Creating a Web Dynpro Tree

Applies to:

Web Dynpro Java in SAP NetWeaver 7.0 (2004s)

Summary

This example demonstrates how to create, implement, deploy and run a basic Web Dynpro application using the Tree UI element to display an example file system in recursive manner. The tutorial also shows you how to implement a more performant approach in handling trees by loading the required data only.

Details

Level of complexity: Intermediate

Time required for completion: 60 min.

Sample Project

A ready to use project is available at *WDJ_TUT_Tree_70.zip* if desired.

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Task

This tutorial shows you how to use a performance-efficient recursive Web Dynpro tree. For that purpose, you will insert the Tree UI element in a view and implement its controller methods in such a way, that only when the user expands a node, the necessary data is added dynamically.

A Web Dynpro tree represents the exact structure as it exists in the context of the view at runtime. For instance, since it is impossible to know how many subfolders a recursive file system of an operating system has, the context must be constructed recursively as well. This can be achieved using a recursive context node.

In addition, if the user selects any file entry in the tree structure, the filename will be displayed in an InputField UI element.

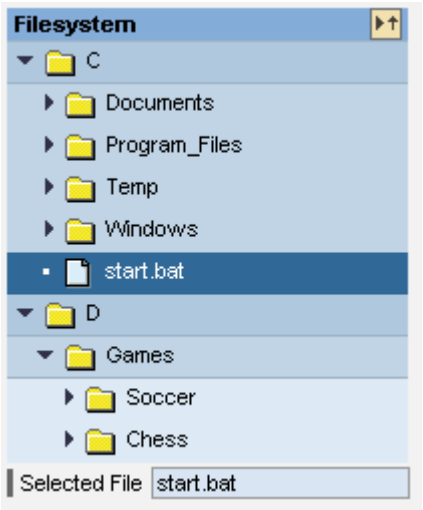
The view consists of a tree-interface element, a label, and an input field for displaying the selected element.

The development process is divided into a declaration part and an implementation part.
In the declaration part, you execute the following steps:

1. Create the context for the *TreeView*
2. Create actions for the tree
3. Create the necessary UI elements, including their binding to the context

In the implementation part, you execute the following steps:

4. Create a resource bundle for the file structure
5. Initialize the context
6. Execute the parameter mapping of the UI element event parameter.
7. Event handling for expansion of a node



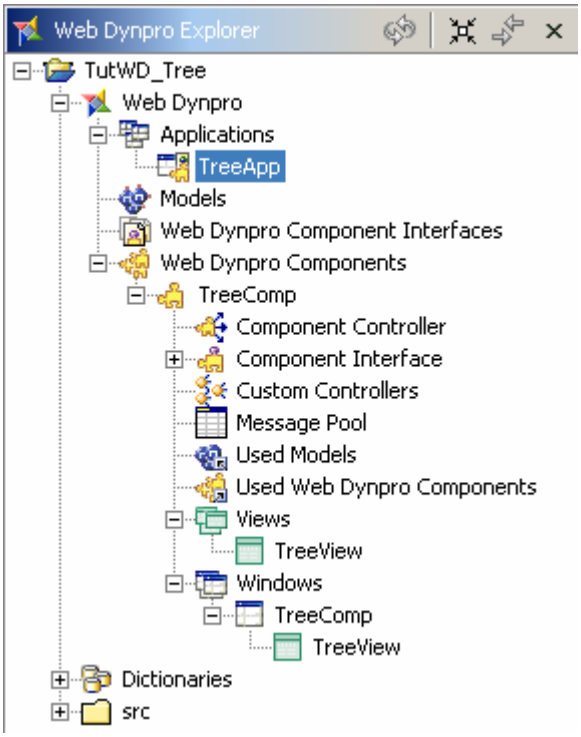
Objectives

When you have completed the described procedure, you will be able to:

- ✔ Use a context recursively
- ✔ Implement a Web Dynpro tree that loads data dynamically
- ✔ Implement an event handler that can react to the selection of a node of the tree.

Creating a new Web Dynpro Project

Create a new Web Dynpro Project with all its necessary units. Name the project **TutWD_Tree**, the application **TreeApp**, the component **TreeComp** and the view **TreeView**. Once you have created the project, you will see the following structure in the Web Dynpro Explorer:



Creating the Context for the TreeView

To display a recursive structure using the Tree UI element, the following context structure must be defined at design time. A *FolderContent* node is created containing some attributes and a *recursive node*. Some attributes can be bound to the *TreeNodeType* properties to control its behavior. For example, the *HasChildren* attribute is used to determine whether the current node is a leaf or not.

Creating the context

1. To open the *View Designer*, double-click *TreeView* in the project structure.
2. Choose the *Context* tab page.

3. Create the nodes and attributes displayed in the table below and set the properties.

Context Element	Type	Properties	Value
FolderContent	Value node		
ChildNode	Recursion Node	repeatedNode	TreeView.FolderContent
HasChildren	Value attribute	type	boolean
IconSource	Value attribute	type	string
IgnoreAction	Value attribute	type	boolean
IsExpanded	Value attribute	type	boolean
Text	Value attribute	type	string
TextOfSelectedNode	Value attribute	type	string

4. To save the project metadata, choose *Save all metadata* from the toolbar.

Description:

- *FolderContent* represents a folder or a file in the tree
- *Text* stores the name of the item (folder or file)
- *HasChildren* specifies whether the node has children or not
- *IconSource* specifies the path to an icon
- *IsExpanded* expands a node initially
- *IgnoreAction* is used to override the execution of the onAction method.

Creating Actions for the Tree

If a file is selected, we want the name of the file to be displayed in another UI element, e.g. an *input field*. Nothing happens when a folder is selected, since the *IgnoreAction* attribute is set to *false*. And for a high-performance solution, we need an action bound to the *onLoadChildren* event, which loads the required data once.

1. To open the *View Designer*, double-click *TreeView* in the project structure.
2. Choose the *Actions* tab page.
3. Choose *New* to create a new action with the name **`LoadChildren`** and choose *Next*.
4. To add a new parameter, choose *New*. Give this parameter the name **`element`** and for *Type*, choose ...
5. In the dialog box that appears, select *Java Native Type*, then choose *Browse...* In the next dialog box that appears, enter **`IFolderContentElement`**.

6. Choose *OK* twice and *Finish* twice.

7. Repeat steps 3 to 6 for another action with the name **`Select`** and the parameter **`selectedElement`** of the same type as in *LoadChildren*.

Creating UI Elements

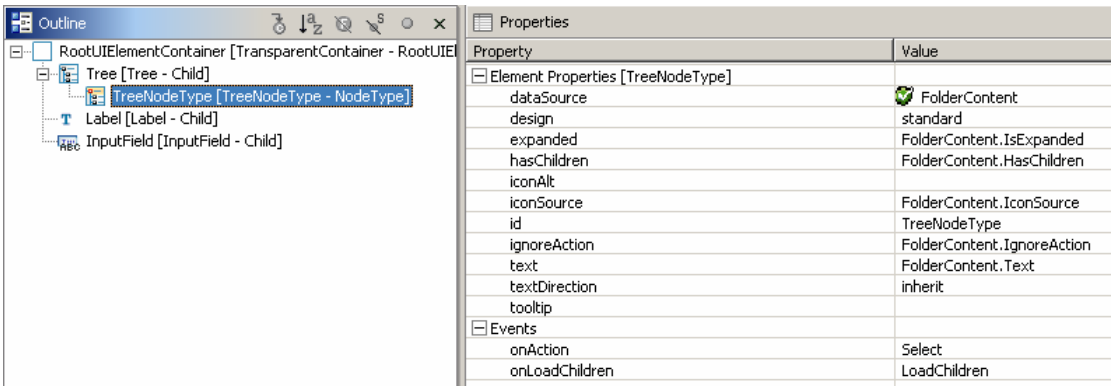
We want the view of this application to display a tree and the name of a selected file. In this step, you integrate a tree into the view and bind it to the corresponding context attributes and actions. You also create a label and an input field.

1. To open the *TreeView*, double-click *TreeView* in the project structure in the Web Dynpro Explorer.
2. Choose the *Layout* tab page and delete the *DefaultTextViewItem* in the Outline View.
3. Insert the UI elements as listed in the table below in the *Outline View* and set the properties in the *Properties* tab.

Property	Value
TheTree of type **Tree**	
Properties of Tree – dataSource	FolderContent
Properties of Tree – rootVisible	false
Properties of Tree – title	Filesystem
Properties of Tree – width	200px
TheNode of type **TreeNodeType** as child of *TheTree*	
Properties of TreeNodeType – dataSource	FolderContent
Properties of TreeNodeType – expanded	FolderContent.IsExpanded
Properties of TreeNodeType – hasChildren	FolderContent.HasChildren
Properties of TreeNodeType – iconSource	FolderContent.IconSource
Properties of TreeNodeType – ignoreAction	FolderContent.IgnoreAction
Properties of TreeNodeType – text	FolderContent.Text
Event – onAction	Select
Event – onLoadChildren	LoadChildren
Label of type **Label**	
Properties of Label – labelFor	Input You cannot set this property until you have created the *Input* input field.
Properties of Label – text	Selected File
Input of type **InputField**	

Properties of InputField – readOnly	True
Properties of InputField – value	TextOfSelectedNode

The *Outline View* and the *TreeNodeType* properties should look like this:



Creating a Resource Bundle for the File Structure

To be able to display some recursive content in a tree, we first need to simulate a file system. In this tutorial we will make use of a simple textfile stored in our project structure.
To do so, we just create a resource file which contains all the necessary information. On startup, an initialize method then parses this file building up the dynamic context.

Add a new directory **`resources`** to the `src/packages/` directory.

1. Switch to the *Package Explorer* and choose the nodes *Tree* > *src/packages*
2. In the context menu, choose *New* > *Other*.
3. In the dialog box that appears, choose *Java* (left side) – *Package* (right side).
4. Choose *Next*. In the window that appears, enter the *Package* name **`resources`** and confirm with *Finish.*

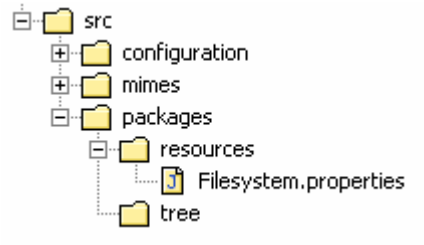
Save the file *`Filesystem.properties`* in the directory that you just created.

1. Select the node *Tree* > *src/packages/resources* and, in the context menu, choose *New* > *Other*.
2. In the dialog box that appears, choose *Simple* (left side) – *File* (right side).
3. Choose Next. In the window that appears, enter the file name **`Filesystem.properties`** and choose *`Finish`*.
4. Copy the following lines of code in the text file and save it.

```
Drives = C;D
C = Documents;Program_Files;Temp;Windows;start.bat
Documents = Word;calc.xls;db.mdb
Word = first.doc;second.doc
Program_Files = Winzip;Accessories
Winzip = wz.com;wzinst.hlp;test.zip
Accessories = calculator.exe;notepad.exe;paint.exe
Windows = Java;Temporary_Internet_Files
```

```
Java = app.java;app.class
Temporary_Internet_Files =
cookie1.txt;cookie2.txt;cookie3.txt;cookie4.txt
D = Games
Games = Soccer;Chess
Soccer = soccer.exe;field.lnd
Chess = chess.exe
```

The project structure under the *src* folder:



Initialising the Context

Now we implement the reusable method a*ddChildren(parentNode)*, which adds a new node to the given parent node.The hook method *wdInit()* builds up the recursive context structure parsing the `Filesystem.properties` file.

1. To open the *TreeView*, double-click *TreeView* in the project structure in the Web Dynpro Explorer.

2. Choose the *Implementation* tab.

3. At the end of the file, after the `//@@begin others` tag, enter the following lines:

```
//@@begin others

// store resource handler for property resource file in private
// member variable
private IWDResourceHandler resourceHandlerForTree = null;

/**
 * Adds child elements to given parent element. The parent
 * element corresponds to a folder.  The folder content (folder
 * elements) is stored as a list of context elements of type
 * IFolderContentElement within the non-singleton node 'ChildNode'
 * under the parent node.
 */
private void addChildren(
  IPrivateTreeView.IFolderContentElement parent) {
  IPrivateTreeView.IFolderContentNode folderContentNode =
    parent.nodeChildNode();
  IPrivateTreeView.IFolderContentElement folderContentElement;

  // read entries (folder content) for given key (folder)
  // in resource bundle    .
  String entries = resourceHandlerForTree.getString(parent.getText());
  StringTokenizer strTokenizer = new StringTokenizer(entries, ";");
  String anEntryToken;

  // if there is no entry in Filesystem.properties for given
  // key (parent.getText()) then the key is returned.
  if (entries.equals(parent.getText())) {
    folderContentElement =
      folderContentNode.createFolderContentElement();
    folderContentElement.setText("Empty Folder");
    folderContentElement.setHasChildren(false);
    folderContentElement.setIgnoreAction(true);
    folderContentNode.addElement(folderContentElement);
  } else {
    // populate non-singleton child node with node elements
    // (folder content elements)
    while (strTokenizer.hasMoreTokens()) {
      anEntryToken = strTokenizer.nextToken();
      folderContentElement =
        folderContentNode.createFolderContentElement();

      if (anEntryToken.indexOf(".") != -1) {
        // entryToken is a file
        folderContentElement.setHasChildren(false);
        folderContentElement.setIgnoreAction(false);
        folderContentElement.setIconSource("~sapicons/s_b_crea.gif");
      } else {
        // entry token is a folder
        folderContentElement.setHasChildren(true);
        folderContentElement.setIgnoreAction(true);
        folderContentElement.setIconSource("~sapicons/s_clofol.gif");
      }
```

```
      folderContentElement.setText(anEntryToken);
      folderContentElement.setIsExpanded(false);
      folderContentNode.addElement(folderContentElement);
    }
  }
}
//@@end
```

4. Organize Imports: Press ***Strg+Shift+o*** or focus the source code area and select with the secondary mouse button ***Source > Organize Imports*** from the context menu.

5. Copy the following lines in the method **`wdDoInit()`** to obtain the initial tree structure:

```
public void wdDoInit()
{ //@@begin wdDoInit()
  //=== STEP 1: Load all initial Data from Filesystem.properties ====
  resourceHandlerForTree =
    WDResourceHandler.createResourceHandlerForCurrentSession();

  // Load the resource bundle "Filesystem.properties" located
  // in the package "com.sap.tut.wd.tree.resources"
  // for locale set in the resource handler.
  resourceHandlerForTree.loadResourceBundle(
    "resources.Filesystem",
    this.getClass().getClassLoader());

  // get all Drives
  String drives = resourceHandlerForTree.getString("Drives");
  StringTokenizer strTokenizer = new StringTokenizer(drives, ";");

  //=== STEP 2: Create node elements of the typ IFolderContentNode ==
  IPrivateTreeView.IFolderContentNode rootFolderContentNode =
    wdContext.nodeFolderContent();
  IPrivateTreeView.IFolderContentElement rootFolderContentElement;

  // begin populating context node 'FolderContent'
  String aDriveToken;
  while (strTokenizer.hasMoreTokens()) {
    aDriveToken = strTokenizer.nextToken();

    // instantiate the new context node element of type
   // 'IFolderContentElement'
    rootFolderContentElement =
      rootFolderContentNode.createFolderContentElement();

    //set contained context value attributes
    rootFolderContentElement.setText(aDriveToken);
    rootFolderContentElement.setHasChildren(true);
    rootFolderContentElement.setIconSource(
      "~sapicons/s_clofol.gif");
    rootFolderContentElement.setIgnoreAction(true);
    // add root folder element to root folder node
    rootFolderContentNode.addElement(rootFolderContentElement);

    // if last folder node element, fill its non-singleton
    // child node (storing its entries) with children (folder node
    // elements) and expand the node ('Drive D' in tree).
    if (!strTokenizer.hasMoreTokens()) {
      addChildren(rootFolderContentElement);
      rootFolderContentElement.setIsExpanded(true);
    } else {
      rootFolderContentElement.setIsExpanded(false);
    }
  }
  //@@end
```

```
}
```

6. Organize Imports (***Strg+Shift+o***) and ***Save*** the project.

Mapping the Event Parameters

In the second step, we created actions for events on a tree node and assigned each of them a parameter. To ensure that these parameters correspond to the selected node at runtime, you must implement a parameter mapping.

1. To open the *TreeView*, double-click *TreeView* in the project structure in the Web Dynpro Explorer.
2. Choose the *Implementation* tab page.
3. Enter the following lines of code in the method **`wdDoModifyView()`**:

```
public static void wdDoModifyView(IPrivateTreeView wdThis,
IPrivateTreeView.IContextNode wdContext,
com.sap.tc.webdynpro.progmodel.api.IWDView view, boolean
firstTime)
  {
    //@@begin wdDoModifyView
          if (firstTime) {
             IWDTreeNodeType treeNode =
                (IWDTreeNodeType)
   view.getElement("TreeNodeType");

         /* parameter mapping from parameter "path" to
          * parameter "selectedElement"
          */
             treeNode.mappingOfOnAction().addSourceMapping(
                "path",
                "selectedElement");
             /* parameter mapping from parameter "path" to
          * parameter "element".
              */

          treeNode.mappingOfOnLoadChildren().addSourceMapping(
                "path",
                "element");
          }
    //@@end
  }
```

4. Organize Imports (***Strg+Shift+o***) and ***Save*** the project.

These lines create a parameter mapping from the UI element parameter *path* to the event parameter *selectedElement* or *element*. The parameter *path* is of type *string* and contains the string representation of the tree node that triggers the event *onAction* or *onLoadChildren*.

Event Handling: Expanding a Node

The defined *LoadChildren* action and its parameter is used to load the required data once, since the browser will cache the data. The previously defined method *addChildren* can be used to take care of this.

1. To open the *TreeView*, double-click *TreeView* in the project structure in the Web Dynpro Explorer.
2. Choose the *Implementation* tab page.
3. Enter the following line in the method `onActionLoadChildren() between the //@@begin` and `//@@end` tags:

```
addChildren(element);
```

Event Handling: Selecting an Entry

We have defined the action *Select*, which contains the selected node as a parameter. Due to the parameter mapping, this parameter contains all the information we need at runtime about the current node. In this scenario, we only make use of the node´s *`getText()`* accessor method to retrieve the name of the item and set the context attribute *TextOfSelectedNode* accordingly which is bound to our input field. And since the *IgnoreAction* is set to *true* for nodes representing folders, the method won´t be executed.

1. To open the *TreeView*, double-click **TreeView** in the project structure in the Web Dynpro Explorer.
2. Choose the *Implementation* tab page.
3. Enter the following lines in the method `onActionSelect()between the //@@begin` and `//@@end` tags:

```
wdContext.currentContextElement().setTextOfSelectedNode(
                    selectedElement.getText());
```

Building, Deploying, and Running the Project

An example of how to deploy and run your application you can find here.

Related Content

Recursive Context Nodes

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