How to Implement a Web Dynpro for Java Table with Sorting and Filtering Capabilities

Applies to:

Web Dynpro for Java 7.11. For more information, visit the Web Dynpro Java homepage.

Summary

The tutorial shows how to implement sorting and filtering in a Web Dynpro table. It also offers two support classes for this purpose: `TableSorter` and `TableFilter`. It is an update of an old tutorial for release 7.0.

Filtering is based on the interface `IWDMappingFilter` which has been introduced in 7.10.

Further features shown in this document: adding and removing rows, a ToolBar with some buttons, calculating totals via calculated attributes, Core Component Types/Core Data Types.

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Created on: 29 June 2010

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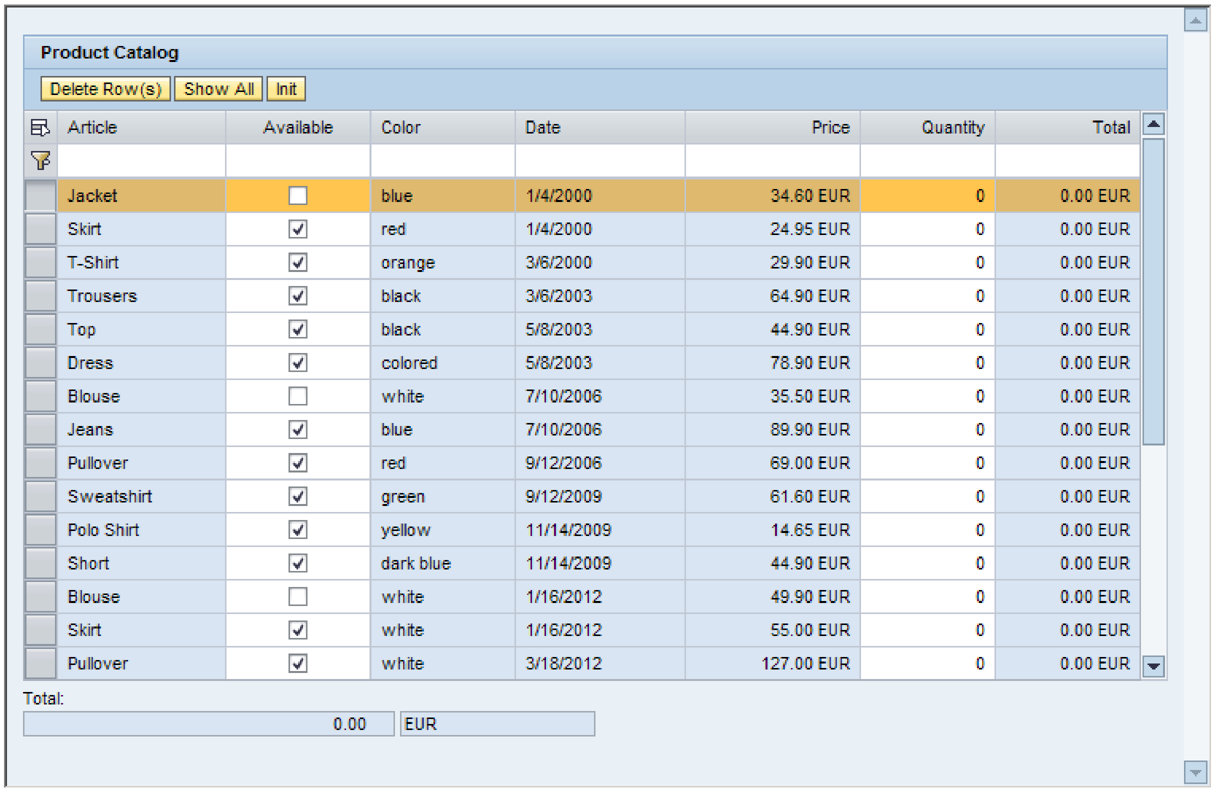
Introduction

This tutorial focuses on the `Table` UI element and shows you how to use Java classes to add custom functionality in Web Dynpro. This tutorial shows you how to write custom Java classes that can react to the `Table` UI element's sorting and filtering events.

First, you see how to display and edit context data using the `Table` UI element, which is rather easy. We implement methods to add, delete, and copy rows of the table. Lastly, the most important scenario is the sorting and filtering of table data.



Article	Available	Color	Date	Price	Quantity	Total
Jacket	☐	blue	1/4/2000	34.60 EUR	0	0.00 EUR
Skirt	✓	red	1/4/2000	24.95 EUR	0	0.00 EUR
T-Shirt	✓	orange	3/6/2000	29.90 EUR	0	0.00 EUR
Trousers	✓	black	3/6/2003	64.90 EUR	0	0.00 EUR
Top	✓	black	5/8/2003	44.90 EUR	0	0.00 EUR
Dress	✓	colored	5/8/2003	78.90 EUR	0	0.00 EUR
Blouse	☐	white	7/10/2006	35.50 EUR	0	0.00 EUR
Jeans	✓	blue	7/10/2006	89.90 EUR	0	0.00 EUR
Pullover	✓	red	9/12/2006	69.00 EUR	0	0.00 EUR
Sweatshirt	✓	green	9/12/2009	61.60 EUR	0	0.00 EUR
Polo Shirt	✓	yellow	11/14/2009	14.65 EUR	0	0.00 EUR
Short	✓	dark blue	11/14/2009	44.90 EUR	0	0.00 EUR
Blouse	☐	white	1/16/2012	49.90 EUR	0	0.00 EUR
Skirt	✓	white	1/16/2012	55.00 EUR	0	0.00 EUR
Pullover	✓	white	3/18/2012	127.00 EUR	0	0.00 EUR

Total:
0.00 EUR

The two classes needed for sorting and filtering are bound to the relevant context attributes, instantiated, and associated with the `Table` via its event properties. Additional functions such as *Delete row* and *Initialize* are provided by buttons in the table's toolbar.

The tutorial is an update of an old tutorial for release 7.0. It also aims to demonstrate the new, extended possibilities regarding sorting, filtering, and data types in 7.1. In addition, there is a section describing the differences to the previous tutorial.

Prerequisites

Systems, Installed Applications, and Authorizations

You need an SAP NetWeaver Developer Studio (NWDS), release 7.1 or higher, to compile and deploy the tutorial application. The application server should be of the same version as the NWDS or a higher version.

The tutorial application is available as a development component (DC). You need to import the software component HM-WDUIDMKTCNT, which contains the DC `tc/wd/tut/table/sofi`. The exact steps are described in a separate document.

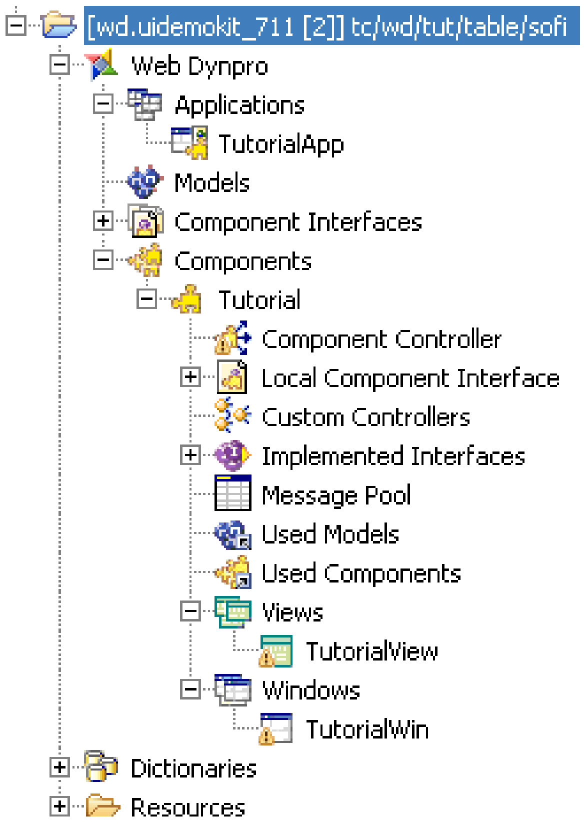
Objectives

In this tutorial, you learn how to:

- Create the context of the component controller and its mapping with the view controller
- Create a `Table` UI element and bind it to the view controller's context
- Implement table sorting functionality
- Implement table row filtering functionality
- Implement a function to delete one or more rows
- Implement a function for calculating the total for selected articles and an overall total

First Steps

Creating a New Web Dynpro DC



Create a new Web Dynpro DC called **tc/wd/tut/table/sofi** containing a Web Dynpro application **TutorialApp** and a Web Dynpro component **Tutorial**. Leave the *Default Window* and *Views* option selected in order to get them applied by default. Then rebuild the project so that the various Java source files are created.

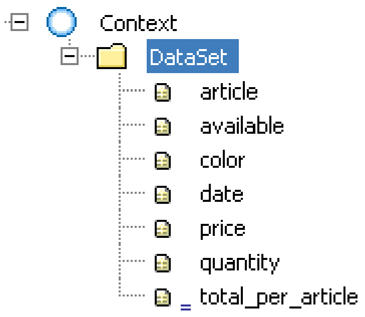
Creating the Context for the Table Data

To provide a table with data, we must first store that data in the context of the *Component Controller*.

1. Add a new node to the context root node and name it `DataSet`. The *collection* cardinality of the node should be left at the default value **0...n**.
2. Change the *selection* cardinality to **0...n**. Both properties can be found in the *Properties* view for the controller.
3. Add attributes to this node and set the data types according to the table below. *Amount* and *Date* are *Core Component Types*. You can choose *Browse…* in the *Type Selection* dialog to select them.
4. For the `Total_per_Article` attribute, set the *calculated* property to `true`. This causes the NWDS to generate the appropriate *accessor* (get/set) methods.

Attribute Name	Type	Calculated?	Read-only?
Article	string	no	false
Available	Boolean	no	false
Color	string	no	false
Date	com.sap.dictionary.ccts.Date	no	false
Price	com.sap.dictionary.ccts.Amount	no	false
Quantity	integer	no	false
Total_per_Article	com.sap.dictionary.ccts.Amount	yes	true

The context of the *Component Controller* should now look as follows:

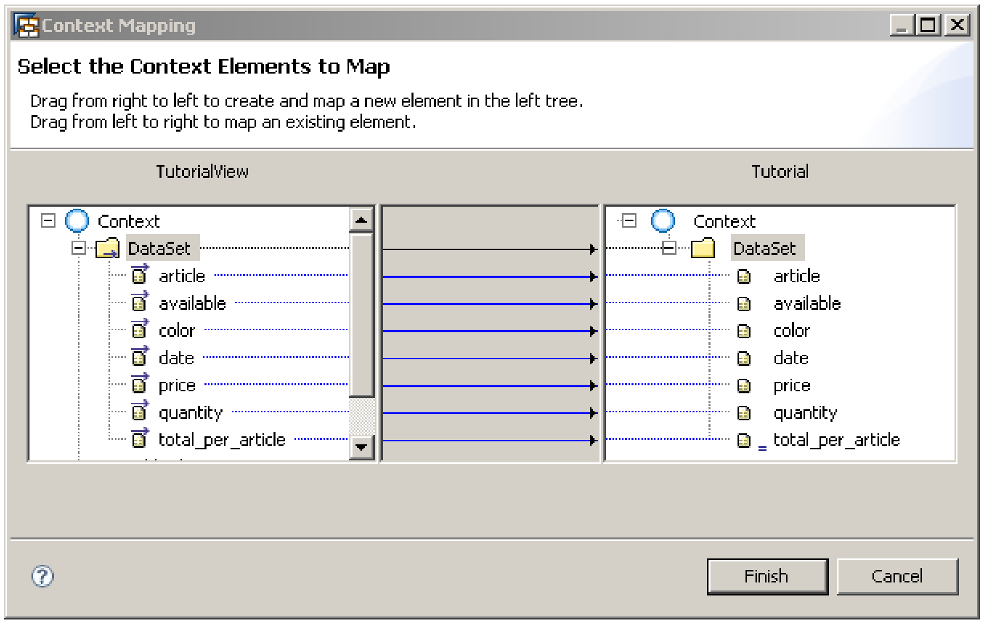


Mapping the View Context onto the Component Controller Context

In order to make the data stored in the context of the component controller available to the view controller, we need to tell the view controller (called *TutorialView*) that it should use the component controller as a data source. Once this has been done, the data in the component controller's context is available to the view controller's context through a technique known as *Context Mapping*.

1. Double-click the icon for the *Tutorial* component to open the graphical controller editor. Create a data link from the *TutorialView* to the component controller. This causes the component controller to be added to the view controller's list of required controllers.

2. Use drag and drop, drag the *DataSet* node from the component controller context on the right (*Tutorial*) to the left and drop it on the view controller's context root node (*TutorialView*). Deselect and select again the *DataSet* node checkbox to include all attributes in the mapping. Confirm by choosing *Finish*.


Context Mapping

Select the Context Elements to Map

Drag from right to left to create and map a new element in the left tree.
Drag from left to right to map an existing element.

The mapping wizard has now created a node called *DataSet* in the context of the view controller and mapped all its attributes to the *DataSet* node (the *mapping origin* node) in the component controller's context.

Any code that accesses data in the *DataSet* node of the view controller actually accesses the data in the context of the component controller.

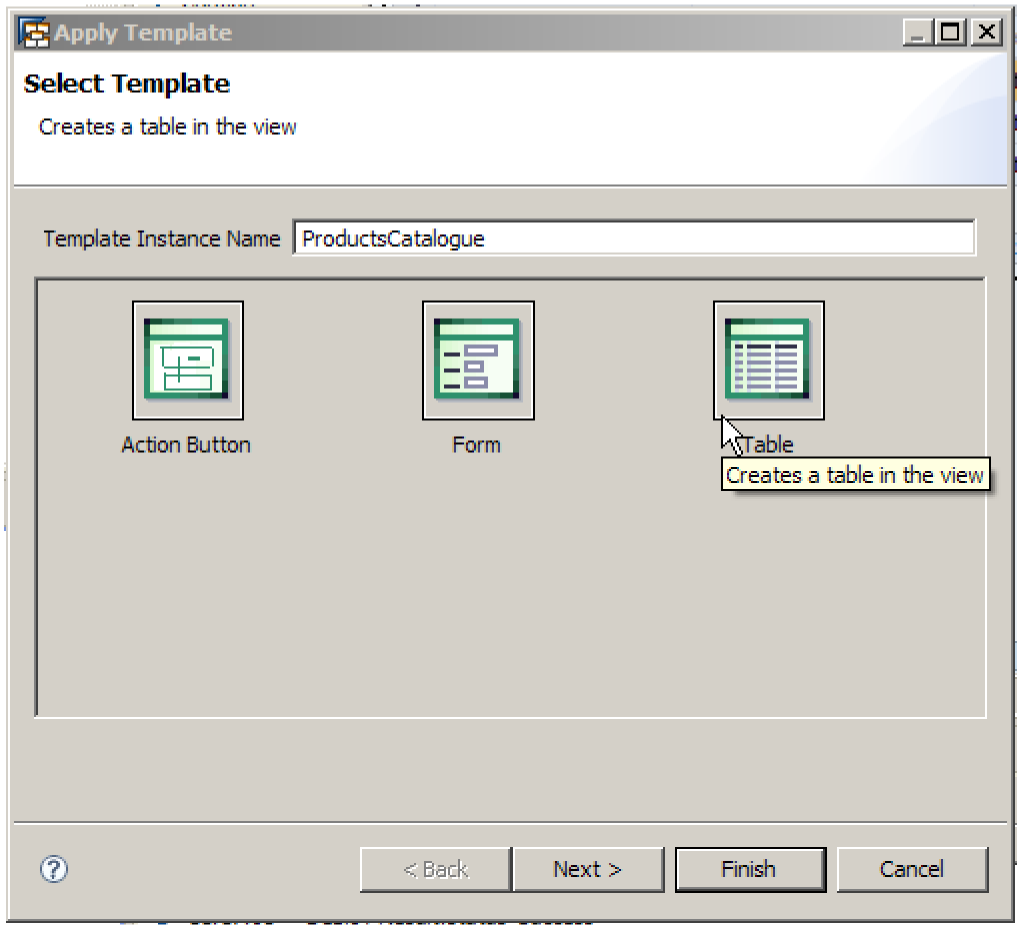
Designing the View Layout

After the view controller context has been created, we can start to add UI elements to the view layout in order to display the context data on the screen.

To present all the articles on the browser screen, we just have to add some UI elements to the view layout.

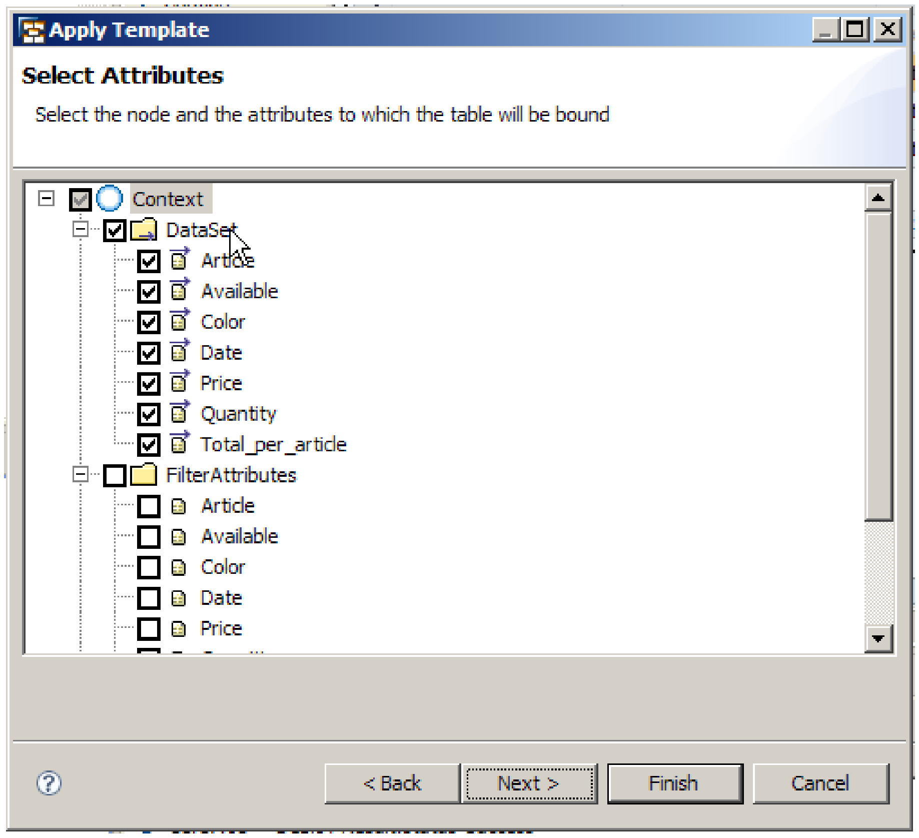
1. Open the *TutorialView* editor by double-clicking the icon or using the context menu. Switch to the *Layout* tab.
2. In the *Outline* view, delete the *DefaultTextView* element if necessary.
3. Right-click the *Root Element* of the view and choose *Apply Template.*

   Select the *Table* icon, overwrite the *Template Instance Name* with the value *ProductsCatalogue*, and choose *Next*. (You can use any valid identifier here but it is important to use the same identifier later in the code that accesses the table at runtime.)



Template Instance Name: ProductsCatalogue

4. Select the *DataSet* context node. By default, all attributes are selected automatically, so just choose *Next*:



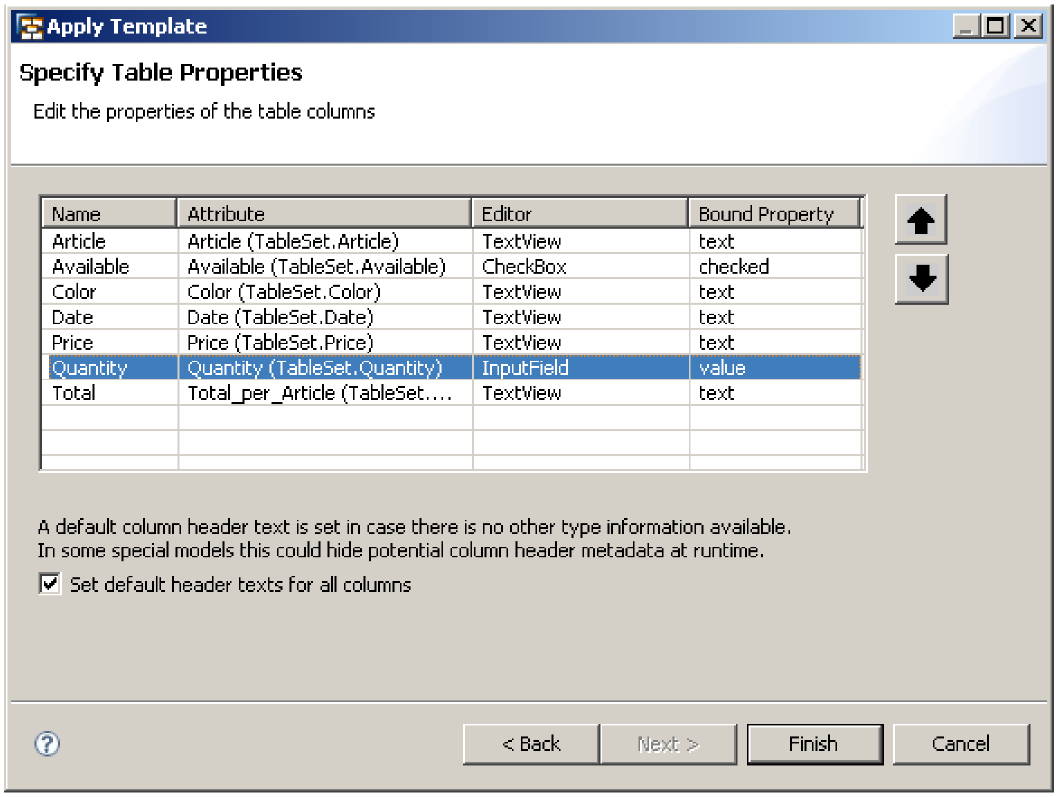
Apply Template

Select Attributes

Select the node and the attributes to which the table will be bound

- [✓] Context
  - [✓] DataSet
    - [✓] Article
    - [✓] Available
    - [✓] Color
    - [✓] Date
    - [✓] Price
    - [✓] Quantity
    - [✓] Total_per_article
  - [ ] FilterAttributes
    - [ ] Article
    - [ ] Available
    - [ ] Color
    - [ ] Date
    - [ ] Price

5. Change the editor for the *Quantity* attribute from `TextView` to `InputField` and confirm by choosing *Finish*.



Apply Template

Specify Table Properties

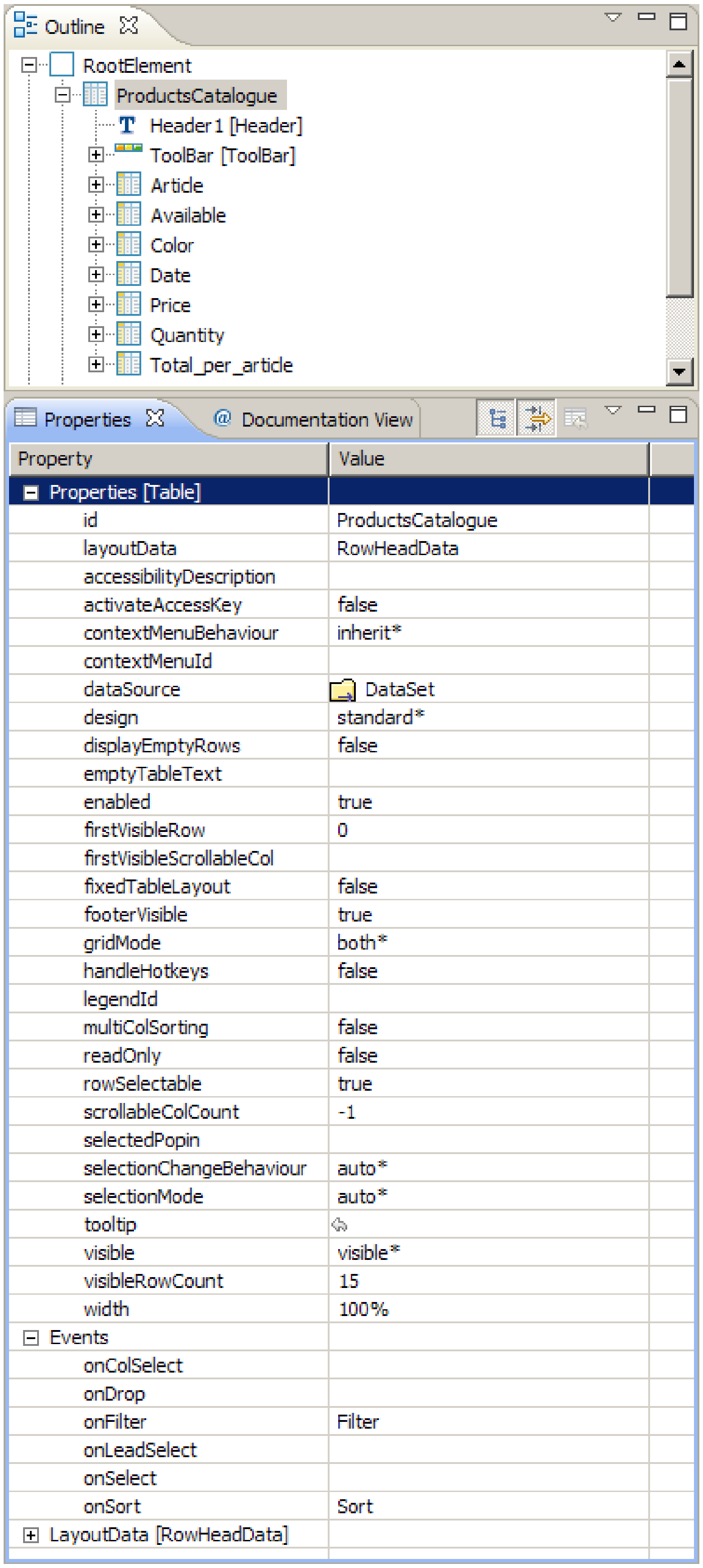
Edit the properties of the table columns

Name	Attribute	Editor	Bound Property
Article	Article (TableSet.Article)	TextView	text
Available	Available (TableSet.Available)	CheckBox	checked
Color	Color (TableSet.Color)	TextView	text
Date	Date (TableSet.Date)	TextView	text
Price	Price (TableSet.Price)	TextView	text
Quantity	Quantity (TableSet.Quantity)	InputField	value
Total	Total_per_Article (TableSet....	TextView	text

A default column header text is set in case there is no other type information available.
In some special models this could hide potential column header metadata at runtime.

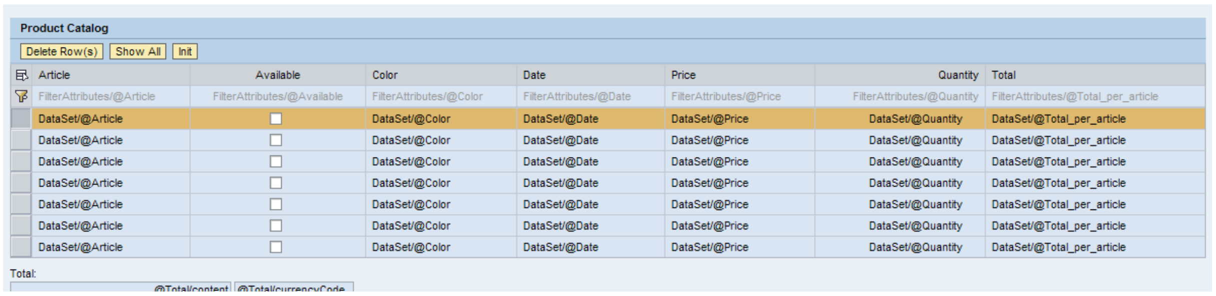
[✓] Set default header texts for all columns

The following screenshots show the complete property settings for the table and how the UI appears in the preview area:



RootElement
- ProductsCatalogue
  - Header1 [Header]
  - ToolBar [ToolBar]
  - Article
  - Available
  - Color
  - Date
  - Price
  - Quantity
  - Total_per_article

Property	Value
Properties [Table]	
id	ProductsCatalogue
layoutData	RowHeadData
accessibilityDescription	
activateAccessKey	false
contextMenuBehaviour	inherit*
contextMenuId	
dataSource	DataSet
design	standard*
displayEmptyRows	false
emptyTableText	
enabled	true
firstVisibleRow	0
firstVisibleScrollableCol	
fixedTableLayout	false
footerVisible	true
gridMode	both*
handleHotkeys	false
legendId	
multiColSorting	false
readOnly	false
rowSelectable	true
scrollableColCount	-1
selectedPopin	
selectionChangeBehaviour	auto*
selectionMode	auto*
tooltip	
visible	visible*
visibleRowCount	15
width	100%
Events	
onColSelect	
onDrop	
onFilter	Filter
onLeadSelect	
onSelect	
onSort	Sort
LayoutData [RowHeadData]	



Product Catalog

Delete Row(s) | Show All | Init

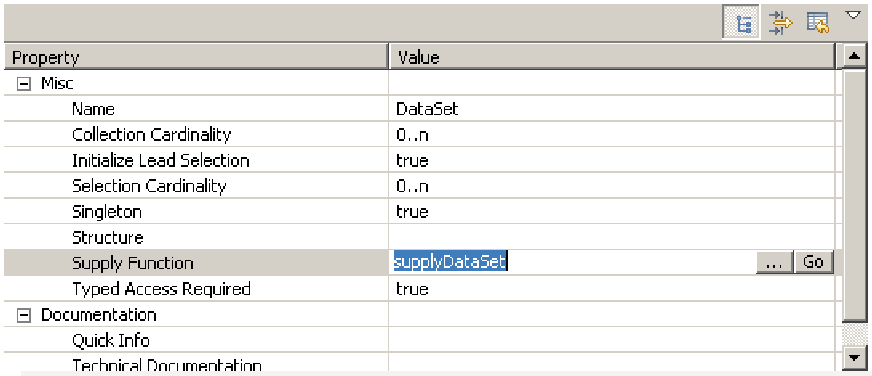
Article	Available	Color	Date	Price	Quantity	Total
FilterAttributes/@Article	FilterAttributes/@Available	FilterAttributes/@Color	FilterAttributes/@Date	FilterAttributes/@Price	FilterAttributes/@Quantity	FilterAttributes/@Total_per_article
DataSet/@Article	☐	DataSet/@Color	DataSet/@Date	DataSet/@Price	DataSet/@Quantity	DataSet/@Total_per_article
DataSet/@Article	☐	DataSet/@Color	DataSet/@Date	DataSet/@Price	DataSet/@Quantity	DataSet/@Total_per_article
DataSet/@Article	☐	DataSet/@Color	DataSet/@Date	DataSet/@Price	DataSet/@Quantity	DataSet/@Total_per_article
DataSet/@Article	☐	DataSet/@Color	DataSet/@Date	DataSet/@Price	DataSet/@Quantity	DataSet/@Total_per_article
DataSet/@Article	☐	DataSet/@Color	DataSet/@Date	DataSet/@Price	DataSet/@Quantity	DataSet/@Total_per_article
DataSet/@Article	☐	DataSet/@Color	DataSet/@Date	DataSet/@Price	DataSet/@Quantity	DataSet/@Total_per_article
DataSet/@Article	☐	DataSet/@Color	DataSet/@Date	DataSet/@Price	DataSet/@Quantity	DataSet/@Total_per_article

Total: @Total/content @Total/currencyCode

Providing Sample Data

In order for the table to display some data, we implement a *supply function* for the `DataSet` context node.

1. Double-click the *Component Controller*
2. Switch to the *Context* tab and select the *DataSet* node.
3. Set the node's property *Supply Function*. Click inside the value cell and choose the button with the ellipsis (three dots). In the dialog box, confirm the proposed name, **supplyDataSet**.



Property	Value
⊟ Misc	
Name	DataSet
Collection Cardinality	0..n
Initialize Lead Selection	true
Selection Cardinality	0..n
Singleton	true
Structure	
Supply Function	supplyDataSet ... Go
Typed Access Required	true
⊟ Documentation	
Quick Info	
Technical Documentation	

Make sure that in the *Project* menu the *Build Automatically* option is selected and subsequently saved. Otherwise, you have to (re)build the project manually each time a declarative change is made, such as the addition of a new method.

4. Choose Ctrl+S to save the changed controller and rerun the code generator. This recreates the Java code for the controller, including the new supply function we have just declared.
5. Navigate to the new *supplyDataSet()* method by choosing *Go*.
6. Between the `//@@begin` and `//@@end` tags, insert the following code:

```
Calendar myCalendar = Calendar.getInstance();
myCalendar.setLenient(false);
java.sql.Date tmpDate = new java.sql.Date(0);
int stockLen = STOCK.length;
int m = 1, d = 1,y = 1980;
CctCode eur = new CctCode("EUR", null, null, null, null, null);
for ( int i = 0; i < stockLen; i++ ) {
  IDataSetElement product = node.createAndAddDataSetElement();
  product.setAvailable((i%6 == 0) ? false : true);
  product.setArticle(STOCK[i][0]);
  product.setColor(STOCK[i][1]);
  product.setPrice(new CctAmount(new BigDecimal(STOCK[i][2]), eur));
  d = ( i % 2 == 0 ) ? (i+4)%30 : d;
  m = ( i % 2 == 0 ) ? i%12 : (i-1)%12;
  y = ( i % 3 == 0 ) ? 2000+i : y;
```

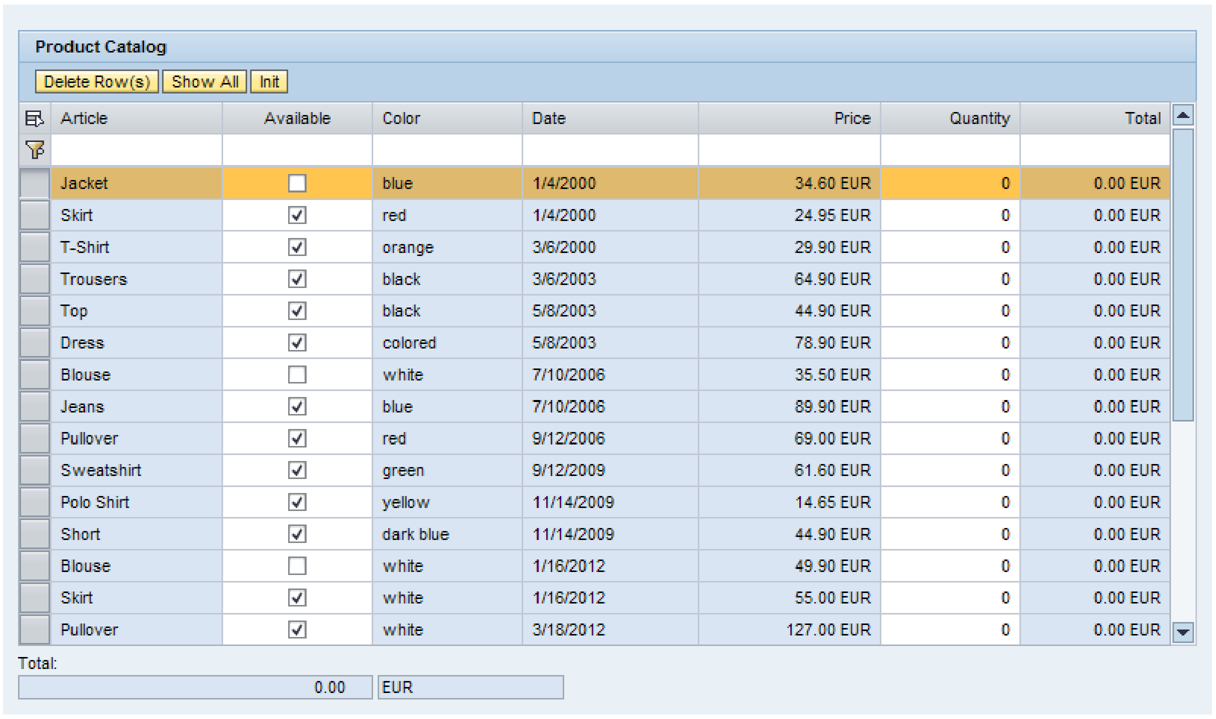
```
        myCalendar.set(y,m,d);
        tmpDate.setTime(myCalendar.getTimeInMillis());
        Date date = new Date(myCalendar.getTime().getTime());
        product.setDate(new CctDate(date));
    }
```

7. There is no need to write any code that calls the supply method explicitly. Instead it is called by the framework automatically whenever the node is empty or invalid and its data is requested, for example when a `Table` UI element is bound to that node.
8. *Organize Imports* (*Ctrl+Shift+O*)
   Choose *com.sap.test.tc.wd.tut.table.sofi.wdp.**IPublicTutorial**.IDataSetElement* and confirm by choosing *Finish*.
9. Between the `//@@begin others` and `//@@end` tags, which can be found at the end of the file, insert the following code:

```
  private static final String STOCK[][] = {
        {"Jacket","blue","34.60"},
        {"Skirt","red","24.95"},
        {"T-Shirt","orange","29.90"},
        {"Trousers","black","64.90"},
        {"Top","black","44.90"},
        {"Dress","colored","78.90"},
        {"Blouse","white","35.50"},
        {"Jeans","blue","89.90"},
        {"Pullover","red","69.00"},
        {"Sweatshirt","green","61.60"},
        {"Polo Shirt","yellow","14.65"},
        {"Shorts","dark blue","44.90"},
        {"Blouse","white","49.90"},
        {"Skirt","white","55.00"},
        {"Pullover","white","127.00"},
        {"Dress","black","178.90"},
        {"Top","red","54.00"},
        {"Trousers","black","79.00"},
        {"T-Shirt","red","45.60"},
        {"Jacket","white","55.80"},
        {"Pullover","white","130.90"},
        {"Jacket","blue","200.90"},
        {"Skirt","brown","89.90"},
        {"Alpaca Pullover","brown","230.00"},
        {"Lambswool Pullover","yellow","130.00"}
  };
```

10. Save the project and select *Deploy New Archive and Run* from the context menu of the application.

The following screen should be displayed in your browser:



Article	Available	Color	Date	Price	Quantity	Total
Jacket	☐	blue	1/4/2000	34.60 EUR	0	0.00 EUR
Skirt	✓	red	1/4/2000	24.95 EUR	0	0.00 EUR
T-Shirt	✓	orange	3/6/2000	29.90 EUR	0	0.00 EUR
Trousers	✓	black	3/6/2003	64.90 EUR	0	0.00 EUR
Top	✓	black	5/8/2003	44.90 EUR	0	0.00 EUR
Dress	✓	colored	5/8/2003	78.90 EUR	0	0.00 EUR
Blouse	☐	white	7/10/2006	35.50 EUR	0	0.00 EUR
Jeans	✓	blue	7/10/2006	89.90 EUR	0	0.00 EUR
Pullover	✓	red	9/12/2006	69.00 EUR	0	0.00 EUR
Sweatshirt	✓	green	9/12/2009	61.60 EUR	0	0.00 EUR
Polo Shirt	✓	yellow	11/14/2009	14.65 EUR	0	0.00 EUR
Short	✓	dark blue	11/14/2009	44.90 EUR	0	0.00 EUR
Blouse	☐	white	1/16/2012	49.90 EUR	0	0.00 EUR
Skirt	✓	white	1/16/2012	55.00 EUR	0	0.00 EUR
Pullover	✓	white	3/18/2012	127.00 EUR	0	0.00 EUR

Total: 0.00 EUR

Implementing Sorting

In the releases SAP NetWeaver 2004 and SAP NetWeaver 7.0, Web Dynpro did not provide any sorting logic by default, this had to be implemented explicitly by the application developer. The SAP NetWeaver 7.0 version of this tutorial offers a separate Java class (called `TableSorter`) to help the application developer with this task. Although the NW 7.1 version of Web Dynpro is now able to sort a node directly, this tutorial continues to use an updated version of the `TableSorter` class that supports the new 7.1 features.

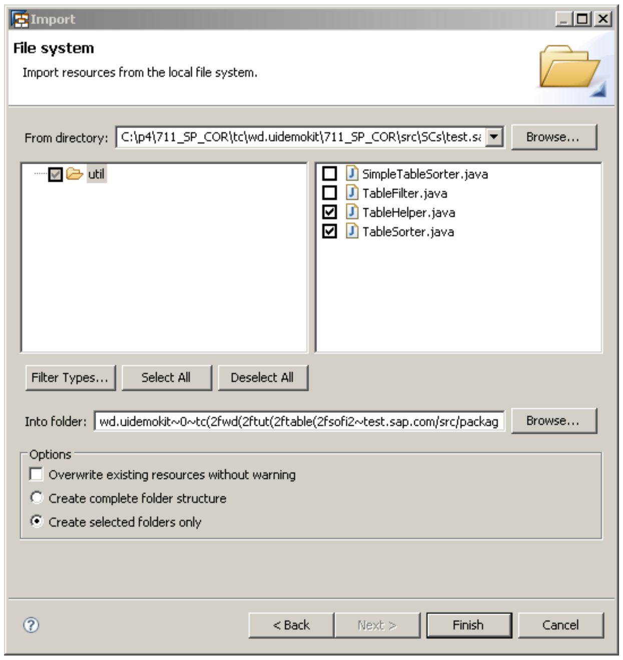
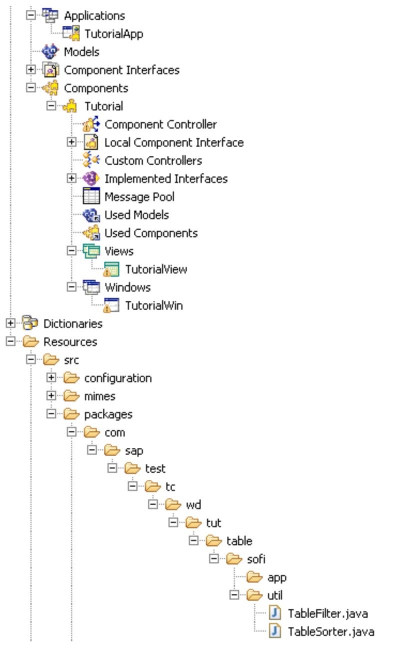
Web Dynpro can sort a node via the `sortElements(ICMISortCriterion)` method. This method is even able to sort by multiple columns.

Importing the TableSorter Class

1. Select *Import* from the *File* menu.
2. Choose *General* → *File System* and choose *Next.*
3. Specify the folder where the Java classes are stored (*TableSorter.java* and its base class *TableHelper.java*) and select them by selecting the corresponding checkbox. You may also import *TableFilter.java*, we will need it later.
4. Now specify where to store the class in the current project structure by using the second browse button *Into Folder*. Navigate through the project structure as follows: *Resources* → *src* → *packages* → *com* → *sap* → *test* → *tc* → *wd* → *tut* → *table* → *sofi* → *util* and confirm by choosing *OK*.
5. Manually append a new folder to this path and name it **util**, so that the path specified describes the location src\packages\com\sap\test\tc\wd\tut\table\sofi\util.

   Confirm by choosing *Finish*.

   If you choose a different location, you need to change the package for the Java class accordingly.

Import Window:	Resulting Project Structure:
	

Import

File system

Import resources from the local file system.

From directory: C:\p4\711_SP_COR\tc\wd.uidemokit\711_SP_COR\src\SCs\test.sa

[✓] util

- [ ] SimpleTableSorter.java
- [ ] TableFilter.java
- [✓] TableHelper.java
- [✓] TableSorter.java

Into folder: wd.uidemokit~0~tc(2fwd(2ftut(2ftable(2fsofi2~test.sap.com/src/packag

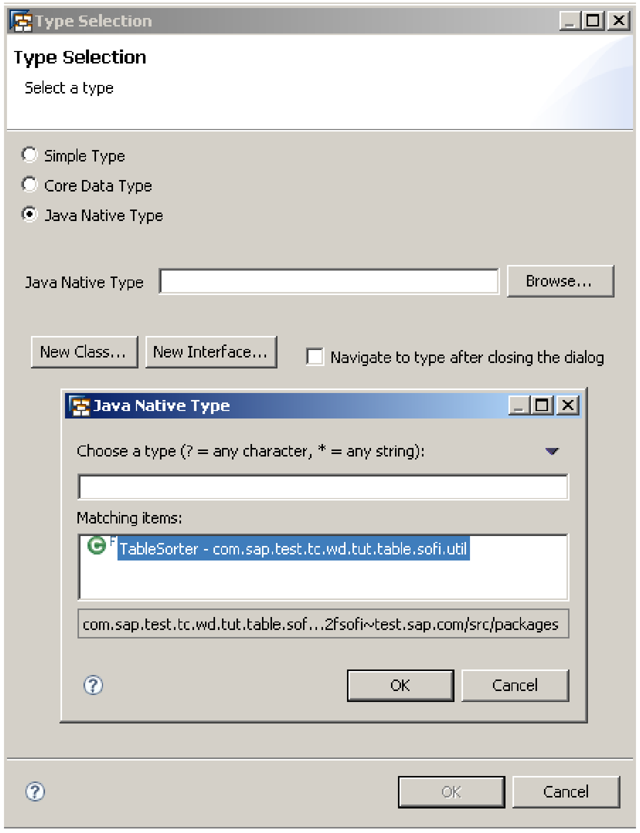
Options
- [ ] Overwrite existing resources without warning
- ○ Create complete folder structure
- ● Create selected folders only

```
  Applications
      TutorialApp
  Models
  Component Interfaces
  Components
      Tutorial
          Component Controller
          Local Component Interface
          Custom Controllers
          Implemented Interfaces
          Message Pool
          Used Models
          Used Components
          Views
              TutorialView
          Windows
              TutorialWin
Dictionaries
Resources
  src
      configuration
      mimes
      packages
          com
              sap
                  test
                      tc
                          wd
                              tut
                                  table
                                      sofi
                                          app
                                          util
                                              TableFilter.java
                                              TableSorter.java
```

Enhancing the Context

We need to store the *TableSorter* instance in a context attribute to be able to access it at runtime. Each time the user clicks a table column header, we need to trigger the table's *onSort* event to sort the table correctly.

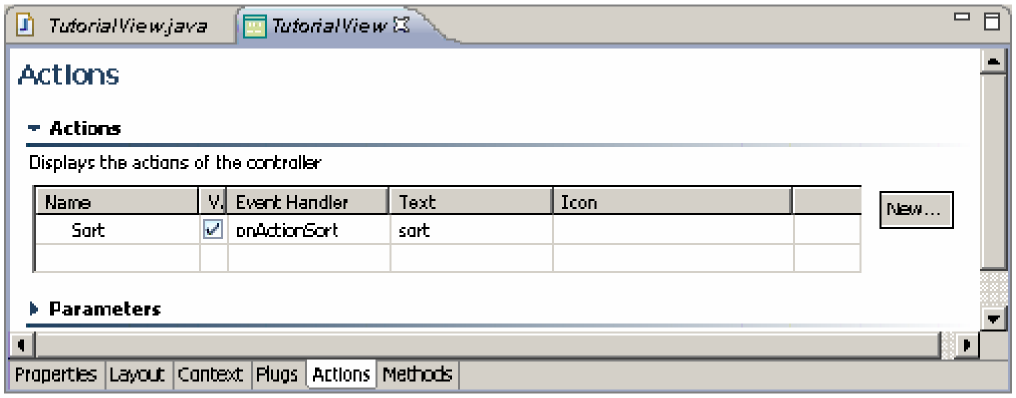
1. Double-click the *Component Controller* and switch to the *Context* tab.
2. Add an attribute named **TableSorter** to the context root node and browse for its *Java Native Type* by typing its class name *TableSorter* into the filter input field. The class should be found and displayed in the lower area, *Matching Items*. If more than one item of the same class name is found, select the one matching your project´s structure path, for example *util*, choose *OK* and confirm by choosing *Finish*.



TableSorter - com.sap.test.tc.wd.tut.table.sofi.util

com.sap.test.tc.wd.tut.table.sof...2fsofi~test.sap.com/src/packages

3. Double-click the *Tutorial* component in the project structure, double-click the data link between the *TutorialView* and *Component Controller* icons and map the *TableSorter* attribute to *TutorialView*.
4. Double-click *TutorialView* and add a new *action*. Switch to the *Action* tab and choose the *New…* button on the upper right-hand side. Name the action **Sort** and choose *Finish*.



Name	V.	Event Handler	Text	Icon
Sort	✓	onActionSort	sort	

5. Open its method implementation by pressing the *F3* key or via the context menu. Add the following code between the `//@@begin` and `//@@end` tags:

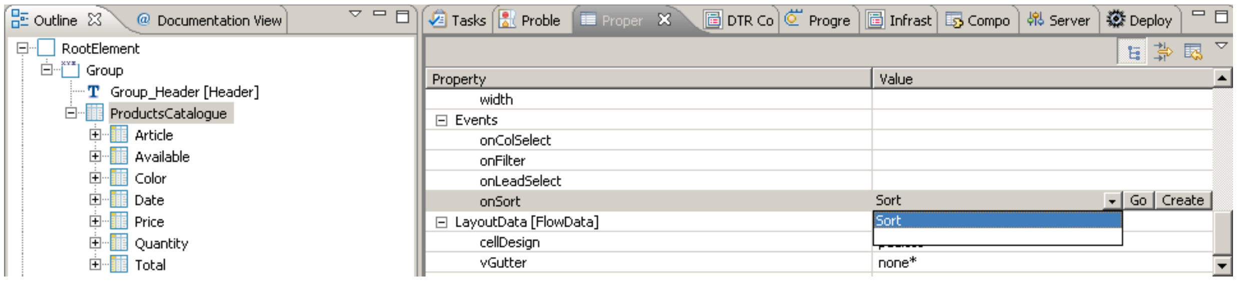
```
wdContext.currentContextElement().
  getTableSorter().sort(wdEvent, wdContext.nodeDataSet());
```

6. Switch to the *wdDoModifyView()* method and insert the following code between the `//@@begin` and `//@@end` tags:

```
if (firstTime) {
  IWDTable table = (IWDTable)view.getElement("ProductsCatalogue");
  wdContext.currentContextElement().setTableSorter(
    new TableSorter(table, wdThis.wdGetSortAction(), null));
}
```

7. *Organize Imports* (*Ctrl+Shift+O*),

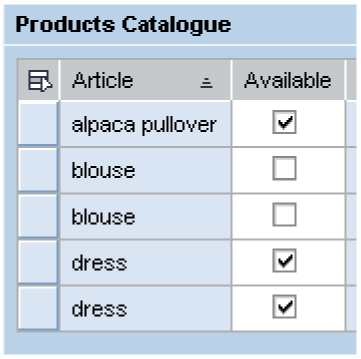
8. Switch to the *Layout* tab of *TutorialView* and select the *ProductsCatalogue* table UI element from the *Outline* view in the bottom left pane. Select the *Properties* tab and associate the table's *onSort* event with the *Sort* action we just created.



Property	Value
width	
Events	
onColSelect	
onFilter	
onLeadSelect	
onSort	Sort
LayoutData [FlowData]	
cellDesign	
vGutter	none*

9. Save, deploy the new archive, and run it.

Now, when you click a column header a sort order icon appears on the sorted column.



Article	Available
alpaca pullover	✓
blouse	☐
blouse	☐
dress	✓
dress	✓

Remarks

The `TableSorter` class has additional capabilities not shown in this tutorial:

- You can specify which columns can be sorted, instead of letting the class automatically choose all columns that can be sorted.
- You can specify your own comparator for any column if the default sorting algorithm does not match your needs. (`IWDNode.setSortCriterion` does not offer this.)
- `TableSorter` can sort entries even if a column uses an attribute of a child of the table's source node. (`IWDNode.setSortCriterion` cannot do this.)

For more information, see the Javadoc.

The major differences between `TableSorter` in this tutorial and the one from the SAP NetWeaver 7.0 tutorial are as follows:

- All string comparisons can be done using a collator instead of simple string comparisons. This allows locale-specific sorting. For compatibility reasons between versions (for example after an upgrade), this is switched off by default.
- Core component types are supported. They are compared by means of the content component.
- You can create a matching comparator for a given data type as a basis for your own comparator.
- You can exchange the comparator for a given column at any time. Any subsequent sorts then use the new comparator.

Implementing Filtering

Filtering is a tedious topic in Web Dynpro in SAP NetWeaver 7.0. In order to apply filtering to a table, we previously needed a total of three context nodes:

- One for the table data (which we already have)
- One to hold the filter values
- One to hold the subset of rows after filtering has been applied

All three nodes needed to have the same structure and had to be located directly under the root node (I.E. Independent nodes). Additionally, we needed an attribute that uniquely identifies each element.

With Web Dynpro 7.1 however, this has become much easier. Now Web Dynpro can apply filtering at the level of context mapping. The application can decide for each element of the data node whether it is visible in the mapped node or not. This can be achieved by attaching an `IWDMappingFilter` to the mapped node's `IWDNodeInfo`.

Nonetheless, there is still some work left to do for the application developer. For this reason, this tutorial provides a pre-written class, called *TableFilter*, which makes filtering really easy.

Filtering Capabilities

The table filter has the following capabilities:

- **Strings:**
  If the filter value contains simply the letter "a", this is treated as if you had entered "*a*" and returns any field that contains an "a" at any position. The search is **not** case sensitive!

  It also accepts the operators "**#**" (for exclude) or "**=**" (for include) in the first position.

- **Numeric values, dates, and times:**
  The filter searches either for the exact value, or if the following operators are used, ranges, inclusions, and exclusions can be specified.

  If you use the inclusion ("**=**") or exclusion ("**#**") operators, then these should always appear first.

  For ranges:

"~100"	specifies all values up to and including 100
"1~100"	specifies all values between 1 and 100 inclusive
"100~"	specifies all values greater than or equal to 100

- **Boolean values:**
  Booleans can be filtered using the inclusion ("**=**") or the exclusion ("**#**") operators in the first position.

Importing the TableFilter Class

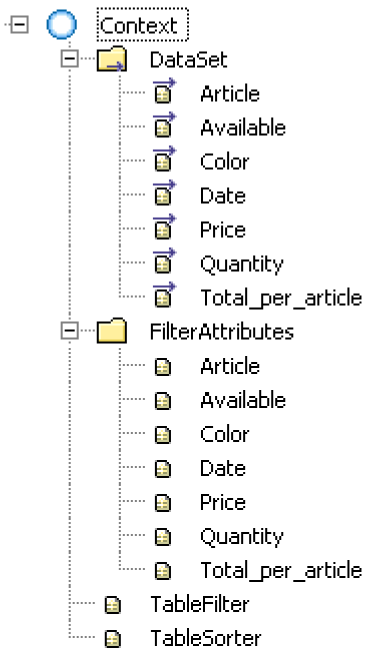
If you did not import the *TableFilter* together with *TableSorter* and *TableHelper*, do it now. Proceed as described in the *Implementing Sorting* section.

Enhancing the Context

We have to create and save a *TableFilter* just like the *TableSorter* and we need to have various context attributes available that can store the filter values. Since these attributes are only relevant for filtering, they will reside in the view controller's context rather than being mapped from the component controller.

1. Double-click the *View Controller* and switch to the context tab.
2. Directly under the context root node, add a new *Java Native Type* attribute named **TableFilter**. Set the data type of this attribute to *TableFilter* in the same way as you did for the *TableSorter* attribute.
3. Create a new node under the context root node called **FilterAttributes**. Set its *collection cardinality* property to **1..1**. Additionally, the *initializeLeadSelection* property should be set.
4. Add the attributes **Article, Available, Color, Date, Price, Quantity,** and **Total_per_Article**, all of type *string*, not calculated and not read-only. These attributes correspond to the table columns that can be used for filtering.

The context should now look as follows:



```
Context
  DataSet
    Article
    Available
    Color
    Date
    Price
    Quantity
    Total_per_article
  FilterAttributes
    Article
    Available
    Color
    Date
    Price
    Quantity
    Total_per_article
  TableFilter
  TableSorter
```

Methods and Actions

TutorialView Controller

1. Double-click the *TutorialView* and switch to the *Actions* tab.
2. Add another action and name it **Filter**.
3. Switch to the *Java Editor* of *TutorialView*. In the *Outline View*, select the *wdDoModifyView()* method and insert the highlighted line of code:

```
if (firstTime) {
  IWDTable table = (IWDTable)view.getElement("ProductsCatalogue");
  wdContext.currentContextElement().setTableSorter(
    new TableSorter(table, wdThis.wdGetSortAction(), null));

  wdContext.currentContextElement().setTableFilter(
    new TableFilter(table,
                  wdThis.wdGetFilterAction(),
                  wdContext.nodeDataSet(), null));
}
```

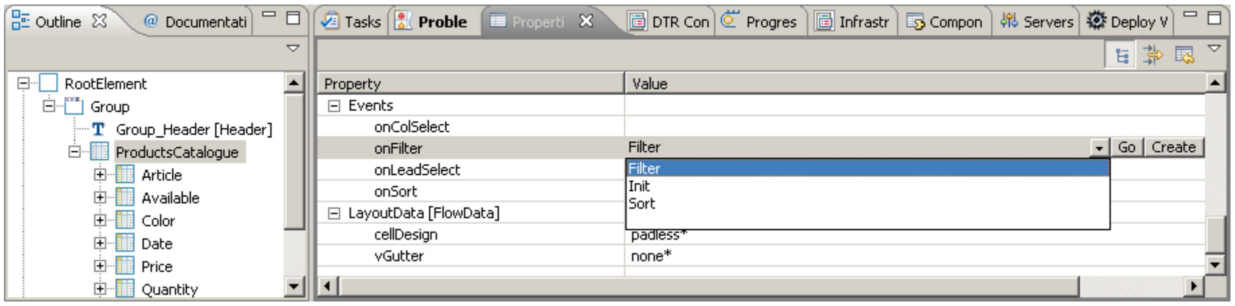
4. *Organize Imports* (*Ctrl+Shift+O*), *save* the project, and then rebuild it.
5. Jump to the *Filter* method implementation, insert the following code between the `//@@begin` and `//@@end` tags, and save it:

```
wdContext.currentContextElement().getTableFilter().filter();
```

Binding the Filter Action and Values

In order to make the `Table` UI element aware that it has filtering capability, you must associate the `Table` UI element's *onFilter* event with the *Filter* action.

1. Double-click *TutorialView* and switch to the *Layout* tab. Then switch to the *Properties* tab in the lower screen section and select in the *Outline* view the table element *ProductsCatalogue*. In the dropdown list for the *onFilter* event, select the *Filter* action.



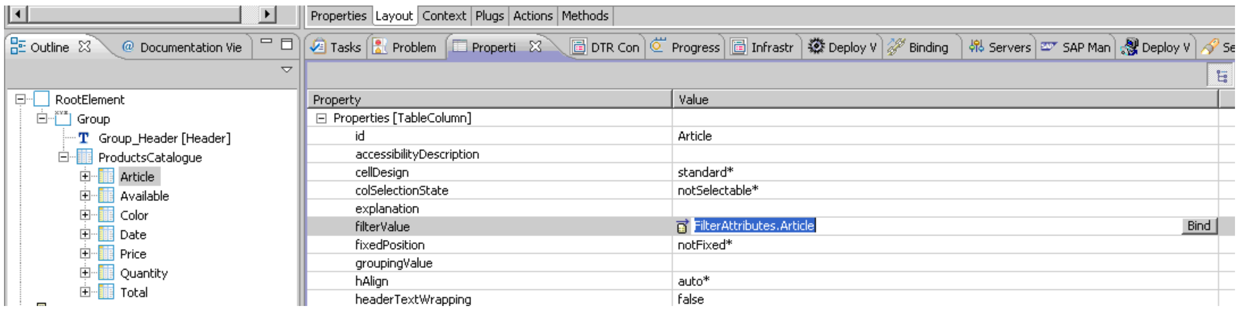
```
RootElement
  Group
    Group_Header [Header]
    ProductsCatalogue
      Article
      Available
      Color
      Date
      Price
      Quantity
```

Property	Value
Events	
onColSelect	
onFilter	Filter
onLeadSelect	
onSort	
LayoutData [FlowData]	
cellDesign	padless*
vGutter	none*

Filter
Init
Sort

As soon as a `TableColumn` is bound to an appropriate filter action, a new first row is created automatically in which you can enter the filter values.

2. Select the `TableColumn` named *Article*. Bind its `filterValue` property to the corresponding context attribute in the *FilterAttributes* node.



Outline | Documentation Vie

- RootElement
  - Group
    - Group_Header [Header]
    - ProductsCatalogue
      - Article
      - Available
      - Color
      - Date
      - Price
      - Quantity
      - Total

Properties | Layout | Context | Plugs | Actions | Methods

Tasks | Problem | Properti | DTR Con | Progress | Infrastr | Deploy V | Binding | Servers | SAP Man | Deploy V | Se

Property	Value
Properties [TableColumn]	
id	Article
accessibilityDescription	
cellDesign	standard*
colSelectionState	notSelectable*
explanation	
filterValue	FilterAttributes.Article
fixedPosition	notFixed*
groupingValue	
hAlign	auto*
headerTextWrapping	false

Repeat the above step for each table column.

3. Save the project, deploy the new archive and run it.

   Filtering and sorting should now be working.

Remarks

Attaching a `TableFilter` changes the behavior of the table's data source node substantially (due to the fact that it attaches an `IWDMappingFilter`), even if no filter applies yet.

Usually adding, removing, or changing the order of elements in the view controller context node directly manipulates the origin node as well and the index of an element in the mapped view node and its origin element are always identical.

IMPORTANT! This relation is lost when an `IWDMappingFilter` is attached!

Now the indexes cannot be identical anymore and as a consequence, the node stops any attempt to keep them in sync. Any changes to the order in the mapped node (for example sorting) do not affect the origin node at all, and vice versa. Additionally, the mapped node prevents any modification of the list (that is, adding or removing elements); you have to delegate this from the view to the component controller.

The `TableFilter` class has additional capabilities not shown in this tutorial:

- You can specify which columns can have a filter, instead of letting the class choose all columns that it can handle.
- You can specify your own matcher for any column if the default filter does not match your needs. This filter can use the attribute value and make object comparisons or it can use the displayed text and pattern matching.
- `TableFilter` can even filter based on a column that uses an attribute of a child of the table's data source node.
- You do not have to supply a filter attribute yourself. `TableFilter` creates one automatically if none exists. However in this case, your application does not have access to the filter value.

For more information, see the Javadoc.

When upgrading an SAP NetWeaver 7.0 application to this new version of the `TableFilter`, you have to make substantial changes to your code.

Below, you can find a short description of this based on the SAP NetWeaver 7.0 tutorial.

In SAP NetWeaver 7.0, there were two nodes for the table data; *SourceNode* always contained the complete list and *TableNode* contained a subset of this list with only those elements that matched the filter criteria. This forced us to write quite a bit of code to keep the *TableNode* up-to-date.

Additionally, any modification of the *TableNode* had to be copied to the corresponding *SourceNode*. This forced us to create a unique identification of the elements, so that we could find the corresponding element in *SourceNode*.

In the 7.1 version, the *DataNode* from the component controller corresponds to the previous *SourceNode* and the *DataNode* in the view corresponds to the previous *TableNode*. Thanks to *IWDMappingFilter* filtering this is now possible without relinquishing the mapping relation. This means that attribute values (and changes) are still propagated automatically. In addition, the addition and removal of elements in the origin node are still observed in the mapped node.

Some of these issues are shown in the following section.

Additional Functionality and Handling

We now have a table that can be filtered and sorted, but we cannot edit the table rows yet, nor reset the table back to the initial list. In order to implement this functionality, we simply put a toolbar to the table UI and add three buttons: *Init*, *ShowAll*, and *DeleteRow(s)*.

The *Total_per_Article* attribute is used to calculate the total price of each row, the *Total* attribute gives the total across all rows.

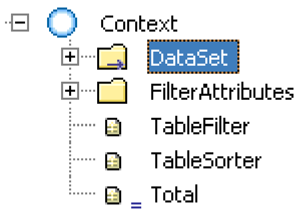
Calculating the Totals

1. Each element has a calculated attribute, *Total_per_Article*. The corresponding getter method however is still empty. We implement it by simply multiplying the price by the quantity. The coding however, gets slightly more complicated because the price is not simply a number, but a core data type.

   Insert the following code in *Tutorial.java* between the `//@@begin` and `//@@end` tags:

```
CctAmount price = element.getPrice();
BigDecimal amount = price.getContent().multiply(
                       new BigDecimal(element.getQuantity()));
return new CctAmount(amount, price.getCurrencyCode());
```

2. Add a new attribute of the core data type *Amount* to the *View Controller* context, name it **Total**, select the *calculated* option, *save*, and *rebuild* the project to cause the NetWeaver Developer Studio to generate the *getTotal* method.

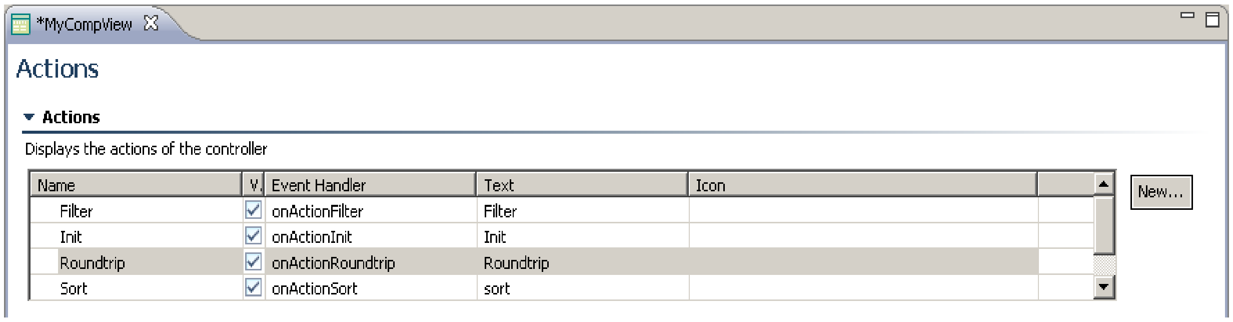


3. Switch to the *Methods* tab, select the *getTotal* method, press the *F3 key* to jump to its implementation or use the context menu and insert the following code between the `//@@begin` and `//@@end` tags:

```
IDataSetNode dataNode = wdContext.nodeDataSet();
if (dataNode.size() == 0) {
  return null;
}
  CctAmount totalPerArticle =
                  dataNode.getDataSetElementAt(0).getTotal_per_article();
BigDecimal sum = totalPerArticle.getContent();
CctCode currency = totalPerArticle.getCurrencyCode();
for (int i = 1; i < dataNode.size(); i++) {
  totalPerArticle = dataNode.getDataSetElementAt(i).getTotal_per_article();
  sum = sum.add(totalPerArticle.getContent());
}
return new CctAmount(sum, currency);
```

4. *Organize Imports* (*Ctrl+Shift+O*), choose *com.sap.test.tc.wd.tut.table.sofi.wdp.**IPrivateTutorialView**.IDataSetNode* and confirm by choosing *Finish*.

5. Double-click *TutorialView* in the project structure and switch to the *Actions* tab, insert an action by choosing *New…* and name it **Roundtrip**. Confirm by choosing *Finish*.



*MyCompView

Actions

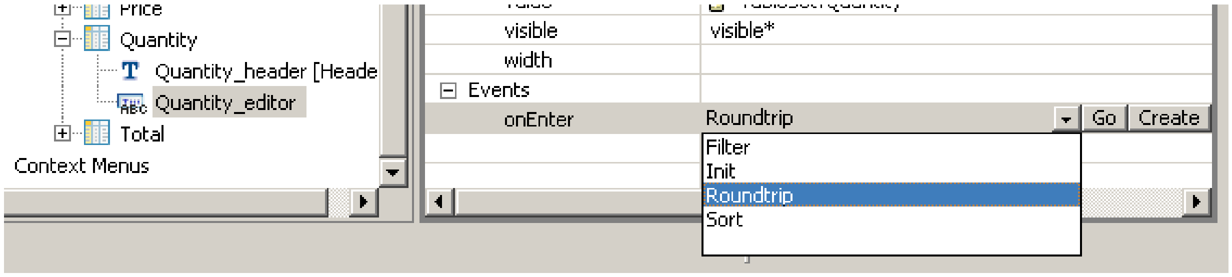
Actions

Displays the actions of the controller

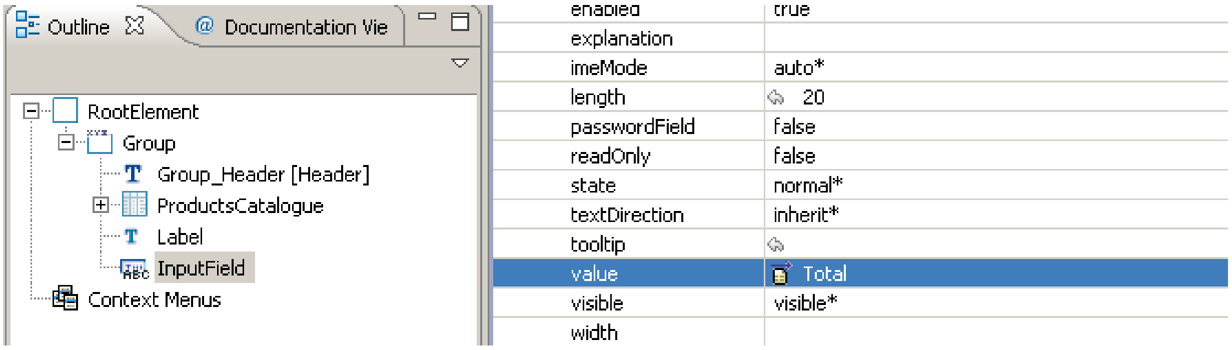
Name	V.	Event Handler	Text	Icon
Filter	✓	onActionFilter	Filter	
Init	✓	onActionInit	Init	
Roundtrip	✓	onActionRoundtrip	Roundtrip	
Sort	✓	onActionSort	sort	

6. Switch to the *Layout* tab and in the *Outline* view, open the *TableColumn* named *Quantity*.

   Select the *Quantity_editor InputField* element and on the *Properties* tab, scroll down to the *onEnter* event and choose the *Roundtrip* action from the dropdown list.



7. Right-click the root element in the *Outline view* tree and choose *Insert Child…* from the context menu. Then select a *Label* UI element and choose *OK*. Set its *text* property to **Total**. Now insert an *InputField* UI element and bind its *value* property to the mapped *Total* attribute.



enabled	true
explanation	
imeMode	auto*
length	20
passwordField	false
readOnly	false
state	normal*
textDirection	inherit*
tooltip	
value	Total
visible	visible*
width	

8. Save the project, deploy the new archive, and run it.

Deleting Rows

Theoretically, it is easy to remove all selected rows of a table. The table maintains its selection in its source node. A row is selected exactly if the source node's multi-selection contains the corresponding node element. So removing all selected elements basically means calling `sourceNode.removeSelected-Elements()`.

But if you try this here, you will notice that it does not work. You will get a `ContextException` telling that you must not modify a filtering node and that you should modify the origin instead. That is what we will do now:

1. Double-click the *Tutorial* component controller in the project structure, switch to the *Methods* tab, add a new method, name it **removeSelectedElements**, and confirm by choosing *Finish*.

   Save the project, go to the method, and insert the following code between the `//@@begin` and `//@@end` tags:

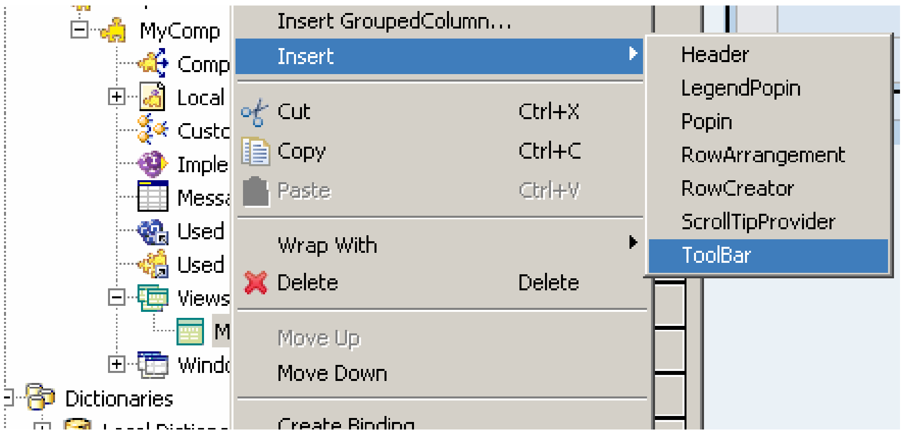
   ```
   wdContext.nodeDataSet().removeSelectedElements();
   ```

2. Double-click the *TutorialView* in the project structure, switch to the *Actions* tab, add a new action, name it **DeleteProducts**, and confirm by choosing *Finish*.

3. *Save* and *rebuild* the project, jump to the new action implementation by pressing the *F3 key* or using the context menu, and insert the following code between the `//@@begin` and `//@@end` tags:

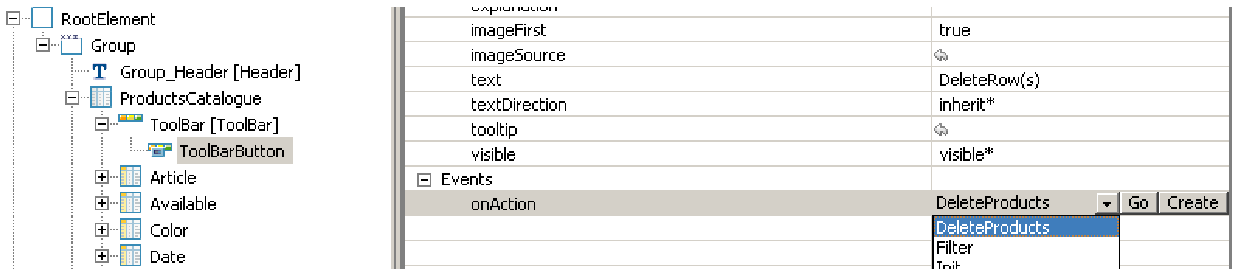
   ```
   wdThis.wdGetTutorialController().removeSelectedElements();
   ```

4. Double-click the *TutorialView* in the project structure, switch to the *Layout* tab and select the `Table` UI element *ProductsCatalogue* with the right mouse button and choose *Insert* → *ToolBar* from the context menu.



5. Select the *ToolBar* UI element with the right mouse button and choose I*nsert ToolBarItem…* In the next window, select a `ToolBarButton` and confirm by choosing *OK*.

   Set its `text` property to **DeleteRow(s)** and select the *DeleteProducts* action from the dropdown list for its *onAction* event.



imageFirst	true
imageSource	
text	DeleteRow(s)
textDirection	inherit*
tooltip	
visible	visible*
onAction	DeleteProducts

Remember, in order to be able to select multiple table rows (using *CTRL+click*), the *Selection Cardinality* property of the *DataSet* node in the *Component Controller* context must be set to 0..n.

Showing the Entire Table Data

Imagine that you have filtered the product catalog for all articles colored blue and you want to reset the list back to its original state. We can implement this functionality via a button action too.

It is quite simple – we just have to clear all filter attributes and trigger filtering again. Since we have put all the filter values into a single node that contains nothing else, deleting all filter values is trivial: Just invalidate the node.

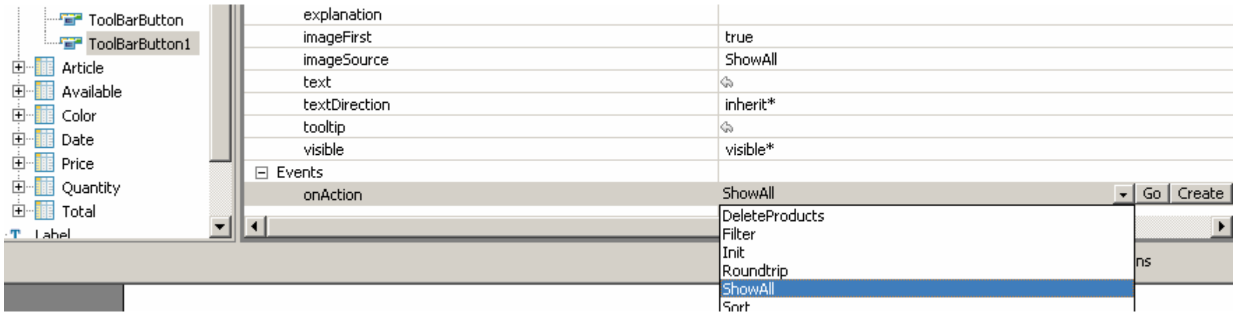
1. Double-click the *TutorialView* in the project structure, switch to the *Actions* tab, add a new action and name it **ShowAll**, and confirm by choosing *Finish*.

   Save and *rebuild* the project, jump to the action's implementation by pressing the *F3 key* or via the context menu and insert the following code between the `//@@begin` and `//@@end` tags:

   ```
   // delete all filter attributes
   wdContext.nodeFilterAttributes().invalidate();
   // filter again
   wdContext.currentContextElement().getTableFilter().filter();
   ```

   This would be a good time for some code refactoring. We have written this lengthy code to call the filter twice, once in *onActionFilter* and once here. It is time for a new method, `filter()`, but this has been left as an exercise for the reader.

2. Double-click the *TutorialView* in the project structure again and switch to the *Layout* tab. Add another *ToolBarButton* to the existing toolbar.



explanation	
imageFirst	true
imageSource	ShowAll
text	
textDirection	inherit*
tooltip	
visible	visible*
Events	
onAction	ShowAll

DeleteProducts
Filter
Init
Roundtrip
ShowAll
Sort

3. Set its `text` property to **ShowAll** and assign the *ShowAll* action to its *onAction* event.

Initializing the Source Data

Last but not least, in order to provide the ability to return to the initial state of the source data, we will add a third button to the table's toolbar. This task is also easy because we are using a supply function to populate the *DataSet* node.

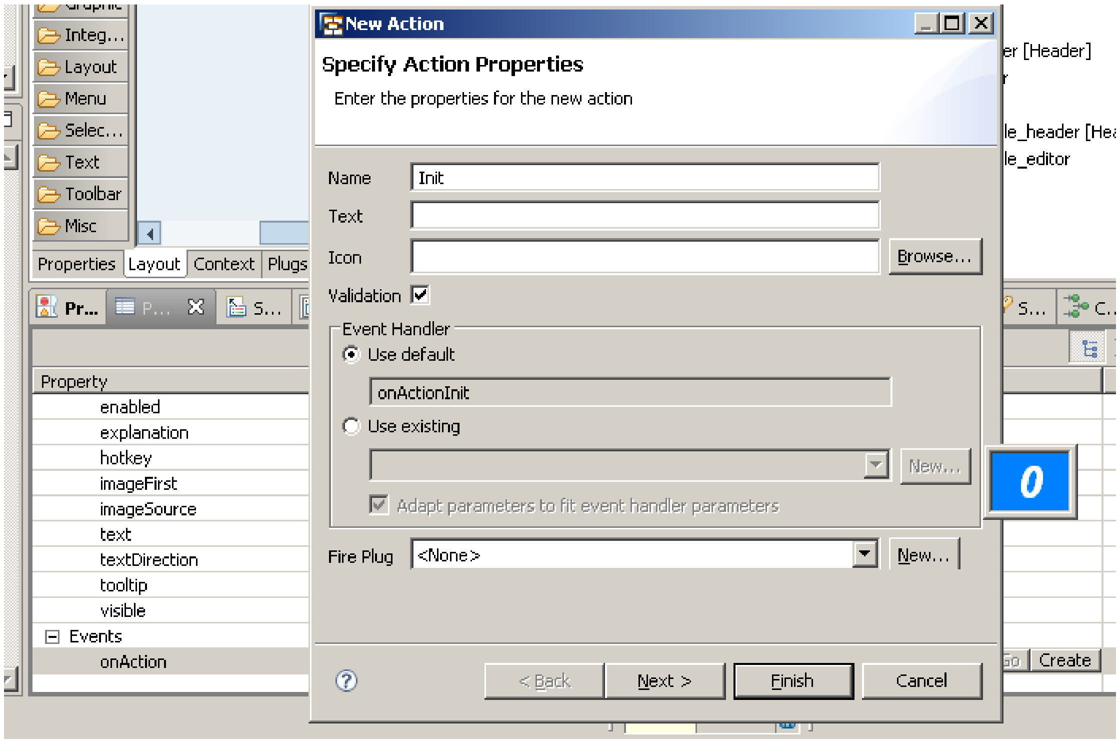
In order to force the execution of a supply function, the only requirement is to invalidate the associated context node. Then, when the next attempt is made to access the contents of the node (for example, when the `Table` UI element is being rendered), the supply function is called automatically.

1. Double-click the *Component Controller* in the project structure, select the *Methods* tab, and add an **init** method with a return type of void and no parameters.

   Save the project, jump to the implementation, and add the following code between the `//@@begin` and `//@@end` tags:

   ```
   wdContext.nodeDataSet().invalidate();
   ```

2. Double-click the *TutorialView* in the project structure, switch to the *Layout* tab, and insert a new toolbar button in the table's *ToolBar* in the *Outline View*. Set its `text` property on the *Properties* tab to **Init** and define its *onAction* event. Since it does not exist yet, choose *Create*, name the action **Init** and choose *Finish*.



New Action

Specify Action Properties

Enter the properties for the new action

Name	Init
Text	
Icon	
Validation	✓

Event Handler
- (●) Use default: onActionInit
- ( ) Use existing
- ✓ Adapt parameters to fit event handler parameters

Fire Plug: <None>

3. *Save* the project, choose *Go* to jump to the implementation, and insert the following code between the `//@@begin` and `//@@end` tags:

```
// delete all filter attributes
wdContext.nodeFilterAttributes().invalidate();
wdThis.wdGetTutorialController().init();
```

Once again we have the possibility of improving the efficiency of the coding here. Now we could factor out a `deleteFilterAttributes()` method.

1. Save the project, deploy the new archive, and run it.

Further Information

UI Element Guide: Table

Parameter Mapping

Binding Tables

Blog: Table Filter

SDN: How to Iterate Over a Context Node

Legend

Text Symbols

Symbol	Usage
⬆	Note
💡	Recommendation
⚠	Warning
📘	See also

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