General Information about Add-ons

Installation

The add-ons are made available as “ccaddons.zip”. This file is part of the default CaptainCasa installation – you find it within the folder <installdir>/resources/addons. The file has the following structure:

```
eclnt_ccaddons.zip
  src_ccadons
    org
      eclnt
        ccaddons
          ..
  webcontent
    ccaddons
      images
      *.jsp
    eclntjsfserver
      config
        resources.ccaddons.xml
    WEB-INF
      lib
        ccaddons.jar <== addons
        eclnt_pbc.jar <== page bean components
```

Typically you simply copy the webcontnt-directory into your CaptainCasa project.

All files and resources of the add-ons are strictly isolated from other parts of CaptainCasa or from other parts of your application:

- All jsp and image resources are kept in the directory /ccaddons
- All literal configuration is kept in resources.ccaddons.xml
- All classes are kept in ccaddons.jar

License Issues

The add-ons are not part of the normal CaptainCasa Enterprise Client license. The rules for using are:

- CaptainCasa provides the add-ons without any type of warranty.
- The usage of the add-ons as part of your application is for free – there is no cost associated, neither at design time nor at runtime.
- You are allowed to view and update the sources. We strongly recommend not to update any of the original source files, but to copy the whole sources into a package of your own.

CaptainCasa may adapt or change these license issues any time.

Versions Issues

The add-ons in general expect to be running on the most current CaptainCasa Enterprise Client version.

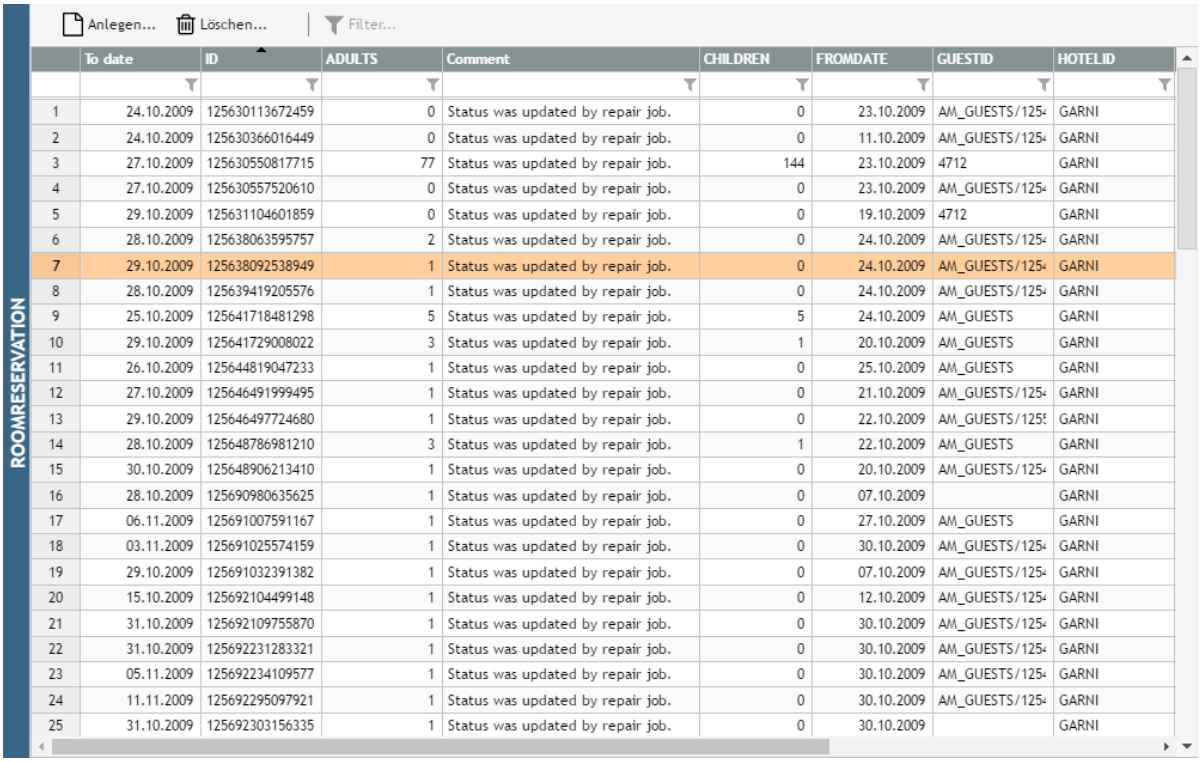
Add-on “Data Object Framework” (DOF)

The “Data Object Framework” (DOF) is part of eclnt_pbc.jar. It provides the capability of creating default “CRUD-dialogs” for data objects.

Introduction

One line of code creating some sophisticated dialog

Example: the following dialog...



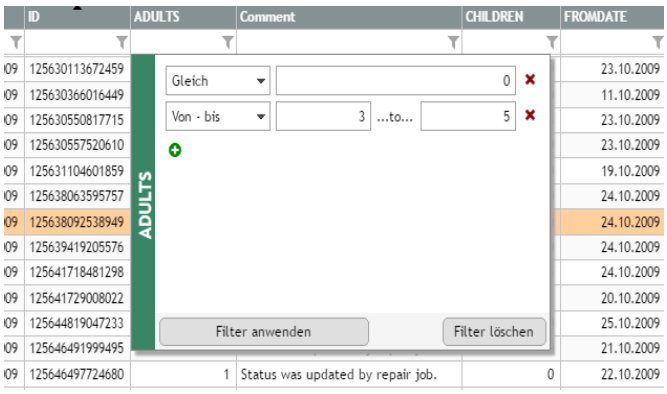
	To date	ID	ADULTS	Comment	CHILDREN	FROMDATE	GUESTID	HOTELID
1	24.10.2009	125630113672459	0	Status was updated by repair job.	0	23.10.2009	AM_GUESTS/125	GARNI
2	24.10.2009	125630366016449	0	Status was updated by repair job.	0	11.10.2009	AM_GUESTS/125	GARNI
3	27.10.2009	125630550817715	77	Status was updated by repair job.	144	23.10.2009	4712	GARNI
4	27.10.2009	125630557520610	0	Status was updated by repair job.	0	23.10.2009	AM_GUESTS/125	GARNI
5	29.10.2009	125631104601859	0	Status was updated by repair job.	0	19.10.2009	4712	GARNI
6	28.10.2009	125638063595757	2	Status was updated by repair job.	0	24.10.2009	AM_GUESTS/125	GARNI
7	29.10.2009	125638092538949	1	Status was updated by repair job.	0	24.10.2009	AM_GUESTS/125	GARNI
8	28.10.2009	125639419205576	1	Status was updated by repair job.	0	24.10.2009	AM_GUESTS/125	GARNI
9	25.10.2009	125641718481298	5	Status was updated by repair job.	5	24.10.2009	AM_GUESTS	GARNI
10	29.10.2009	125641729008022	3	Status was updated by repair job.	1	20.10.2009	AM_GUESTS	GARNI
11	26.10.2009	125644819047233	1	Status was updated by repair job.	0	25.10.2009	AM_GUESTS	GARNI
12	27.10.2009	125646491999495	1	Status was updated by repair job.	0	21.10.2009	AM_GUESTS/125	GARNI
13	29.10.2009	125646497724680	1	Status was updated by repair job.	0	22.10.2009	AM_GUESTS/125	GARNI
14	28.10.2009	125648786981210	3	Status was updated by repair job.	1	22.10.2009	AM_GUESTS	GARNI
15	30.10.2009	125648906213410	1	Status was updated by repair job.	0	20.10.2009	AM_GUESTS/125	GARNI
16	28.10.2009	125690980635625	1	Status was updated by repair job.	0	07.10.2009		GARNI
17	06.11.2009	125691007591167	1	Status was updated by repair job.	0	27.10.2009	AM_GUESTS	GARNI
18	03.11.2009	125691025574159	1	Status was updated by repair job.	0	30.10.2009	AM_GUESTS/125	GARNI
19	29.10.2009	125691032391382	1	Status was updated by repair job.	0	07.10.2009	AM_GUESTS/125	GARNI
20	15.10.2009	125692104499148	1	Status was updated by repair job.	0	12.10.2009	AM_GUESTS/125	GARNI
21	31.10.2009	125692109755870	1	Status was updated by repair job.	0	30.10.2009	AM_GUESTS/125	GARNI
22	31.10.2009	125692231283321	1	Status was updated by repair job.	0	30.10.2009	AM_GUESTS/125	GARNI
23	05.11.2009	125692234109577	1	Status was updated by repair job.	0	30.10.2009	AM_GUESTS/125	GARNI
24	11.11.2009	125692295097921	1	Status was updated by repair job.	0	30.10.2009	AM_GUESTS/125	GARNI
25	31.10.2009	125692303156335	1	Status was updated by repair job.	0	30.10.2009		GARNI

...is created by the following Java code:

```
DOFJdbcUtil.initialize
(
    "org.hsqldb.jdbcDriver", // driver class name
    "jdbc:hsqldb:hsql://localhost:50100/PMS" // connection URL
);
m_listBean = DOFJdbcUtil.instance().createListEditor
(
    "ROOMRESERVATION" // name of table
);
```

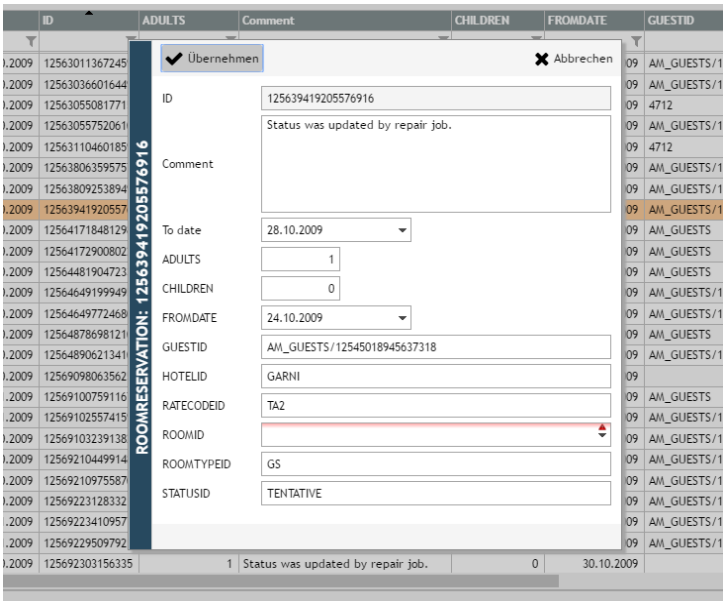
The dialog that was created just by passing the name of an SQL table already contains quite some number of functions:

- There is a headline on top of the data. Here the user can filter the data:



The user may define several filter conditions.

- When double clicking an item then a dialog is shown:



In the dialog the user may update the data item and save it.

Open and flexible binding to persistence infrastructure

The basic DOF-processing is independent from any persistence infrastructure. This means: the passing of the table name in the code above is only one option to go - the option for these ones who use straight JDBC to access their data. It's simple to adapt DOF to any other persistence infrastructure.

High level of configuration

Starting with a very basic “table view” (if using the JDBC binding) you can step by step enhance your dialogs by simply passing additional configuration data. This includes:

- Define proper texts for the attributes / columns
- Define proper controls (e.g. if the database columns is of type “biginteger” holding a date value)
- Define key fields
- Define mandatory fields
- Define the optical order of fields in the list and in the detail view

- Define valid values rules for certain attributes
- etc.

Extensible by Java implementation

The DOF processing is built to simply add functions by implementation if configuration is not sufficient. Maybe there are more sophisticated validation rules or maybe you want to update the whole dialog to your needs.

In this case you find some dedicated extension points for the Java code. And you may completely design the dialog on your own within the CaptainCasa Layout Editor.

General classes + Configuration

Basic Classes

- DOFObject – instance of an object
  - Holds properties within some inner HashMap
  - Holds status information
- Meta data
  - DOFObjectType => description of an object
  - DOFPropertyType => description of a property within an object
- DOFRepository
  - keeps meta data

Each data item (e.g. a row of the list) is an object of class “DOFObject”. DOFObject itself holds a data map (java.util.Map). The key of the map is the String-based id of the corresponding value (column name in case of using JDBC) and the argument of the map being the data object.

The DOFObject also holds its current validation information – but this is described later on.

The DOFObject is described by an instance of class “DOFObjectType”. In this instance the meta data is kept. Part of the meta data is the data / property structure of the object: a “DOFObjectType” holds n instances of “DOFPropertyType”.

The DOF Repository is the instance to know about the meta data.

When to pass meta data information

Well, this may be obvious. But: the meta data information needs to be passed into the repository as first issue – before e.g. opening a corresponding DOF dialog.

The binding layers (e.g. JDBC binding or Bean Binding) will check if there is meta data available – and will create missing meta data automatically using the information that they have. Example: in case of the JDBC binding this information is based on the JDBC-ResultSetMetaData object which passes back the information about the column structure of a table. But this information can only be the starting point, because it is too rudimentary.

Passing meta data information into the repository by API

Example: the following table is to be accessed via DOF:

```
CREATE TABLE PERSON
(
    PERSONID CHARACTER(20) PRIMARY KEY,
    FIRSTNAME VARCHAR(255),
    LASTNAME VARCHAR(255),
    GENDER CHARACTER(1),
    BIRTHDATE BIGINT,
    BIRTHTOWN VARCHAR(255),
    TITLE CHAR(20),
    SALUATION CHAR(20),
    PASSPORTNUMBER VARCHAR(255),
    DRIVERLICENSENUMBER VARCHAR(255),
    SOCIALSECURITYNUMBER VARCHAR(255)
);
```

You now may pass the meta data by using the DOF API:

```
private static void initializePERSON()
{
    DOFObjectType ot = new DOFObjectType();
    ot.setId("PERSON");
    ot.setName("Person");
    ot.setClassNamePersistor(DOFJdbcPersistor.class.getName());
    {
        DOFPropertyType pt = new DOFPropertyType();
        pt.setId("PERSONID");
        pt.setName("Person id");
        pt.setDataClass(DOFENUMDataClass.STRING.name());
        pt.setLength(20);
        pt.setKey(true);
        ot.getProperties().add(pt);
    }
    {
        DOFPropertyType pt = new DOFPropertyType();
        pt.setId("FIRSTNAME");
        pt.setName("First name");
        pt.setDataClass(DOFENUMDataClass.STRING.name());
        pt.setLength(255);
        pt.setMandatory(true);
        ot.getProperties().add(pt);
    }
    {
        DOFPropertyType pt = new DOFPropertyType();
        pt.setId("LASTNAME");
        pt.setName("Last name");
        pt.setDataClass(DOFENUMDataClass.STRING.name());
        pt.setLength(255);
        pt.setMandatory(true);
        ot.getProperties().add(pt);
    }
    {
        DOFPropertyType pt = new DOFPropertyType();
        pt.setId("TITLE");
        pt.setName("Title");
        pt.setDataClass(DOFENUMDataClass.STRING.name());
        pt.setLength(20);
        pt.setEditorClass(DOFPropertyComboFieldUI.class.getName());

pt.setValidValuesProviderId("org.eclnt.ccaddons.dof.util.DOFValidValuesProviderBy
JdbcQuery(SELECT * FROM TITLE)");
        ot.getProperties().add(pt);
    }
    {
        DOFPropertyType pt = new DOFPropertyType();
        pt.setId("SALUATION");
        pt.setName("Saluation");
        pt.setDataClass(DOFENUMDataClass.STRING.name());
        pt.setLength(20);
        pt.setEditorClass(DOFPropertyComboFieldUI.class.getName());

pt.setValidValuesProviderId("org.eclnt.ccaddons.dof.util.DOFValidValuesProviderBy
JdbcQuery(SELECT * FROM SALUATION)");
        ot.getProperties().add(pt);
```

```
    }
    {
        DOFPropertyType pt = new DOFPropertyType();
        pt.setId("BIRTHDATE");
        pt.setName("Date of birth");
        pt.setDataClass(DOFENUMDataClass.LONG.name());
        pt.setFormat("date");
        pt.setEditorClass(DOFPropertyCalendarFieldUI.class.getName());
        ot.getProperties().add(pt);
    }
    ot.getProperties().add(createDefaultTextPropertyType("BIRTHTOWN","Town of
birth"));

ot.getProperties().add(createDefaultTextPropertyType("PASSPORTNUMBER","Passport
number"));

ot.getProperties().add(createDefaultTextPropertyType("DRIVERLICENSENUMBER","Drive
r license number"));

ot.getProperties().add(createDefaultTextPropertyType("SOCIALSECURITYNUMBER","Soci
al security number"));
    DOFRepository.instance().addObjectType(ot);
}
private static DOFPropertyType createDefaultTextPropertyType(String id, String
name)
{
    DOFPropertyType pt = new DOFPropertyType();
    pt.setId(id);
    pt.setName(name);
    pt.setDataClass(DOFENUMDataClass.STRING.name());
    pt.setLength(255);
    return pt;
}
```

You see:

- A DOFObjectType instance is created.
- A number of DOFPropertyType instances is created – and added to the DOFObjectType instance.
- The DOFObjectType instance is added into the DOFRepository.

Passing meta data information into the repository by XML - Explicitly

DOFObjectType and DOFPropertyType are simple Java objects – that can be XML-serialized via JAXB. As consequence you may define the meta data as XML string as well – and pass this XML into the repository:

Example: table structure:

```
CREATE TABLE TITLE
(
    TITLEID CHARACTER(20) PRIMARY KEY,
    NAME VARCHAR(255)
);
```

The XML is:

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

<classNamePersistor>org.eclnt.ccaddons.dof.util.DOFJdbcPersistor</classNamePersis
tor>
    <detailRendering/>
    <id>TITLE</id>
    <name>Title</name>
    <properties>
        <id>TITLEID</id>
        <name>Title</name>
        <dataClass>STRING</dataClass>
        <key>true</key>
```

```
        <length>20</length>
        <mandatory>true</mandatory>
    </properties>
    <properties>
        <dataClass>STRING</dataClass>
        <id>NAME</id>
        <name>Name</name>
        <length>255</length>
        <mandatory>true</mandatory>
    </properties>
    <screenHeight>200</screenHeight>
    <screenWidth>500</screenWidth>
</dofObjectType>
```

The Java code is:

```
private static void initializeTITLE()
{
    String xml = ...ontain the XML...;
    DOFRepository.instance().addObjectType(xml);
}
```

Passing meta data information into the repository by XML – Implicitly

The same XML can be passed implicitly by just making at accessible through the class loader. In other words: when an object type is accessed which is not yet known to the repository then the repository checks for the availability of the XML information within the class loader.

Example:

- If the object type's id is “Abcde” then the repository will check for the XML file using the path “DOFObjectType.Abcde.xml”
- If the object type's id is “abc.def.Fghij” then the repository will check for the XML file using the path “abc/def/DOFObjectType.Fghij.xml”

As consequence you may not explicitly fill the repository but may just provide corresponding XML information as part of your code.

Please check the JavaDoc...

The documentation of the properties of DOFObjectType and DOFPropertyType is part of the JavaDoc for the eclnt_pbc.jar package. Because the XML is just a direct representation of the Java objects, this JavaDoc documentation is valid both for the Java API and the XML based way of feeding the repository.

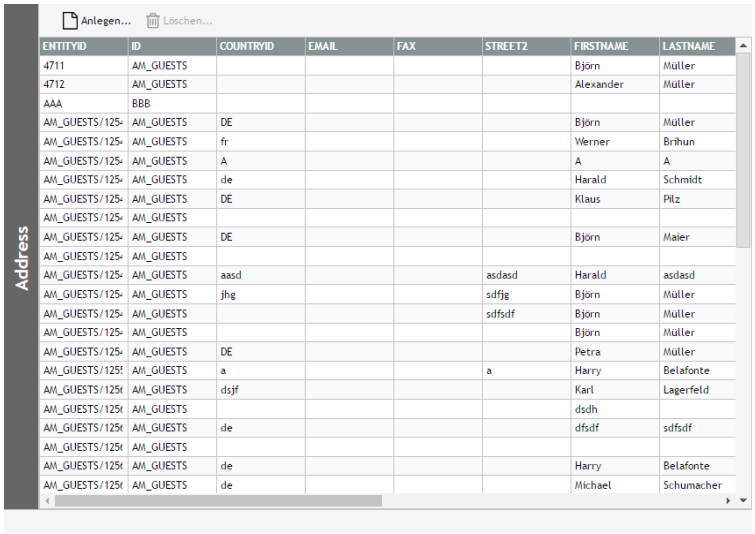
PageBeanComponent “DOFObjectListEditorUI”

(!!!This chapter needs some update!!!)

Purpose

- Represents a list of DOFObjects
- Triggers creation/removal of objects
- Opens up detail editor for single object instance on double click on item

Creation via DOFJdbcUtil



JSP Page:

```
<t:rowbodypane id="g_2" padding="0">
      <t:row id="g_7">
            <t:pagebeancomponent id="g_5"
                  pagebeanbinding="#{d.TestDofQuery.listBean}" />
      </t:row>
</t:rowbodypane>
<t:rowstatusbar id="g_1" />
```

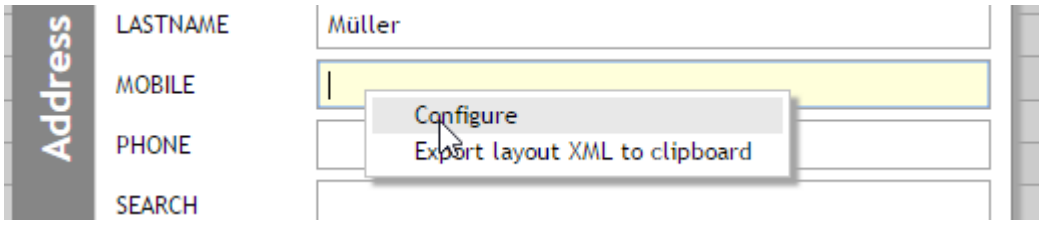
Code:

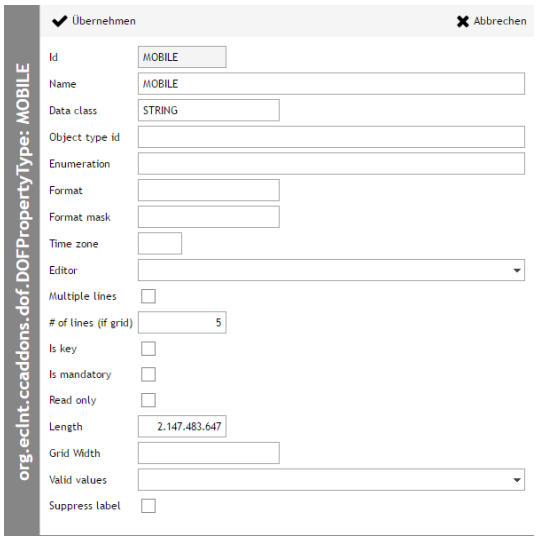
```
package managedbeans;

import java.io.Serializable;
import java.sql.Connection;
import java.sql.Statement;

import javax.faces.event.ActionEvent;

import org.eclnt.ccaddons.dof.pbc.DOFObjectListEditorUI;
import org.eclnt.ccaddons.dof.util.DOFJdbcUtil;
import org.eclnt.editor.annotations.CCGenClass;
import org.eclnt.jsfserver.defaultscreens.Statusbar;
import org.eclnt.jsfserver.pagebean.PageBean;
import org.eclnt.util.log.CLog;
import org.eclnt.util.valuemgmt.ValueManager;

@CCGenClass (expressionBase="#{d.TestDofQuery}")

public class TestDofQuery
    extends PageBean
    implements Serializable
{
    // ------------------------------------------------------------------------
    // inner classes
    // ------------------------------------------------------------------------

    // ------------------------------------------------------------------------
    // members
    // ------------------------------------------------------------------------

    DOFObjectListEditorUI m_listBean;

    // ------------------------------------------------------------------------
    // constructors & initialization
    // ------------------------------------------------------------------------
```

```
    public TestDofQuery()
    {
        initialize();
    }

    public String getPageName() { return "/testdofquery.jsp"; }
    public String getRootExpressionUsedInPage() { return "#{d.TestDofQuery}"; }

    // ------------------------------------------------------------------------
    // public usage
    // ------------------------------------------------------------------------

    public DOFObjectListEditorUI getListBean() { return m_listBean; }

    // ------------------------------------------------------------------------
    // private usage
    // ------------------------------------------------------------------------

    private void initialize()
    {
        try
        {
            DOFJdbcUtil.initialize
            (
                "org.hsqldb.jdbcDriver", // driver class name
                "jdbc:hsqldb:hsql://localhost:50100/PMS" // connection URL
            );
            m_listBean = DOFJdbcUtil.instance().createListEditor
            (
                "ADDRESSMANAGERITEM", // name of table
            );
        }
        catch (Throwable t)
        {
            CLog.L.log(CLog.LL_ERR,"",t);

Statusbar.outputError(t.getMessage(),ValueManager.getStackstraceString(t));
        }
    }

}
```

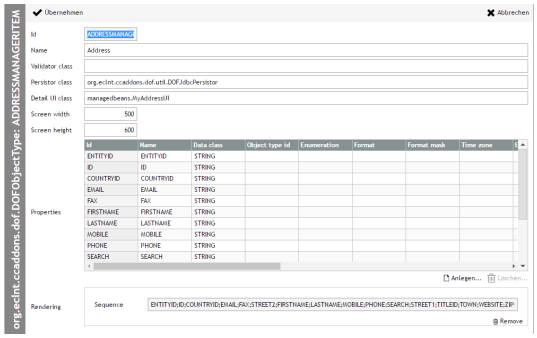
Working with DOFObjectListEditorUI

- Double click on item => instance popup
- in instance popup:
  - right mouse button on component => configuration of DOFPropertyType
  -





- right mouse button in free area (e.g. right of component) => configuration of DOFObjectType



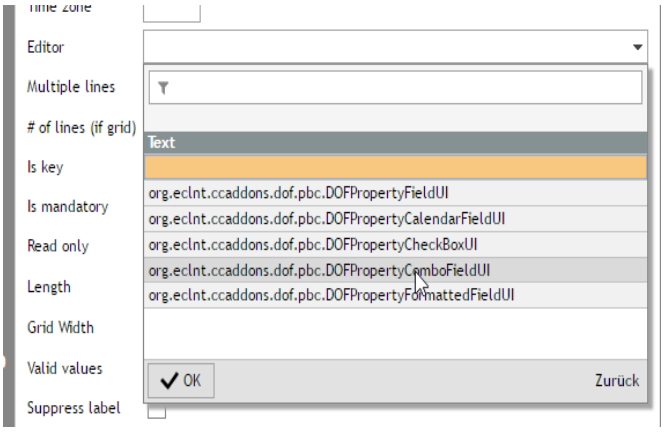
- The meta data is stored in tomcat/work/<app>/Catalina/localhost/streamstore/dof

Configuration of keys

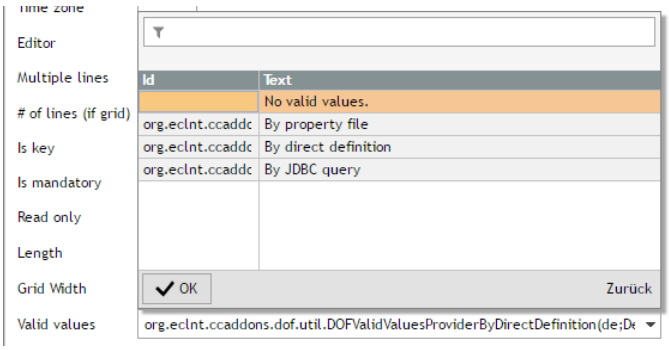
- When working with the JDBC persistence then is it inevitable to define the keys of the data object! Check the corresponding “is key” flag within the configuration of the corresponding properties.

Configuration of ValidValues

- Configure property to use the editor “DOFPropertyComboFieldUI”:



- Use the rigt implementation of “Valid values provider”:

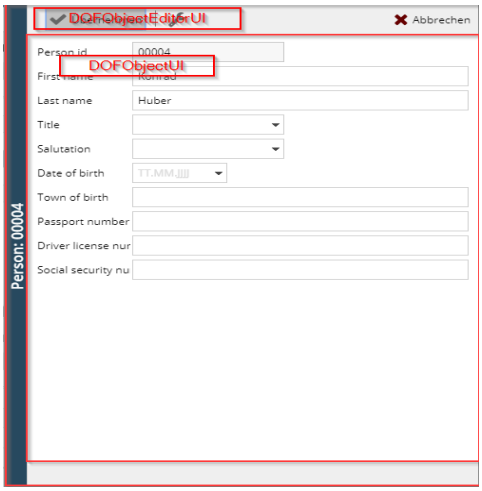


- There are differente implementations currently:
  - DOFValidValuesProviderByProperties(...) - pass the name of the properties file as parameter
    - Example: DOFValidValuesProviderByProperties(resources/countries.properties)
  - DOFValidValuesProviderByDirectDefinition(...) - pass the id/text of the valid values directly
    - Example: DOFValidValuesProviderByDirectDefinition(de;Germany;fr;France)
  - DOFValidValuesProviderByJdbcQuery(...) - pass a qeury, the first columns of the result will be used as id/text for the valid values
    - Example: DOFValidValuesProviderByJdbcQuery(SELECT ID,TEXT FROM XYZ)

Page Bean Components “DOFObjectEditorUI” and “DOFObjectUI”

When double clicking a DOF object within the list processing (DOFObjectListEditorUI) then the list processing opens up a dialog showing the detail of the corresponding DOF object.

This dialog shows a page bean component of class “DOFObjectEditorUI” - which itself is containing a page bean component of type “DOFObjectUI”:

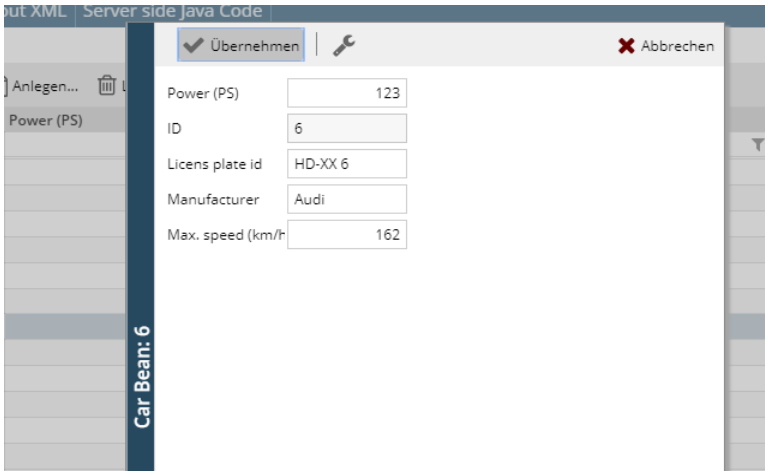


“DOFObectUI” is responsible for arranging the content and renders fields / check boxes / combo boxes according to the definitions of the corresponding object type. “DOFObjetEditorUI” is responsible for all the processing around – like saving the corresponding object.

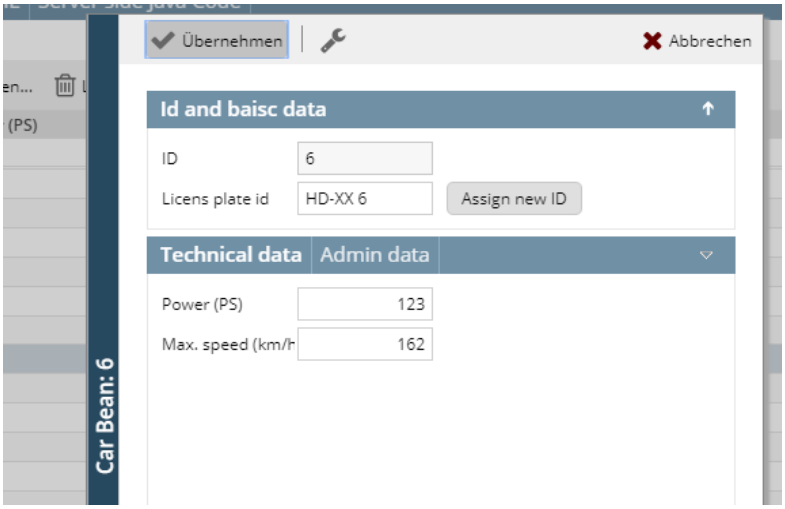
Extension Concepts - Defining an own detail UI

The default “DOFObjectUI” implementation arranges the values of the object as simple linear list – one attribute below the other. You may define the sequence of the attributes as part of the meta data – but not more. You may simply write an own JSP-definition – also including own visual functions by defining an own JSP page and by extending the default “DOFObjectUI” implementation.

Example: the following screen is the default screen of a “CarBean” object:



We want to change it to look like this:



Create an own layout definition

The first thing to do is pretty normal – you create some own layout definition in the Layout Editor. The layout definition needs to contain exactly one outest row, in which all the subsequent content is placed.

So create the following layout.

```
<t:row id="g_1">
</t:row>
```

Please follow this rule when further on editing the layout: it must contain exactly ONE OUTEST row...!

Create an own Page Bean class

A page needs a page bean class – so now create one, and extend it from DOFObjectUI. In our example the code is:

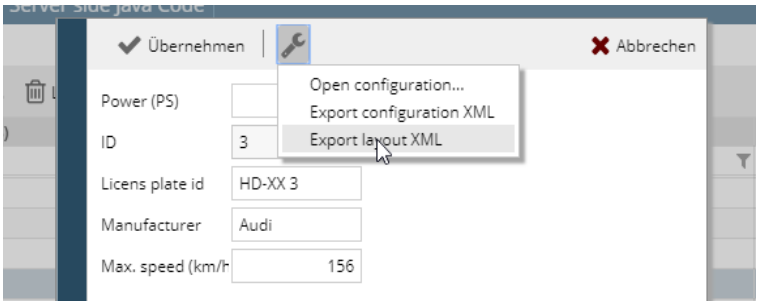
```
public class DemoDOFCarBeanDetail
    extends DOFObjectUI
    implements Serializable
{
    /*
     * This constructor is only called in the layout editor.
     */
    public DemoDOFCarBeanDetail()
    {
    }

    /*
     * This constructor is called during runtime.
     */
    public DemoDOFCarBeanDetail(DOFObject instance,
                                IDOFObjectPersistor persistor)
    {
        super(instance, persistor);
    }

    public String getPageName() { return "/workplace/demodofcarbeandetail.jsp"; }
    public String getRootExpressionUsedInPage()
    { return "#{d.DemoDOFCarBeanDetail}"; }

}
```

Of course the “getPageName()” and the “getRootExpressionUsedInPage()” method will return different values in your implementation.

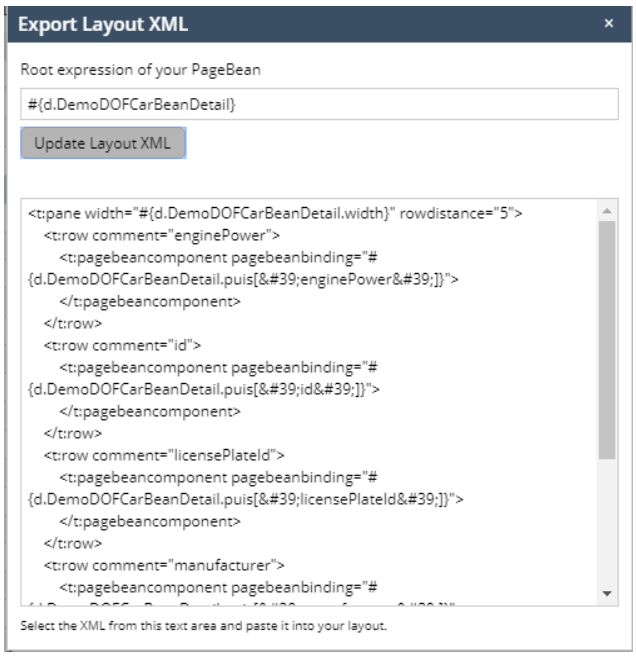
Copy the default layout

There is a nice function to now copy the default layout of the DOFObjectUI -processing into your layout, so that you already have the default fields/etc. inside your layout and do not have to start from the scratch.

Open the default layout:



From the menu call “Export Layout XML”:



You see the layout XML definition. Specify the root expression of your page bean (in our case “#{d.DemoDOFCarBeanDetail}”) and press the “Update” button – the expressions in the layout XML will be updated accordingly.

Then copy the content of the XML definition (copy & paste) and add it into your JSP definition (using some text editor of your development environment).

```
...
<t:row id="g_1">
<t:pane width="#{d.DemoDOFCarBeanDetail.width}" rowdistance="5">
    <t:row comment="enginePower">
        <t:pagebeancomponent
pagebeanbinding="#{d.DemoDOFCarBeanDetail.puis[&#39;enginePower&#39;]}">
        </t:pagebeancomponent>
    </t:row>
    <t:row comment="id">
        <t:pagebeancomponent
pagebeanbinding="#{d.DemoDOFCarBeanDetail.puis[&#39;id&#39;]}">
        </t:pagebeancomponent>
    </t:row>
    <t:row comment="licensePlateId">
        <t:pagebeancomponent
pagebeanbinding="#{d.DemoDOFCarBeanDetail.puis[&#39;licensePlateId&#39;]}">
        </t:pagebeancomponent>
    </t:row>
    <t:row comment="manufacturer">
        <t:pagebeancomponent
pagebeanbinding="#{d.DemoDOFCarBeanDetail.puis[&#39;manufacturer&#39;]}">
        </t:pagebeancomponent>
    </t:row>
    <t:row comment="maxSpeed">
        <t:pagebeancomponent
pagebeanbinding="#{d.DemoDOFCarBeanDetail.puis[&#39;maxSpeed&#39;]}">
        </t:pagebeancomponent>
    </t:row>
</t:pane>
</t:row>
...
```

Now your JSP page will look the same as the generated layout.

You see that per attribute of the DOF object one page bean component internally is created, which points in its expression to the corresponding attribute.

Register you Page Bean as the one to be used

The DOF framework now has to know that you created some own page bean to take over the detail visualization. So you have to register.

Registration is done within the DOFObjectType for the object. The DOFObjectType provides a property “classNameDetailUI”. Here you have to set the full name of your page bean class.

So...

- if you define the object type by API, then call DOFObjectType.setClassNameDetailUI()
- if you define the object type by XML then define...

```
...
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<dofObjectType>
    <classNameDetailUI>workplace.DemoDOFCarBeanDetail</classNameDetailUI>
    <id>workplace.dof.CarBean</id>
    <name>Car Bean</name>
    <properties>
        <dataClass>INTEGER</dataClass>
        <filterByDistinctValues>true</filterByDistinctValues>
…
```

Please note: the repository buffers its meta data. So you may need to reload your application within the Layout Editor after updating the meta data.

Now simply “develop”!

You may now add any further element into the page using normal editing functions of the CaptainCasa environment. And you may extend the page bean class by any other function. So you may re-arrange the content of the UI, you may add further buttons on JSP side – and add corresponding code on page bean side.

Simplify life – implement the empty constructor

Development is much easier if you implement the empty constructor (i.e. the one without any parameters) and create a corresponding DOF object. Otherwise the page bean components for the attributes will not have any reference and will not be created when editing the layout in the Layout Editor.

Example:

```
    public DemoDOFCarBeanDetail()
    {
        DOFObjectType ot =
DOFRepository.instance().readObjectType(CarBean.class.getName(),true);
        DOFObject o = new DOFObject(ot);
        construct(o);
    }

    public DemoDOFCarBeanDetail(DOFObject instance, IDOFObjectPersistor
persistor)
    {
        super(instance, persistor);
    }
```

When creating the DOFObjectType reference you need to point to your object type id, of course.

Add-on “Pivot Table”

The pivot table is part of ccaddons.jar.

Overview

“Pivot-Table”

The add-on “Pivot-Table” provides a simple way to display data as interactive Piviot-Table. The data is passed as a list of flat data items, together with some meta data, describing its structure.

Based on this data the user can build up own pivot-table definitions:

- The user can easily define which key attributes to show “on the left” and “on the top”.
- The user can easily define which data to calculate in the body.
- The user can open/close data levels both vertically and horizontally.

Building Blocks

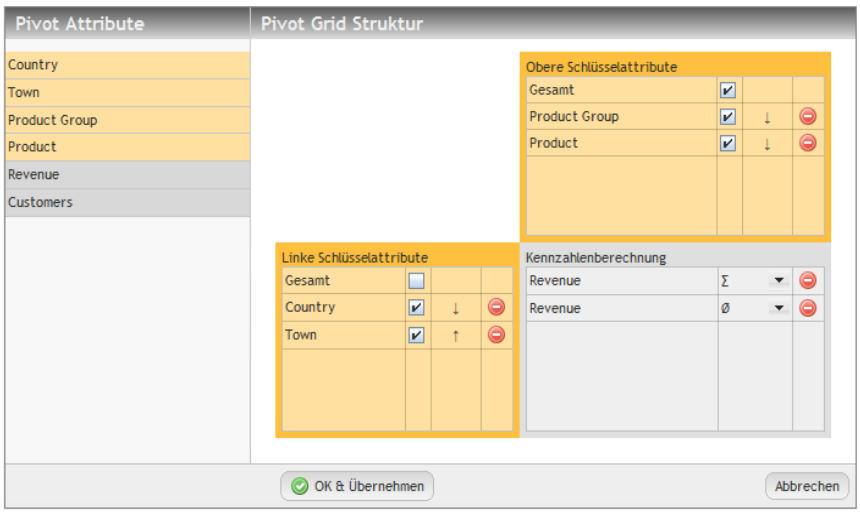
The core building block is a generic UI component “PivotPageBean”. This is a page bean that you can easily embed into your application.

The page beans receives an instance of a “PivotData” object. This object contains both the meta data description (which key attributes, which figure attributes) and the flat data items.

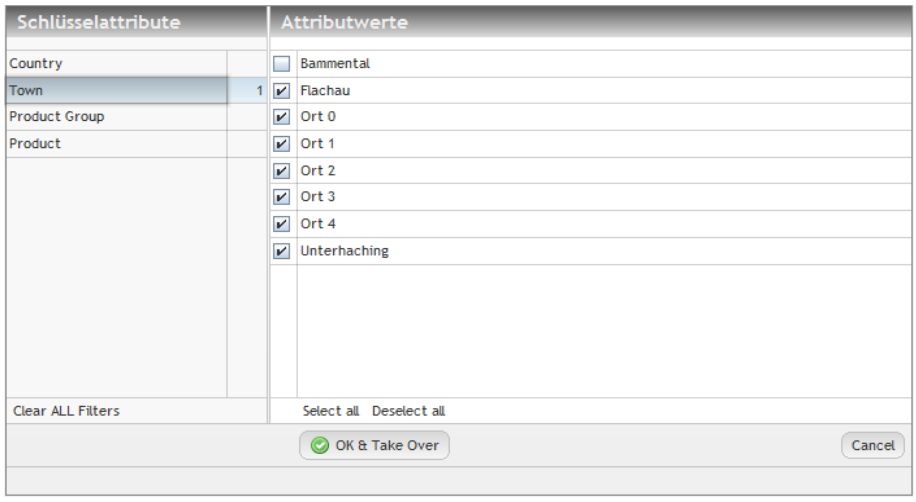
Example

Revenue(Σ) Revenue(Ø)	Gesamt							
	Product Group		Food				Non Food	
Country Town(1)	Product				4711			
Gesamt								
Austria	8.500,00	1.063,00	500,00	500,00	500,00	500,00	8.000,00	1.143,00
Ort 4	1.400,00	1.400,00	0,00	0,00	0,00	0,00	1.400,00	1.400,00
Ort 3	1.300,00	1.300,00	0,00	0,00	0,00	0,00	1.300,00	1.300,00
Ort 2	1.200,00	1.200,00	0,00	0,00	0,00	0,00	1.200,00	1.200,00
Ort 1	1.100,00	1.100,00	0,00	0,00	0,00	0,00	1.100,00	1.100,00
Ort 0	1.000,00	1.000,00	0,00	0,00	0,00	0,00	1.000,00	1.000,00
Flachau	2.500,00	833,00	500,00	500,00	500,00	500,00	2.000,00	1.000,00
Germany	2.000,00	2.000,00	2.000,00	2.000,00	2.000,00	2.000,00	0,00	0,00
Unterhaching	2.000,00	2.000,00	2.000,00	2.000,00	2.000,00	2.000,00	0,00	0,00

When the user presses the configuration icon on the right top the following dialog is shon:



Data can be filtered by pressing the filter icon:



Architecture and APIs

"PivotData" - Passing the Data

Data is passed as "PivotData" object. The following example program shows how to build up an object:

```
    static PivotAttribute attributeCountry =
        new PivotAttribute("COUNTRY","Country");
    static PivotAttribute attributeTown =
        new PivotAttribute("TOWN","Town");
    static PivotAttribute attributeProductGroup =
        new PivotAttribute("PRODUCTGROUP","Product Group");
    static PivotAttribute attributeProduct =
        new PivotAttribute("PRODUCT","Product");
    static PivotAttribute attributeRevenue =
        new PivotAttribute("REVENUE","Revenue");
    static PivotAttribute attributeCustomers =
        new PivotAttribute("CUSTOMERS","Customers");

    static PivotIdText countryGermany = new PivotIdText("de","Germany");
    static PivotIdText countryAustria = new PivotIdText("a","Austria");
    static PivotIdText pgFood = new PivotIdText("1","Food");
```

```
    static PivotIdText pgNonFood = new PivotIdText("2","Non Food");

    public static PivotData buildPivotData()
    {
        PivotData pivotData = new PivotData();

        // meta data
        pivotData.addKeyAttribute(attributeCountry);
        pivotData.addKeyAttribute(attributeTown);
        pivotData.addKeyAttribute(attributeProductGroup);
        pivotData.addKeyAttribute(attributeProduct);
        pivotData.addFigureAttribute(attributeRevenue);
        pivotData.addFigureAttribute(attributeCustomers);

        // data items
        {
            PivotDataItem item = new PivotDataItem();
            item.putKeyValue(attributeCountry,countryGermany);
            item.putKeyValue(attributeTown,"Unterhaching");
            item.putKeyValue(attributeProductGroup,pgFood);
            item.putKeyValue(attributeProduct,"4711");
            item.putFigureValue(attributeRevenue,new BigDecimal(2000));
            item.putFigureValue(attributeCustomers,new BigDecimal(100));
            item.setComment("This is a wonderful item!");
            pivotData.addDataItem(item);
        }
        {
            PivotDataItem item = new PivotDataItem();
            item.putKeyValue(attributeCountry,countryGermany);
            item.putKeyValue(attributeTown,"Bammental");
            item.putKeyValue(attributeProductGroup,pgFood);
            item.putKeyValue(attributeProduct,"4711");
            item.putFigureValue(attributeRevenue,new BigDecimal(1000));
            item.putFigureValue(attributeCustomers,new BigDecimal(100));
            pivotData.addDataItem(item);
        }
        {
            PivotDataItem item = new PivotDataItem();
            item.putKeyValue(attributeCountry,countryAustria);
            item.putKeyValue(attributeTown,"Flachau");
            item.putKeyValue(attributeProductGroup,pgFood);
            item.putKeyValue(attributeProduct,"4711");
            item.putFigureValue(attributeRevenue,new BigDecimal(500));
            item.putFigureValue(attributeCustomers,new BigDecimal(100));
            pivotData.addDataItem(item);
        }
        {
            PivotDataItem item = new PivotDataItem();
            item.putKeyValue(attributeCountry,countryAustria);
            item.putKeyValue(attributeTown,"Flachau");
            item.putKeyValue(attributeProductGroup,pgNonFood);
            item.putKeyValue(attributeProduct,"4712");
            item.putFigureValue(attributeRevenue,new BigDecimal(1000));
            item.putFigureValue(attributeCustomers,new BigDecimal(100));
            pivotData.addDataItem(item);
        }
        {
            PivotDataItem item = new PivotDataItem();
            item.putKeyValue(attributeCountry,countryAustria);
            item.putKeyValue(attributeTown,"Flachau");
            item.putKeyValue(attributeProductGroup,pgNonFood);
            item.putKeyValue(attributeProduct,"4713");
            item.putFigureValue(attributeRevenue,new BigDecimal(1000));
            item.putFigureValue(attributeCustomers,new BigDecimal(100));
            pivotData.addDataItem(item);
        }
        for (int i=0; i<5; i++)
        {
            PivotDataItem item = new PivotDataItem();
            item.putKeyValue(attributeCountry,countryAustria);
            item.putKeyValue(attributeTown,"Ort " + i);
            item.putKeyValue(attributeProductGroup,pgNonFood);
            item.putKeyValue(attributeProduct,"4713");
            item.putFigureValue(attributeRevenue,new BigDecimal(1000 + i*100));
            item.putFigureValue(attributeCustomers,new BigDecimal(100));
            item.setCellExtension(new TestPivotCellExtension());
//            item.setStatus(1);
            pivotData.addDataItem(item);
```

```
        }

        // display of keys
        pivotData.addKeyAttributeLeft
            (new PivotKey(attributeCountry,true));
        pivotData.addKeyAttributeLeft
            (new PivotKey(attributeTown,true,PivotData.SORT_DOWN));
        pivotData.addKeyAttributeTop
            (new PivotKey(attributeProductGroup,true));
        pivotData.addKeyAttributeTop
            (new PivotKey(attributeProduct,true));

        // display of figures
        pivotData.addFigure
            (new PivotFigure(attributeRevenue,new PivotFigureCalculationSum()));
        pivotData.addFigure(new PivotFigure
            (attributeRevenue,new PivotFigureCalculationAverage()));

        // apply "in memory filter"
        pivotData.addFilterValue(attributeTown,"Bammental");
```

You see, that there are three sections:

- First the meta data is described by calling addKeyAttribute(..) and addFigureAttribute(..). Each attribute is defined as “PivotAttribute”-object, itself containing an id and a text.
- Then the data is filled by calling “addDataItem” - passing a “PivotDataItem” object. The “PivotDataItem” contains the attribute values. The rules for passing attribute values are:
    - Key values are either an instance of “PivotIdText” or an instance of “String”.
    - Figure values are an instance of “Number”, i.e. you can pass integers, decimals, floats, etc.
- Finally – and this is optional – you may pass some initial configuration about how the pivot-table should be rendered. You may define which key attributes you want to see on the “left” and on the “top side”, and you may define which calculated figured you want to see within the body. And you may define to filter some data.
    - If no passing this configuration data then an empty grid will be shown – waiting for a configuration by the user.

Embedding into your Page

The PivotData-instance is passed into a page bean of type “PivotPageBean”. This means:

- Within your JSP page definition you have to add a ROWPAGEBEANINCLUDE component.
- The attribute ROWPAGEBEANINCLUDE-PAGEBEANBINDING has to bind to an instance of “PivotPageBean”.

Example:

```
JSP-Page:
=========

<t:rowbodypane id="g_6" >
      <t:rowpagebeaninclude id="g_7" pagebeanbinding="#{d.TestPivotUI.pivot}" />
</t:rowbodypane>

Implementation:
```

```
package managedbeans;
```

```
@CCGenClass (expressionBase="#{d.TestPivotUI}")

public class TestPivotUI
    extends WorkpageDispatchedPageBean
    implements Serializable
{
    boolean m_withCellExtension = false;
    PivotPageBean m_pivot;
    String m_configXML = null;

    public TestPivotUI(IWorkpageDispatcher dispatcher)
    {
        super(dispatcher);
        m_pivot = new PivotPageBean(dispatcher);
        PivotData pivotData = TestPivot.buildPivotData();
        m_pivot.prepare(pivotData);
    }

    public String getPageName() { return "/testpivot.jsp"; }
    public String getRootExpressionUsedInPage() { return "#{d.TestPivotUI}"; }

    public PivotPageBean getPivot() { return m_pivot; }

}
```

Cell Interaction

There are certain types of interaction that you can react on. The most important ones are:

- The user may select (double-click) a cell.
- The user may mark (single-click) one or more cells (control-single-click).
- The user may open a popup menu.

Interface IPivotListener

You can pass in implementation of interface “IPivotListener” into the PivotData object:

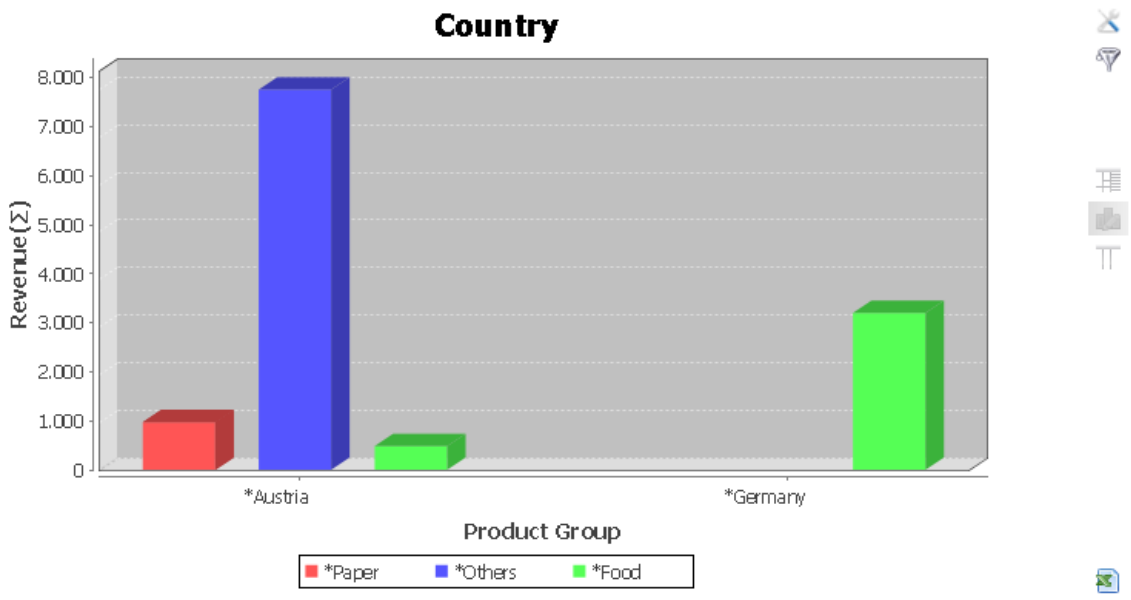
```
public interface IPivotListener
{
    public void reactOnCellMarked(Map<PivotAttribute,Object> keyValues,
PivotAttribute figure, BigDecimal cellValue, List<PivotDataItem> cellDataItems);

    public void reactOnCellSelection(Map<PivotAttribute,Object> keyValues,
PivotAttribute figure, BigDecimal cellValue, List<PivotDataItem> cellDataItems);

    public void reactOnCellPopupMenu(Map<PivotAttribute,Object> keyValues,
PivotAttribute figure, BigDecimal cellValue, List<PivotDataItem> cellDataItems,
String command);

    public void reactOnCellEdit(PivotKeyTupel cellTupel, PivotDataItem dataItem,
boolean isNewDataItem, PivotAttribute figure);

    public List<PivotDataItem> reactOnProxyDataItemResoultion(PivotDataItem
proxyItem);

    public void reactOnFilterUpdate();
    public void reactOnConfigurationUpdate();
}
```

With each cell selection / cell marking you receive the complete data of the corresponding cell, i.e. the key values, the figure attribute, the value of the calculated figure and the list of flat data items which is behind the cell.

Please check the JavaDoc for the class PivorPageBean in addition to see how to obtain further information out of the currently displayed pivot-table.

Graphics

The Pivot allows to display the current data as graphics:



The graphics is interactive – this means:

- You can dive into the pivot data cube by pressing on the labels that are marked with "*". This is the normal pivot navigation that you normally do inside the pivot table, but now executed from the graphics.
- By clicking onto the bars the same events are thrown that are normally thrown when working inside the pivot table.

Configuring the Type of Graphic

Two types of graphics are provided – horizontal and vertical display – dependent on the figure attribute. The definition is done through the PivotData-object, by calling the methods PivotData.setGraphicTypeForFigure(...).

Please find details within the Javadoc-documentation.

Extending the Graphics Processing

The Graphics processing is done in a page bean on its own, which is created and managed by the PivotPageBean-object – which is the one managing the whole pivot processing.

You may override the default implementation by subclassing from class PivotGrapicsPageBean and add your own functions there. Reasons for overriding may be:

- You want to introduce new types of graphics or you want to fine-control the way the graphics is created.
- You want to add own rules for deciding if it makes sense to create a graphics at all.

After sub-classing you need to tell PivotPageBean that it now should create an object of your class when opening a graphics. To do so there is a certain factory mechanism:

- Implement an own class that implements interface PivotPageBean.IGraphicsPageBeanCreator.

- Pass an instance of your class into your PivotPageBean instance by calling PivotPageBean.setPivotGraphicsCreator.

The interface looks like:

```
public interface IGraphicsPageBeanCreator
{
    public PivotGraphicsPageBean createPivotGraphicsPageBean
                                        (PivotPageBean owner);
}
```

Every time the PivotPageBean requires to create a graphics-bean instance it will now use your implementation of IGraphicsPageBeanCreator – so you can create your PivotGraphicsPageBean-extension accordingly.

Hook for Deciding if Creation of Graphics makes Sense at all

When the user switches into the graphics view then before the graphics is built a certain "hook" is processed. In this hook you can decide that it does not make sense at all to create the graphics – for any reason on your side.

The hook is done via some protected methods of PivotGraphicsPageBean – which you can override on your own. The methods are:

```
    protected void checkIfGraphicsCanBeRendered()
        throws ExceptionGraphicsCannotBeRendered
    {
        ...
    }

    protected void checkIfGraphicsCanBeRebdered(PivotPageBean owner,
                                                GridLine leftParent,
                                                GridLine topParent,
                                                List<List<Number>> numbers)
        throws ExceptionGraphicsCannotBeRendered
    {
        ...
    }
```

By default the first method (without parameters) is called, collects certain data and then calls the second method. So, in typical cases you only override the second method.

In case you find out that a creation of a graphics is not possible for any reason, you just throw an exception of type ExceptionGraphicsCannotBeRendered. The text that you pass in the exception is the one that is displayed as alert message later on.

Item List View

The item list view shows the "raw items" (instances of PivotDataItem) that are part of the PivotData that you display:

	Country	Product	Product Group	Town	Customers	Reached Goal	Revenue
1	Germany	4711	Food	Unterhaching	100,00	☒	,00
2	Germany	4715	Paper	Unterhaching	100,00	☐	
3	Germany	4711	Food	Bammental	100,00	☒	1.000,00
4	Germany	4711	Food	Bayrischzell	110,00	☐	1.100,00
5	Germany	4711	Food	Augsburg	120,00	☒	1.200,00
6	Austria	4711	Food	Flachau	100,00	☒	500,00
7	Austria	4712	Others	Flachau	100,00	☒	1.000,00
8	Austria	4713	Others	Flachau	100,00	☒	1.000,00
9	Austria	4715	Paper	Flachau	100,00	☒	1.000,00
10	Austria	4713	Others	Ort 0	100,00	☒	1.000,00
11	Austria	4713	Others	Ort 1	100,00	☒	1.100,00
12	Austria	4713	Others	Ort 2	100,00	☒	1.200,00
13	Austria	4713	Others	Ort 3	100,00	☒	1.300,00
14	Austria	4713	Others	Ort 4	100,00	☒	1.400,00
	#2	#4	#3	#10	Σ 1.430,00	Σ ☐☒	Ø 914,00

By pressing into the filter section of the column header you can call the normal filter dialog. In the footer line by default the number of different data items is shown in for key attributes, and the sum is shown for figure attributes.

Defining Footer Line Calculation for Figure Attributes

You may define a special calculation for a figure attribute by calling methods PivotData.setFigureItemListCalculation(...).

E.g. in the example above the calculation for the revenue was set to be an average calculation:

```
...
PivotAttribute attributeRevenue = new PivotAttribute("REVENUE","Revenue");
...
...
PivotData pivotData = new PivotData();
...
pivotData.addFigureAttribute(attributeRevenue);
pivotData.setFigureItemListCalculation(attributeRevenue,
                                       new PivotFigureCalculationAverage());
```

Using the Item List View outside the Pivot Table Processing

The item list view is a page bean on its own that may be managed by the pivot table processing - under the control of PivotPageBean.

But you may also use the bean as standalone bean - without the context of the PivotPageBean. In this case just create an instance of PivotItemListPageBean inside your page processing and call the prepare method:

```
PivotData pivotData = new PivotData();
...
PivotItemListPageBean pb = new PivotItemListPageBean(getOwningDispatcher());
pb.prepare(pivotData);
```

Include the page bean within your page juzst by using the normal page bean ROWPAGEBEANINCLUDE component.