCReport Linux distribution to any directory you want: (i.e ncreport)

   ```
   $ cd ncreport
   tar -xzvf ncreport2.x.x.tar.gz
   $ cd ncreport/bin
   ```

3. NCReport binary files are intended to be used directly from the `ncreport2.x.x/bin` directory. That is, you can start NCReport binaries by simply executing:

   To start the report designer:

   ```
   $ ./NCReportDesigner
   ```

   To start the command line report engine:

   ```
   $ ./ncreport
   ```

   After that, you may want to add `ncreport2.x.x/bin/` to your $PATH.

2.1.3 Install (commercial) source package under Linux

1. Make sure that GCC/G++ c++ compiler and the appropriate version of Qt development environment is already installed on your Linux system. In addition, you need to be compiled/installed appropriate Qt's database drivers. Example reports mostly use QMYSQL and QSQLITE database drivers.
2. Unpack the NCReport Linux source package inside any directory you want:

```
$ cd directory
$ tar -xzvf ncreport2.x.x.tar.gz
$ cd NCReport2.x.x
$ qmake
$ make
```

3. To start NCReport binary files just do the same as it's written in previous section.

2.1.4 Install binary package on Windows

1. It is strongly recommended to download and install one of the auto install `setup.exe` files. (`NCReport_2.x.x_Windows.exe`, `NCReport_2.x.x_Windows_MinGW.exe`)
2. Just simply run the setup executable file and follow the setup wizard instructions.
3. To start NCReport Designer use the Start menu

2.1.5 Install (commercial) source package [1] under Windows

1. Make sure that a Windows™ C++ development environment is already installed on your Windows system. If you use Open Source version of Qt, the GNU MinGW compiler is contained in the Qt SDK.Current example shows the compiling procedure using Microsoft Visual C++ compiler
2. Make sure that the appropriate version of Qt development environment is already installed on your Windows system. In addition, you need to be compiled/installed appropriate Qt's database drivers. Example reports are mostly use QMYSQL and QSQLITE database drivers.
3. Simply unpack the downloaded `ncreport2.x.x.zip` or .tar.gz or .7z source package. Use a tool like WinZip, 7-Zip or Info-Zip [2] to unzip the NCReport distribution inside any directory you want:

```
mkdir ncreport
cd ncreport
unzip ncreport2.x.x_src.zip
qmake
nmake
```

2.2 Contents of the installation directory

/bin Contains the NCReport executable files

/doc Contains the User Guide and API documentation in html format

/sql Contains the sql script files are required for some of example reports

/reports Contains the sample reports for demonstrating NCReport features

/lib Contains the binary library files (Unix/Linux only)

/testdata Contains test files for demonstration purposes. `defaulttestdata.xml` file is used by Designer application for storing test parametersdata. If want to use it, please copy this file to /bin directory before starting NCReportDesigner.

[1] For license holders only
[2] Note that Windows XP has built-in support for `.zip` archives.

/i18n Contains internationalization files.

/images Contains image files for a `sql_productlist_with_dynimages_demo.xml` test report

/src Contains the source codes of NCReport system. The binary package contains only the source of demo and sample applications. The full source code is available for commercial license holders only.

2.3 Acknowledgements

On Windows, NCReport installer .exe is built using Inno Setup by Jordan Russell's software. We truly recommend this excellent and free-to-use tool.

Chapter 3

Getting started

This chapter is intended to provide a quick introduction to NCReport system. If you're already familiar with using the tool, you only need to skim this chapter. To work with NCReport, you need to understand a few basic concepts of structured editing in general, and NCReport, in particular. That's covered here. You also need some concrete experience with the way a NCReport report definition is structured. That's covered in the next chapter.

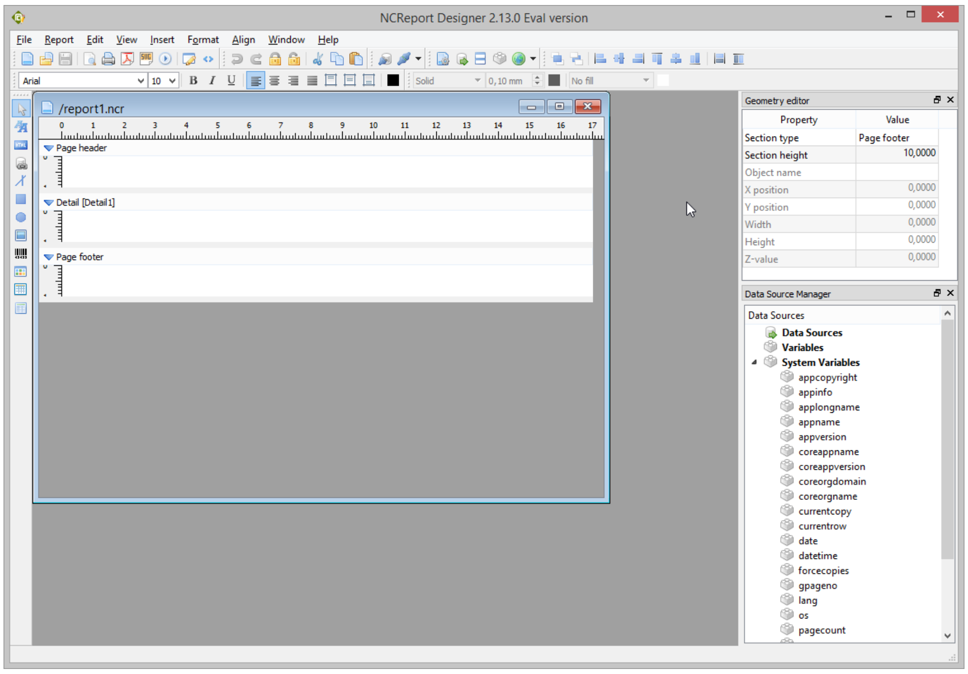
3.1 Creating a basic report

At the very beginning we go through the first basic steps of creating a simple report. In our example we build a plain product price list report grouped by product category.

3.1.1 Beginning a new report

Open the report designer GUI application and let's begin a new report by clicking New tool bar button or use **File** → **New** menu.

Figure 3.1 A new empty report in Designer



Property	Value
Section type	Page footer
Section height	10,0000
Object name	
X position	0,0000
Y position	0,0000
Width	0,0000
Height	0,0000
Z-value	0,0000

3.1.2 Setting up page options

Page options of the current report can be specified in **Report and Page settings** dialog. Open the **Report** menu and select **Report and Page options...** menu. In the report page settings dialog you can specify the following options:

Report name Type the name of the report. It's just an informative option, it's not used by report generator.

Report type There are two type of reports available. Report represents a normal report, Text document is a limited report mode. In this mode the report can contain HTML text items only. The generated report will be a paginated rich text document.

File encoding The encoding of the XML file. When user opens or saves the report definition file, this will be the default encoding. In most cases UTF-8 fulfills the requirements, but for special international characters you can choose any specified encoding.

Default font The font name and size are basically used for the text labels and fields in the whole report. Unique object settings may overwrite this option.

Page size The size of the page. The size names are listed in the combo box and their names are the standard size names. Currently the standard page sizes are supported.

Background color The background color of the report. This option currently is unused.

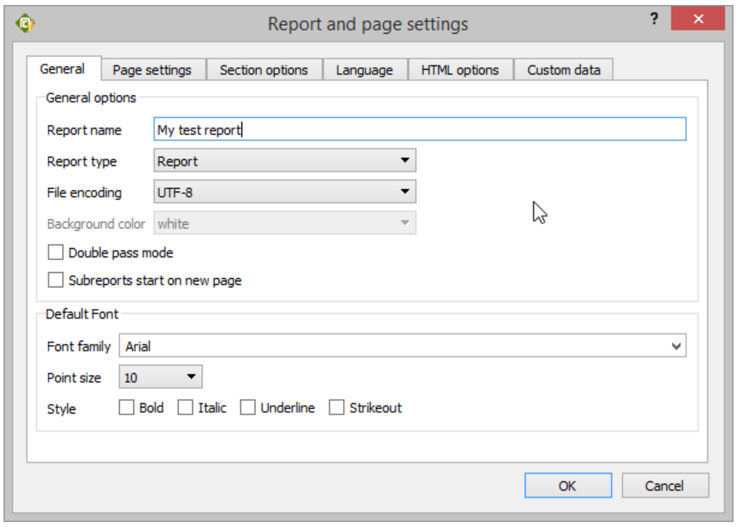
Header and footer settings The check boxes can be used to enable or disable page header/footer and report header/footer. To alter the height of these sections you may use spin boxes corresponding to their check boxes. You can also change these height properties by mouse dragging or by geometry editor

Margins margin properties represent the top, bottom, left and right margins of the page in millimeters. To alter the margin values just use the spin boxes.

Orientation This radio button option represents the orientation of the page, Portrait or Landscape orientation can be selected.

Specify the page's properties by this example and click OK button for saving data source settings. We add the report's name only, other default properties we don't change.

Figure 3.2 Page settings dialog



General options

Report name: My test report

Report type: Report

File encoding: UTF-8

Background color: white

Double pass mode

Subreports start on new page

Default Font

Font family: Arial

Point size: 10

Style: Bold Italic Underline Strikeout

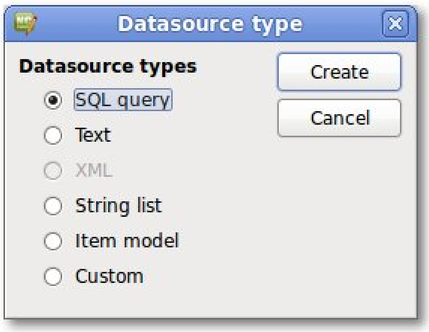
3.1.3 Adding a data source

First, you see an empty new report that contains a page header, a detail and a page footer sections by default. Before starting to add report items we define the data source that represents a definition where the data will come from. In our example the data source is a Text.

To specify a data source in your report open the Report menu and select **Data sources...** menu item. Then appears a dialog on you can add and or remove data sources. To add a new data source click the

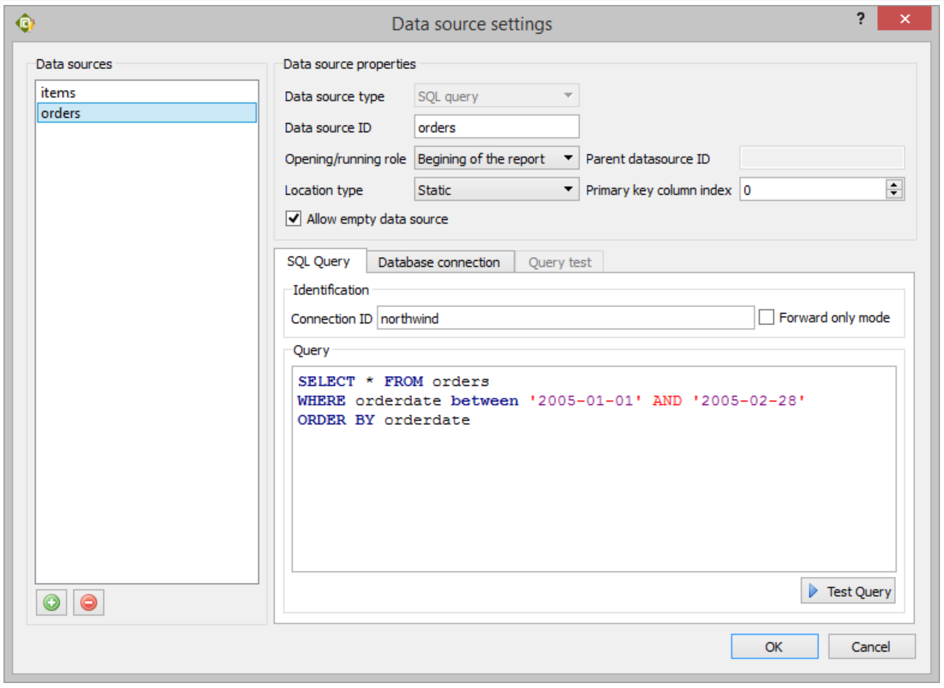
Add button in dialog and then select the **Text** data source type from the list of available data source types.

Figure 3.3 Data source types dialog



Choosing Create button opens the data source dialog and adds the selected type of data source. In the data source dialog you can specify all data source settings.

Figure 3.4 Data source setting dialog (This is an SQL data source example)



```
SELECT * FROM orders
WHERE orderdate between '2005-01-01' AND '2005-02-28'
ORDER BY orderdate
```

In our example in the data source dialog the following properties we will specify:

Data source ID This ID is important for assigning data source to a detail section. You can use this ID in all expressions and data source reference.

Data source type The type of the data source you've already chosen before.

Location type Location type is a property that describes where the data can be found. In this report we will use static Text which is a statically typed or pasted text. The text will be stored in the report.

Because we chose static data source, we have to insert a static text data into the Static Text area. In our example we create a simple product list included the following columns:

- type as 0. column
- product name as 1. column

- product code as 2. column
- available as 3. column
- weight as 4. column
- price as 5. column

The semicolon separated static data:

```
A;Magnetometer;D54/78;1;0.778;15.6
A;Pressostat CMR;M542;0;2.547;30
B;Oil pump Merin;CT-784;1;1.510;17
B;Hydraulic pump;RF-800;1;3.981;58
B;Erling o-ring;577874;0;2.887;49
C;Hydraulic cup;HC55;0;0.435;39
C;Ballistic rocket;BV01;1;1.260;157.9
C;Wheel WRRT56;Q185/70;1;25.554;199.0
```

The data columns are identified by `col0, col1, col2, col3, col4, col5` identifier. Alternatively you can use the column numbers only but the first alternative is recommended.

TIP

To make the column identification easier with text data source we can use column names. Text data source can have a column name row, this is the first row if we enable **First row as column header** option.

For example: `type;productname;code;available;weight;price`

In our example the col0-col5 column names are used. We specify the other text data source options:

Column delimiter Text data columns can be separated by the column delimiters specified in the combo box. We select semicolon as column delimiter.

Encoding The text data encoding name. UTF-8 is good choice in most cases.

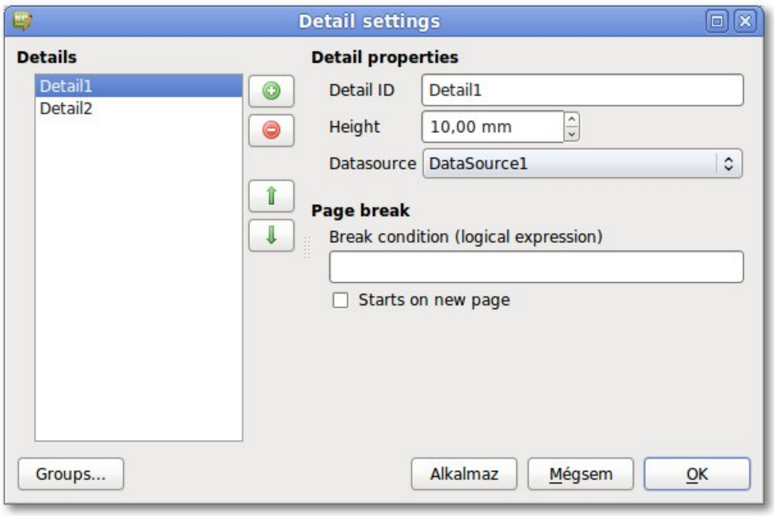
First row as column header When this option is enabled the first row of the text data is considered as a column name definition. In our example we enable this as we defined the columns at the 1st row.

After specifying the data source properties by this example and click OK to save the data source settings.

3.1.4 Assigning data source to the detail section

To assign the data source we defined before, open the **Report** menu and select **Details and grouping...** menu item, then appears a dialog on you can manage the detail sections of the report. A default detail ID is Detail1, you may change it to whatever ID you want. Select the previously defined data source from **data source** combo box.

Figure 3.5 Detail settings dialog



Click OK button to apply detail settings.

3.1.5 Using Geometric Editor

Geometry editor is a small property tool window in designer for showing or editing the position and size of objects in focus. To enable/disableGeometry editor just use **View** menu and enable/disable **Geometry editor** menu item. Then the tool window will appear in the right side. The current objects or sections are always activated by a mouse click. You can type the numeric size or position values into the spin boxes. Any changes made to the object's properties cause it to be updated immediately.

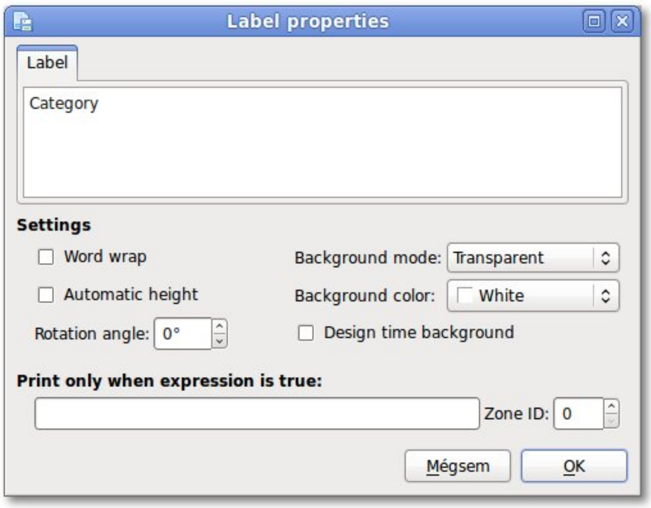
3.1.6 Designing page header section

Page headers is used to contain page headings. First, we will add column titles as labels to page header section. Labels are simple texts. Label items are used to display descriptive information on a report, such as titles, headings, etc. Labels are static items, their value never change.

3.1.6.1 Adding Labels

Select the Label tool button or menu item in Tools menu. After that the cursor changes to a cross beam, then click in the page header of the report definition where you want the Label to be located. Doing so will create the Label object in that section and opens the Label settings dialog.

Figure 3.6 Label dialog


Label properties

Label

Category

Settings

☐ Word wrap

☐ Automatic height

Rotation angle: 0°

Background mode: Transparent

Background color: White

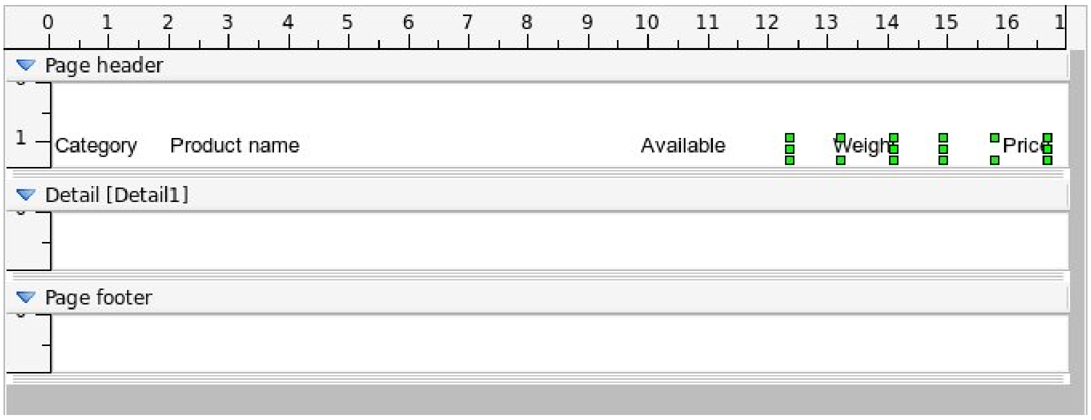
☐ Design time background

Print only when expression is true:

Zone ID: 0

Add labels to page header for column titles and move them to positions by example. Then select "Weight" and "Price" (multiple selecting is available) and align them right by clicking Right alignment tool button.

Figure 3.7 Labels as headers



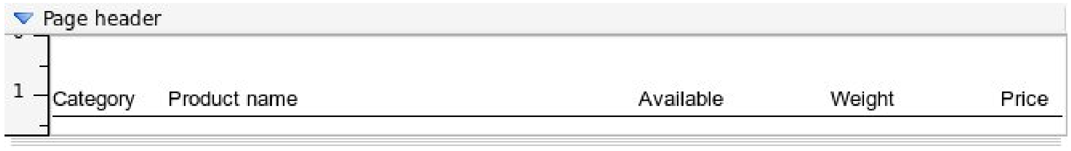
3.1.6.2 Resize section

Increase the height of page header section by dragging the resizer bar at the bottom of the section. Another way for resizing to type Section height value in Geometry editor.

3.1.6.3 Drawing a line

To underline the labels, let's draw a Line by selecting the Line button in the tool bar or menu item in Tools menu. After that the cursor changes to a cross beam, then click in the section of the report definition where you want the line to be started and simply drag the line to the end position. To move the line just drag and drop by left mouse button.

Figure 3.8 Page Header with labels and line



3.1.7 Designing Detail section

The core information in a report is displayed in its Detail section. This section is the most important section of the report since it contains the row by row data from the data source.

3.1.7.1 Adding Fields

Select the Field tool button or menu item in Tools menu. After that the cursor changes to a cross beam, then click in the detail section where you want the Field to be located. Doing so will create the Field object in that section and opens the Field settings dialog.

The following properties must be specified:

Field source type The combo box contains the possible sources from where the field can pull data.

Field column/expression This property represents the name of the data column from where field's value is loaded from.

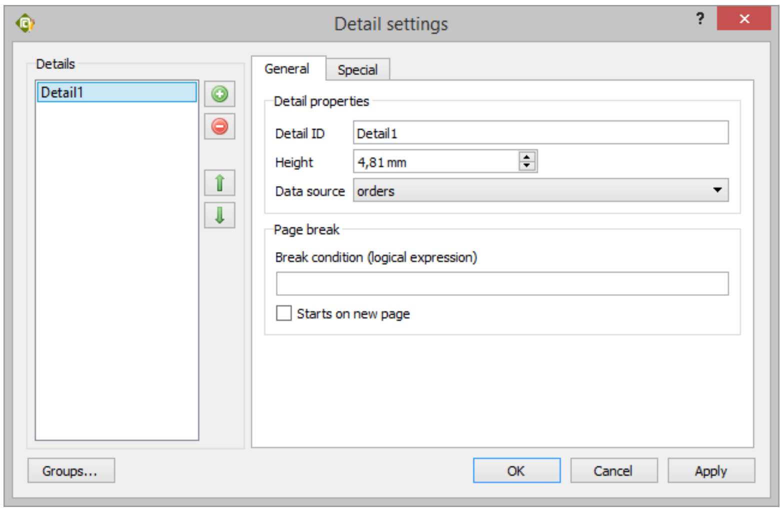
For identifying data columns specify:

- the name of SQL column when using SQL data source
- the number of column `0,1,2...n` or `col0,col1,col2...coln` when using StringList, ItemModel, StringParameter, Text data source.

Data type The field's base data type. The following data types are supported: Text,Numeric,Date,Boolean

The field's property dialog of the 1st column field:

Figure 3.9 Field properties dialog


Detail settings

Details: Detail1

General | Special

Detail properties

Detail ID: Detail1

Height: 4,81 mm

Data source: orders

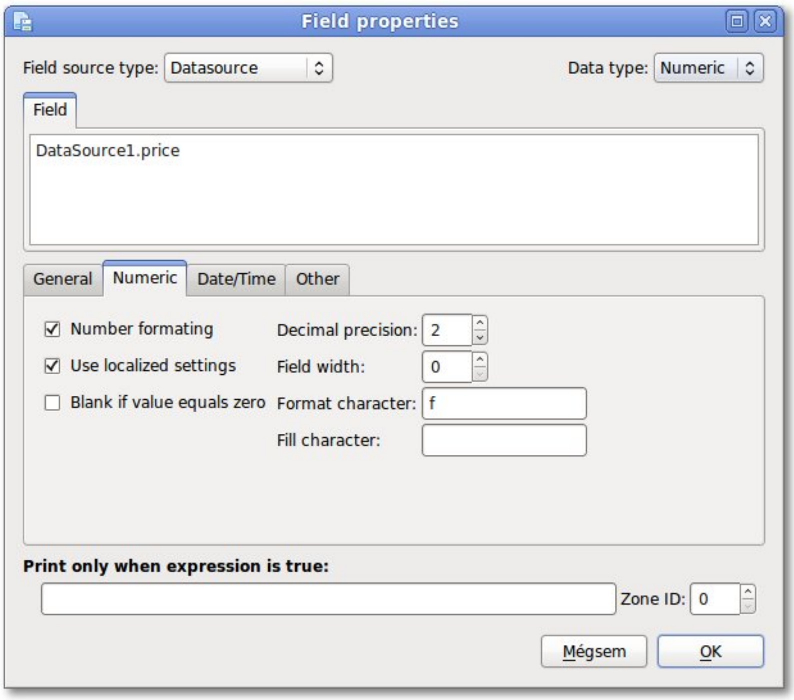
Page break

Break condition (logical expression):

Starts on new page [ ]

Add Fields to Detail and move them to positions by example. Field column names are: `col0, col1, col2, col3, col4, col5` (alternative naming: `0, 1, 2, 3, 4, 5`) Select col4 and col5 field item and align them right by clicking Right alignment tool button. After, in the field's dialog set Data type to Numeric and use the **Numeric tab page** to set number formatting properties.

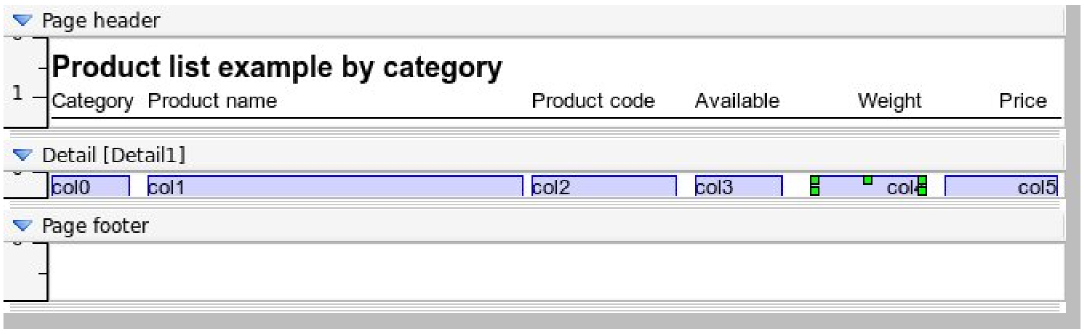
Figure 3.10 Field properties dialog - numeric data



Field source type: Datasource
Data type: Numeric
DataSource1.price
☑ Number formating
☑ Use localized settings
☐ Blank if value equals zero
Decimal precision: 2
Field width: 0
Format character: f
Fill character:
Print only when expression is true:
Zone ID: 0

Resize the detail section to 4.5 mm height. After also a title label added to the page header section and formatted, the report should look like this:

Figure 3.11 Product list example report in Designer



3.1.8 Designing page footer section

Page footer is usually used to display informations such as number of the page. In our example we only add two system variable fields: Application info and the current page number.

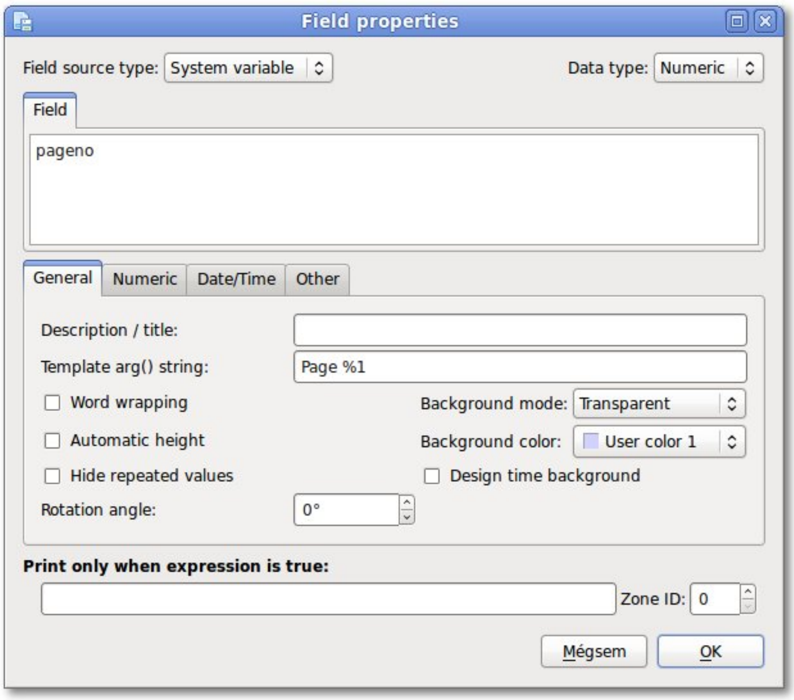
3.1.8.1 Adding System variable fields

Select the Field tool button or menu item in Tools menu. After that the cursor changes to a cross beam, then click in the detail section where you want the Field to be located. Doing so will create the Field object in that section and opens the Field settings dialog.

3.1.8.2 Adding page number field

Specify the field's properties by this example:

Figure 3.12 Page number System Variable



Field source type: System variable
Data type: Numeric
pageno
Description / title:
Template arg() string: Page %1
☐ Word wrapping
☐ Automatic height
☐ Hide repeated values
Rotation angle: 0°
Background mode: Transparent
Background color: User color 1
☐ Design time background
Print only when expression is true:
Zone ID: 0

3.1.8.3 Adding application info field

Add again a new field to page footer and specify the field's properties by this, similar to the previous:

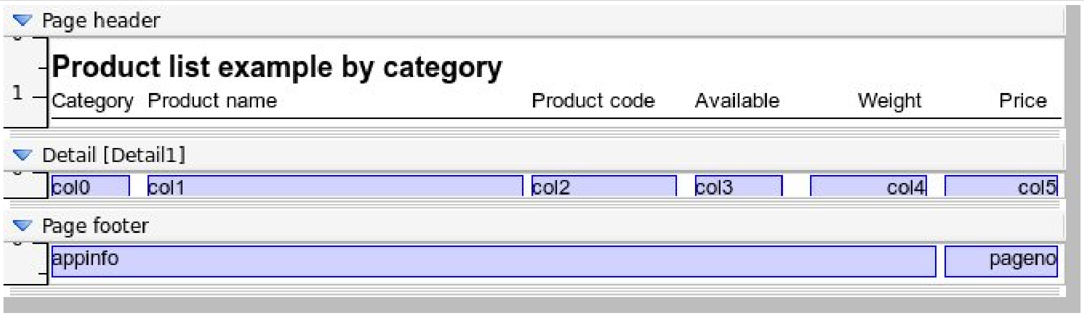
Field source type: System variable Field column expression: `appinfo`

3.1.8.4 Resize section

Derease the height of page footer section by dragging the resizer bar at the bottom of the section. Another way for resizing to type Section height value in Geometry editor.

After setting the alignments and moved fields to the right positions, the report should look like this:

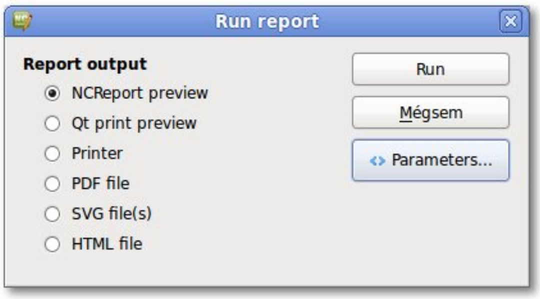
Figure 3.13 Report example with page footer



3.1.9 Testing report in the Designer

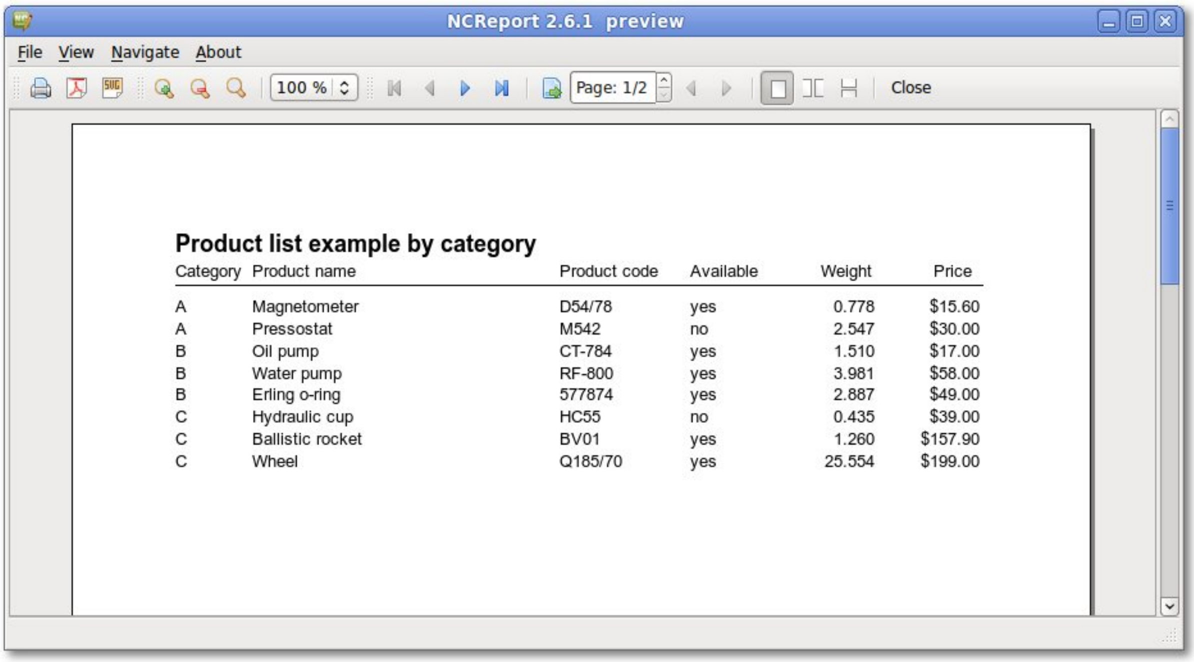
Our sample report now is ready for testing. To run report from designer there are at least two ways: Select **Report/Run report...** menu and after the report runner dialog appears you can choose the report's output. To start running report just click OK button.

Figure 3.14 Run report from Designer



For fast preview just select **Report/Run report to preview...** menu and then the Designer will run report to print preview immediately. In this state the preview of our example report appears like this:

Figure 3.15 Test report print preview example



Product list example by category

Category	Product name	Product code	Available	Weight	Price
A	Magnetometer	D54/78	yes	0.778	$15.60
A	Pressostat	M542	no	2.547	$30.00
B	Oil pump	CT-784	yes	1.510	$17.00
B	Water pump	RF-800	yes	3.981	$58.00
B	Erling o-ring	577874	yes	2.887	$49.00
C	Hydraulic cup	HC55	no	0.435	$39.00
C	Ballistic rocket	BV01	yes	1.260	$157.90
C	Wheel	Q185/70	yes	25.554	$199.00

3.2 Advanced functions

The following section describes how to use some advanced feature of NCReport. We will define a group and after we will add summary variables to our example report.

3.2.1 Adding a variable for summary

Variables are special numeric items used for providing counts and totals. Each of them have name, function type, data type, and have an assigned data source column the variable based on. To add a variable open the **Report** menu and select **Variables...** menu item. Then appears a dialog on you can manage variables.

The following options are available for variables:

Variable ID The name/ID of the variable

Variable expression The data source column name the variable is based on

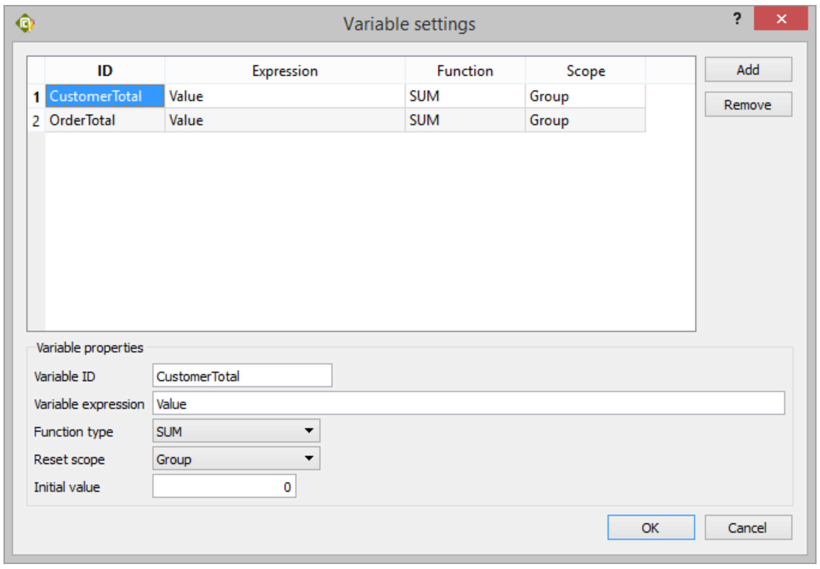
Function type The function type of the variable. Supported function types: Sum, Count

Reset scope Specifies the scope after report engine resets the variable. Group level resets also must be set by group settings dialog.

Initial value Initial value of the variable

Let's create a `var0` which will summarize col4 column. (weight) It provides variable to summarize col4 values in 'Group' **Reset scope**. Specify the field's properties by this example:

Figure 3.16 Variable dialog



	ID	Expression	Function	Scope
1	CustomerTotal	Value	SUM	Group
2	OrderTotal	Value	SUM	Group

Variable ID	CustomerTotal
Variable expression	Value
Function type	SUM
Reset scope	Group
Initial value	0

To apply settings click OK button on Variable dialog.

3.2.2 Defining a group

Reports often require summary data by band. In our example we will add weight summary by product category to report. First, open the **Report** menu and select **Details and grouping...** menu item, then appears a dialog on you may manage the detail sections and groups of the detail. Select "Detail1" detail and click the Data grouping... button, then the Group settings dialog will appear. The following properties are available for a group:

Group ID The name/ID of the group for identification purposes

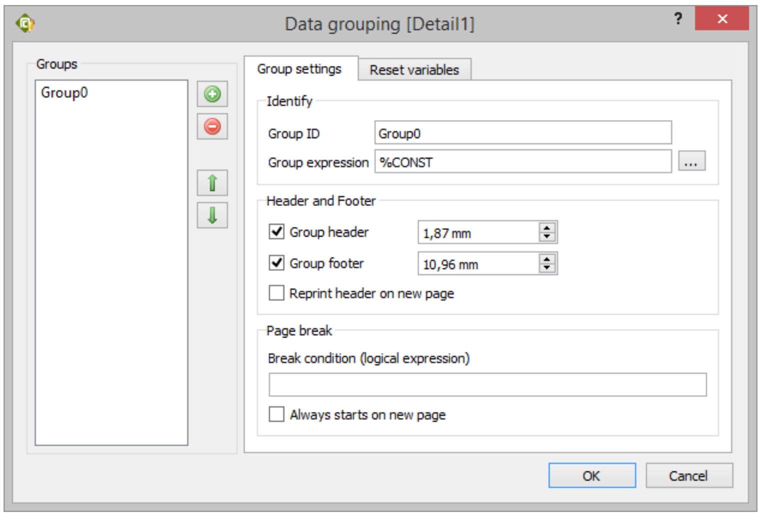
Group expression The name of the data source column the group is based on.

Header and Footer To enable or disable group header and footer, check on or off the specified check box. To set initial height of these sections you can use spin boxes near the check boxes.

Reset variables This list contains the 'Group' scope variables. You can specify which variable the report generator has to reset when a group level run out.

We want the grouping to be based on `col0` column (product category column). Specify the field's properties by this example:

Figure 3.17 Group settings dialog



Groups: Group0

Group ID: Group0
Group expression: %CONST

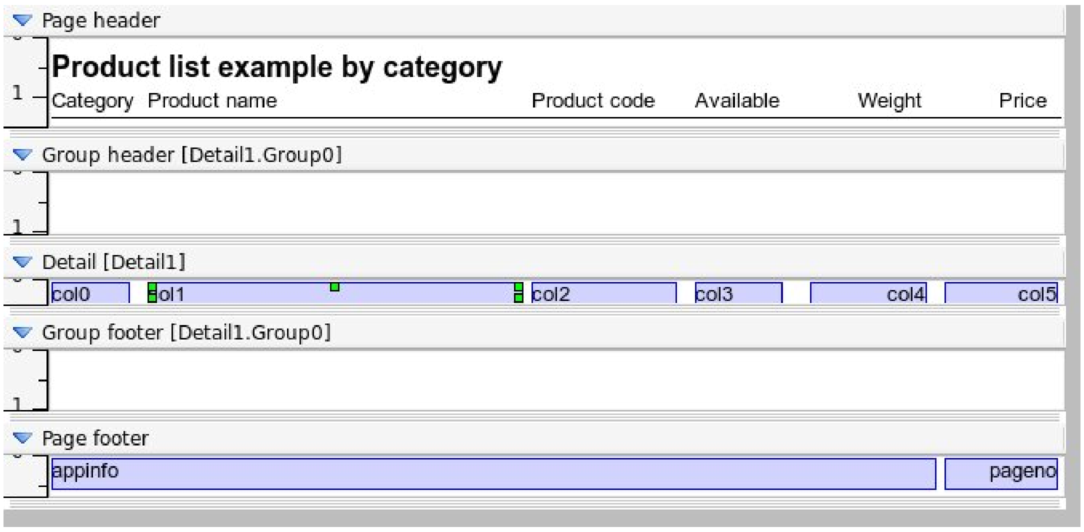
[✓] Group header: 1,87 mm
[✓] Group footer: 10,96 mm
[ ] Reprint header on new page

Break condition (logical expression):

[ ] Always starts on new page

To apply settings click OK button on Group dialog and then click OK button on Detail dialog. After doing so group header and footer of the detail will appear.

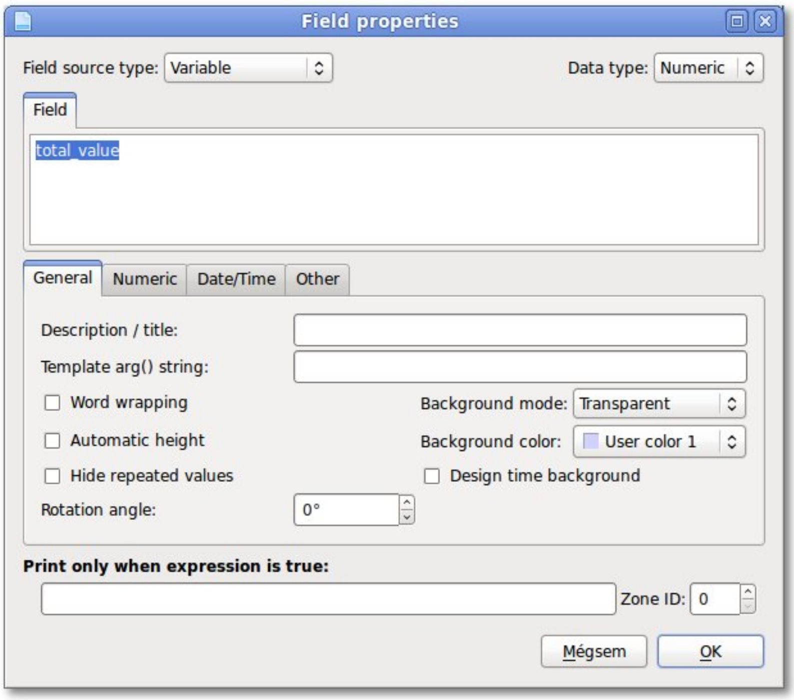
Figure 3.18 Group in the report



3.2.3 Adding summary field to group footer

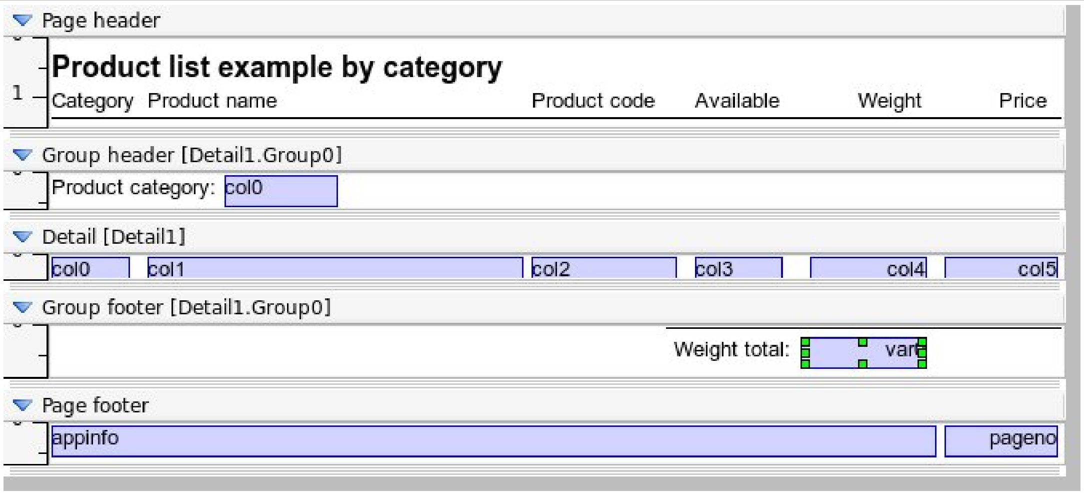
To add a Field based on `var0` variable just add again a new field to group footer and specify the field's properties by example:

Figure 3.19 Variable field



After adding variable field and some labels and a line to group header and footer our report should look like this:

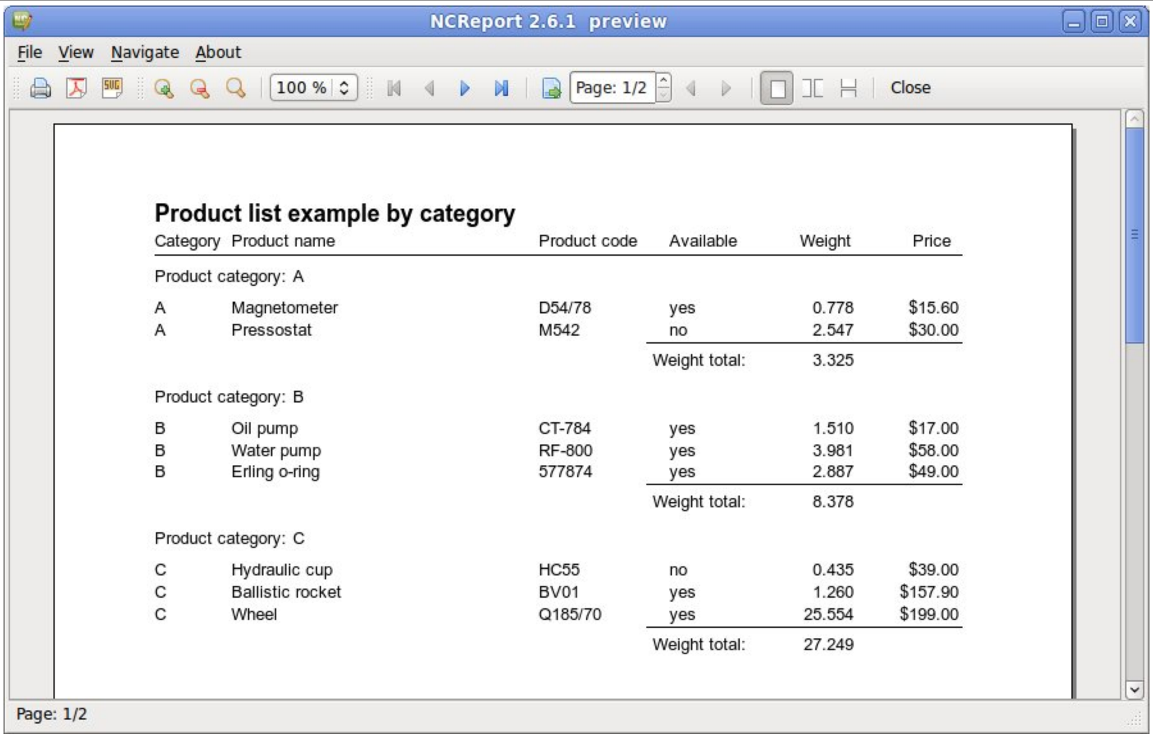
Figure 3.20 Report example with group


Page header
1
Product list example by category
Category Product name Product code Available Weight Price
Group header [Detail1.Group0]
Product category: col0
Detail [Detail1]
col0 col1 col2 col3 col4 col5
Group footer [Detail1.Group0]
Weight total: var
Page footer
appinfo
pageno

3.3 Final testing the report

Now we are ready! For preview testing just select again **Report/Run report to preview...** menu and then the Designer will run our report to print preview. In this state the preview of our example report appears like this:

Figure 3.21 Report final print preview



Product list example by category

Category	Product name	Product code	Available	Weight	Price
Product category: A					
A	Magnetometer	D54/78	yes	0.778	$15.60
A	Pressostat	M542	no	2.547	$30.00
			Weight total:	3.325	
Product category: B					
B	Oil pump	CT-784	yes	1.510	$17.00
B	Water pump	RF-800	yes	3.981	$58.00
B	Erling o-ring	577874	yes	2.887	$49.00
			Weight total:	8.378	
Product category: C					
C	Hydraulic cup	HC55	no	0.435	$39.00
C	Ballistic rocket	BV01	yes	1.260	$157.90
C	Wheel	Q185/70	yes	25.554	$199.00
			Weight total:	27.249	

And yeah! We have created a simple one level group report. In the next step we will describe how to run this report from your application.

3.4 Integrating NCReport into a Qt application

3.4.1 Adding NCReport library to an application

For using NCReport from your application, first you have to integrate NCReport into your application project. There are at least two different ways to do this: Direct including the sourcesShared library mode

- Including the whole sources statically to your project and build it together with your application. In this case you don't need NCReport shared libraries. Doing so open your `.pro` project file and add the full source package to the project as `testapp/testapp.pro` does.
- Using NCReport engine as shared library. For using NCReport library like any other shared libraries in your project you need to specify the library connection in your project file.
  The following project example shows the necessary settings

```
QT        += core gui
greaterThan(QT_MAJOR_VERSION, 4): QT += widgets printsupport

TARGET = MySimpleDemo
TEMPLATE = app
SOURCES += main.cpp

win32:CONFIG(release, debug|release) : LIBS += -L$$PWD/../ncreport/lib/ - ↩
    lNCReport2
else:win32:CONFIG(debug, debug|release): LIBS += -L$$PWD/../ncreport/lib/ - ↩
    lNCReportDebug2

unix:CONFIG(release, debug|release) : LIBS += -L/usr/local/lib/ncreport - ↩
    lNCReport
else:unix:CONFIG(debug, debug|release): LIBS += -L/usr/local/lib/ncreport - ↩
    lNCReportDebug
```

```
INCLUDEPATH += $$PWD/../ncreport/includes
```

WARNING

Check the library and include path and use the correct paths from your environment. be sure that you link the debug version library in debug mode and the release version in release mode!

For more informations see the Qt documentation in qmake manual at chapter Declaring Other Libraries.

TIP

Use Qt designer's **Add library...** menu to add NCReport library to your project.

3.4.2 Initializing NCReport class

This step shows you how to initialize NCReport class.

Includes. First we have to add includes. To include the definitions of the module's classes, use the following includes:

```
#include "ncreport.h"
#include "ncreportoutput.h"
#include "ncreportpreviewoutput.h"
#include "ncreportpreviewwindow.h"
```

Creating NCReport class. We create the report class just like as another QObject based class:

```
NCReport *report = new NCReport();
```

If NCReport object has been created earlier and passed as a parameter, you should inititalize the report by calling `reset()` method:

```
report->reset();
//or
report->reset(true);
```

`NCReport::reset()` function will delete all object references, and makes report engine able to run a report again. If parameter is set TRUE, also report parameters, added data sources such as QStringLists, custom items will be deleted.

3.4.3 Setting the Report's source

Report source means the way of NCReport handles XML report definitions. Report definitions may opened from a file - in most cases it is suitable, but also it can be loaded from an SQL database's table. In our example we apply File as report source:

```
    report->setReportFile( fileName );
```

This code is equivalent with this code:

```
    report->setReportSource( NCReportSource::File );
    report->reportSource()->setFileName( fileName );
```

3.4.4 Adding parameters

To add a parameter to NCReport use addParameter method. The parameter ID is a string, the value is a QVariant object.

```
report->addParameter( "id", QVariant("value") );
```

You can use the same for the different data types:

```
report->addParameter( "par1", "String Parameter" );
report->addParameter( "par2", 5.687 );
report->addParameter( "par3", 1024 );
report->addParameter( "par4", QDate::currentDate() );
```

3.4.5 Running the Report

Now we are ready to run the Report to different outputs. Doing so just use one of runReportTo... functions.

Running report to printer

```
report->runReportToPrinter();
```

Running report to PDF

```
QString fileName("mypdffile.pdf");
report->runReportToPDF( fileName );
```

Running report to Print Preview

```
report->runReportToPreview();
```

If you run report to preview, result will be stored in an NCReportPreviewOutput object. Report engine does not run the preview form automatically. After the report engine successfully done we need to initialize an NCReportPreviewWindow object for previewing. Before doing so we check if a report error occurred.

```
if ( !report->hasError() ) {
  NCReportPreviewWindow *pv = new NCReportPreviewWindow();
  pv->setOutput( (NCReportPreviewOutput*)report->output() );
  pv->setWindowModality( Qt::ApplicationModal );
  pv->setAttribute( Qt::WA_DeleteOnClose );
  pv->setReport( report ); // sets the report objects
  pv->exec();
} else {
    QMessageBox::warning( tr("Error");
}
```

To get the current output use `NCReport::output()` function.

WARNING

! When you run report to preview the report output object won't be deleted by NCReport. When the `NCReportPreviewWindow` object is destroyed, output is deleted automaticaly by it's destructor.

3.4.6 Error handling

To catch occurrent errors you can use the following functions:

```
bool error = report->hasError();
QString errormsg = report->lastErrorMsg();
```

3.4.7 Deleting Report object

After report running action you may delete the report object. When NCReport object is deleted all child objects are also deleted.

```
delete report;
```

WARNING

Don't delete NCReport object if `NCReportPreviewWindow` object still exists. If you want to use report object again without deleting just use `NCReport::reset()` function.

Chapter 4

Designer's manual

NCReport Designer is a tool for designing and building report files. It allows you to create and design the report definition files (report files) to NCReport instead of writing the XML file manually with a text editor.

4.1 Getting Started with NCReport Designer

This chapter covers the fundamental steps that most users will take when creating reports with NCReport Designer. We will introduce the main features of the tool by creating a simple report that we can use with NCReport engine.

4.1.1 Launching Designer

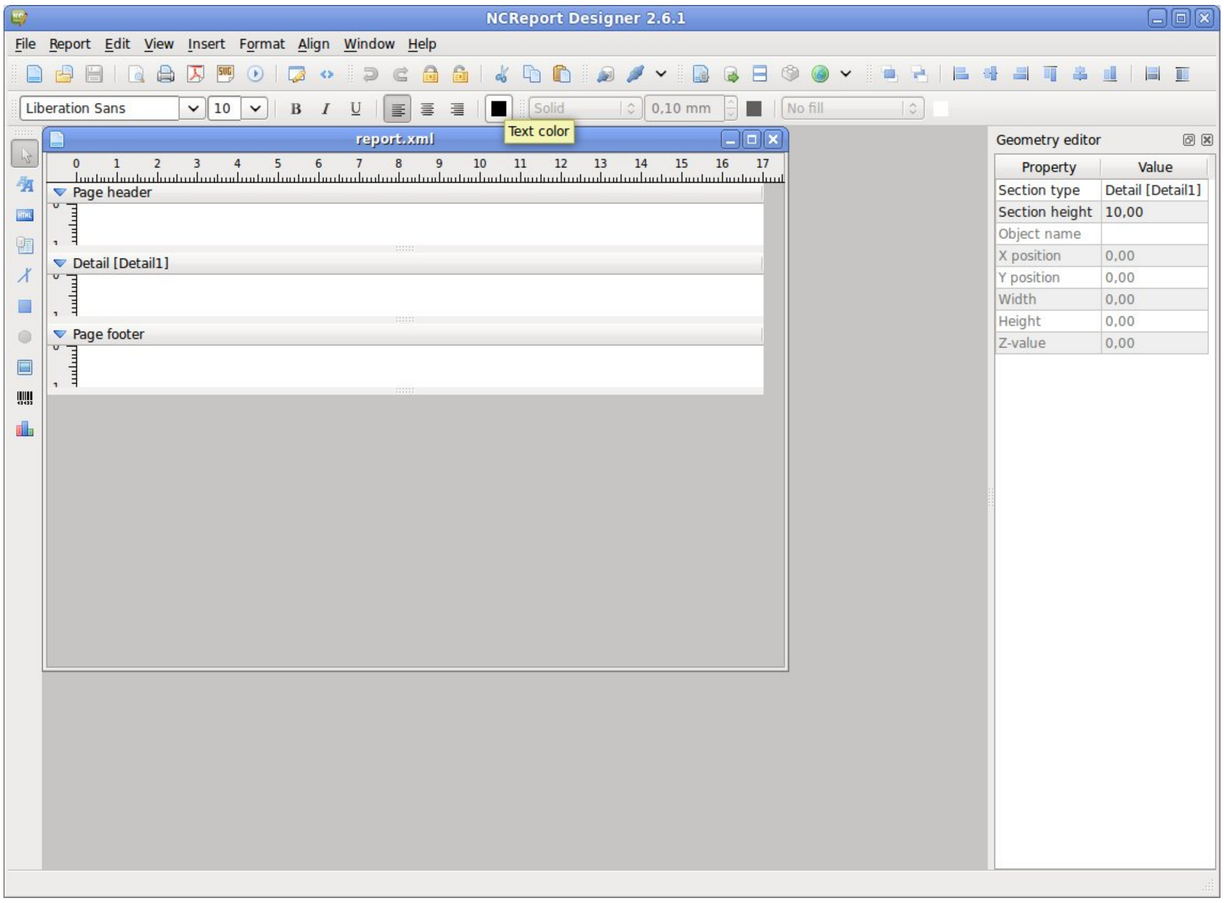
The way that you launch NCReport Designer depends on your platform:

- On Windows, click the Start button, open the Programs submenu, open the NCReport2 submenu, and click NCReport Designer.
- On Unix or Linux, you may find a NCReport Designer icon on the desktop background or in the desktop start menu under the NCReport submenu. You can launch Designer from this icon. Alternatively, you can enter `./NCReportDesigner` in a terminal window in NCReport/bin directory
- On Mac OS X, double click on NCReport Designer in the Finder.

4.1.2 The User Interface

When used as a standalone application, NCReport Designer's user interface is configured to provide a multi-window user interface. The main window consists of a menu bar, a tool bar, and a geometry editor for editing the position and size of objects. Geometry editor can be enabled or disabled by clicking on View/Geometry editor checkbox menu.

Figure 4.1 NCReport Designer desktop



Property	Value
Section type	Detail [Detail1]
Section height	10,00
Object name	
X position	0,00
Y position	0,00
Width	0,00
Height	0,00
Z-value	0,00

4.1.3 NCReport Designer's Main Window

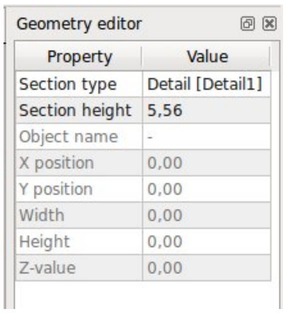
The menu bar provides all the standard actions for opening and saving report files, managing report sections, using the clipboard, and so on. The tool bar displays common actions that are used when editing a report. These are also available via the main menu. File menu provides the file operation actions, Report menu contains the report and it's sections settings that belong to the current/active report. View menu displays the specified items can be enabled or disabled in MDI area. The Tool menu provides common report objects that are used to build a report. The Align menu holds the alignment actions for the specified report items can be aligned. With the Window menu you can manage the windows are opened concurrently.

Most features of NCReport Designer are accessible via the menu bar or the tool bar. Some features are also available through context menus that can be opened over the report sections. On most platforms, the right mouse button is used to open context menus.

4.1.4 Geometry editor

Geometry editor is a tool window can be enabled by View/Geometry menu. This window displays the position and size informations of the current report section or object. The current objects or sections are always activated by a mouse click. You can type the numeric size or position values into the spin boxes. Any changes made to the object's properties cause it to be updated immediately.

Figure 4.2 Geometry editor


Geometry editor

Property	Value
Section type	Detail [Detail1]
Section height	5,56
Object name	-
X position	0,00
Y position	0,00
Width	0,00
Height	0,00
Z-value	0,00

4.2 Designing a report

In this chapter we will look at the main steps that users will take when creating new report with NCReport Designer. Usually, creating a new report will involve various activities:

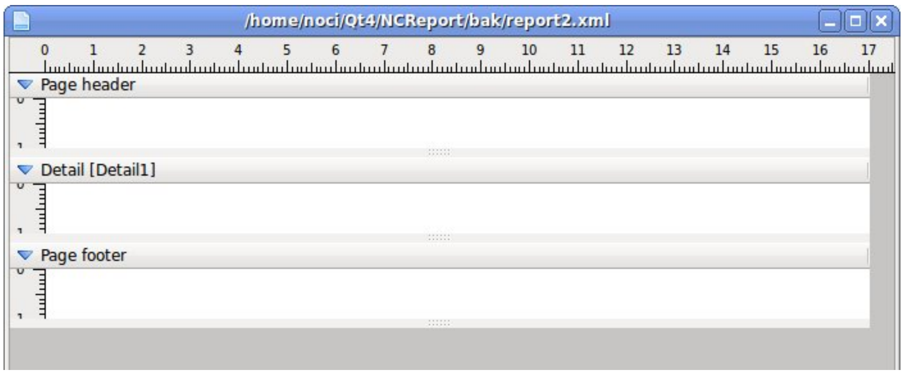
- Deciding what kind of report structure to create.
- Deciding which kind of data sources to use.
- Defining the datas sources
- Adding the report sections are needed
- Deciding which kind of items/objects to use in the different sections.
- Composing the user interface by adding report objects to the report sections.
- Connecting to SQL data source if needed
- Testing the report

Users may find that they prefer to perform these activities in a different order, However, we present each of the activities in the above order, and leave it up to the user to find the approach that suits them best. To demonstrate the processes used to create a new report, we will take a look at the steps needed to create a simple report with NCReport Designer. We use a report that engages SQL database data source to illustrate certain features of the tool.

4.2.1 Begining a new report

By clicking the New menu or tool opens a new instance of a report. Select this tool button or menu to begin a new report definition. By default the new empty report contains page header, a detail and a page footer sections.

Figure 4.3 New report



4.2.2 Report sections

Report sections are the representations of the function specific areas inside the report. Reports are builded from sections. They are often a recurring areas such as detail, header or footer. The most important section is called Detail since details can contain the fields are changed row by row. Each sections can contain all kinds of report items. Item's coordinates are always relative to their parent section. One report can contain the following sections: Report header, report footer, page headers, page footers, group headers and footers and details

To change the height of a section just drag the bottom resizer bar under the section area and resize to the size you want or type the height value in millimeter at Geometry editor's spinbox if that is enabled. To activate the current section just click onto the empty area of a section

4.2.3 Detail

The core information in a report is displayed in its Detail section. This section is the most important section of the report since it contains the row by row data from the data source. Detail section have the following characteristics:

- Generally print in the middle of a page (between headers and footers)
- Always contain the core information for a report
- Display multiple rows of data returned by a data source
- The detail sections generally contains fields.
- Multiple independent details are allowed in one report, each detail after the other
- All of details are assigned to one specified data source

4.2.4 Page header

Page headers is used to contain page headings. Page headers have the following characteristics:

- Always print at the top of a page
- Always contain the first information printed on a page
- Only display one (current) row of data returned by a data source
- Only one allowed per page

In most cases you need page header in reports. To add or remove page header select Report/Page options... menu, then appears a dialog on you can set the page options of the current report. To enable or disable page header just use Page header check box.

4.2.5 Page footer

Page Footer are commonly used to close the pages. Page footers have the following characteristics:

- Always print at the bottom of a page
- Only display one (current) row of data returned by a data source
- Only one allowed per page

Page footer is usually used to display informations such as number of the page, report titles and so on. In most cases you need page footer in reports. To enable or disable page footer just use Page footer check box in Report/Page options... menu.

4.2.6 Report header

Report header is a section used to contain report headings. Report header has the following characteristics:

- Always printed after the page header
- Report header is printed only once at the begining of the report
- Displays only one (current) row of data returned by a data source

To enable or disable report header use Report header check box in Page options dialog can be activated by opening *Report* menu and selecting *Page Options...*

4.2.7 Report footer

Report footer is a section commonly used to close the report. Report footer has the following characteristics:

- Always printed before the page footer at the end of the report
- Only display one (current) row of data returned by a data source
- Only one allowed per report

To enable or disable report footer use Report foter check box in Page options dialog can be activated by opening *Report* menu and selecting *Page Options...*

4.2.8 Setting up page and report options

Page options of the current report can be specified in Page options dialog. Open the *Report* menu and select *Page options...*. In the report page settings dialog you can specify the following options:

Report name Type the name of the report. It's just an informative option, it's not used by report generator.

File encoding The encoding of the XML file. When user opens or saves the report definition file, this will be the default encoding. In most cases UTF-8 encoding suit the requirements, but for special international characters you may choose the specified encoding.

Page size The size of the page. The size names are listed in the combobox and their names are the standard size names. Currently the standard page sizes are supported.

Default font The font name and size are basically used for the text labels and fields in the whole report. Each object may change this option.

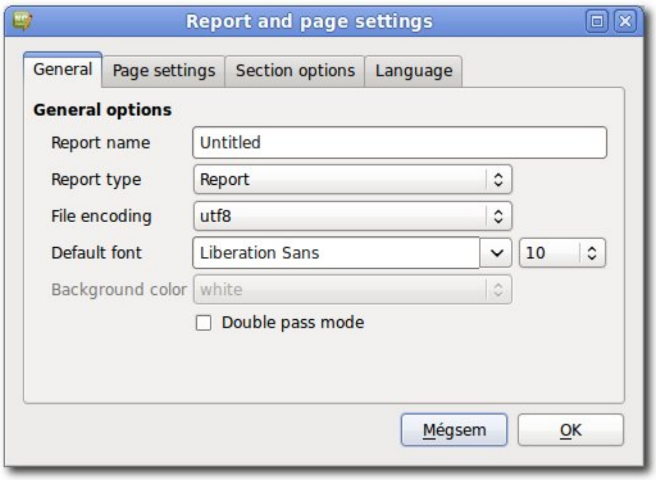
Background color The background color of the report. This option currently is not used.

Header and footer settings The check boxes can be used to enable or disable page header/footer and report header/footer. To alter the height of theese sections you may use spin boxes corresponding to their check boxes. You can also change these height properties by mouse dragging or by geometry editor

Margins margin properties represent the top, bottom, left and right margins of the page in millimeters. To alter the margin values just use the spin boxes.

Orientation This radio button option represents the orientation of the page, Portrait or Landscape orientation can be selected

Figure 4.4 Page settings dialog



General options
Report name: Untitled
Report type: Report
File encoding: utf8
Default font: Liberation Sans 10
Background color: white
☐ Double pass mode

The following buttons are available for apply or cancel settings:

- *OK* Select to apply your settings.
- *Cancel* Closes the screen without saving any changes, returning you to the designer desktop.

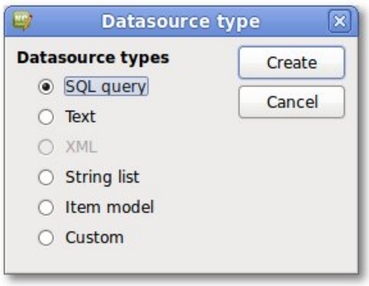
Specify the report page properties by using Page options dialog and validate the settings by clicking the *OK* button.

4.2.9 Adding data sources

At the very begining we have to decide what data source(s) we will use in the report. Since the report generator builds a printable representation of data from a data source, at least one data source must be defined in the report. Data may be sourced from an sql query using Qt's database sql database connection drivers or from other sources that don't require SQL connection, such as text, string list or custom defined data source. One report can contain multiple data sources and each details can be connected to one selected data source. Often a data source is not assigned to any of detail, in this case you can use these kind of unassigned data sources as a one (first) row/record source of data. See the details later.

To specify a data source to your report open the *Report* menu and select *data sources...* menu item. Then appears a dialog on you can add and remove data sources. To add a new data source click the *Add* button and then select the data source type from the list of available datasoure types.

Figure 4.5 data source types dialog



Datasource types
● SQL query
○ Text
○ XML
○ String list
○ Item model
○ Custom

In our example we choose SQL query data source type. After you click *OK* button a new SQL query data source will be added to the list in dialog panel. Then you can specify the data source options. The following properties are available for data sources:

data source ID. This string property is very important for identification purpuses. You can refer to the data source by this ID string.

data source type The type of the data source you've chosen before. It is cannot be changed after the data source added to the list

Location type Location type is a property that describes where the data or the sql query can be found, inside the report file or inside an external file. It's value may be: Static,File,Http,Ftp,Parameter (Http, Ftp currently is not supported) For the different type of data sources it means a bit different. For SQL query the Static location type is suitable, it means that SQL query will be saved statically into the report file. Parameter type provides that the data is added to NCReport by NCReport-Paramer. For example a QString Text or an SQL query can be added as parameter to NCReport depending on the data source type.

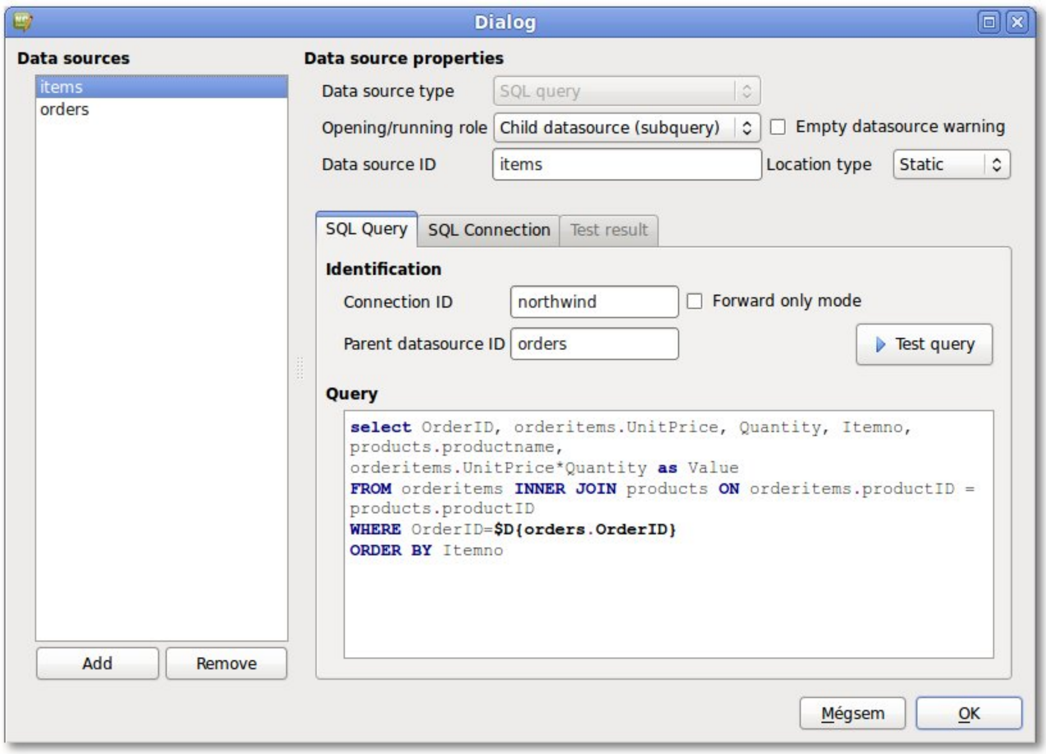
File name/URL In case non Static location type is selected, here you can specify the name of the file that contains data. (URL address currently is not supported.)

Connection ID This string property represents the ID of an SQL database connection. This name just the same ID that is used in QSqlDatabase::addDatabase() function for identifying database connection. When you add database connection in your application before running report, this connection name you should specify.

Use external connection If you want to make available the SQL data source to use it's own database connection, you may enable this checkbox. After, the external connection panel becomes enabled and you can specify the required properties of sql connection: hostname, database, username, password, port (optional).

SQL query This text area in which you can edit the sql query expression. Almost every cases it is a `SELECT...FROM` expression applying the SQL syntax of the specified database. Only one sql query is allowed for the data source. SQL expression can contain Parameters, see later.

Figure 4.6 SQL data source



Data sources

items
orders

Data source properties

Data source type: SQL query
Opening/running role: Child datasource (subquery)
☐ Empty datasource warning
Data source ID: items
Location type: Static

SQL Query | SQL Connection | Test result

Identification

Connection ID: northwind
☐ Forward only mode
Parent datasource ID: orders

Query

```
select OrderID, orderitems.UnitPrice, Quantity, Itemno,
products.productname,
orderitems.UnitPrice*Quantity as Value
FROM orderitems INNER JOIN products ON orderitems.productID =
products.productID
WHERE OrderID=$D{orders.OrderID}
ORDER BY Itemno
```

In our example we set the data source ID to data source1 (the default name) and choose Static location type. We name the Connection ID Con0. After the SQL query must be specified.

NOTE

This example requires a running MySQL database server with existing northwind database and tables. For generating sample database and tables SQL script file is attached with NCReport project

Let's use this simple query:

```
SELECT ProductID, ProductName, QuantityPerUnit, UnitPrice,
QuantityPerUnit*UnitPrice as value
FROM products
WHERE ProductID>20
ORDER BY ProductName
```

The following buttons are available for apply or cancel settings:

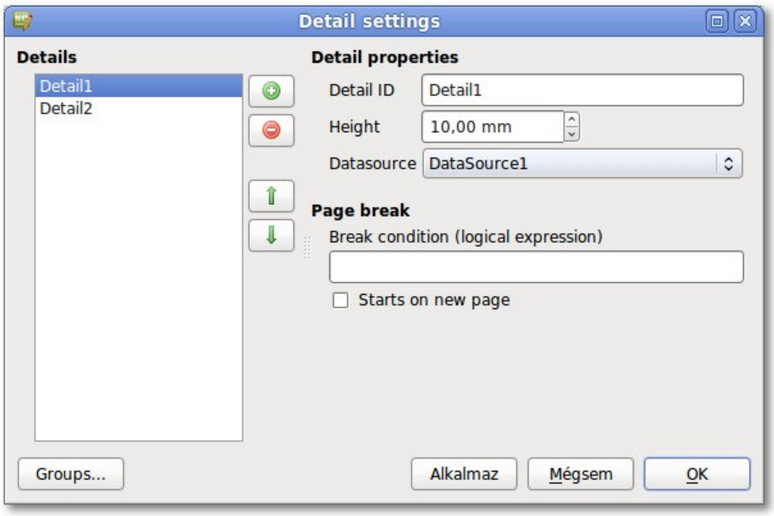
- *OK* Select to apply your data source settings.
- *Cancel* Closes the screen without saving any changes, returning you to the designer desktop.

Validate the data source settings by clicking the *OK* button.

4.2.10 Assigning data source to the Detail

To assign the data source we defined before, open the *Report* menu and select *Details and grouping...* menu item, then appears a dialog on you may manage the detail sections of the report. A default Detail1 named detail is already defined. You can rename it to the name you want if you change Detail ID. Select the previously defined data source from data source combo box. The combo box contais all of defined data sources. This option must be specified for working of the report.

Figure 4.7 Detail dialog



Detail ID: Detail1
Height: 10,00 mm
Datasource: DataSource1
Break condition (logical expression):
☐ Starts on new page

Here we summarize the options of Detail dialog:

Detail ID The name of the detail section.

Height Height of the detail section in millimeters. To alter the height of theese sections you may use this spin box. You can also change the height by mouse dragging or by geometry editor

data source data source name assigned to the detail. Previously defined data sources can be selected in the combo box

Data grouping By clicking this button the group management dialog of the corresponding detail can be opened.

You can add more details by *Add* button or remove existing detail by *Remove* button. One detail section must be existed, so it does not construe to remove the only one detail.

The following buttons are available for apply or cancel settings:

- *OK* Select to apply your settings.
- *Cancel* Closes the screen without saving any changes, returning you to the designer desktop.

Validate the detail settings by clicking the *OK* button.

4.2.11 Adding report items

After we defined the data source and specifed the report options now we can design the report by adding items to the specified sections. The *Tools* menu or the tool bar displays report items that can be used when designing a report. Let's summarize the various report items of NCReport:

Text label The Label represents simple text or label items. Label items are used to display descriptive information on a report definition, such as titles, headings, etc. Labels are static item, it's values don't change when rendering the report.

Field The Field is the matter of report items. It represents the data Field objects. By data type Fields may be text, numeric and date. Field items are used for pulling dynamically generated data into a report from the specified data source such as database the report generator uses. For example, a Field item may be used to present sql data, variables and parameters. NCReport handles data formatting for the different type of fields like numbers or texts.

Line The Line option enables you to create Line items. In general, Line items are used for drawing vertical, horizontal lines for headings, underlining titles or so on. Lines are defined by it's start and the end point coordinates

Rectangle The Rectangle enables you to create Rectangle items. Rectangles are usually used for drawing boxes or borders around a specified area. Rectangle makes easier the box drawings instead of drawing four lines.

Ellipse The Ellipse item enables you to create circle or ellipse in report. Ellipses are mostly used for drawing charts or borders around a text.

Image The Image option enables you to create Image items. Image items are used to insert either static or dynamic into a report definition. Static images such as a company logo often displayed in the Report Header can be loaded from a static file or from report definition. Dynamic images can be loaded from the specified sql data source.

Barcode The Barcode option enables you to create barcodes. Currently the EAN13 code format is supported. Barcodes might be either static or dynamic items similar to images. Static barcodes read it's value from the report definition, dynamic barcodes are loaded from the specified data source.

Custom item / Graph Graph/Custom item is a special member of NCReport items. This option enables you to render special, custom defined contents in reports. The typical field of application is using this feature for rendering graphs or such contents.

4.2.11.1 Adding heading Labels

First let's add the labels that represent the column header of data rows. To create a new Label object, first select the *Label* tool button or menu item in *Tools* menu. After that the cursor changes to a cross beam, then click in the section of the report definition where you want the Label to be located. (i.e. we add label to the report header.) Doing so will create the Label object in that section and opens the Object settings dialog. On the dialog you may then set the Label object's properties.

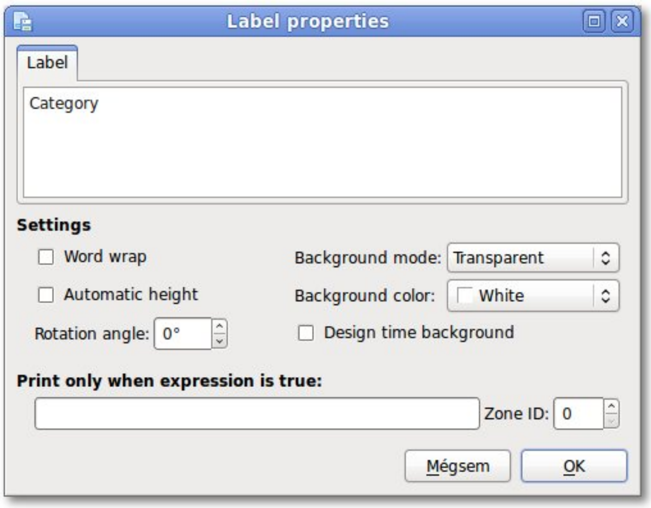
The following options are avalilable for labels:

Text Just enter here the text of the label

Automatic word wrapping If this check box is enabled the text will be wrapped fitting to it's size.

Print when expression This is a logical expression which enables you to define when the Label object is shown or not. See the details later.

Figure 4.8 Label dialog


Label properties

Label

Category

Settings

- [ ] Word wrap
- [ ] Automatic height
- Rotation angle: 0°
- Background mode: Transparent
- Background color: White
- [ ] Design time background

Print only when expression is true:

Zone ID: 0

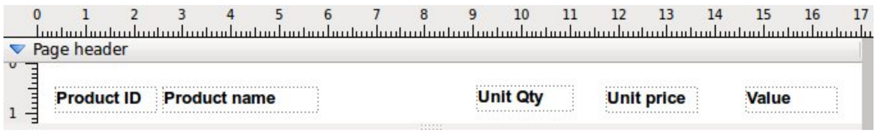
Mégsem OK

The following buttons are available for apply or cancel settings:

- *OK* Select to apply your label settings.
- *Cancel* Closes the screen without saving any changes, returning you to the designer desktop.

Add the following labels to the Page Header: Product ID, Product name, Unit Qty, Unit price, Value and move them by drag and drop to the place you want to be located. To move the added Label just drag (select) it with left mouse button and drop it to the location you want. To delete a Label, select it and press *Delete* button

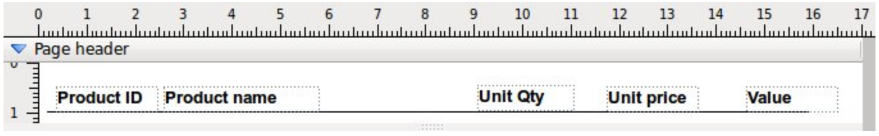
Figure 4.9 Adding labels



4.2.11.2 Adding Line

To create a new Line object select the Line button in the tool bar or menu item in *Tools* menu. After that the cursor changes to a cross beam, then click in the section of the report definition where you want the line to be started and simply drag the line to the end position. To move the added line just drag (select) it with left mouse button and drop it to the location you want. To delete the line just select it and press *Delete* button

Figure 4.10 Adding line



To open the line properties dialog just double click on the line, on the dialog you may then set the object's properties. In the dialog you are presented with the following options are available:

Print when expression This is a logical expression which enables you to define when the Line object is shown or not. See the details later.

4.2.11.3 Adding Fields

Now we have to add the most important items to the report. Field objects contain dynamic information retrieved from a data source, parameter or a variable. To create a new Field object, first select the *Field* tool button or the menu item in *Tools* menu. After that the cursor changes to a cross beam, then click in the section onto you want the Field to be located. This section is in generally the Detail section. Doing so will create the Field object in the specified section at that position and opens the Field property dialog. On the dialog you may then set the Field's properties.

The following options are availilable for fields:

Field source type The combo box contains the possible sources from where the field can pull data. Field's data can be loaded form the following sources: data source, Parameter, Variable, System variable, Expression. About various source types you can find informations in NCReport specification.

Field column/expression This property represents the name of the data column from where field's value are pulled. When SQL query data source is used by the field, this name equals the corresponding sql column name included in sql query. When other data sources such as Text, this value is often the number of the data column.

Data type The field's base data type. The following data types are supported: Text, Numeric, Date, Boolean

Automatic word wrapping If this check box is enabled the field will be wrapped fitting to it's size.

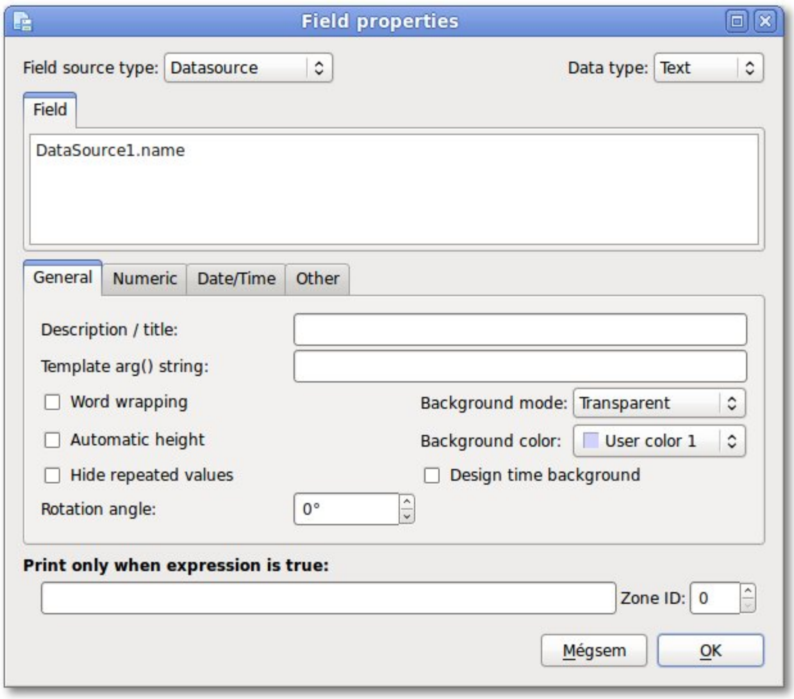
QString::arg() expression This is a string expression with %1 symbol for the same purpuse what QString("String %1").arg(value) code does. The field's value will be embedded into this expression.

Call function This feature currently is unavailable.

Lookup class name This feature currently is unavailable.

Print when expression This is a logical expression which enables you to define when the Field is shown or not. See the details later.

Figure 4.11 Field dialog



Field source type: Datasource
Data type: Text

DataSource1.name

Description / title:
Template arg() string:
☐ Word wrapping
☐ Automatic height
☐ Hide repeated values
Rotation angle: 0°
Background mode: Transparent
Background color: User color 1
☐ Design time background

Print only when expression is true:
Zone ID: 0

The following table summarizes the various formulas you can specify in fields as field column expression. The formula depends on what field source type you use.

Table 4.1 Field column formulas

Filed source type	**Field column formula**	**Description**
data source	[data sourceID.]column	The column equals a valid SQL column name in your SQL query. If data sourceID is specified, the report engine will assign the named data source by this ID. If you don't specify data sourceID, the default (currently processing) data source is interpreted you have assigned before to the detail.
Parameter	parameterName	The name/ID of the parameter
Variable	variableName	The name/ID of the variable
System variable	variableName	The name/ID of the system variable.
Expression	expression	You can use even a complex script expression for the field. Both data source data, Parameters, Variables can be used in expressions. For more informations about expressions see the Using expressions chapter.
Template	template expression	Template is a simple substitution of report items such as data source data, parameter or variable. All of them are joined into one string.

Some properties are available for different data types only. They are located on separated tab widgets within the dialog. The following additive options are avalilable for numeric fields:

Number formating: If this option is checked, the number formating will be turned on

Use localized settings If this option is checked, the report engine will use localized number formats by the current application's QLocale settings.

Blank if value equals zero If this option is checked, the field's current value will not appear when it's value equals zero.

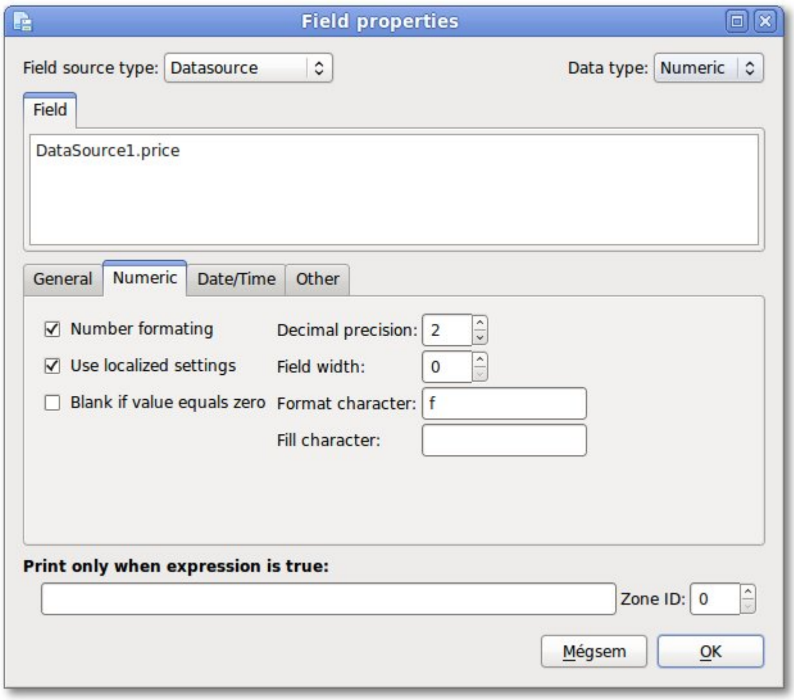
Decimal precision The number of digits after the decimal point.

Field width Width of number in digits. Specifies the minimum amount of space that a is padded to and filled with the character fillChar. A positive value will produce right-aligned text, whereas a negative value will produce left-aligned text.

Format character This one digit option specifies the format code for numbers. Possibly values are: e,E,f. With e, E and f, precision is the number of digits after the decimal point. With 'g' and 'G', precision is the maximum number of significant digits. Used by `QString::arg( double a, int fie-ldWidth = 0, char format = 'g', int precision = -1, const QChar fillCha-r)` function.

Fill character specifies the character the numeric value is filled with when formating. See QString::arg() fillChar parameter.

Figure 4.12 Field dialog - numeric data



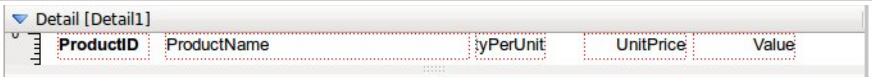
Field source type: Datasource
Data type: Numeric
Field
DataSource1.price
General | Numeric | Date/Time | Other
☑ Number formating
☑ Use localized settings
☐ Blank if value equals zero
Decimal precision: 2
Field width: 0
Format character: f
Fill character:
Print only when expression is true:
Zone ID: 0
Mégsem
OK

The following buttons are available for apply or cancel settings:

- *OK* Select to apply your field settings.
- *Cancel* Closes the screen without saving any changes, returning you to the designer desktop.

To continue our instance report, add the following (four) fields to the detail section. Use the following names and data types in field column expression: ProductID (Numeric), ProductName (Text), QuantityPerUnit (Numeric), UnitPrice (Numeric), Value (Numeric)

Figure 4.13 Details section with fields



4.2.11.4 Adding Variables for totals

Before we add variable field to the report, let's see the handling of variables in NCReport. Variables are special items used for providing counts and totals. Each of the variables have name, function type, data type, and have an assigned data source column the variable based on. To add a variable open the *Report* menu and select *Variables...* menu item. Then appears a dialog on you can manage variables.

The following options are avalilable for variables:

Variable ID The name/ID of the variable.

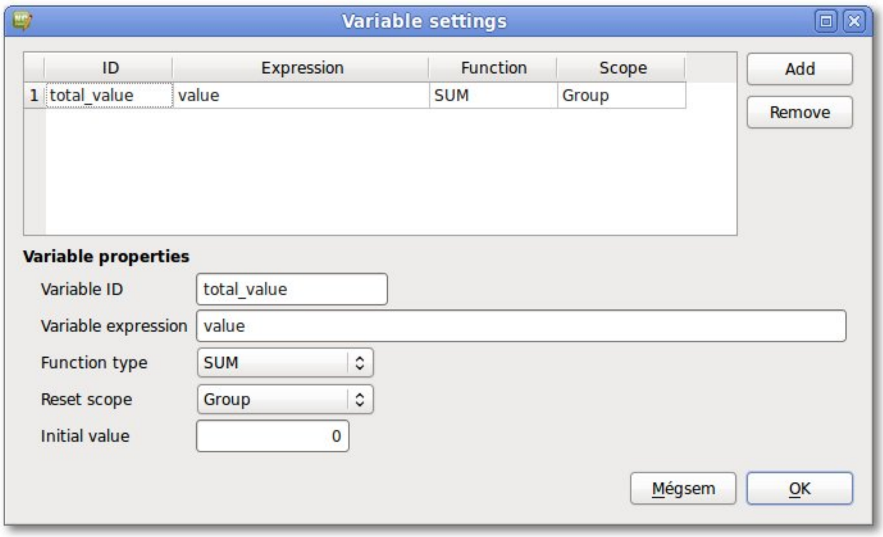
Variable expression This property represents the name of the data column from where variable's value is pulled from.

Function type The function type of the variable. Supported function types: Sum, Count Count: The COUNT type of variable will increment by 1 for every detail row. Sum: The SUM (summary) variable will summarize the value of the specified data column returned by the field

Reset scope If this check box is enabled the field will be wrapped fitting to it's size.

Initial value Initital value of the Variable

Figure 4.14 Variable dialog



	ID	Expression	Function	Scope
1	total_value	value	SUM	Group

Variable properties

Variable ID	total_value
Variable expression	value
Function type	SUM
Reset scope	Group
Initial value	0

The variables added to report are shown in the variable list view. Clicking on the list items the selected item becomes active. To delete the selected item just select the *Remove* button. The following buttons are available in the dialog:

Add Adds a new variable and enable the variable options to edit. *Remove*: Deletes the variable selected from the list

- *OK* Select to save your variable settings.
- *Cancel* Closes the dialog without saving any changes, returning you to the designer desktop.

Add a new variable by clicking the *Add* button and then specify the options by followings: Variable ID: total_value, Variable expression: value, Function type: SUM, Reset scope: Group

To add total first, we should add a new group to the detail. In the next section we explain how to use the grouping feature.

4.2.11.5 Adding group to detail

While most reports can be defined using a single Detail section having multiple columns and rows of data, others - just like our example report - require summary data, totals as subtotals. For reports requiring summary data, NCReport supports Group sections. Group sections have the following characteristics:

- Always associated with a Detail section
- Defined by Group Headers and Group Footers
- Group Headers always print above it's Detail section
- Group Footers always print below it's Detail section
- Reference database column on which Group Headers and Group Footers will break
- Force new Group Header each time the value of the referenced column changes
- Force a new Group Footer each time the value of the referenced column changes
- Unlimited level of groups allowed

In the group dialog the groups added to the report are shown in the order you have added. The added group sections will appear in the designer after you applied the group settings. Groups are structured hierarchically. The first group will be the primary level of group, the second one is the second level and so on.

To add a new group to the detail, open the *Report* menu and select *Details and grouping...*. Then the Detail settings dialog will appear. Select the Detail1 detail in the list, then to open the grouping dialog click on *Data grouping...* button. The Group settings dialog appeared, always belongs to the previously selected detail. To add a new group click on the *Add* button.

The following additive options are avalilable for a group:

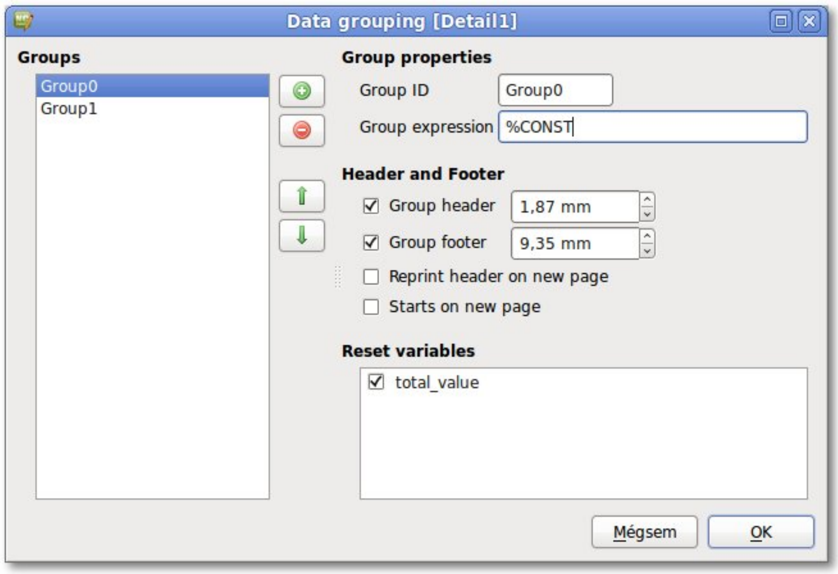
Group ID The name/ID of the group for indentification purposes

Group expression The name of the data source column the group is based on. If the value of this referenced column changes, the group breaks. Also constant values such as 0 or 1 can be used as group expression. Then the group will never break just ends. This could be very useful for end-total fields.

Header and Footer To enable or disable group header and footer, check on or off the specified check box. To set initial height of these sections you can use spin boxes near the check boxes.

Reset variables This list contains the variable names are available to reset when the group ends. The variables that have Report reset scope status are visible only in the list.

Figure 4.15 Group dialog



Group ID: Group0
Group expression: %CONST
☑ Group header: 1,87 mm
☑ Group footer: 9,35 mm
☐ Reprint header on new page
☐ Starts on new page
☑ total_value

The groups added to a detail appear in the group list. Clicking on the list items the selected item becomes active. To delete the selected group just select the *Remove* button. The following buttons are available in the dialog:

- *Add* Adds a group and enables the group options to edit.
- *Remove* Removes the group selected from the list
- *OK* Select to save your group settings.
- *Cancel* Closes the dialog without saving any changes, returning you to the Detail settings dialog.

So, let's add a new group with the following specification: Group ID: Group0, Group expression: 0, Show group header and footer, Reset total_value variable. After you select *OK* button, the new group sections (header and footer) will appear in report document. Close also the Detail settings dialog by clickink *OK* button.

4.2.11.6 Adding total variable field

Now we have a defined group with header and footer. Group footers in general a sections are usable for showing totals and subtotals. Let's add a new field to the report footer with the following parameters:

Field source type: Variable, Field column: total_value, Data type: Numeric

Now we have got almost all of fields we need. What we have to do also is just adding some missing lines, labels and adjusting the report.

4.2.11.7 Adding some other items

We summarize the tasks below:

- Add a Total value: Label to the report footer section near the total field.
- Add a Line above the totals.
- Move the items adjusted to the appropriate columns.
- Add a Line to the Page footer similar to the line in the Page header
- Add a Field to the Page footer: Field source type: System variable, Field column: pageno, Data type: Numeric, QString::arg() expression: Page: %1

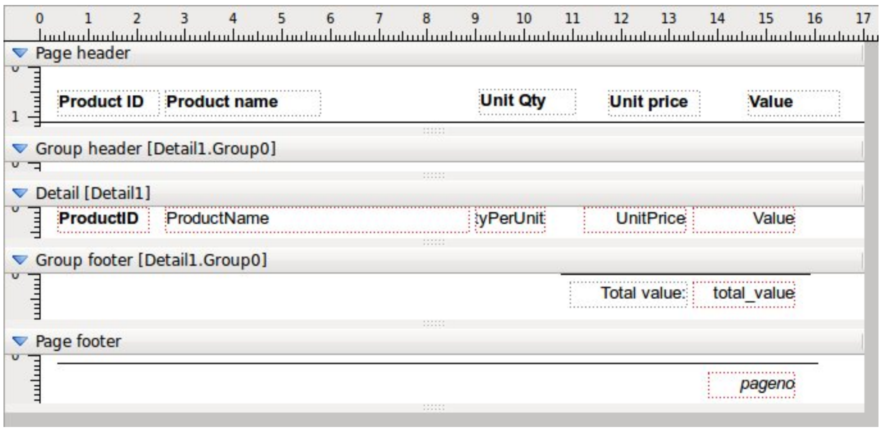
4.2.11.8 Adjustment and formatting

To finish the report now we can format and adjust the items. Here are tasks you should also do:

- Adjust the height of the sections for the fitting size by mouse dragging the base line of section or by geometry editor. The height of the detail is important, since it is often recured many times.
- Select the labels in Page header and set the font weight to bold by clicking the *Bold* tool button in tool bar. Item multi-selection may used.
- Select ProductID field in Detail section and set its font weight to bold.
- Select and align right all of numeric fields to right by clicking the *Align right* tool button in tool bar.
- Set the number format options for numeric fields: Number formating: on, Decimal precision: 2
- Set also Use localized settings on for value and total_value fields

Save the report. Now you should get something similar this:

Figure 4.16 Report is ready



4.3 Testing and running the report

This section describes how to test the report in designer mode. If Sql data source is used in the report it's neccessary to provide the database connection before running.

4.3.1 Connecting to database from Designer

NCReport Designer now enables you to test the report from inside the designer. Since this report requires internal MySQL database connection, first we should connect to northwind database. SQL database connections can be managed by the Connection manager within the designer application. Open the *Report* menu and then select *SQL connection manager...* After the Connection manager dialog will appear. By this dialog you can add one or more sql connections.

The following options are availilable for connections:

Database driver The appropriate SQL database driver.

Connection name The name of the database connection. Qt uses this name in addDatabase(...) function. For identifying the corresponding connection this value have to be specified.

Host name Name or IP address of host

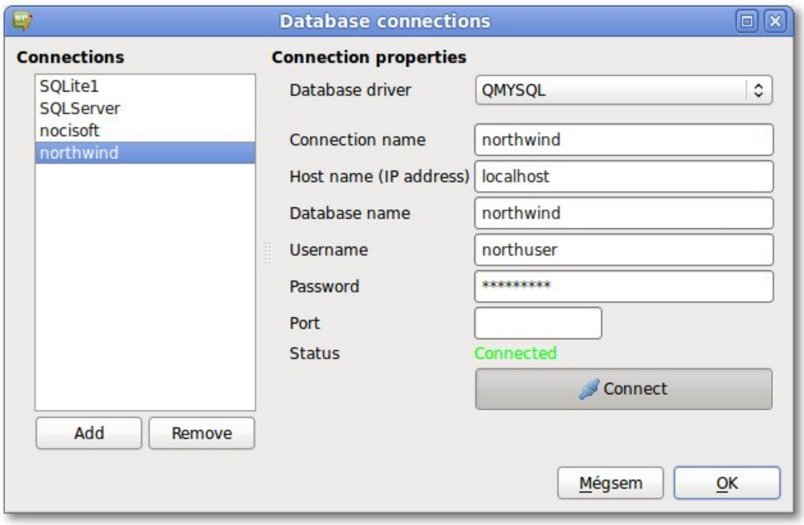
Database name Name of the database

Username Connection's user name

Password Connection's password

Port Connection's port number. If empty, the default port is used in connection.

Figure 4.17 SQL connection dialog



SQLite1
SQLServer
nocisoft
northwind

Database driver	QMYSQL
Connection name	northwind
Host name (IP address)	localhost
Database name	northwind
Username	northuser
Password	*********
Port	
Status	Connected

- *Connect* Tries to establish the connection
- *Add* Adds a new connection and enables the options to edit
- *Remove* Removes the connection selected from the list
- *OK* Select to save your connection settings.
- *Cancel* Closes the dialog without saving any changes, returning you to the desktop.

After you specified connection parameters to the added connection use the Connect button to establish connection. If the connection is succeded then your report is ready to run. Before running the report we rename our connection to northwind and then also our data source's connection name must be renamed to northwind. Doing so just open again the *data sources...* dialog and then rename the connection ID to northwind too

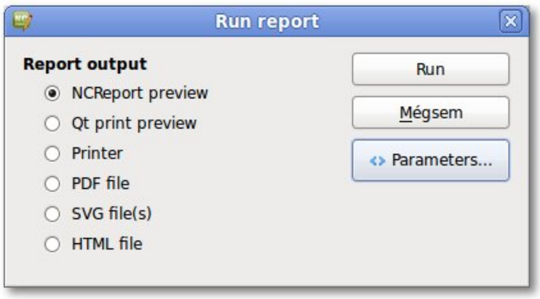
NOTE

You don't need any SQL connection if you use non SQL data source in your report, for example Text, Stringlist or other data source

4.3.2 Running the report

For running report from the Designer window open *Report* menu and select *Run report...* menu item. Then the report runner dialog will appear. You may add and remove parameters by *Add/Remove* buttons. About parameters in example see the next section. Select the output where you want the report to go to and then start the report by clicking *OK* button

Figure 4.18 Run report dialog

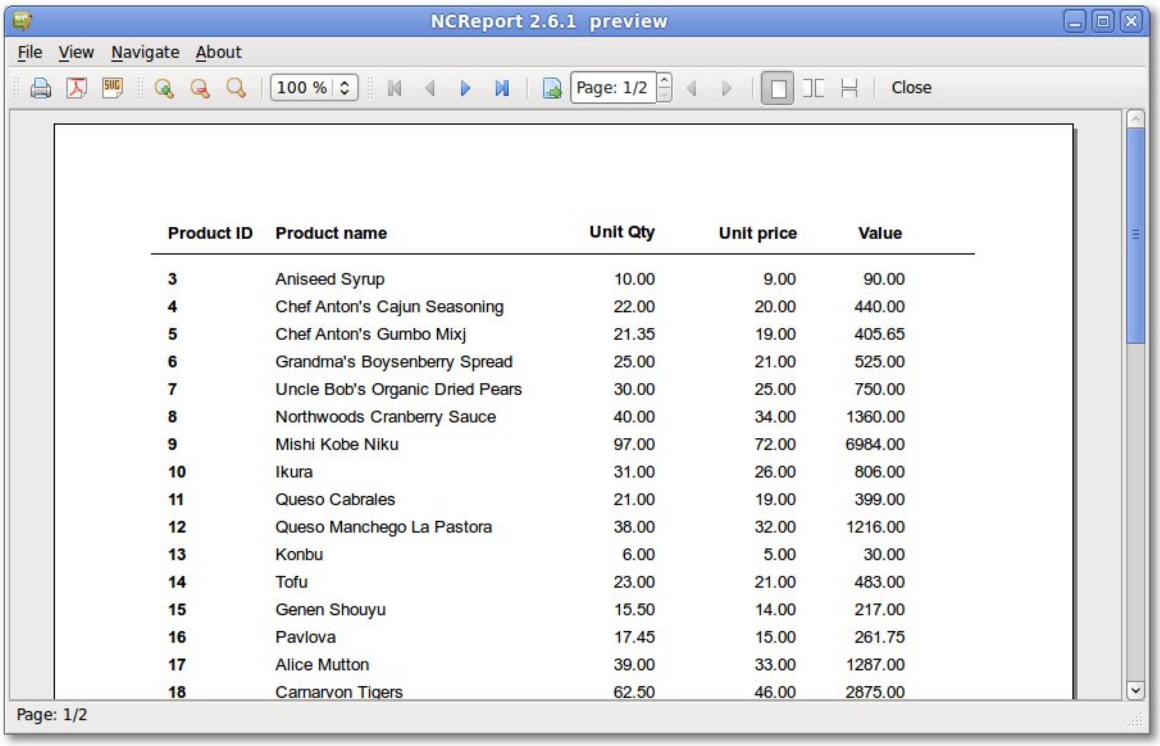


Report output

(● NCReport preview) ○ Qt print preview ○ Printer ○ PDF file ○ SVG file(s) ○ HTML file

Running the report to Preview window now you should see something similar:

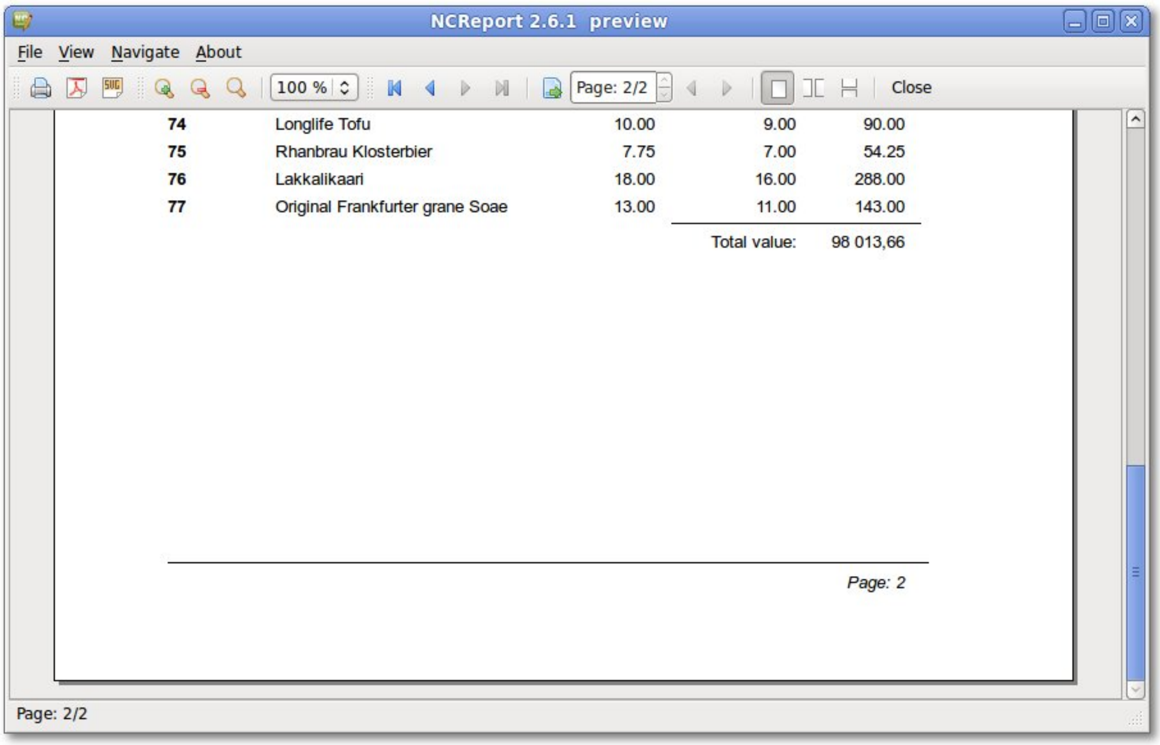
Figure 4.19 Preview output - page 1



Product ID	Product name	Unit Qty	Unit price	Value
3	Aniseed Syrup	10.00	9.00	90.00
4	Chef Anton's Cajun Seasoning	22.00	20.00	440.00
5	Chef Anton's Gumbo Mixj	21.35	19.00	405.65
6	Grandma's Boysenberry Spread	25.00	21.00	525.00
7	Uncle Bob's Organic Dried Pears	30.00	25.00	750.00
8	Northwoods Cranberry Sauce	40.00	34.00	1360.00
9	Mishi Kobe Niku	97.00	72.00	6984.00
10	Ikura	31.00	26.00	806.00
11	Queso Cabrales	21.00	19.00	399.00
12	Queso Manchego La Pastora	38.00	32.00	1216.00
13	Konbu	6.00	5.00	30.00
14	Tofu	23.00	21.00	483.00
15	Genen Shouyu	15.50	14.00	217.00
16	Pavlova	17.45	15.00	261.75
17	Alice Mutton	39.00	33.00	1287.00
18	Carnarvon Tigers	62.50	46.00	2875.00

And the second page:

Figure 4.20 Preview output - page 2



```
74   Longlife Tofu                      10.00     9.00     90.00
75   Rhanbrau Klosterbier                7.75     7.00     54.25
76   Lakkalikaari                       18.00    16.00    288.00
77   Original Frankfurter grane Soae    13.00    11.00    143.00
                                          Total value:  98 013,66

                                                         Page: 2
```

Page: 2/2

Chapter 5

Advanced features

To create more complex, professional reports we need even more features and functions. The following section describes about these important advanced functions of the NCReport reporting system.

5.1 Script Expressions

NCReport since 2.0 version can handle script expressions using Qt Script module the new powerful feature of Qt 4.3. Qt Script is based on the ECMAScript scripting language, as defined in standard ECMA-262. Fields can even contain script codes instead of a simple data source column, parameter or variable. In this case the report engine evaluates the specified script code each time when the fields are refreshed. Report items can also have **"Print only when expression is true"** (short name: printWhen) property. Print when expressions are script expressions too but they must always return boolean result. To use script expression in fields you have to set *Expression* field source type in the *Field property dialog*.

5.1.1 Using references in expressions

Expressions can contain the following references: Data source data, Parameter, Variable, Field result. When expressions are evaluated the references always replaced with their current value. The syntax formats of the references are the following:

Table 5.1 References in expressions

Syntax	Description
$D{[datasourceID.]column}	Data source column reference. Returns the current value of the data source column from the current data row/record. If `datasourceID` is not specified the default current data source (what is assigned to the current detail) is considered.
$P{parameterID}	Parameter reference. Returns the value of the parameter by name/ID
$V{variableID}	Variable reference. Returns the current value of the variable by name/ID.
$F{fieldID}	Field reference. Returns the current display value of the specified Field. FieldID is the auto generated but editable ID value of the field generated first when it's added to a section.

NOTE

If an expression contains any inserted reference with string/text type, quote marks are needed at the beginning and the end of the token. For example `$D{ds.lastname}-"=="Smith"`. You don't need quote marks for numeric or boolean values, i.e `$D{price}==750.0` is correct syntax

5.1.2 Reference examples

Example of using script expression in fields

```
"$D{datasource1.productName}"+" first string "+" second string "+"$P{ ↩
    parametername}"
```

Example of using script expression as **"Print only when expression is true"** property. The expression must return logical value.

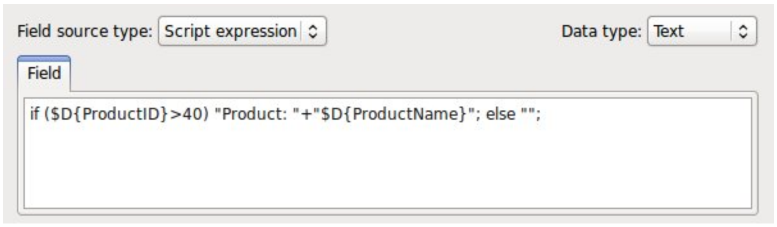
```
$D{productPrice}<1500
```

5.1.3 Testing Field Expression

Now we try out how expressions are working with Fields. We use our last report example. Let's open the report in the designer and select the productName Field in the detail section. Open the Field properties dialog by double clicking on the field item. Change the Field source type to Expression and then the Field column expression we modify to the following script expression:

```
if ($D{ProductID}>40) "Product: "+"$D{ProductName}"; else "";
```

Figure 5.1 Field expression

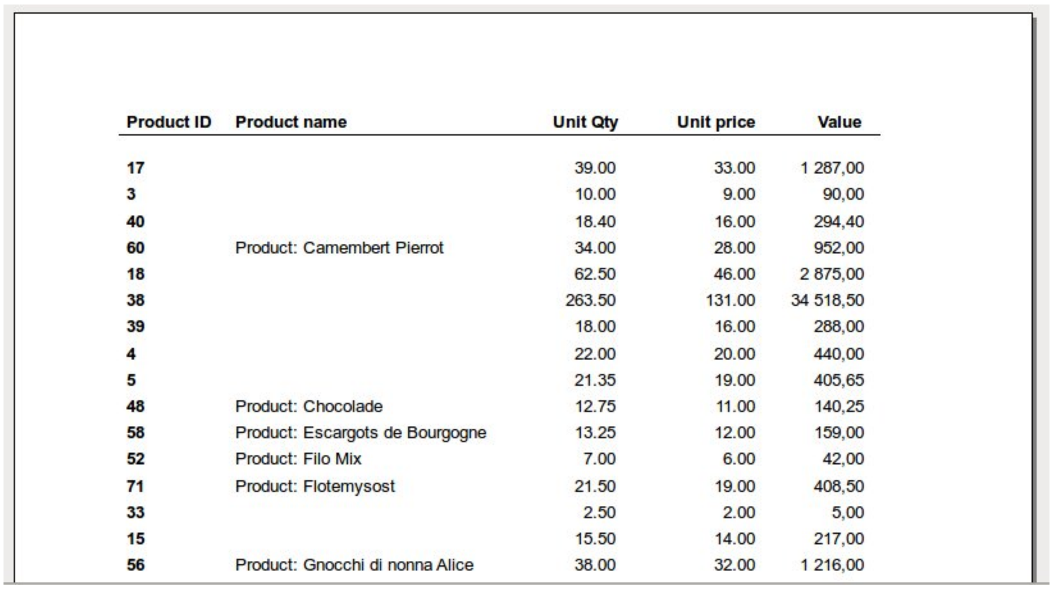


Field source type: Script expression
Data type: Text

```
if ($D{ProductID}>40) "Product: "+"$D{ProductName}"; else "";
```

In this case the report engine first replaces the references in the code and then evaluates the script code before each rendering action. Close the dialog by clicking *OK* button and then save the report. Now we just run report to preview window. Let's see the result:

Figure 5.2 Result of field expression



Product ID	Product name	Unit Qty	Unit price	Value
17		39.00	33.00	1 287,00
3		10.00	9.00	90,00
40		18.40	16.00	294,40
60	Product: Camembert Pierrot	34.00	28.00	952,00
18		62.50	46.00	2 875,00
38		263.50	131.00	34 518,50
39		18.00	16.00	288,00
4		22.00	20.00	440,00
5		21.35	19.00	405,65
48	Product: Chocolade	12.75	11.00	140,25
58	Product: Escargots de Bourgogne	13.25	12.00	159,00
52	Product: Filo Mix	7.00	6.00	42,00
71	Product: Flotemysost	21.50	19.00	408,50
33		2.50	2.00	5,00
15		15.50	14.00	217,00
56	Product: Gnocchi di nonna Alice	38.00	32.00	1 216,00

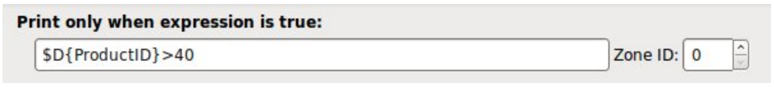
This example is spectacular but not the most effective way of using expressions. In most cases when you use expressions in fields you don't need too complex code. If you need a condition by your field should be visible or not, we recommend to use **"Print only when expression is true"** feature instead. We test this feature in the next section.

5.1.4 Testing Print when expression

So, print when script expressions are codes that return boolean result. They often called as logical expressions. To test it just open the Field properties dialog by double clicking on the same field item. Type the following code to Print when logical expression:

```
$D{ProductID}>40
```

Figure 5.3 Print only when expression is true condition



Print only when expression is true:

$D{ProductID}>40 Zone ID: 0

Then modify the previous Field column expression by the following:

```
"Product: "+"$D{ProductName}"
```

After you validate the settings and save the report run the report again. We have to get the same result.

5.1.5 Templates in Fields and Texts

Templates are special expressions when the data references are simply included in a text. It is not a script hence you cannot use script language elements but data source, parameter and variable references only. For example:

```
Customer name: $D{ds1.name} Address: $D{ds1.address}
```

```
Interval: $P{datefrom} - $P{dateto}
```

TIP

Template expressions are faster than script expressions because it requires no evaluation but a simple insertion only.

5.2 Parameters

Parameters are data that obtained from outside of the report generator. The application that calls NCReport object passes informations as parameter to NCReport class by `NCReport::addParameter(...)` method. Parameters are evaluated within SQL queries and script expressions. Field objects also may have a parameter data source type, so they can be presented as data in the report. Parameters mostly used in SQL queries and expressions.

5.2.1 Parameter syntax

For example if you want to embed a parameter into the query or an expression use this syntax:

```
$P{parameterID}
```

Example of using parameter in sql query:

```sql
SELECT productId, productName FROM db.products WHERE primaryKey=$P{parameterID}
```

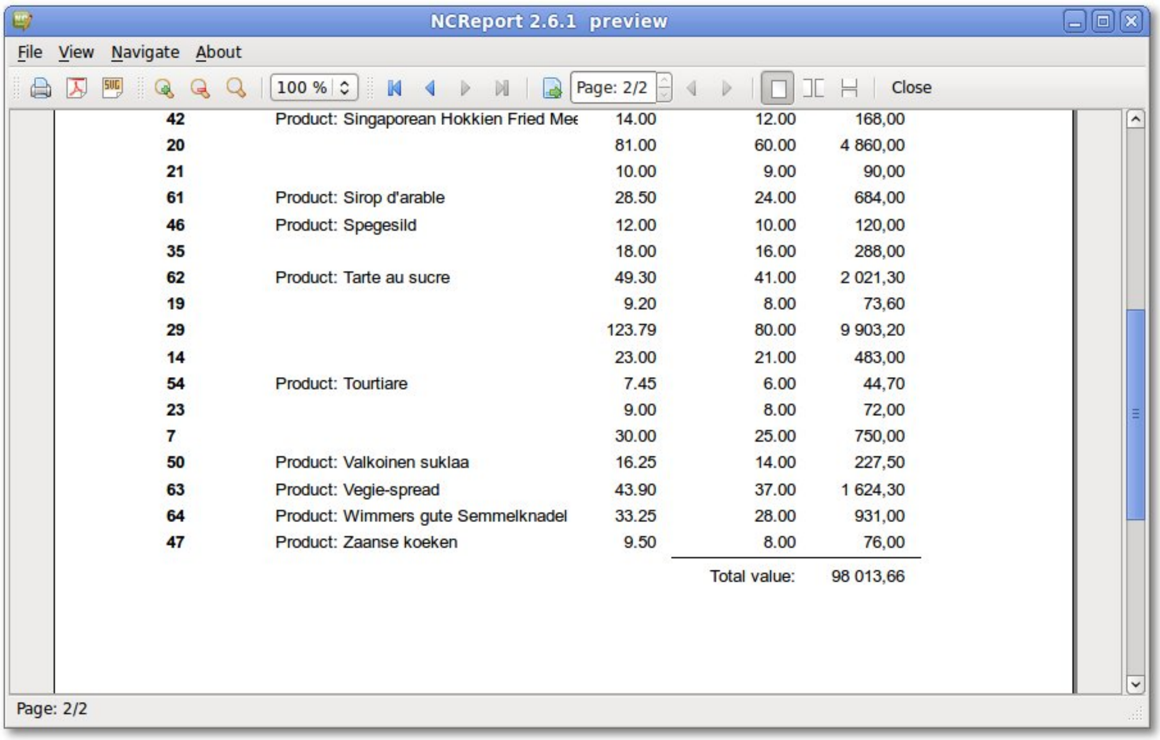
5.2.2 Testing Parameters

Our last sample report uses SQL data source and we defined a static SQL query in it. In most cases it's not suitable because usually we have to influence and change the content of SQL queries for i.e. filtering or for similar purposes. Parameters are very handy to do this. To modify our SQL query open the Report menu and select **Report/Data sources...** menu item. Modify the SQL query of our connection by the following:

```sql
SELECT ProductID, ProductName,
QuantityPerUnit, UnitPrice, QuantityPerUnit*UnitPrice as value
FROM products
WHERE ProductID > $P{prodID}
ORDER BY ProductName
```

After we have to add a Parameter with prodID ID/name to NCReport otherwise the query will throw an error. NCReport Designer has a test runner dialog with parameter adding feature. To open the runner dialog select the **Run report...** menu item from **Report** menu. To add a new Parameter just click Add button and then specify it's name to prodID and the value to a code what you want. We specify the value to 70. After running the report to Preview we get the following result:

Figure 5.4 Testing parameter - preview



```
42   Product: Singaporean Hokkien Fried Mee   14.00   12.00     168,00
20                                            81.00   60.00   4 860,00
21                                            10.00    9.00      90,00
61   Product: Sirop d'arable                  28.50   24.00     684,00
46   Product: Spegesild                       12.00   10.00     120,00
35                                            18.00   16.00     288,00
62   Product: Tarte au sucre                  49.30   41.00   2 021,30
19                                             9.20    8.00      73,60
29                                           123.79   80.00   9 903,20
14                                            23.00   21.00     483,00
54   Product: Tourtiare                        7.45    6.00      44,70
23                                             9.00    8.00      72,00
7                                             30.00   25.00     750,00
50   Product: Valkoinen suklaa                16.25   14.00     227,50
63   Product: Vegie-spread                    43.90   37.00   1 624,30
64   Product: Wimmers gute Semmelknadel       33.25   28.00     931,00
47   Product: Zaanse koeken                    9.50    8.00      76,00
                                                   Total value:  98 013,66
```

In all reports the Parameters are always evaluated within the SQL queries, scripts and PrintWhen expressions

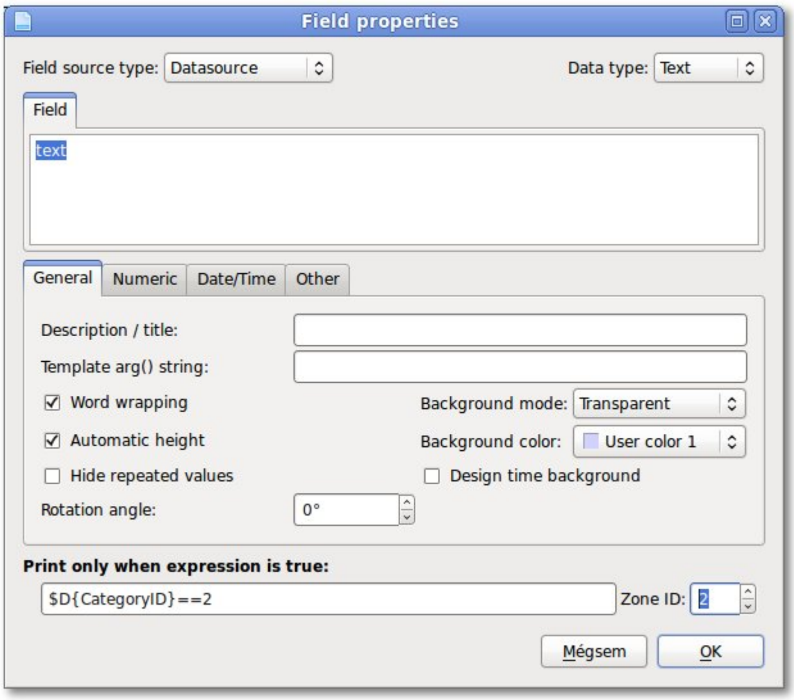
5.3 Zones [1]

Zones are virtual bands within a report section. All items can have a specified Zone ID. Items with the same zone id, just like a group, represent a horizontal zone as a virtual band inside the section. When the section's automatic height option is enabled, the report engine will process the rendering of zones in order by zone ID sequentially, one after another. If a content of a zone is empty for example because the *printWhen* expression of all items in the zone return false, then the zone won't be printed and the section will be shrunken. The rendering order of zones matches the order of zone IDs.

To set the Zone ID of a report item use the item property dialogs.

[1] Since version 2.2.0

Figure 5.5 Zone ID in property dialog



Field properties

Field source type: Datasource

Data type: Text

Field

text

General | Numeric | Date/Time | Other

Description / title:

Template arg() string:

☑ Word wrapping

Background mode: Transparent

☑ Automatic height

Background color: User color 1

☐ Hide repeated values

☐ Design time background

Rotation angle: 0°

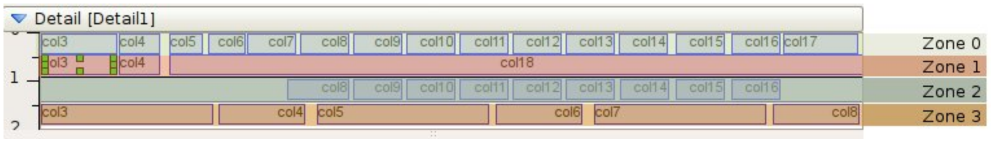
Print only when expression is true:

$D{CategoryID}==2

Zone ID: 2

Mégsem | OK

Figure 5.6 Zones in Design mode



NOTE

Zones are not visible in design mode. The specified region is determined by only the zone IDs of the report items

5.4 Text Document printout mode

TextDocument mode feature allows to render and print multi-page `QTextDocument` based rich texts. The text source may be a file or any data source, so the text can be static and dynamic or even a template. In this mode you can use only a page header, page footer and one or more detail in the report definition. The result will be a paginated, printer-ready text document. In TextDocument mode the `pagecount` system variable is automatically available

5.4.1 Steps of usage

To create a text document printout report use the Designer application

- In Designer select the **Report** → Page options menu. Then the report page settings dialog will appear. Set the **Report type** combobox to *Text document*
- Add a text report item into (the only one) Detail section. Set the text's properties by using its property dialog. The text may come from any source as usual.

- Design the report's page header and footer (Not required)

NOTE

In this mode only one detail section within one text item is supported. The horizontal position and the width of the text item are followed when rendering.

Example 5.1 Text Document printout report

To see how it's working try `textdocument_printout.xml` demo report. It prints a long Qt class documentation HTML file.

5.5 Data Relation system

This feature is also named as Sub-Query or Sub-Data Source system

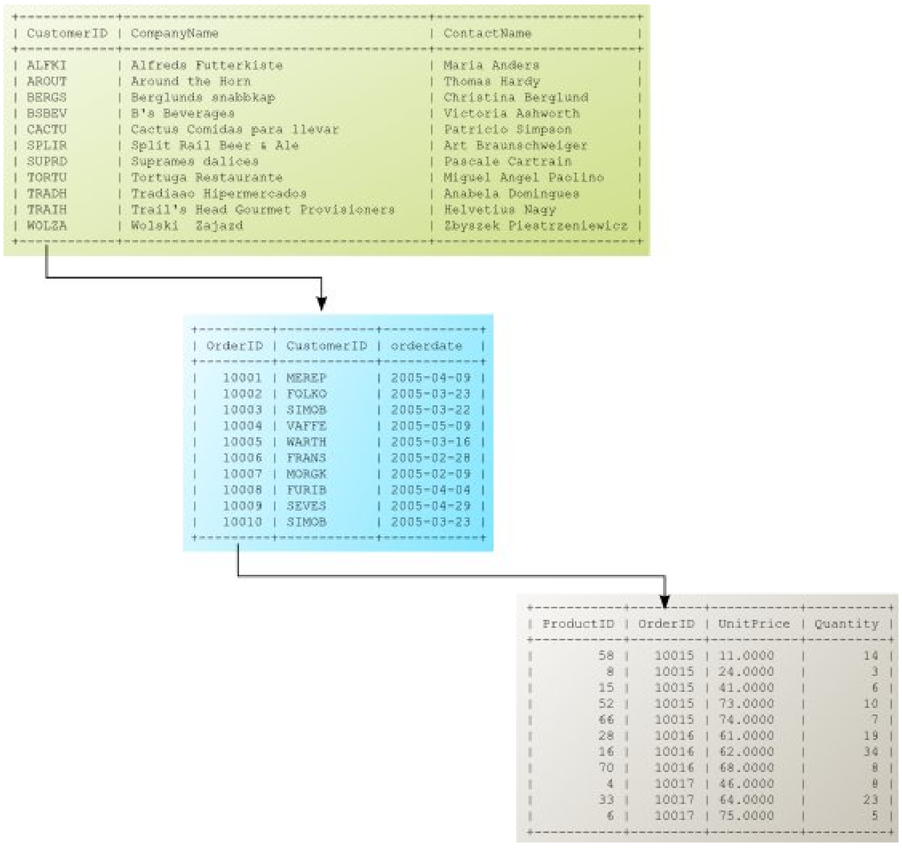
Database systems almost always have master/detail data relation between tables. When defining reports for a typical kind of documents such as invoices, orders etc. there are at least one header and a related detail data is used which are linked via primary and foreign key. The goal of the data relation system that child data sources are updated runtime row by row driven by a parent data source. This works by an ID column which is the primary key of the parent and the foreign key of the child. The data source relation is very useful option for SQL data sources where the data are fetched from database tables via SQL command and for Item Model data sources as well where you can manage the data source content from code.

NOTE

The data source relation system currently works for SQL data source and Item Model data source only. The other data source types are not supported by this feature, expect the *Item model* data source.

The following example shows a 3 level parent/child structure.

Figure 5.7 Data relation



```
+------------+------------------------------------+---------------------------+
| CustomerID | CompanyName                        | ContactName               |
+------------+------------------------------------+---------------------------+
| ALFKI      | Alfreds Futterkiste                | Maria Anders              |
| AROUT      | Around the Horn                    | Thomas Hardy              |
| BERGS      | Berglunds snabbkap                 | Christina Berglund        |
| BSBEV      | B's Beverages                      | Victoria Ashworth         |
| CACTU      | Cactus Comidas para llevar         | Patricio Simpson          |
| SPLIR      | Split Rail Beer & Ale              | Art Braunschweiger        |
| SUPRD      | Supremes dalices                   | Pascale Cartrain          |
| TORTU      | Tortuga Restaurante                | Miguel Angel Paolino      |
| TRADH      | Tradiaao Hipermercados             | Anabela Domingues         |
| TRAIH      | Trail's Head Gourmet Provisioners  | Helvetius Nagy            |
| WOLZA      | Wolski  Zajazd                     | Zbyszek Piestrzeniewicz   |
+------------+------------------------------------+---------------------------+
```

```
+---------+------------+------------+
| OrderID | CustomerID | orderdate  |
+---------+------------+------------+
|   10001 | MEREP      | 2005-04-09 |
|   10002 | FOLKO      | 2005-03-23 |
|   10003 | SIMOB      | 2005-03-22 |
|   10004 | VAFFE      | 2005-05-09 |
|   10005 | WARTH      | 2005-03-16 |
|   10006 | FRANS      | 2005-02-28 |
|   10007 | MORGK      | 2005-02-09 |
|   10008 | FURIB      | 2005-04-04 |
|   10009 | SEVES      | 2005-04-29 |
|   10010 | SIMOB      | 2005-03-23 |
+---------+------------+------------+
```

```
+-----------+---------+-----------+----------+
| ProductID | OrderID | UnitPrice | Quantity |
+-----------+---------+-----------+----------+
|        58 |   10015 | 11.0000   |       14 |
|         8 |   10015 | 24.0000   |        3 |
|        15 |   10015 | 41.0000   |        6 |
|        52 |   10015 | 73.0000   |       10 |
|        66 |   10015 | 74.0000   |        7 |
|        28 |   10016 | 61.0000   |       19 |
|        16 |   10016 | 62.0000   |       34 |
|        70 |   10016 | 68.0000   |        8 |
|         4 |   10017 | 46.0000   |        8 |
|        33 |   10017 | 64.0000   |       23 |
|         6 |   10017 | 75.0000   |        5 |
+-----------+---------+-----------+----------+
```

In the the next section you can overview how to define the data sources of master/detail relation. We will create a three level data source relation in the following example.

5.5.1 Defining a parent data source

You can add the master data source in Data Source settings Dialog. In the Designer select **Report** → Data sources... and add a new SQL data source. Set the **Opening role** to *Beginning of the report*. It means that the query will be executed only once at the beginning of the report. Type the data source ID, set the connection properties and edit the SQL query in the SQL editor text box.

This is our example master query that queries the customers:

```sql
SELECT customers.CustomerID, customers.CompanyName, customers.CompanyName
FROM orders
INNER JOIN customers ON orders.CustomerID=customers.ContactName
WHERE OrderDate between '2005-03-01' and '2005-03-31'
GROUP BY CustomerID
```

5.5.2 Defining child data sources

At the same (Data source) dialog we have to add two more data sources within the parent/child structure. Doing the first one add a new SQL data source again. Set the **Opening role** to *Child datasource (subquery)*. It means that the query will be executed repetitively every time when the next master record is processed. Type the *data source ID*, set the connection properties in the **SQL connection tab**. After type the *Parent datasource id* which is the ID of previously defined parent data source. (customers)

WARNING

The *Parent datasource id* is case sensitive. It must be equal to the already existed parent data source ID

Edit the SQL query in the sql editor text box. This is the 1st child query, it queries the order headers between a date period and is related to a customer:

```
SELECT OrderID,CustomerID,EmployeeID,OrderDate,ShipName
FROM orders
WHERE CustomerID='$D{customers.CustomerID}'
AND OrderDate between '2005-03-01' and '2005-03-31'
ORDER BY OrderID
```

As here can be seen, the data relation is managed by a data reference expression: `$D{customers.-CustomerID}` We have to insert the key value of parent data source into the SQL command.

After comes the second child data source. This is the third level of the relation. Set the **Opening role** to *Child data source (sub-query)* too and type the *Parent data source id* which is the ID of its parent data source (orders). Edit the SQL query in the SQL editor text box. This query retrieves order items are related to a specified order ID:

```
SELECT OrderID, orderitems.UnitPrice, Quantity, Itemno,
products.productname, orderitems.UnitPrice*Quantity as Value
FROM orderitems INNER JOIN products ON orderitems.productID = products.productID
WHERE OrderID=$D{orders.OrderID}
ORDER BY Itemno
```

At this level the data relation is managed by the following data reference expression: `$D{orders-.OrderID}` Accordingly the parent key will always be evaluated and the query is executed when the parent key change occurs. (When its parent row is changed by report processor)

5.5.3 Setting up the detail section

In this step we have to assign the appropriate data source to the Detail section. Doing that open **Report** → Details and grouping... menu (or the tool button on the toolbar), then appears the Detail section properties dialog. Select the previously defined data source which is the lowest level in hierarchy, in our example: *items*.

NOTE

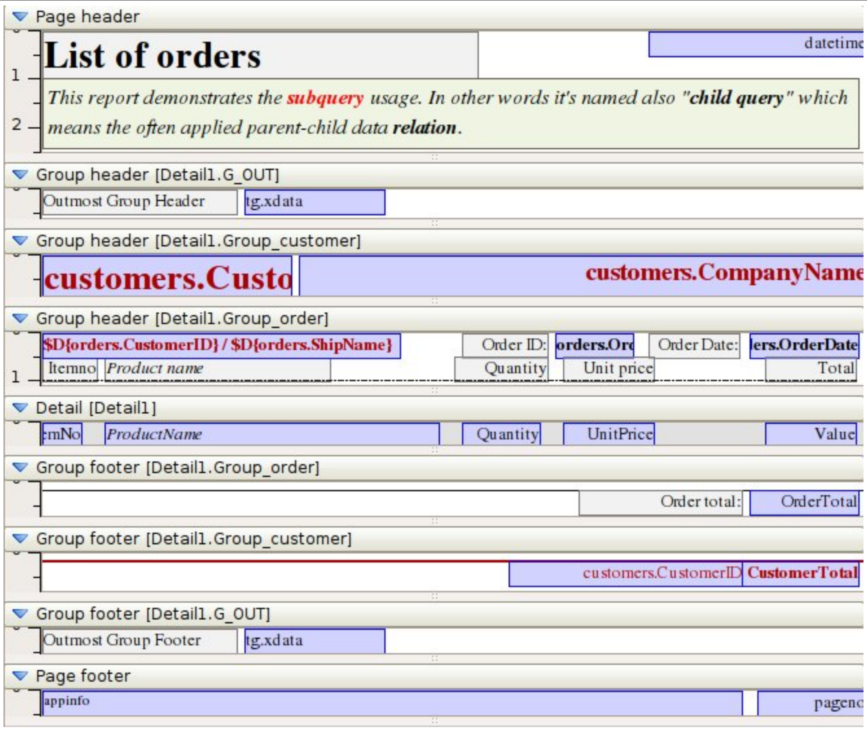
When defining a sub-query, always the lowest level child query should be assigned to the actual Detail section. This because the report engine handles sub-queries by iterating on child level data source records.

5.5.4 Designing the report

After we defined the data sources and assigned them to the Detail we have to add the appropriate groups also to the Detail by using Data grouping... button. As usual each data source level is related to a group level.

Add the other report sections and report items and set the alignments. The following figure appears the ready to run report. (The name of this example report file: `list_of_orders_complex.xml`)

Figure 5.8 Sub-query report example in Designer



Page header

List of orders

datetime

*This report demonstrates the **subquery** usage. In other words it's named also "**child query**" which means the often applied parent-child data **relation**.*

Group header [Detail1.G_OUT]

Outmost Group Header | tg.xdata

Group header [Detail1.Group_customer]

customers.Custo | customers.CompanyName

Group header [Detail1.Group_order]

$D{orders.CustomerID} / $D{orders.ShipName} | Order ID: | orders.Or | Order Date: | ers.OrderDate

Itemno | *Product name* | Quantity | Unit price | Total

Detail [Detail1]

:mNo | *ProductName* | Quantity | UnitPrice | Value

Group footer [Detail1.Group_order]

Order total: | OrderTotal

Group footer [Detail1.Group_customer]

customers.CustomerID | CustomerTotal

Group footer [Detail1.G_OUT]

Outmost Group Footer | tg.xdata

Page footer

appinfo | pagenc

The report preview result of our example looks like this: (The name of this example report file: `list_of_orders_complex.xml`)

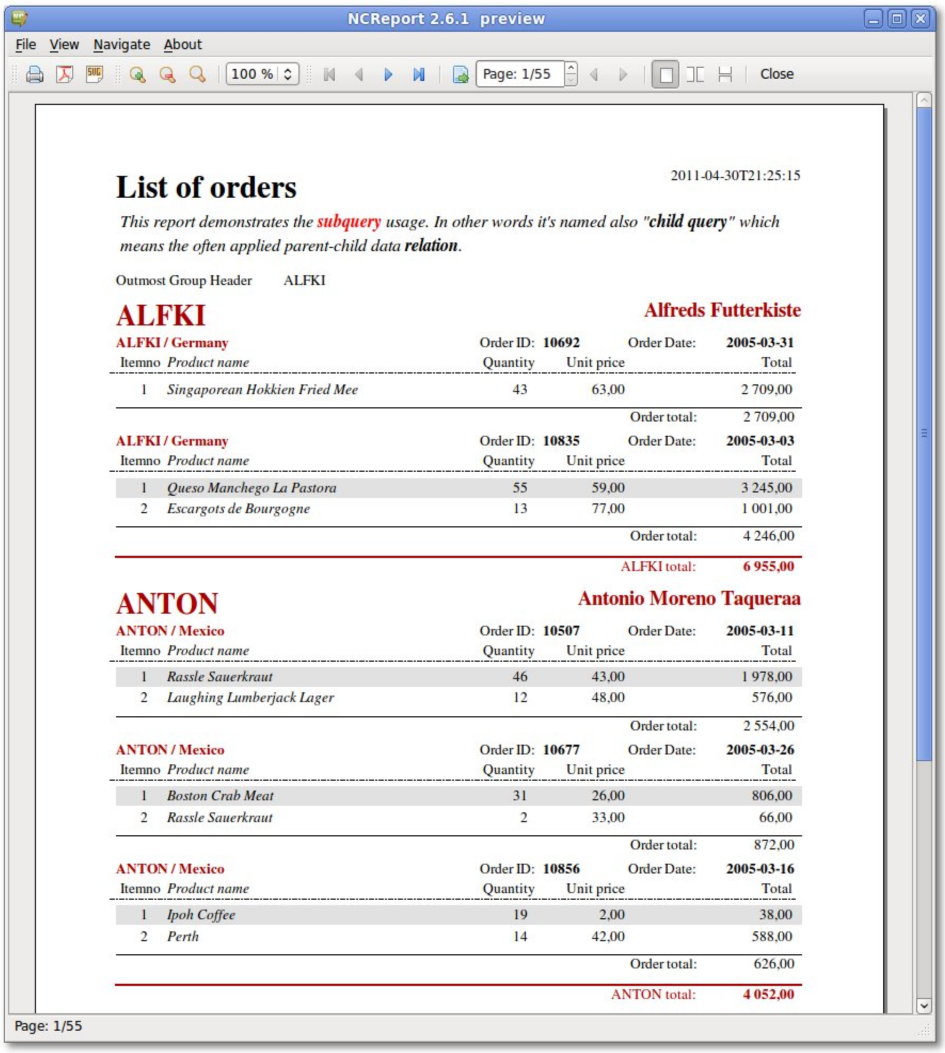


Figure 5.9 Result of a sub-query report example

```
List of orders                                                  2011-04-30T21:25:15
This report demonstrates the subquery usage. In other words it's named also "child query" which
means the often applied parent-child data relation.

Outmost Group Header      ALFKI

ALFKI                                                           Alfreds Futterkiste
ALFKI / Germany                        Order ID:  10692    Order Date:    2005-03-31
 Itemno  Product name                   Quantity     Unit price                Total
-----------------------------------------------------------------------------------
    1    Singaporean Hokkien Fried Mee      43          63,00               2 709,00
-----------------------------------------------------------------------------------
                                                          Order total:      2 709,00
ALFKI / Germany                        Order ID:  10835    Order Date:    2005-03-03
 Itemno  Product name                   Quantity     Unit price                Total
-----------------------------------------------------------------------------------
    1    Queso Manchego La Pastora          55          59,00               3 245,00
    2    Escargots de Bourgogne             13          77,00               1 001,00
-----------------------------------------------------------------------------------
                                                          Order total:      4 246,00
-----------------------------------------------------------------------------------
                                                          ALFKI total:      6 955,00

ANTON                                                   Antonio Moreno Taqueraa
ANTON / Mexico                         Order ID:  10507    Order Date:    2005-03-11
 Itemno  Product name                   Quantity     Unit price                Total
-----------------------------------------------------------------------------------
    1    Rassle Sauerkraut                  46          43,00               1 978,00
    2    Laughing Lumberjack Lager          12          48,00                 576,00
-----------------------------------------------------------------------------------
                                                          Order total:      2 554,00
ANTON / Mexico                         Order ID:  10677    Order Date:    2005-03-26
 Itemno  Product name                   Quantity     Unit price                Total
-----------------------------------------------------------------------------------
    1    Boston Crab Meat                   31          26,00                 806,00
    2    Rassle Sauerkraut                   2          33,00                  66,00
-----------------------------------------------------------------------------------
                                                          Order total:        872,00
ANTON / Mexico                         Order ID:  10856    Order Date:    2005-03-16
 Itemno  Product name                   Quantity     Unit price                Total
-----------------------------------------------------------------------------------
    1    Ipoh Coffee                        19           2,00                  38,00
    2    Perth                              14          42,00                 588,00
-----------------------------------------------------------------------------------
                                                          Order total:        626,00
-----------------------------------------------------------------------------------
                                                          ANTON total:      4 052,00
```

5.5.5 Changes in 2.13 version

Data Source Relations has been extended from version 2.13. This is now much better supported general feature. The function has been extended to Item Models. The reports that is created by the old sub-query/relation system are not compatible anymore with the new version of data source relation function.

WARNING

The reports that uses sub-query function and created in previous version of NCReport, must be upgraded. This function is not compatible with the old report versions.

Changes in the function: (you have to change this in old reports)

- The detail's data source must be the root parent data source
- All fields and expressions must have its data source identifier i.e: datasource.column

To use the new data source relation system follow these rules:

- A data source relation can be defined by simply set "child data source" and giving the parent data source id. (as usual)

- 1 parent can have only 1 child (1 to many relation)
- You can specify the primary key column index. If a primary key column is defined for the parent data source, you can use {PK} or {ID} expression in the child data source query. (This is useful only in SQL data sources)
- If you assign a data source relation to a detail section always set the root parent data source to the detail. In earlier version we had to set the last child data source, but it is outdated in 2.13.
- Use `dataSourceUpdateRequest(const QString dataSourceID, const QString foreignKeyValue);` signal to handle data source updates.
- Use `!$D{datasource.isEmpty()}` print when expression of a detail section to hide the empty children data

5.6 Double pass mode

Double pass mode is a report option that influences the running mode of report engine. When double pass mode is enabled the report is executed two times - this two running cycle is called primary (test) and secondary (real) pass. When the two pass mode is necessary? In normal (1 pass) mode the report generator simply runs the report without anticipatory counting and calculations such as determining the total page numbers.

NOTE

The `pagecount` system variable always returns zero in 1 pass (normal) mode. If the `pagecount` system variable is needed you have to enable the double pass mode option.

5.6.1 Setting double pass mode

The double pass option is part of the report options are saved into the report definition. To enable or disable this option in Designer select **Report**Report and Page Options... To read more: Section 4.2.8.

5.6.2 Example using of `pagecount` variable

Use `$V{pagecount}` expression as field in expression or template mode ore use in text in expression mode

Example 5.2 Expression mode example

```
$V{pagecount}
```

Example 5.3 Template mode example

```
Page $V{pagenum} of $V{pagecount}
```

5.7 Batch report mode

Batch report mode is a feature that enables running multiple reports into one output. Read more at Section 8.11.

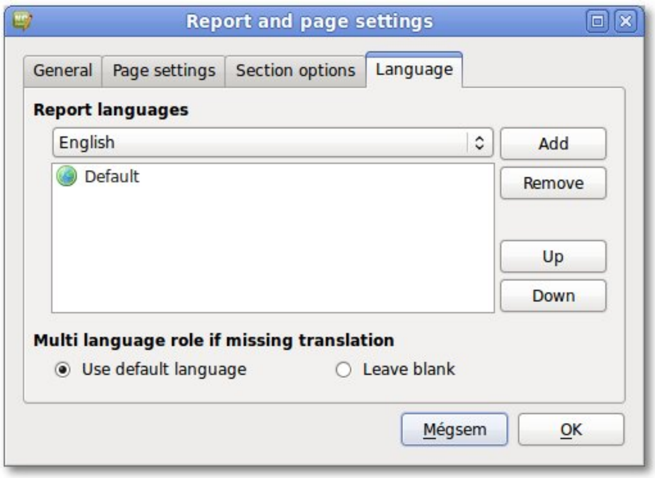
5.8 Multi language reports

Since version 2.5 reports have ability to be multiple lingual. This is an important aspect of international applications. The goal of this feature that fields and labels can store more than one texts according to previously defined languages.

5.8.1 Adding languages

1. To set languages use **Report and page settings** menu and choose **Language** tab in the dialog.

2. To add more languages select the language from combo box and add to language list using Add button


Report and page settings

General | Page settings | Section options | Language

Report languages

English

Default

Multi language role if missing translation

(●) Use default language ( ) Leave blank

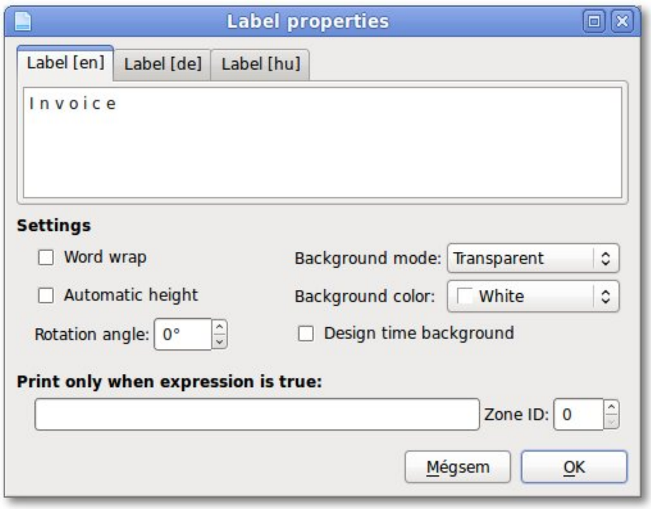
TIP

Leave the **Default** language first in the list. This represents the original language of the report.

3. Set the **Multi language role**. If not all labels or fields are translated and the current language translation is missing, two options can be chosen. In order to choose **Use default language** the default text will appear otherwise the label or field will not be printed (This is the **Leave blank** option)

5.8.2 Adding translations of Fields or Labels

Insert a Field or Label item as usual. The property dialog appears with tabs of each language that was defined previously. Type the translations to the appropriate language tab control. Empty translation tab means a missing translation.


Label properties

Label [en] | Label [de] | Label [hu]

Invoice

Settings

- Word wrap
- Automatic height
- Rotation angle: 0°
- Background mode: Transparent
- Background color: White
- Design time background

Print only when expression is true:

Zone ID: 0

5.8.3 Setting up the current language

The current language of the report can be set both in design mode and in running mode. In Designer select **Report language** from the **Report** menu or the Languages tool button from the toolbar and select the language what you want from the submenu

To set the language from application code use `setCurrentLanguage( const QString & langcode )` function where *`langcode`* is the international two letter language code.

Example 5.4 Setting up the language

```
NCReport* report = new NCReport(parent);
report->setLanguage("de");
```

To set the language from console running mode use *`-l`* command line parameter the international two letter language code.

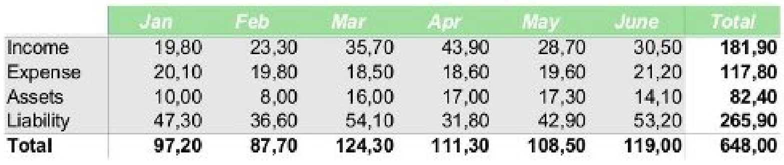
Example 5.5 Setting up the current language from command line

```
ncreport -f report.xml -o pdf -of report.pdf -l de
```

5.9 Cross-Tab tables

Reports are often contain tables or data in table style layout. Sometimes it is necessary to rotate results so that columns are presented horizontally and rows are presented vertically. This is sometimes known as creating a PivotTable®, creating a cross-tab report, or rotating data. In cross tab tables the data source records are represented as horizontal columns and the cross-tab rows are printed as data source columns. Tables often contain horizontal and/or vertical summarization as well.

Figure 5.10



	Jan	Feb	Mar	Apr	May	June	Total
Income	19,80	23,30	35,70	43,90	28,70	30,50	**181,90**
Expense	20,10	19,80	18,50	18,60	19,60	21,20	**117,80**
Assets	10,00	8,00	16,00	17,00	17,30	14,10	**82,40**
Liability	47,30	36,60	54,10	31,80	42,90	53,20	**265,90**
Total	**97,20**	**87,70**	**124,30**	**111,30**	**108,50**	**119,00**	**648,00**

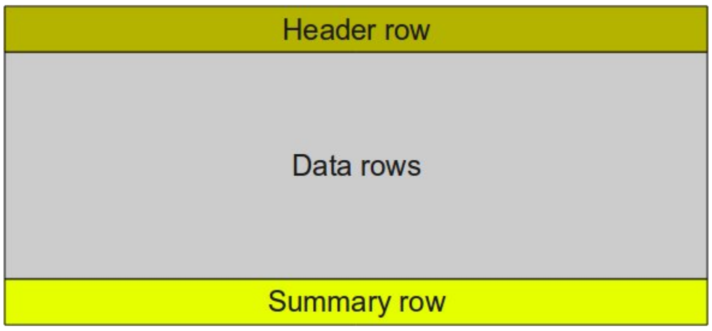
Cross-table has a unique data source assigned. In the report a unique data source is needed to be defined for the table. When report generator renders cross tables they have the following behave:

- Expandable horizontally: If table is wider than the space to right it should be continued in a new table below. Table columns are represented as data source records
- Expandable vertically: Vertically enlargement: each row represents a data column from the specified data source - it can break to multiple pages

5.9.1 Table structure

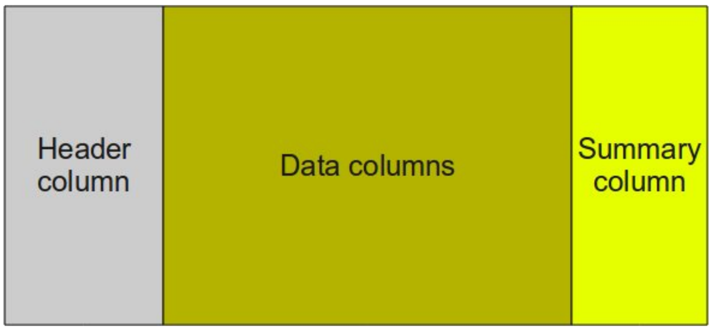
Cross-tables are built from cells. Each cell has its own function depending on were it is located. The first level function elements of tables are the rows and columns. The following two figures show the cross-tab row and column structure with their named function.

Figure 5.11 Table rows



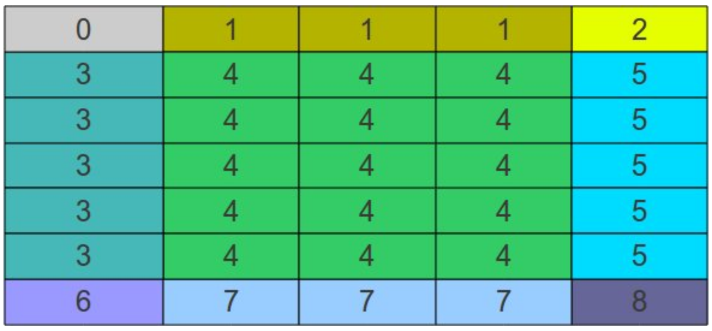
Vertical table sections: Header row, data rows, summary row.

Figure 5.12 Table columns



Horizontal table sections: header column, data columns, summary column.
The following figure represents the cell structure of cross-tables:

Figure 5.13 Cell structure



0	1	1	1	2
3	4	4	4	5
3	4	4	4	5
3	4	4	4	5
3	4	4	4	5
3	4	4	4	5
6	7	7	7	8

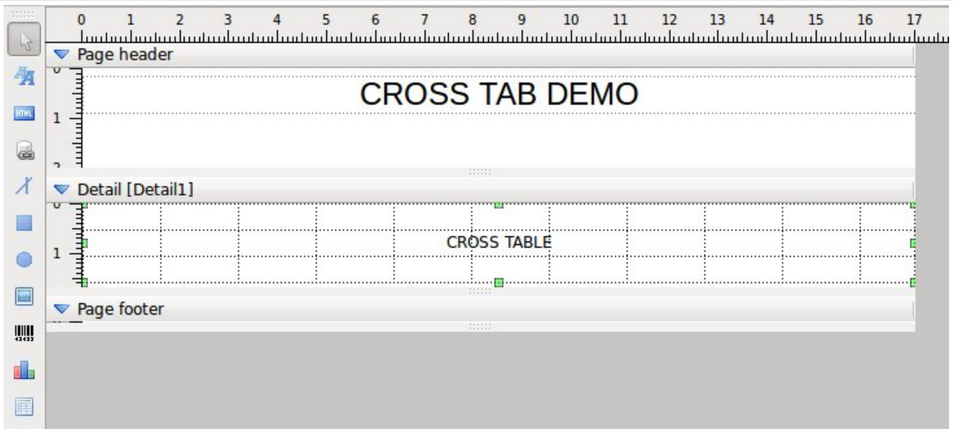
- 0: corner header
- 1: column header

- 2: side summary header
- 3: row header
- 4: data
- 5: side summary data
- 6: bottom summary header
- 7: bottom summary data
- 8: cross summary data

5.9.2 Using cross-table in Designer

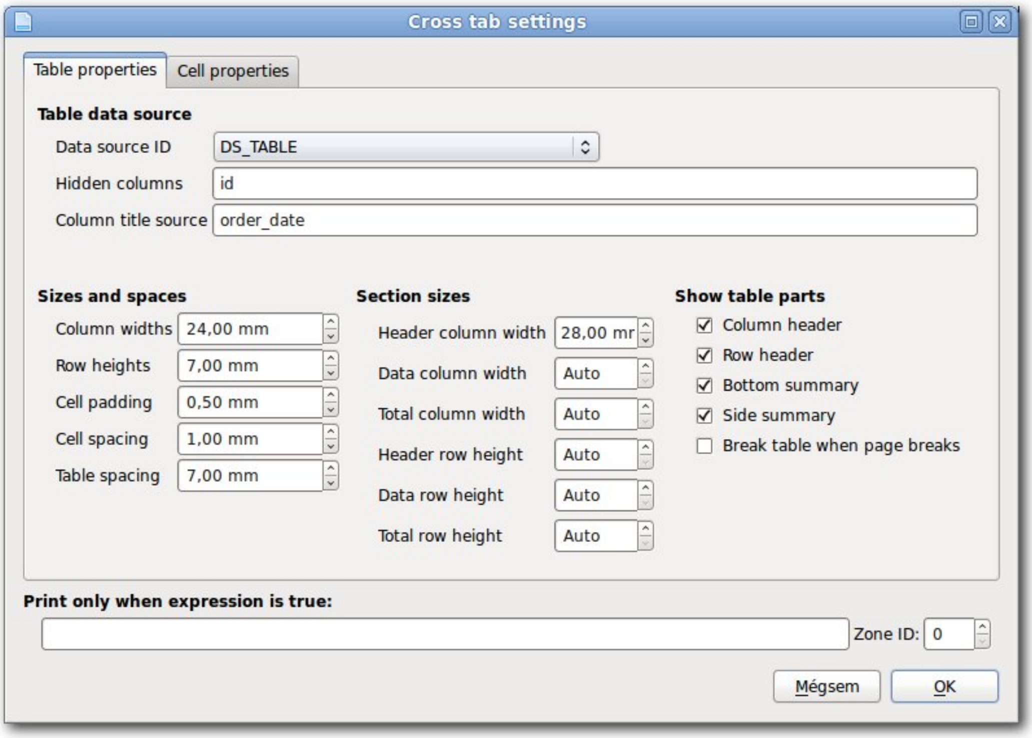
To add a cross-tab to a report select Cross table item from toolbar or from Insert menu To create a new Cross-table object, first select the Cross tab tool button or the menu item in **Tools** menu. After that the cursor changes to a cross beam, then click in the section into you want the table to be located. The recommended section is generally the Detail section.

Figure 5.14 Cross-tab in Designer



Doing so will create a new Cross tab object in the selected section at position you have clicked and opens the Cross table property dialog. On the dialog you can set all table's properties.

Figure 5.15 Cross-tab settings dialog



Cross tab settings

Table properties | Cell properties

Table data source

Data source ID	DS_TABLE
Hidden columns	id
Column title source	order_date

Sizes and spaces

Column widths	24,00 mm
Row heights	7,00 mm
Cell padding	0,50 mm
Cell spacing	1,00 mm
Table spacing	7,00 mm

Section sizes

Header column width	28,00 mr
Data column width	Auto
Total column width	Auto
Header row height	Auto
Data row height	Auto
Total row height	Auto

Show table parts

- ☑ Column header
- ☑ Row header
- ☑ Bottom summary
- ☑ Side summary
- ☐ Break table when page breaks

Print only when expression is true:

Zone ID: 0

The property dialog is devided to the following tabs: **Table properties** and **Cell properties** As usual you find the **Print only when expression** at the bottom of dialog. If a logical expression is defined, the table will be shown or hidden, depending on the result of the expression. The following paragraps describe the table's properties:

5.9.3 Table level properties

TABLE DATA SOURCE
The group box represents the data source related options.

Data source ID ID of the defined data source which is related to the table. The selected data source should be unique that is independent from the data source of any detail because cross tables has own data processing.

Hidden columns Comma separated list of valid data source columns we don't want to show in the table. These data columns of course are existed in data source definition.

Column title source Data column ID of column header titles. If not specified, the column numbers appear.

SIZES AND SPACES
This group box represents the general sizes of cross-tab table elements.

Column widths General width of columns

Row heights General height of table rows

Cell padding Gap size inside of the cells. This is equal to internal cell margin

Cell spacing Spacing size between the cells

Table spacing Spacing between the tables when cross-tab is multi line. Table is broken to multi line when wider than a page.

SECTION SIZES
This group box represents the sizes of cross-tab table sections. To read more about table sections look at the table structure. The following options contains the size of specified table part.

Header column width Width of the header (left/first) column

Data column width Width of data columns

Total column width Width of total/summary column. Mostly this is last, rightmost column.

Header row height Height of the header (first) row.

Data row height Height of the data rows

Total row height Height of the total/bottom summary row. Mostly this is the last row of the table.

SHOW TABLE PARTS
This group box represents the switches with you can enable or disable the specified table part.

Column header To show or hide column header

Row header To show or hide row header

Bottom summary To show or hide summary row

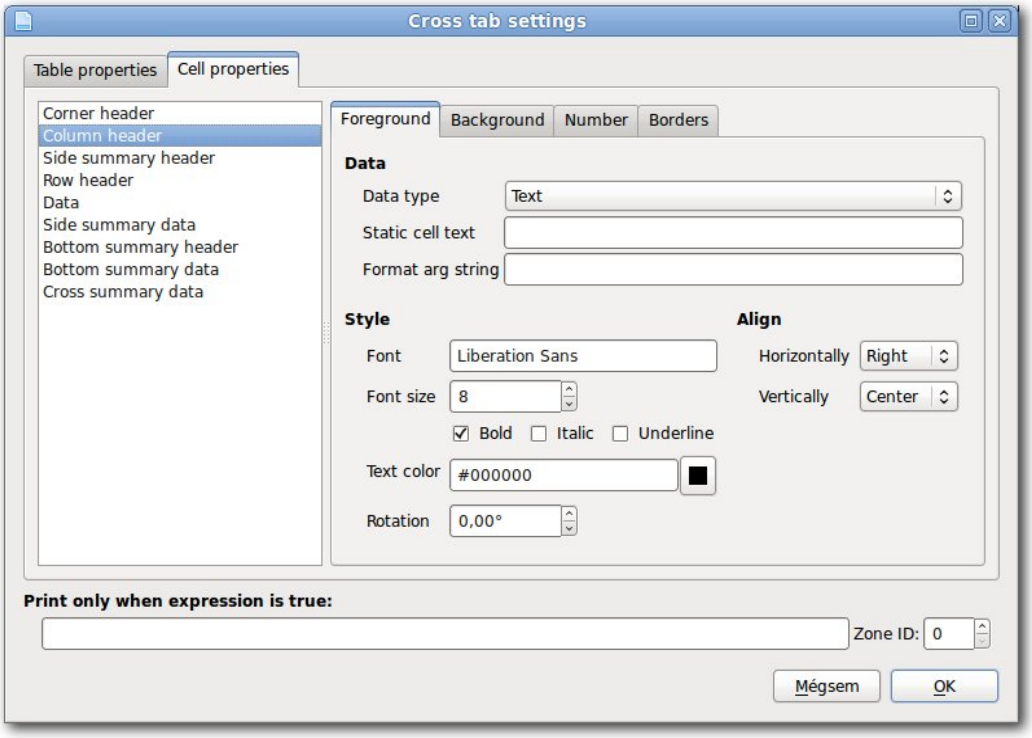
Side summary To show or hide side summary column

Break table when page breaks If this option is enabled the table can break within its rows when the page breaks. To avoid table breaking disable this option.

5.9.4 Cell level properties

The cell properties are related to the specified cells. The cell names are represented by their function. To read more about cell structures look at the table structure.

Figure 5.16 Cell settings



Data
Data type: Text
Static cell text:
Format arg string:

Style
Font: Liberation Sans
Font size: 8
[✓ Bold] Italic Underline
Text color: #000000
Rotation: 0,00°

Align
Horizontally: Right
Vertically: Center

Print only when expression is true:
Zone ID: 0

5.10 Conditional formatting

This function allows to use dynamic, data-driven text styles in reports depending on current value of any data source columns, parameters, variables or even script expressions. This runtime formatting option is available for Labels or Fields only. HTML texts can be dynamically formatted by embedding dynamic tags within HTML code.

Format definition is a code text with style tag symbols and expressions similar to generic CSS style code. Style tag and its value/expression are divided by colon. Each row represents one style definition. Script expressions have to enclose into curly braces.

5.10.1 Style tag symbols

The following style tag symbols can be used in format code. Multiple style tags are allowed in the code.

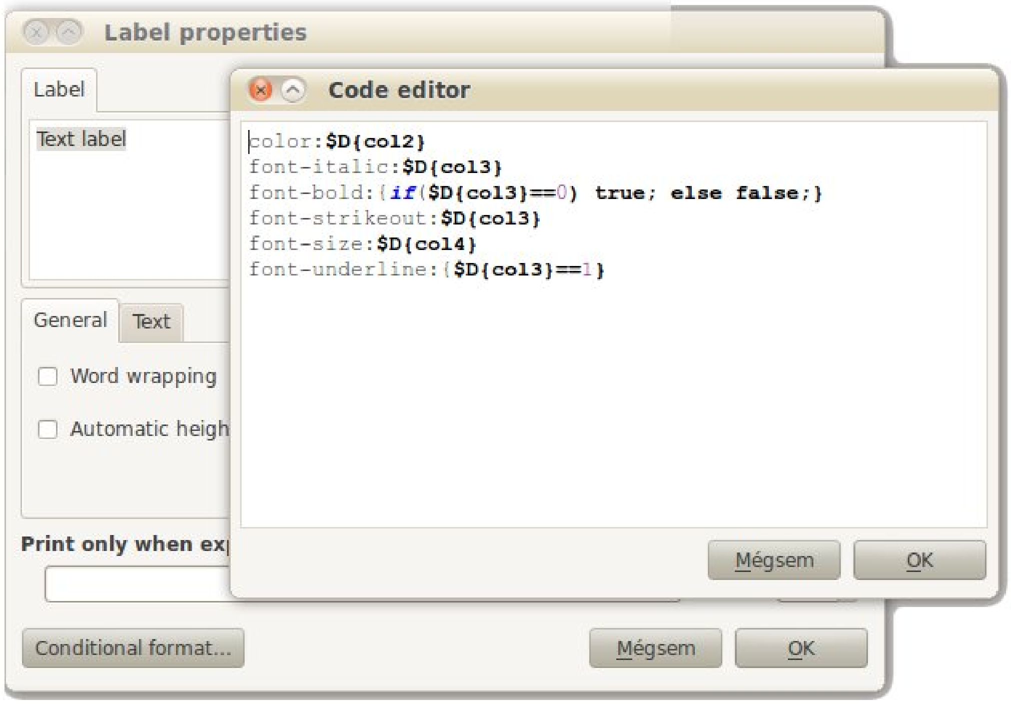
Table 5.2 Dynamic style tag symbols

Tag symbol	Description	Examples
`color:`	Text foreground color	color:#ff0000 color:$D{ds.color} color:{if($D{ds.price}>500) "#ff0000";}
`background-color:`	Text background color	background-color:#ff0000 background-color:$D{ds.bgcolor}
`font-family:`	Font family name	font-family:Arial font-family::$D{ds.font}
`font-bold:`	Font bold on/off	font-bold:true font-bold:$D{ds.isBold}
`font-italic:`	Font italic on/off	font-italic:true font-italic:$D{ds.isItalic}
`font-weight:`	Font weight integer value. Higher value results bolder text.	font-weight:50 font-weight:$D{ds.fweight}
`font-underline:`	Font underline on/off	font-underline:true font-underline:$D{ds.isUnderline}
`font-size:`	Font size in points. Integer value.	font-size:12 font-size:$D{ds.size}
`font-strikeout:`	Font strikeout on/off	font-strikeout:true font-strikeout:$D{ds.fstrikeout}
`letter-spacing:`	Text letter spacing value. Greater value results bigger spacing	letter-spacing:1.5 letter-spacing:$D{ds.letterspacing}
`capitalization:`	Rendering option for text font applies to. Integer value from 0-4. Equals QFont::Capitalization enumeration property	capitalization:$D{ds.cap}

5.10.2 Edit style code in Designer

To define a conditional text formatting of a Label or a Field click on the *Conditional formatting...* button at the bottom of the item property dialog. Then the conditional format code dialog will appear. Type or paste the format code by keeping the syntax rules. Click *OK* to save the code

Figure 5.17



```
color:$D{col2}
font-italic:$D{col3}
font-bold:{if($D{col3}==0) true; else false;}
font-strikeout:$D{col3}
font-size:$D{col4}
font-underline:{$D{col3}==1}
```

NOTE

Style tag and its corresponding value should be in one line! Multiple lines of style definitions are not evaluated.

5.10.3 Default style

In order to using a condition (script or data) that returns empty value, the default style formatting option is applied. The default style settings are what you set statically in the report as usual.

5.11 Sub-Report iteration

The feature called 'sub-report' means here the whole repeated report process by traversing through a dedicated data source. This is similar to the 'classic sub-report' model but supports only 1 level. This function is very useful when a complex report or a multi detail report has to be repeated by processing different data records. The function uses a dedicated 'parent' data source as a repeation source.

Sub-Report function is a great opportunity for creating simple one-to-many relation reports.

5.11.1 Sub-Report data source

To set the data source on which the iteration based, you have to add a data source to the report as usual. Set the *Opening role* to *Sub-Report iteration*

5.11.2 Reference to master data source

You can place any reference to master data source in the SQL data source queries. For example:

```
SELECT product.name, product.code WHERE id=$D{master.id}
```

For non SQL data sources such as Item Model data source it is possible to use the SIGNAL/SLOT mechanism. Use the following signal of NCReport object:

```
signals:
  void dataSourceUpdateRequest(const QString& dataSourceID, const QString& data);
```

NOTE

All data sources are updated repeatedly when a sub-report cycle begins, after the last cycle finished, except the master data source. The function is similar to a parent/child relation

5.12 Printing QTableView

Table View item is a report item destined to rendering QTableView tables with full WYSWYG print support. The function is aimed to print the tables in the same rate as the existed QTableView screen widget. The current version yet doesn't provide options to change some table settings such as column background, line types, etc. - these options are pre-defined.

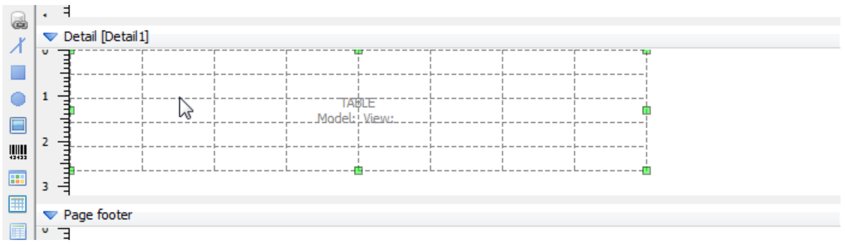
5.12.1 Adding TableView item

In Designer to add a TableView item into a section select the *Table View* tool button or menu item from **Tools** menu. After the cursor changes to a cross beam click in the section where you want the item to be located. The *Table View* item is created and its settings dialog appears.

NOTE

It is strongly recommended to add *Table View* to a Detail section, not into any headers or footers. Since the table may fill the available space both horizontally and vertically, no other report items should add to this section.

Figure 5.18 Table View Item in Designer



Specify the same ID values in the Table View settings dialog that you will apply when setting the table view and the model from code. The report engine will identify the objects by the specified IDs.

Figure 5.19 Table View Item in Designer

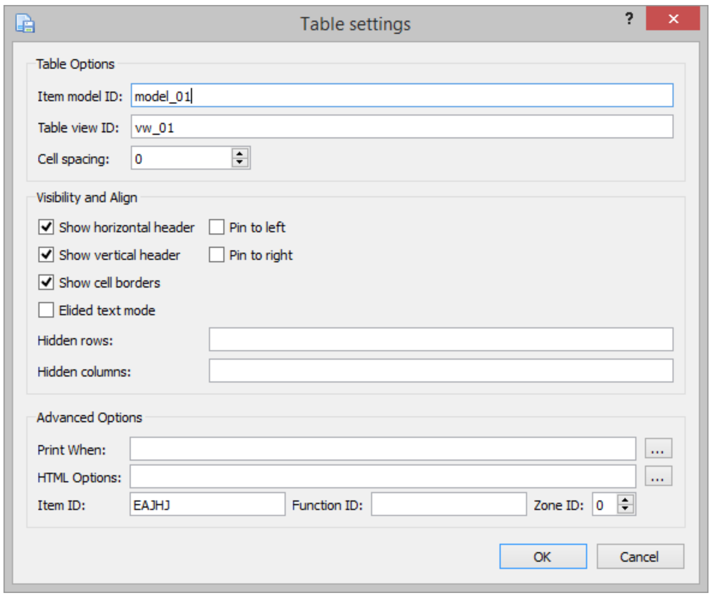


Table settings

Table Options

Item model ID: model_01

Table view ID: vw_01

Cell spacing: 0

Visibility and Align

[✓] Show horizontal header [ ] Pin to left

[✓] Show vertical header [ ] Pin to right

[✓] Show cell borders

[ ] Elided text mode

Hidden rows:

Hidden columns:

Advanced Options

Print When:

HTML Options:

Item ID: EAJHJ Function ID: Zone ID: 0

The dialog options are as follows:

Item Model ID Identifies the model object pointer related to the QTableView.

Table View ID Identifies the QTableView object pointer you want to render.

Cell spacing Spacing value for cells. Has no affect.

Show horizontal header If enabled then the horizontal table header will appear.

Show vertical header If enabled then the vertical table header will appear.

Elided text mode When this option is enabled the multi-line texts will not be rendered, but partially the first line only with three dots.

Pin to left The table will automatically be adjusted to the left margin.

Pin to right The table will automatically be adjusted to the right margin.

5.12.2 Setting the object references

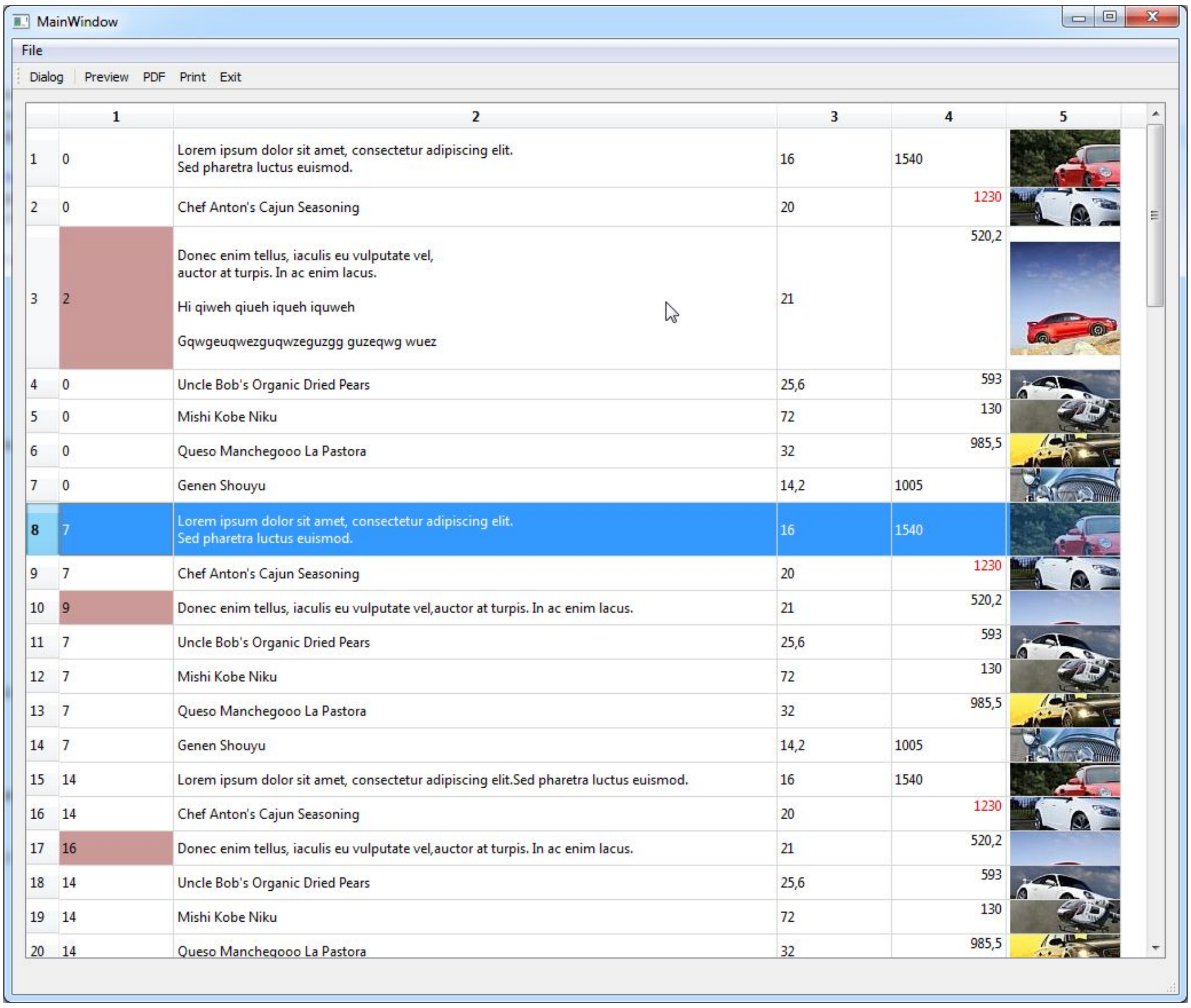
Use the following API functions for defining the QTableView object and its model for NCReport. You have to set the appropriate IDs to identify the objects. This because it is possible to assign multiple object pointers to NCReport. You don't need this in design time but only when running the report.

```
NCReport* report = new NCReport( this );
...
report->addTableView( ui->tableView, "myView");
report->addItemModel(ui->tableView->model(), "myModel");
```

5.12.3 Example

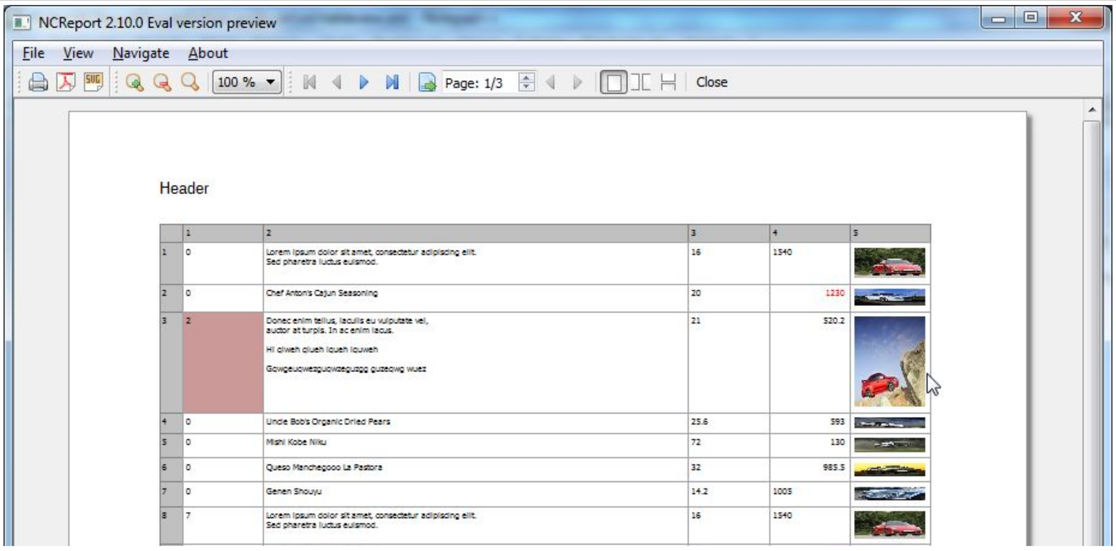
The following example shows how a printed QTableView widget looks like on the screen. The table is filled with test data and even images.

Figure 5.20 QTableView widget



	1	2	3	4	5
1	0	Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed pharetra luctus euismod.	16	1540	
2	0	Chef Anton's Cajun Seasoning	20	1230	
3	2	Donec enim tellus, iaculis eu vulputate vel, auctor at turpis. In ac enim lacus. Hi qiweh qiueh iqueh iquweh Gqwgeuqwezguqwzeguzgg guzeqwg wuez	21	520,2	
4	0	Uncle Bob's Organic Dried Pears	25,6	593	
5	0	Mishi Kobe Niku	72	130	
6	0	Queso Manchegooo La Pastora	32	985,5	
7	0	Genen Shouyu	14,2	1005	
8	7	Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed pharetra luctus euismod.	16	1540	
9	7	Chef Anton's Cajun Seasoning	20	1230	
10	9	Donec enim tellus, iaculis eu vulputate vel,auctor at turpis. In ac enim lacus.	21	520,2	
11	7	Uncle Bob's Organic Dried Pears	25,6	593	
12	7	Mishi Kobe Niku	72	130	
13	7	Queso Manchegooo La Pastora	32	985,5	
14	7	Genen Shouyu	14,2	1005	
15	14	Lorem ipsum dolor sit amet, consectetur adipiscing elit.Sed pharetra luctus euismod.	16	1540	
16	14	Chef Anton's Cajun Seasoning	20	1230	
17	16	Donec enim tellus, iaculis eu vulputate vel,auctor at turpis. In ac enim lacus.	21	520,2	
18	14	Uncle Bob's Organic Dried Pears	25,6	593	
19	14	Mishi Kobe Niku	72	130	
20	14	Queso Manchegooo La Pastora	32	985,5	

Figure 5.21 QTableView table in print preview



Header

	1	2	3	4	5
1	0	Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed pharetra luctus euismod.	16	1540	
2	0	Chef Anton's Cajun Seasoning	20	1230	
3	2	Donec enim tellus, iaculis eu vulputate vel, auctor at turpis. In ac enim lacus. Hi qiweh qiueh iqueh iquweh Gqwgeuqwezguqwzeguzgg guzeqwg wuez	21	520.2	
4	0	Uncle Bob's Organic Dried Pears	25.6	593	
5	0	Mishi Kobe Niku	72	130	
6	0	Queso Manchegooo La Pastora	32	985.5	
7	0	Genen Shouyu	14.2	1005	
8	7	Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed pharetra luctus euismod.	16	1540	

5.13 Sending report via e-mail

From version 2.10 there is a new class that provides you to send e-mail from your application. The class is named `LMailSender`. Also it is possible to run report into *PDF* file and one step sending via e-mail by calling `NCReport::runReportToPDFSendMail(const QString &filename, LMailSender *mailSender)` method. An existing `LMailSender` object must be prepared before calling this function. The detailed class information you find in API documentation.

5.13.1 E-mail sending example

The following example shows how the `LMailSender` should be used and how the attachments are added.

```
LMailSender mail;
mail.setSmtpServer("mail.mailserver.com");
//mail.setPort(465);
//mail.setSsl(true);
mail.setLogin("user@mailserver.com", "xyz123");
mail.setSubject("Test Email");
mail.setBody("Hello!\nThis is a test report. How are you?");
mail.setFrom("me@myself.com");
mail.setFromName("Albert Einstein");

// Recipient
QStringList listTo;
listTo << "myfriend@anywhere.com";

mail.setTo( listTo );

QFile file("c:/Documents/report_result1.pdf");
if (file.open(QFile::ReadOnly))
  mail.setAttachment("report_result1.pdf", file.readAll());

QFile file2("c:/Documents/report_result2.html");

if (file2.open(QFile::ReadOnly))
  mail.setAttachment("report_result2.html", file2.readAll());

if ( !mail.send() )
  qDebug("Mail error: %s",qPrintable(mail.lastError()));
```

Example of running report to PDF and sending via e-mail:

```
LMailSender mail;
mail.setSmtpServer("mail.mailserver.com");
mail.setLogin("user@mailserver.com", "xyz123");
mail.setSubject("Test Email");
mail.setBody("Hello!\nThis is a test report. How are you?");
mail.setFrom("me@myself.com");
mail.setFromName("Albert Einstein");

NCReport* report = new NCReport();
...
report->runReportToPDFSendMail("myreport.pdf", mail);
...
```

5.14 General TEXT output

Text output is a very powerful feature in NCReport. The function provides the ability of generating various kind of text outputs like HTML, XML, Plain text, etc. Text Output requires an additinal template to be existed. Before running a report you have to specify the text template file as well.

TIP

TEXT output is generated very fast, because data is processed and substituted directly into the text template without any graphical rendering.

5.14.1 Text template manager tags

The following manager keywords/tags are available when you create a text template. Each start and end tags represents a specified section. Tags are enclosed in standard HTML comment tokens, according to HTML

Table 5.3 Text template tags

Tag keyword	Description
`<!-- BEGIN {DH} -->`	Document header begins. Document means the current text output. For example the HTML header part.
`<!-- END -->`	Section ends
`<!-- BEGIN {DF} -->`	Document footer begins. For example the HTML document footer part.
`<!-- END -->`	Section ends
`<!-- BEGIN {PH} -->`	Page header section begins.
`<!-- END -->`	Section ends
`<!-- BEGIN {PF} -->`	Page footer section begins.
`<!-- END -->`	Section ends
`<!-- BEGIN {RF} -->`	Report header section begins.
`<!-- END -->`	Section ends
`<!-- BEGIN {RF} -->`	Report footer section begins.
`<!-- END -->`	Section ends
`<!-- BEGIN {D.DetailID} -->`	Detail section begins. Section is identified by DetailID
`<!-- END -->`	Section ends
`<!-- BEGIN {GH.DetailID.GroupID} -->`	>Group header section begins. Section is identified by both DetailID and GroupID
`<!-- END -->`	Section ends
`<!-- BEGIN {GF.DetailID.GroupID} -->`	>Group footer section begins. Section is identified by both DetailID and GroupID
`<!-- END -->`	Section ends

5.14.2 Examples

Example 5.6 TEXT output template example

The following example shows how a typical usage of text template

```
<!-- BEGIN {DH} -->
SIMPLE TEXT REPORT OUTPUT
<!-- END -->
<!-- BEGIN {PH} -->
Customer ID       Name             Address
-----------------------------------------------
<!-- END -->
<!-- BEGIN {D.Detail1} -->
$D{custid}        $D{custname}     $D{address}
<!-- END -->
```

Chapter 6

Command line client

NCReport engine is also available in command line client executable.

6.1 To run command line executable

Running the command line engine use the *NCReport* command in the installed /bin directory:

```
NCReport [options]
```

6.2 Command line options

-?, --help Display this help

-v, --version NCReport version

-f, --report-file [filename] Name of the report definition XML file. If this is set, the report definition will be parsed from this file instead of a database

-q, --sql-driver [driver] Qt sql driver name for database connection. Avaible drivers: QDB2, QIBASE, QMYSQL, QOCI, QODBC, QPSQL, QSQLITE, QTDS

-h, --host [hostname] Database host name or IP address (default is localhost)

-u, --user [username] Database user login name

-p, --password [password] Database user login password

-d, --database [dbname] Database name to use

-pt --port [port] Database port number

-c, --connection-id [id] Sql connection name/id

-cs, --connect-string [string] Joined connection string in [user]/[pass]@[host/sid] format

-co, --connect-option [opt] Connect option string/id

-o, --output [output type] Output types: print, preview, pdf, svg, html, image. Use *print* for send report to printer or *preview* to show report in a preview window. The default output is preview

-of, --output-file [filename] Output file name. Required for file based output types.

-n, --printer [printername] Name of the target printer

--copies [1..50] Number of copies in case output is printer

--force-copy Use forced copy printing method. This is useful for documents in which has to be known the number of current copy.

--nodialog Runs report to default printer without showing printer dialog.

-dbid, --report-db-id [id] ID number of the report definition (xml) text in a database record. If this is set the report definition will be parsed from database/table/record instead of a file.

-par, --add-parameter [parametername],[value] Adds a custom parameter to report. You must specify the value and name of the parameter separated by comma. The $P{parametername} expression can be used in the report definition (Example: firstname,Robert)

-l, --language [filename] International 2 letters language code of the current report language Works only when the specified language is defined in a multi lingual report.

-td, --template-dir [dir] Sets default template directory when using additional files, such as charts. Works only when the specified language is defined in a multi lingual report.

-hs, --htmlstrategy HTML output generation strategy. 1 = section is translated as one table (default) 2 = sections are always unique tables

-css, --css-file HTML output style sheet file to be generated. If not set, the stylesheet is included in the target HTML file.

Part II

Reference

Chapter 7

Specification

This document is essentially a specification of NCReport Reporting System XML structure. This is a brief documentation of XML report definition.

7.1 Data sources

Since the report generator builds a printable representation of data from a data source, the the data source is one of the most important part of the system. Data may come from an SQL query using Qt's database SQL database connection drivers or from other sources such as *text, XML, string list, item model* or *custom* defined data source. One report can contain multiple data sources and each details can be connected it's own data source. Often a data source is not assigned to any of the detail, then the initial (first) record/row data of the data source is evaluated

7.1.1 SQL data source

SQL queries are mostly used data sources of NCReport. It requires SQL database connection using Qt's database driver plugins. Database connection might be internal or external. With internal (the default) connection a valid database connection must be established by the application uses NCReport before running the report. External connection parameters must be specified if external connection is used.

7.1.1.1 XML syntax

```
<datasource>[SQL query]</datasource>
<datasource>[query filename]</datasource>
```

7.1.1.2 Tag properties

id data source ID. Identification name of the data source. Details are assigned to data source by this ID.

type Specifies the data source type. Equals `SQL` for SQL data sources. Possible values are: `SQL,txt,-xml,list,model,custom`

source The source of the data source definition. Depending on this option the SQL query is stored and read from the report definition or from a specified file. Possibly values are: `static,file,par-ameter`

connection Specifies the SQL database connection handling method. Possibly values are: `internal,-external` With internal (the default) connection a valid database connection must be established by the application uses NCReport before running the report. If external connection is specified, the report generator connects to the database when opening the data source. If this occurs the `host,database,user,password,port` possible connection parameters are used.

connID The database connection's name that is used when the `QSQLDatabase::addDatabase(.-..)` method is called in the report engine. This ID is required for running SQL query which is assigned to the data source

parentID If the data source is a sub-item of a parent data source (sub-query system) then this ID equals to the ID of parent data source. Valid for SQL data sources only

driver The name of the Qt's SQL database driver. The possible values are: `QDB2, QIBASE, QMYSQL, QOCI, QODBC, QPSQL, QSQLITE2, QSQLITE, QTDS`

host Host name for SQL database connection. Used only when external connection is defined.

database Database name for SQL database connection. Used only when external connection is defined.

user Host name for SQL database connection. Used only when external connection is defined.

password Password for SQL database connection. Used only when external connection is defined.

port Port number for SQL database connection. Used only when external connection is defined.

7.1.2 Text data source

Texts, text files, are able to be as a data source for NCReport. The data colums of a text are usually delimited by tab or other delimiter character. Even it's possible to avoid SQL database connection when using this kind of data source. It's necessary to set the delimiter type, this delimiter separates the columns and each row represents a data record. Text data sources can be static, stored in XML definition or can be a file

7.1.2.1 XML syntax

```
<data source>[static text]</data source>
<data source>[filename]</data source>
```

7.1.2.2 Tag properties

id data source ID. Identification name of the data source. Details are assigned to data source by this ID.

type Specifies the data source type. Equals `txt` for text data sources.

source The source of the data source definition. Depending on this option the text is stored and read from the report definition or from a specified file. Possibly values are: `static,file`

7.1.3 XML data source

Extensible Markup Language (XML) format is also can be a data source for NCReport. If using xml data source you don't need SQL database connection. Currently not available

7.1.3.1 XML syntax

```
<data source>[static xml text]</data source>
<data source>[xml filename]</data source>
```

7.1.3.2 Tag properties

id data source ID. Identification name of the data source. Details are assigned to data source by this ID.

type Specifies the data source type. Equals `xml` for XML data sources.

7.1.4 String list data source

It's possible to use also QStringList as data source for NCReport. Before running report, a QStringList must be assigned to the specified data source and also is necessary to set a delimiter character for separating columns in each list item that represents a data record.

7.1.4.1 XML syntax

```
<data source></data source>
```

7.1.4.2 Tag properties

id data source ID. Identification name of the data source. Details are assigned to data source by this ID.

listID ID of the list. This identification name specifies the id of the `QStringList` added to NCReport.

type Specifies the data source type. Equals `list` for string list data sources.

7.1.5 Item model data source

Qt's item model classes provide a generic model for storing custom data. For example `QStandardItemModel` can be used as a repository for standard Qt data types. It is one of the Model/View Classes and is part of Qt's model/view framework. It's possible to use item models as data source for NCReport. Before running report, a `QAbstractItemModel` based class must be created and assigned to the specified data source.

7.1.5.1 XML syntax

```
<data source></data source>
```

7.1.5.2 Tag properties

id data source ID. Identification name of the data source. Details are assigned to data source by this ID.

modelID ID of the model. This identification name specifies the id of the Model added to NCReport.

type Specifies the data source type. Equals `model` for item model data sources.

7.1.6 Custom data source

Often data is stored in special repository such as lists, arrays etc. You can build your custom data source class derived from `NCReportdata source` base class. It is an abstract class - you just have to implement the required methods.

7.2 Report sections

Report sections are the representations of the function specific areas inside the report. The whole report is builded from sections. They are often a recurring areas such as detail, headers and footers. The most important section is called Detail since details can contain the fields are changed row by row. Each sections can contain all kinds of report items. Item's coordinates are always relative to it's parent section. One report can contain the following sections:
Report header, report footer, page headers, page footers, group headers and footers and details

7.2.1 Page header

Page headers is used to contain page headings. Page headers have the following characteristics:

- Always print at the top of a page
- Always contain the first information printed on a page
- Only display one (current) row of data returned by a data source
- Only one allowed per page

7.2.1.1 XML syntax

```
<pageheader>...</pageheader>
```

7.2.1.2 Tag properties

height The height of the page header section in millimeters

7.2.2 Page footer

Page Footer are commonly used to close the pages. Page footers have the following characteristics:

- Always print at the bottom of a page
- Only display one (current) row of data returned by a data source
- Only one allowed per page
- Page footer is usually used to display informations like number of the page, report titles and so on.

7.2.2.1 XML syntax

```
<pagefooter>...</pagefooter>
```

7.2.2.2 Tag properties

height The height of the page footer section in millimeters

7.2.3 Report header

Report header is used to contain report headings. Report header has the following characteristics:

- Always printed after the page header
- Report header is printed only once at the begining of the report
- Displays only one (current) row of data returned by a data source

7.2.3.1 XML syntax

```
<reportheader>...</reportheader>
```

7.2.3.2 Tag properties

height The height of the report header section in millimeters

7.2.4 Report footer

Report footer is commonly used to close the report. Report footer has the following characteristics:

- Always printed before the page footer at the end of the report
- Only display one (current) row of data returned by a data source
- Only one allowed per report

7.2.4.1 XML syntax

```
<reportfooter>...</reportfooter>
```

7.2.4.2 Tag properties

height The height of the report footer section in millimeters

7.2.5 Details

The core information in a report is displayed in its Detail section. This section is the most important part of the report since it contains the row by row data from the data source Detail section have the following issues:

- Generally print in the middle of a page
- Always contain the core information for a report
- Display multiple rows of data returned by a data source
- The detail sections generally contains fields or dynamic objects.
- Multiple independent details are allowed in one report, each detail after the other
- Each detail is assigned to one specified data source

7.2.5.1 XML syntax

```
<detail>...</detail>
```

Structure:

```
<details>
  <detail>
    <items>...</items>
    <groups>...</groups>
  </detail>
  <detail>
    <items>...</items>
    <groups>...</groups>
  </detail>
  ...
</details>
```

7.2.5.2 Tag properties

id Name/ID of the detail for identification purpuses

height The height of the group header section in millimeters

data source The data source name/id the detail section is assigned to

7.2.6 Group sections

While most reports can be defined using a single Detail section having multiple columns and rows of data, others require summary data - such as subtotals. For reports requiring summary data, the report writer supports Group sections. Group sections have the following characteristics:

- Always associated with a Detail section
- Defined by Group Headers and Group Footers
- Group Headers always print above it's Detail section
- Group Footers always print below it's Detail section
- Reference database column on which Group Headers and Group Footers will break
- Force new Group Header each time the value of the referenced column changes
- Force a new Group Footer each time the value of the referenced column changes
- Unlimited level of groups allowed

The groups added to XML definition are shown in the order you have added. They are structured hierarchically. The first group will be the primary level of group, the second one is the second level and so on. The added group sections will appear in the designer after you applied the group settings.

7.2.6.1 XML syntax

```
<groups>
  <group>
    <groupheader>...</groupheader>
    <groupfooter>...</groupfooter>
  </group>
</groups>
```

7.2.6.2 Tag properties

id Identification label for naming the group

groupExp Group expression or data source column. Specifies the name of the data source column on which Group Headers and Group Footers will break. The expression also can be a constant value, in this case the detail row won't break. The constant group expression: `%CONST`

resetVariables The variable list appears the existed variables in the report. Just select the items represent the variables will be reset when the current group ends. Selecting the specified variables is very useful when for example you want to reset a total or a count variable.

reprintHeader Item's Y coordinate in millimeter within the current section.

7.2.6.3 Group header

Group headers are used to contain group heading items such as column head titles or so on. They are always printed above it's Detail section. A new Group Header is forced each time the value of the referenced column changes.

7.2.6.3.1 XML syntax

```
<groupheader>...items...</groupheader>
```

7.2.6.3.2 Tag properties

height The height of the group header section in millimeters

7.2.6.4 Group footer

Group footers are used to contain group footing items such as totals, subtotals. They are always printed below it's Detail section. A new Group Footer is forced each time the value of the referenced column changes.

7.2.6.4.1 XML syntax

```
<groupfooter>...items...</groupfooter>
```

7.2.6.4.2 Tag properties

height The height of the group footer section in millimeters

7.3 Report Parameters

Parameters are data pulled from outside of the report generator. The application that calls NCReport object passes informations as parameter to NCReport class by `addParameter(...)` method. Parameters are evaluated within SQL queries and fields or script expressions. Field objects may have a parameter data source type, so they can be presented as data in the report. Parameters mostly used in queries. If you want to embed a parameter into the query or an expression use this syntax:

```
$P{parametername}
```

Example of using parameter in SQL query:

```
SELECT productId, productName FROM db.products WHERE primaryKey=$P{parametername}
```

7.4 Variables

Variables are specific items of the report. Variables are special fields used for providing counts and totals. Each of the variables have name, function type, data type, and have an assigned data source column the variable based on. We will explain what the different function types mean:

Count The *COUNT* type of variable will increment by 1 for every row returned by a query.

Sum The *SUM* (summary) variable will summarize the value of the specified data source column. It requires numeric field type. To embed a parameter into an expression use this syntax:

```
$V{variablename}
```

7.5 System Variables

System variables are special variables that provide some report system informations such as page number, current date/time etc. for fields Names of available system variables are:

pageno Returns the current page number

pagecount Returns the count of total pages of the report. Works only for Text document printout mode.

forcecopies Returns the number of total force copies

currentcopy Returns the current number of force copy

currentrow Returns the current detail row number

date Returns the current date

time Returns the current time

datetime Returns the timestamp

appname Returns the name of this application

applongname Returns the long name of this application

appinfo Returns the full info string of this application

appversion Returns the version of this application

appcopyright Returns the copyright info of this application

qtversion Returns the Qt version

os Returns the operation system

For variable fields or to embed a parameter into an expression use this syntax:

```
$V{systemvariablename}
```

7.6 Expressions

NCReport since 2.0 version handles script expressions using Qt Script the new powerful feature of Qt 4.3. Qt Script is based on the ECMAScript scripting language, as defined in standard ECMA-262. Fields and group expressions may are script codes instead of data source column. The report engine evaluates the specified script code in each time when fields are refreshed. Report items can have printWhen property. They are also script expressions that return boolean result. To use script expression in fields the `ftype="exp"` field property must be specified.

7.6.1 References in expressions

Expressions can contain and evaluate references such as

- data source data
- parameter
- variable

The references are always replaced to their current value before the exression is evaluated. The syntax of referneces are the following:

$D{[data source.]column[,n]} data source column reference. Returns the current value of the data source column from the current row/record. If `[data source.]` is not specified the current data source (assigned to the current detail) is interpreted.

If *n* is specified then first, the data source will be positioned to *n* th. record. Works only if the `::seek( int )` method is defined in the appropriate data source class.

$P{paramatername} Parameter reference. Returns the value of the parameter by name/ID

$V{variablename} Variable reference. Returns the current value of the variable by name/ID.

7.6.2 Using script expression in field:

```
"$D{db.productName}"+" "+"some string"+"$P{parametername}"
```

Using script expression in `printWhen` property

```
$D{price}<1500
```

NOTE

Quotation mark in expressions is required only if a string data are applied. Otherwise (i.e for number) the quotation mark is not neccessary.

7.7 Report items

7.7.1 Text label

The Label represents simple text or label items. Label items are used to display descriptive information on a report definition, such as titles, headings, etc. Labels are static item, it's values don't change when rendering the report.

7.7.1.1 XML syntax

```
<label>Text label...</label>
```

7.7.1.2 Tag properties

id Identification number for internal purpuses (temporarily not used)

posX Item's X coordinate in millimeter within the current section.

posY Item's Y coordinate in millimeter within the current section.

width Label's width in millimeter.

height Label's height in millimeter.

resource Resource of the label. Not used for labels since they are always static.

fontName Font style/face name

fontSize Font size in points.

fontWeight Font weight. Possible values are: `bold,demibold`

alignmentH Label's horizontal alignment. Possible values: `left,right,center`

alignmentV Label's vertical alignment. Possible values: `top,center,bottom`

forecolor The foreground color of the label in `#RRGGBB` format

zValue This integer number specifies Z-order value of the item. This value decides the stacking order of sibling (neighboring) items.

printWhen This logical script expression specifies the item's visibility. If this expression is not empty, the report engine evaluates it each time before rendering. If the logical expression returns true (or 1) the item is shown, otherwise the item is hidden.

7.7.2 Field

The Field is the matter of report items. It represents the data Field objects. By data type Fields may be text, numeric and date. Field items are used for pulling dynamically generated data into a report from the specified data source such as database the report generator uses. For example, a Field item may be used to present SQL data, variables and parameters. NCReport handles data formatting for the different type of fields like numbers or texts.

7.7.2.1 XML syntax

```
<field>[data sourcename.]column</field>
<field>[expression]</field>
<field>[parametername]</field>
<field>[variablename]</field>
<field>[system variablename]</field>
```

7.7.2.2 Tag properties

id Identification number for internal purpuses (temporarily not used)

type The field's base data type. The following data types are handled:

- `txt` Text data
- `num` Numeric data. All numeric formatting options are valid only when this option is set
- `date` Date data. The date formattiong options are valid for date type data only
- `bool` Boolean data. It's value might be Yes/True or Not/False

ftype This property represents what kind of field source expression is used by the field. Field's value are pulled from the specified source is set by this property. The possible sources are:

- `ds/SQL` The field gets data from the default or the specified data source
- `par` The field gets data from the specified parameter
- `var` The field gets data from the specified variable
- `sys` The field gets data from the specified system variable
- `exp` The field evaluates the script expression and it's result will be rendered

posX Item's X coordinate in millimeter within the current section.

posY Item's Y coordinate in millimeter within the current section.

width Field's width in millimeter.

height Field's height in millimeter.

resource Not used for fields since they are always dynamic.

fontName Font style/face name

fontSize Font size in points.

fontWeight Font weight. Possible values are: `bold, demibold`

alignmentH Field's horizontal alignment. Possible values: `left, right, center`

alignmentV Field's vertical alignment. Possible values: `top, center, bottom`

forecolor The foreground color of the field in `#RRGGBB` format

formatting If the field's data type is numeric, this option tells the report engine if number formatting is turned on or off. The possible values are: `true,false`

numwidth Width of number in digits. The fieldWidth value specifies the minimum amount of space that a is padded to and filled with the character fillChar. A positive value will produce right-aligned text, whereas a negative value will produce left-aligned text. Works only when the number formatting is turned on

format This one digit option specifies the format code for numbers. Possibly values are: `e,E,f`. With `e,E` and `f`, precision is the number of digits after the decimal point. With 'g' and 'G', precision is the maximum number of significant digits. Used by `QString::arg( double a, int fieldWidth = 0, char format = 'g', int precision = -1, const QChar & fillChar)` function.

precision The number of digits after the decimal point for numeric data.

fillchar The numwidth value specifies the minimum amount of space that a is padded to and filled with the character fillchar. A positive value will produce right-aligned text, whereas a negative value will produce left-aligned text.

callFunction Specifies the Field level custom function is called when the field is evaluated. Not used currently.

lookupClass Similar to callFunction. Temporarely is not used.

dateFormat Date formatting expression. This expression uses the same format `QDate::fromString()` uses. Works only when the field's type is date

localized Specifies if localization is turned on or off. Works for numeric data only. The possible values are: `true, false`

blankifzero If `true`, If the field's value equals zero, the field will not be displayed.

arg This expression specifies the `QString::arg(...)` string of field's value to be replaced or formatted. The field gets a copy of this string where a replaces the first occurrence of %1. The '%' can be followed by an 'L', in which case the sequence is replaced with a localized representation of a. The conversion uses the default locale, set by `QLocale::setDefault()`. If no default locale was specified, the "C" locale is used.

zValue This integer number specifies Z-order value of the item. This value decides the stacking order of sibling (neighboring) items.

printWhen This logical script expression specifies the item's visibility. If this expression is not empty, the report engine evaluates it each time before rendering. If the logical expression returns true (or 1) the item is shown, otherwise the item is hidden.

7.7.3 HTML Text

HTML Text represents the rich texts in Html format.

7.7.3.1 XML syntax

```
<text>Static (encoded) Html text</text>
<text>[data source].column</text>
<text>[filename]</text>
```

7.7.3.2 Tag properties

id Identification number for internal purpuses (temporarily not used)

posX Item's X coordinate in millimeter within the current section.

posY Item's Y coordinate in millimeter within the current section.

width width in millimeter.

height height in millimeter.

resource Resource of the text. Not used for labels since they are always static.

fontName Font style/face name. Effects only if system settings is enabled.

fontSize Font size in points. Effects only if system settings is enabled.

fontWeight Font weight. Possible values are: `bold,demibold` Effects only if system settings is enabled.

forecolor The foreground color of the label in `#RRGGBB` format. Effects only if system settings is enabled.

zValue This integer number specifies Z-order value of the item. This value decides the stacking order of sibling (neighboring) items.

printWhen This logical script expression specifies the item's visibility. If this expression is not empty, the report engine evaluates it each time before rendering. If the logical expression returns true (or 1) the item is shown, otherwise the item is hidden.

7.7.4 Line

The Line option enables you to create Line items. In general, Line items are used for drawing vertical, horizontal lines for headings, underlining titles or so on. Lines are defined by it's start and the end point coordinates

7.7.4.1 XML syntax

```
<line></line>
```

7.7.4.2 Tag properties

id Identification number for internal purpuses (temporarily not used)

lineStyle Specifies the line drawing style of the item. Possible values are:

- `solid` Solid line
- `dash` Dashed line
- `dot` Dotted line
- `dashdot` Dash+dotted line
- `dashdotdot` Dash+dot+dot line
- `nopen` No line painted. Unavailable for lines

fromX X coordinate of the start point of line in millimeters within the current section.

fromY Y coordinate of the start point of line in millimeters within the current section.

toX X coordinate of the end point of line in millimeters within the current section.

toY Y coordinate of the end point of line in millimeters within the current section.

resource Not used for lines since they are always static.

lineWidth The width of the line in millimeters

lineColor The color of the line in `#RRGGBB` format

zValue This integer number specifies Z-order value of the item. This value decides the stacking order of sibling (neighboring) items.

printWhen This logical script expression specifies the item's visibility. If this expression is not empty, the report engine evaluates it each time before rendering. If the logical expression returns true (or 1) the item is shown, otherwise the item is hidden.

7.7.5 Rectangle

The Rectangle enables you to create Rectangle items. Rectangles are usually used for drawing boxes or borders around a specified area. Rectangle makes easier the box drawings instead of drawing four lines.

7.7.5.1 XML syntax

```
<rectangle></rectangle>
```

7.7.5.2 Tag properties

id Identification number for internal purpuses (temporarily not used)

lineStyle Specifies the line drawing style of the rectangle. Possible values are:

- `solid` Solid line
- `dash` Dashed line
- `dot` Dotted line
- `dashdot` Dash+dotted line
- `dashdotdot` Dash+dot+dot line
- `nopen` No line painted. The rectange is rendered without outline

fillStyle Specifies the fill style or painting brush of the rectangle. Possible values are:

- `no` Rectangle is not filled.
- `solid` Solid fill
- `dense1` Extremely dense brush pattern fill
- `dense2` Very dense brush pattern fill
- `dense3` Somewhat dense brush pattern fill
- `dense4` Half dense brush pattern fill
- `dense5` Half dense brush pattern fill
- `dense6` Somewhat sparse brush pattern fill
- `dense7` Very sparse brush pattern fill
- `hor` Horizontal lines pattern fill
- `ver` Vertical lines pattern fill
- `cross` Cross lines pattern fill
- `bdiag` Backward diagonal lines pattern fill
- `fdiag` Foreward diagonal lines pattern fill
- `diagcross` Crossing diagonal lines pattern fill

posX Rectangle's X coordinate in millimeters within the current section.

posY Rectangle's Y coordinate in millimeters within the current section.

width Rectangle's width in millimeters.

height Rectangle's height in millimeters.

resource Not used for rectangles since they are always static.

lineWidth The width of the outline in millimeters

lineColor The color of the rectangle's outline in `#RRGGBB` format

fillColor The fill color of the rectangle in `#RRGGBB` format

zValue This integer number specifies Z-order value of the item. This value decides the stacking order of sibling (neighboring) items.

printWhen This logical script expression specifies the item's visibility. If this expression is not empty, the report engine evaluates it each time before rendering. If the logical expression returns true (or 1) the item is shown, otherwise the item is hidden.

7.7.6 Image

The Image option enables you to create Image items. Image items are used to insert either static or dynamic into a report definition. Static images such as a company logo often displayed in the Report Header can be loaded from a static file or from report definition. Dynamic images can be loaded from the specified SQL data source.

7.7.6.1 XML syntax

```
<image>[image in Base64 encoded format]</image>
<image>[image file name]</image>
<image>[data source.]column</image>
```

7.7.6.2 Tag properties

id Identification number for internal purpuses (temporarily not used)

resource Specifies the resource of the image item. Possible values are:

- `static` Image is loaded from report definition. The image must be saved into XML definition in Base64 encoded format
- `data source` Image is loaded from data source (SQL database)
- `file`Image is loaded from the specified file. File might be with full path or reative to the program's directory

posX Image's X coordinate in millimeters within the current section.

posY Image's Y coordinate in millimeters within the current section.

width Image's width in millimeters.

height Image's height in millimeters.

scaling Logical option that specifies the image if is scaled or not. Possible values: `true`, `false`

aspectRatio If scaling option is switched on, this property specifies the scaling method. Possible values:

- `ignore` The size of image is scaled freely. The aspect ratio is not preserved.
- `keep` The size is scaled to a rectangle as large as possible inside a given rectangle, preserving the aspect ratio.
- `expand` The size is scaled to a rectangle as small as possible outside a given rectangle, preserving the aspect ratio.

zValue This integer number specifies Z-order value of the item. This value decides the stacking order of sibling (neighboring) items.

printWhen This logical script expression specifies the item's visibility. If this expression is not empty, the report engine evaluates it each time before rendering. If the logical expression returns true (or 1) the item is shown, otherwise the item is hidden.

7.7.7 Barcode

The Barcode option enables you to create barcodes. Currently the EAN13 code format is supported. Barcodes might be either static or dynamic items similar to images. Static barcodes read it's value from the report definition, dynamic barcodes are loaded from the specified data source.

7.7.7.1 XML syntax

```
<barcode>[code]</barcode>
<barcode>[data source.]column</barcode>
```

7.7.7.2 Tag properties

id Identification number for internal purpuses (temporarily not used)

resource Specifies the resource of the barcode item. Possible values are:

- `static` Barcode is loaded from report definition. The barcode's code must be specified in XML definition
- `data source` Barcode is loaded from data source

posX Barcode's X coordinate in millimeters within the current section.

posY Barcode's Y coordinate in millimeters within the current section.

width Barcode's width in millimeters.

height Barcode's height in millimeters.

barcodeType The type name of the barcode. Possible values: `EAN13`

showCode The logical property specifies if the code is shown under the barcode or not. Possible values: `true, false`

sizeFactor This integer property specifies the zooming factor of the barcode when it is rendering. This property is very useful when we print barcodes to a high resolution device such as printer. (Suggested value=10)

fontSize The font size of the barcode's text in points.

zValue This integer number specifies Z-order value of the item. This value decides the stacking order of sibling (neighboring) items.

printWhen This logical script expression specifies the item's visibility. If this expression is not empty, the report engine evaluates it each time before rendering. If the logical expression returns true (or 1) the item is shown, otherwise the item is hidden.

7.7.8 Graph or custom item

Graph/Custom item is a special member of NCReport items. This option enables you to render special, custom defined contents in reports. The typical field of application is using this feature for rendering graphs or such contents. For using this feature you need to do the followings:

- Add a Graph (Custom) item into your report in the designer and specify the size and the location of this object.
- Set the class ID of the specified item
- If need, add a static item definition for the object. If you set it's resource to data source and fill out the data source column, this information will come from the specified data source column.
- Derive the `NCReportAbstractItemRendering` class implementing it's paintItem method. You may 'stick' this class to your graph or any kind of rendering class by multiple inheritance. The paintItem method gets the following parameters:
  - `QPainter* painter` this is the painter pointer.
  - `NCReportOutput* output` the output object pointer.
  - `const QRectF& rect` the rectangle of the object in the specified output. The geometry of the rectangle is depending on the output's resolution.
  - `const QString& itemdata` item definition information comes from data source or report definition for custom purpuses.
- Set the string ID of your class for identification by `setID(...)` method.
- Create your custom rendering object (it must to be derived from `NCReportAbstractItemRendering` class) and add it to NCReport object by using `addItemRenderingClass(...)` method.

7.7.8.1 XML syntax

```
<graph></graph>
```

7.7.8.2 Tag properties

id Identification number for internal purpuses (temporarily not used)

classID Class ID text for custom item class identification

resourceSpecifies the resource of the graph item. Possible values are:

- `static` Graph definition is loaded from report definition. The definition text must be existed in XML definition
- `data source` Graph definition text is loaded from data source

posX Graph's X coordinate in millimeters within the current section.

posY Graph's Y coordinate in millimeters within the current section.

width Graph's width in millimeters.

height Graph's height in millimeters.

zValue This integer number specifies Z-order value of the item. This value decides the stacking order of sibling (neighboring) items.

printWhen This logical script expression specifies the item's visibility. If this expression is not empty, the report engine evaluates it each time before rendering. If the logical expression returns true (or 1) the item is shown, otherwise the item is hidden.

Part III

Using NCReport API

Chapter 8

Using NCReport class

This chapter shows you how to create an NCReport class and how to use it from your application. As we described earlier NCReport system consists of two parts: Report renderer library and a report designer GUI application. Of course the report engine can be used separately from Designer.

If you want to use NCReport from your application, first you have to integrate NCReport to your app. There are several ways to do this:

- To add the whole sources to your project and build it together with your application.
- To use NCReport engine as shared library. For using NCReport library like other libraries in your project you need to specify them in your project file. For more informations see the Qt documentation in qmake manual at chapter Declaring Other Libraries.
- Statically linking NCReport library to your project. For more informations see the Qt documentation in qmake manual at chapter Declaring Other Libraries

8.1 Project file settings

You have to add to your .pro file at least the following lines:

```
DEFINES += NCREPORT_IMPORT
...
LIBS += /PathToLib/ncreport2.lib
INCLUDEPATH += /PathToIncludes/include
...
```

8.2 Initialize NCReport class

This section covers the fundamental steps that most users should take when creating and using NCReport class. We present each of the activities in the suggested order.

8.2.1 Include directives

To include the definitions of the module's classes, use the following directive:

```
#include "ncreport.h"
#include "ncreportoutput.h"
#include "ncreportpreviewoutput.h"
#include "ncreportpreviewwindow.h"
```

8.2.2 Creating NCReport class

Create the report class just like as another QObject based class:

```
NCReport *report = new NCReport();
```

If the class has created earlier and passed as a parameter to your method in which you use the report object you should inititalize the report by calling `reset()` method:

```
report->reset();
```

You dont't need using `reset()` if the report object is declared immediately before using it.

8.3 Connecting to SQL database

SQL connection is required only when your data source uses internal database connection. In other words Internal connection menas an already existing database connection which is established before running the report. On the other hand reports can also use external (defined in the report / built-in) connection as well. Other data sources don't require db connection.

This example code shows a typical SQL database connection with error handling:

```
QSqlDatabase defaultDB = QSqlDatabase::addDatabase("QMYSQL", "myconn" );
if ( !defaultDB.isValid() ) {
    QMessageBox::warning( 0, "Report error", QObject::tr("Could not load database ↩
         driver.") );
    delete report;
    return;
}
defaultDB.setHostName( "host" );
defaultDB.setDatabaseName( "database" );
defaultDB.setUserName( "user" );
defaultDB.setPassword( "password" );

if ( !defaultDB.open() ) {
    QMessageBox::warning( 0, "Report error", QObject::tr("Cannot open database: " ↩
        )+defaultDB.lastError().databaseText() );
    return;
}
```

8.4 Setting the Report's source

Report source means the way of NCReport handles XML report definitions, in other words the source of report definition XML data. Report definitions may opened from a file - in most cases it is suitable, but it can be loaded also from an SQL database's table. For informations of configuring and using the different report sources see ...

In current example we apply File as report source:

```
report->setReportFile( fileName );
```

This code is equivalent with this code:

```
report->setReportSource( NCReportSource::File );
report->reportSource()->setFileName( fileName );
```

8.5 Adding parameters

If your report uses parameters you have to add parameter object(s) to NCReport object before running the report. To create and add a parameter do this:

```
report->addParameter( "id", "value" );
```

where ID is a QString, the value is a QVariant object.

8.6 Running the Report

Now we are ready to run the Report and catch the error message if an error occurs. There are at least two ways to start running the report engine.

8.6.1 Running the Report by One Step

This running mode is the most simple but with less custom configuration is available.

```
// run report to printer
bool result = report->runReportToPrinter(1, true, parent);
// run report to pdf file
bool result = report->runReportToPDF( "file.pdf" );
// run report to svg files
bool result = report->runReportToSVG( "file.svg" );
// run report to preview output
bool result = report->runReportToPreview();
// run report to QPrintPreview dialog
bool result = report->runReportToQtPreview();
```

By this way, if we want to preview the report we also have to create and show `NCReportPrevie-wWindow`. See the next section.

8.6.2 Running the Report in customized mode

This running report mode allows more flexible configuration. First we have to initialize the output object, after the report is ready to run.

8.6.2.1 Initializing Report's Output

The next issue is to create and specify the report's output. As rendering target, NCReport applies a class derived from NCReportOutput base class. There are pre-defined classes for the mostly used outputs: `NCReportPrinterOutput`, `NCReportPreviewOutput`, `NCReportPdfOutput`. To define the specified output use a code similar to this:

```
NCReportOutput *output=0;

if ( rbPreview->isChecked() ) {
    output = new NCReportPreviewOutput();
    output->setAutoDelete( FALSE );
    report->setOutput( output );

} else if ( rbPrinter->isChecked() ) {
    output = new NCReportPrinterOutput();
    output->setCopies(1);
    output->setShowPrintDialog(TRUE);
    report->setOutput( output );

} else if ( rbPdf->isChecked() ) {
    QString fileName = QFileDialog::getSaveFileName(this, tr("Save PDF File"),
    "report.pdf", tr("Pdf files (*.pdf)"));
    if ( fileName.isEmpty() ) {
    delete report;
    return;
} else {
    output = new NCReportPdfOutput();
    output->setFileName( fileName );
    report->setOutput( output );
}
```

8.6.2.2 Running the Report

Now we are ready to run the Report and catch the error message if an error occures:

```
QApplication::setOverrideCursor(QCursor(Qt::WaitCursor));
report->runReport();
bool error = report->hasError();
QString err = report->lastErrorMsg();
QApplication::restoreOverrideCursor();
```

8.6.2.3 Previewing Report

If we specified NCReportPreviewOutput as report's output, it does not run the preview form automatically. After the report engine succesfully done we need to inititalize an `NCReportPreviewWindow*` object for previewing. The following code shows the way of doing this. It is suggested to catch the error first, before running preview dialog.:

```
if ( error )
    QMessageBox::information( 0, "Riport error", err );
else {
    if ( rbPreview->isChecked() ) {
        //-----------------------------
        // PRINT PREVIEW
        //-----------------------------
        NCReportPreviewWindow *pv = new NCReportPreviewWindow();
        pv->setReport( report );
        pv->setOutput( (NCReportPreviewOutput*)output );
        pv->setWindowModality(Qt::ApplicationModal );
        pv->setAttribute( Qt::WA_DeleteOnClose );
        pv->exec();
    }
}
```

WARNING

We must not delete the output object after we added to the NCReportPreviewWindow object. The preview window will delete its output object when destroys.

TIP

For the best performance (quality) we should not delete NCReport object until we close preview dialog. Add the report object to the preview object by `setReport( NCReport* )`. If it's done the printing from preview will result the original printout quality, since it will run report again instead of printing the lower quality preview pages.

Since 2.8.4 version it's possible to show the preview widget in dialog mode, just like QDialog. NCReportPreviewMainWindow::exec() function shows the preview window and keeps application event loop while preview. This is good when you use a locally defined report object, because the report object will not be deleted until user closes the preview window.

8.7 Deleting Report object

After report running action you may want to delete the report object. Note, that preview window requires NCReport object to be existed. If NCReportPreviewWindow::exec() is used, then the application event loop stops until the preview window gets closed.

```
delete report;
```

8.8 Using other Datasources

NCReport allows you to use non SQL datasources of the likes of QString based text, QStringList, or custom defined datasource. Depending on the datasource type, data may come from a File, NCReportParameter or by another way.

8.8.1 QString based Text Datasource

NCReport allows to use QString texts as simplest datasource. Each text row represents one data record (rows are separated by the linefeed character) and the data columns are separated by a specified delimiter character. For column identification in fields use the number of the column as reference in the report by the following:

0 for 1st column, 1 for 2nd column ... etc. or col0 for 1st column, col1 for 2nd column ... etc.

For using text datasources add a Text datasource to your report in Designer. You have the following ways:

- Storing a static text in report definition. For doing so, in Designer select Static location type and add static text to the edit box by using the specified delimiter character.
- Using an existed text file. For doing so, in Designer select File location type and specify the name of the text file you want to use. Also you must specify the delimiter character.
- Adding text to NCReport by NCReportParameter. For doing so, first add the data text as a parameter to NCReport by addParameter() function. Select Parameter location type in Designer and specify the ID of the parameter you have added. Also you must specify the delimiter character.

Example of adding a QString text to NCReport as parameter and Tab character as column delimiter:

```
NCReport report;

QString data;

data += "1 \tChai                          \t16.0000\t1\t1540\t0\n";
data += "2 \tChang                         \t17.0000\t1\t 874\t0\n";
data += "3 \tAniseed Syrup                 \t 9.0000\t1\t1687\t0\n";
data += "4 \tChef Anton's Cajun Seasoning  \t20.0000\t1\t1230\t0\n";
data += "5 \tChef Anton's Gumbo Mixj       \t19.0000\t2\t1900\t0\n";
data += "6 \tGrandma's Boysenberry Spread  \t21.0000\t2\t 520\t0\n";
data += "7 \tUncle Bob's Organic Dried Pears \t25.0000\t3\t 540\t0\n";
data += "8 \tNorthwoods Cranberry Sauce    \t34.0000\t3\t 120\t0\n";
data += "9 \tMishi Kobe Niku               \t72.0000\t3\t 130\t0\n";
data += "10 \tIkura                        \t26.0000\t3\t2247\t0\n";
data += "11 \tQueso Cabrales               \t19.0000\t4\t 741\t0\n";
data += "12 \tQueso Manchego La Pastora    \t32.0000\t4\t 512\t0\n";
data += "13 \tKonbu                        \t 5.0000\t4\t1470\t0\n";
data += "14 \tTofu                         \t21.0000\t4\t 978\t0\n";
data += "15 \tGenen Shouyu                 \t14.0000\t4\t1005\t0\n";

report.addParameter( "data1", data );
```

8.8.2 QStringList Datasource

NCReport allows you to use also QStringList as a datasource. First you should define a QStringList. Each QStringList item represents one data record and the data columns are separated by a specified delimiter character.

For column identification in fields use the number of the column as reference in the report by the following:

0 for 1st column, 1 for 2nd column ... etc. or col0 for 1st column, col1 for 2nd column ... etc.

For using QStringList datasources add a StringList datasource to your report in Designer. You can only use Static location type since QStringList can be added to NCReporthave in one way only: using addStringList() function. You have to specify an id with the list for identifying purpuses.

Example of using QStringList as datasource:

```
NCReport report;

QStringList list;
list << "24|Renate Moulding|Desert Hot Springs,CA|1|2008-01-01";
list << "78|Alfred Muller|Miami Beach, FL|1|2008-01-03";
list << "140|Angela Merkel|Munchen, Germany|1|2008-01-07";
list << "139|Bob Larson|Dallas, TX|0|2008-01-20";

report.addStringList( list, "sl0" );
```

8.8.3 Item Model Datasource

Item/Model/View architecture is a very useful new feature of Qt4. NCReport allows you to use a datasource based on QAbstractItemModel. First you have to create your item model. Each model row represents one data record. For column identification in fields use the number of the column as reference in the report by the following:

0 for 1st column, 1 for 2nd column ... etc. or col0 for 1st column, col1 for 2nd column ... etc.

For using Item Model Datasources add an Item Model datasource to your report in Designer. You can only use Static location type, other locations are undefined. In your code add the Item model to NCReport using `addItemModel(...)` function. You have to specify an id to the model for identifying purpuses. The same ID you must specify for item model datasource in the designer.

Example of using Item Model as datasource:

```
QStandardItemModel *model = new QStandardItemModel( 2, 4 );
QStandardItem *item =0;

// -----------------------------------
item = new QStandardItem();
item->setData( 1, Qt::EditRole );
model->setItem( 0, 0, item);

item = new QStandardItem();
item->setData( "Chai", Qt::EditRole );
model->setItem( 0, 1, item);

item = new QStandardItem();
item->setData( 16.0, Qt::EditRole );
model->setItem( 0, 2, item);

item = new QStandardItem();
item->setData( 1540.0, Qt::EditRole );
model->setItem( 0, 3, item);

// -----------------------------------
item = new QStandardItem();
item->setData( 2, Qt::EditRole );
model->setItem( 1, 0, item);

item = new QStandardItem();
item->setData( "Chef Anton's Cajun Seasoning", Qt::EditRole );
model->setItem( 1, 1, item);

item = new QStandardItem();
item->setData( 20.0, Qt::EditRole );
model->setItem( 1, 2, item);

item = new QStandardItem();
item->setData( 1230.0, Qt::EditRole );
model->setItem( 1, 3, item);


report.addItemModel( model, "model1" );
```

8.9 Custom Datasources

NCReport allows you to create your own datasource by subclassing NCReportDataSource abstract class. By this way you can use anything as data for NCReport. You only have to implement the the required class methods. For adding your class to NCReport use addCustomDataSource() function. The following example demonstrates the way of defining and using custom datasource class:

8.9.1 Declaration

```
#include "../../ncreport/ncreportdatasource.h"
#include <QDate>

struct TestData {
    int id;
    QString name;
    QString address;
    bool valid;
    QDate date;
};

class TestDataSource : public NCReportDataSource
{
    Q_OBJECT
public:
    TestDataSource( QObject *parent=0 );
    TestDataSource() {}

    void addData( const TestData& );

    bool open();
    bool close();
    bool first();
    bool last();
    bool next();
    bool prevoius();
    int size() const;
    QVariant value( const QString& ) const;
    QVariant value( int ) const;
    bool read( NCReportXMLReader* );
    bool write( NCReportXMLWriter* );
private:
    QList<TestData>
    list;
    };
```

8.9.2 Implementation

```
TestDataSource::TestDataSource(QObject * parent) : NCReportDataSource( parent )
{
    datasourcetype = Custom;
    location = Static;
    recno =0;
}

bool TestDataSource::open()
{
    if ( list.isEmpty() ) {
        error->setError( tr("No data in TestDataSource datasource") );
        return false;
    }
    recno =0;
    m_opened = true;
    return true;
}
```

```
bool TestDataSource::close()
{
    recno =0;
    m_opened = false;
    return true;
}

bool TestDataSource::next()
{
    recno++;

    if ( recno >= list.count() ) {
        recno--;
        flagEnd = true;
        return FALSE;
    }
    flagBegin = false;
    return TRUE;
}

int TestDataSource::size() const
{
    return list.count();
}

bool TestDataSource::prevoius()
{
    recno--;

    if ( recno < 0 ) {
        recno = 0;
        flagBegin = true;
    }
    return TRUE;
}

bool TestDataSource::first()
{
    recno=0;
    return TRUE;
}

bool TestDataSource::last()
{
    recno = list.count()-1;
    return TRUE;
}

QVariant TestDataSource::value(const QString & column ) const
{
    if ( column == "id" )
        return value( 0 );
    if ( column == "name" )
        return value( 1 );
    if ( column == "address" )
        return value( 2 );
    if ( column == "valid" )
        return value( 3 );
    if ( column == "date" )
        return value( 4 );
    else
        return QVariant();
}
```

```
QVariant TestDataSource::value( int column ) const
{
    QVariant v;
    switch (column) {
        case 0: v = list.at(recno).id; break;
        case 1: v = list.at(recno).name; break;
        case 2: v = list.at(recno).address; break;
        case 3: v = list.at(recno).valid; break;
        case 4: v = list.at(recno).date; break;
    }
    return v;
}

bool TestDataSource::read(NCReportXMLReader *)
{
    return TRUE;
}

bool TestDataSource::write(NCReportXMLWriter *)
{
    return TRUE;
}

void TestDataSource::addData(const TestData & data)
{
    list.append( data );
}
```

8.9.3 Using the class

Now we have to take our TestDataSource class. For using the TestDataSource datasource add a Custom datasource to your report in Designer. You can only use Static location type for this datasource. Specify the class ID id with the list for identifying purpuses both in Designer and in the class by setID() function.

```
NCReport report;

TestDataSource *ds = new TestDataSource();

ds->setID("cds0");

TestData d1;
d1.id = 123;
d1.name = "Alexander Henry";
d1.address = "HOT SPRINGS VILLAGE, AR";
d1.valid = true;
d1.date = QDate(2008,01,10);
ds->addData( d1 );

TestData d2;
d2.id = 157;
d2.name = "Julius Coleman";
d2.address = "Coronado, CA";
d2.valid = false;
d2.date = QDate(2008,01,12);
ds->addData( d2 );

TestData d3;
d3.id = 157;
d3.name = "Peter Moulding";
d3.address = "San francisco, CA";
d3.valid = true;
d3.date = QDate(2008,01,07);
ds->addData( d3 );
```

```
report.addCustomDataSource( ds );
```

8.10 Custom items in NCReport

Custom items are powerful members of the report system. Custom item feature enables you to render special, custom defined contents in reports. The typical field of application is using this feature for rendering graphs or such kind of contents.

- Add a Graph (Custom) item into your report in the designer and specify the size and the location of the object. Specify the class ID of the item. This ID is used for identification.
- Subclass NCReportAbstractItemRendering class and implementing it's paintItem method.
- Set the ID of your class for identification by setID() function.
- Add your item class to NCReport by using addItemRenderingClass() function.

Let's take an example for custom item class:

8.10.1 Declaration

```
#include "../../ncreport/ncreportabstractitemrendering.h"

class TestItemRendering : public NCReportAbstractItemRendering
{
public:
    TestItemRendering();
    ~TestItemRendering();

    void paintItem( QPainter* painter, NCReportOutput* output, const QRectF& rect ↩
        , const QString& itemdata );
};
```

8.10.2 Implementation

```
#include "testitemrendering.h"
#include "../../ncreport/ncreportoutput.h"

#include <QPainter>
#include <QColor>

TestItemRendering::TestItemRendering()
{
}

TestItemRendering::~ TestItemRendering()
{
}

void TestItemRendering::paintItem(QPainter * painter, NCReportOutput * output,  ↩
    const QRectF & rect, const QString & itemdata)
{
    switch ( output->output() ) {
        case NCReportOutput::Printer:
        case NCReportOutput::Pdf:
        case NCReportOutput::Preview:
            break;
        default:
            return;
    }

    const int numcols = 10;
    const int cw = qRound(rect.width()/numcols);
    painter->setPen( Qt::NoPen );
    int ch=0;
    QColor color;
    color.setAlpha( 128 );
    for ( int i=0; i < numcols; ++i ) {
        if ( i%3 == 0 ) {
            color.setRgb(0xAAAAFF);
            ch = qRound(rect.height()*0.8);
        } else if ( i%2 == 0 ) {
            color.setRgb(0xAAFFAA);
            ch = qRound(rect.height()*0.4);
        } else {
            color.setRgb(0xFFAAAA);
            ch = qRound(rect.height()*0.6);
        }
        painter->setBrush( QBrush(color) );
        painter->drawRect( rect.x()+i*cw, rect.y()+qRound(rect.height())-ch , cw, ↩
             ch );
    }

    painter->setPen( QPen(Qt::black) );
    painter->setBrush( Qt::NoBrush );

    painter->drawRect( rect );

    painter->setFont( QFont("Arial",8) );
    painter->drawText( rect, Qt::AlignHCenter | Qt::AlignVCenter | Qt:: ↩
        TextWordWrap, QString("GRAPH EXAMPLE: %1").arg(itemdata) );
}
```

8.10.3 Using the class

```
NCReport report;

TestItemRendering *irc = new TestItemRendering();
irc->setID("testitem0");
report.addItemRenderingClass( irc );
...
```

8.11 Batch report mode[1]

Batch report mode is a feature that enables running multiple reports into one output. Batch mode makes possible to join two or more reports in a specified order and run them as one report. Page numbering doesn't change, each member reports keep its own number of pages. In reports the `reportno` and `reportcount` *system variables* are usable for determining the current report number and the total number of reports in batch.

[1] Since version 2.4.1

Example 8.1 Using batch mode

Batch mode is enabled when a report XML definition string is added by `addReportToBatch(...)` function. This example shows how we can easily prepare a batch report from existing report files.

```
...
report->clearBatch();
QString report1;
Utils::fileToString( "/home/anywhere/report1.xml", report1 );
report->addReportToBatch( report1 );

QString report2;
Utils::fileToString( "/home/anywhere/report2.xml", report2 );
report->addReportToBatch( report2 );

QString report3;
Utils::fileToString( "/home/anywhere/report3.xml", report3 );
report->addReportToBatch( report3 );
...
```

NOTE

The order of reports in batch equals the order of applied `addReportToBatch(...)` commands