Abstract:

This blog article explains how to search in a rendered, ADF bound tree component. The use case is to find and expand tree nodes that match a specific search pattern in their tree node attributes.
**Oracle ADF Code Corner** is a loose blog-style series of how-to documents that provide solutions to real world coding problems.

**Disclaimer:** All samples are provided as is with no guarantee for future upgrades or error correction. No support can be given through Oracle customer support.

Please post questions or report problems related to the samples in this series on the OTN forum for Oracle JDeveloper: [http://forums.oracle.com/forums/forum.jspa?forumID=83](http://forums.oracle.com/forums/forum.jspa?forumID=83)

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**Introduction**

The sample code listed in this blog article allows users to search within a rendered tree component to find node or leaf entries that match a given search criteria. The tree configuration is to allow multi row (node) selection so that developers can perform additional operations on the tree nodes found.

The images below show a sample search. Users can select the node attributes to find a specific search string in. The search in the sample is for attribute values that start with, end with or contain the search string. The search is performed in a single or multiple attributes.
How-to search in a rendered ADF bound tree

View:  Search in: First name, Last name, Job id

Search Criteria:
- CONTAINS
- STARTS WITH
- ENDS WITH
- CONTAINS

Results:
- 1000 Roma
- 1100 Venice
- 1200 Tokyo
- 1300 Hiroshima
- 1400 Southlake
- 1500 South San Francisco
- 1600 South Brunswick
- 1700 Seattle
- 1800 Toronto
- 1900 Whitehorse
- 2000 Beijing
- 2100 Bombay
- 2200 Sydney
- 2300 Singapore
- 2400 London
- 2500 Oxford
- 2600 Sheffield
- 2700 Munich
- 2800 Sao Paulo
- 2900 Geneva
- 3000 Bern
- 3100 Utrecht
- 3200 Mexico City

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- 2200 Sydney
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- 2400 London
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- 2800 Sao Paulo
- 2900 Geneva
- 3000 Bern
- 3100 Utrecht
- 3200 Mexico City
Using the ctrl-key, users can change the list of selected tree nodes by clicking on a node.

**Note:** See sample #026 "How-to access the selected row data in ADF bound TreeTable and Tree" on ADF Code Corner (http://www.oracle.com/technetwork/developer-tools/adf/learnmore/index-101235.html) for code samples that explain how to further process tree nodes selected by a user.

**Note:** The sample code is an excerpt from the McGraw Hill book "Oracle Fusion Developer Guide". The book samples are not publicly available for download. The plan is and was – over time - to release selected samples, updated for the current version of Oracle JDeveloper, here on ADF Code Corner.

**Building the Tree**

There is nothing specific in building the tree. Just drag a collection – in the sample I used a View Object for the HR Locations table with detail references to Departments and Employees.
The tree component is surrounded by an af:panelCollection, which not only is my favorite ADF Faces component but also provides the toolbar area for the search component input fields.

However, be aware that the panel collection is a naming container, which needs to be taken into account when dynamically looking up the tree component in the view. The component id of the tree is prefixed with the id of the naming container, separated by a colon, ".:"

```java
#node
#node
#node
```
<af:panelCollection id="pc1">
  <f:facet name="menus"/>
  <f:facet name="toolbar">
    <af:toolbar id="t2">
      <af:selectManyChoice label="Search in" id="sml1" value="#{viewScope.SearchBean.searchAttributes}"
        value="#{viewScope.SearchBean.searchAttributes}">
        <af:selectItem label="FirstName" value="FirstName" id="si4"/>
        <af:selectItem label="LastName" value="LastName" id="si2"/>
        <af:selectItem label="Email" value="Email" id="si6"/>
        <af:selectItem label="JobId" value="JobId" id="si1"/>
        <af:selectItem label="DepartmentName" value="DepartmentName" id="si5"/>
        <af:selectItem label="City" value="City" id="si3"/>
      </af:selectManyChoice>
      <af:selectOneChoice label="" id="soc1" value="#{viewScope.SearchBean.searchType}"
        value="#{viewScope.SearchBean.searchType}">
        <af:selectItem label="CONTAINS" value="CONTAIN" id="si7"/>
        <af:selectItem label="STARTS WITH" value="START" id="si8"/>
        <af:selectItem label="ENDS WITH" value="END" id="si9"/>
      </af:selectOneChoice>
      <af:inputText label="Search" id="it1" simple="true" value="#{viewScope.SearchBean.searchString}"/>
      <af:commandToolbarButton text="Search" id="ctb1" actionListener="#{viewScope.SearchBean.onSearch}"/>
    </af:toolbar>
  </f:facet>
  <f:facet name="statusbar"/>
  <af:tree value="#{bindings.allLocations.treeModel}" var="node"
    rowSelection="multiple" id="tree1" partialTriggers=":ctb1">
    <f:facet name="nodeStamp">
      <af:outputText value="#{node}" id="ot1"/>
    </f:facet>
    <f:facet name="pathStamp">
      <af:outputText value="#{node}" id="ot2"/>
    </f:facet>
  </af:tree>
</af:panelCollection>

Managed Bean Search Code

The managed bean code to access the tree and parse its node values for the search string is provided as a reference. An Oracle JDeveloper sample workspace can be downloaded from the ADF Code Corner website for you to try. Comments are added inline to explain the functionality in the managed bean.

Note: The managed bean is configured in viewScope for performance reason.
public class SearchBean {
    private String searchString = "";
    private String searchType = "CONTAIN";
    private List<String> searchAttributes = new ArrayList<>();
    private RichTree tree1 = null;

    //log information to the ADF logger
    ADFLogger logger = ADFLogger.createADFLogger(this.getClass());

    public SearchBean() {
        super();
    }

    public void onSearch(ActionEvent actionEvent) {
        JUCtrlHierBinding treeBinding = null;

        //get handle to tree if it does not exist. If tree component
        //cannot be found in view, exit this function
        if (tree1 == null) {
            this.findTreeInView();
            if (tree1 == null) {
                //tree not found
                log("The tree component could not be found in the view. " +
                     "Check for naming containers. Search function cancelled");
                return;
            }
        }

        //Get the JUCtrlHierBinding reference from the PageDef
        CollectionModel model = (CollectionModel)tree1.getValue();
        treeBinding = (JUCtrlHierBinding)model.getWrappedData();

        //Read the attributes to search in from the SelectManyChoice
        //component
String searchAttributeArray[] = null;
searchAttributeArray[] = (String[])searchAttributes.toArray(new String[searchAttributes.size()]);

//Define a node to search in. In this example, the root node is used
JUCtrlHierNodeBinding root = treeBinding.getRootNodeBinding();

//However, if the user used the "Show as Top" context menu option to shorten the tree display, then we only search starting from this top node
List topNode = (List)tree1.getFocusRowKey();
if (topNode != null) {
    //make top node the root node for the search
    root = treeBinding.findNodeByKeyPath(topNode);
}

//Select the tree items that match the search criteria and expand the tree to display them. The resultRowKeySet contains the list of nodes to select. The disclosedRowKeySet contains the keys of the selected rows and their parent nodes
RowKeySet resultRowKeySet = searchTreeNode(root, searchAttributeArray, searchType, searchString);
RowKeySet disclosedRowKeySet = buildDiscloseRowKeySet(treeBinding, resultRowKeySet);
tree1.setSelectedRowKeys(resultRowKeySet);
tree1.setDisclosedRowKeys(disclosedRowKeySet);
//refresh the tree after the search
AdfFacesContext.getCurrentInstance().addPartialTarget(tree1);

/**
 * Method that parses an ADF bound ADF Faces tree component to find search string matches in one of the specified attribute names.
 * Attribute names are ignored if they don't exist in the search node.
 * The method performs a recursive search and returns a RowKeySet with the row keys of all nodes that contain the search string
 * @param node The JUCtrlHierNodeBinding instance to search
 * @param searchAttributes An array of attribute names to search in
 * @param searchType defines where the search is started within the text. Valid values are START, CONTAIN, END. If NULL the "CONTAIN" is set as the default
 * @param searchString The search condition
 * @return RowKeySet row keys
 */
private RowKeySet searchTreeNode(JUCtrlHierNodeBinding node,
String[] searchAttributes, String searchType, String searchString) {
    RowKeySetImpl rowKeys = new RowKeySetImpl();
    // Set default search
    String _searchType = searchType == null ? "CONTAIN" :
        searchType.length() > 0 ? searchType : "CONTAIN";
    // Sanity checks
    if (node == null) {
        log("Node passed as NULL");
        return rowKeys;
    } 
    if (searchAttributes == null || searchAttributes.length < 1) {
        log(node.getName() + ": search attribute is NULL or has a ZERO length");
        return rowKeys;
    }
    if (searchString == null || searchString.length() < 1) {
        log(node.getName() + ": Search string cannot be NULL or EMPTY");
        return rowKeys;
    }
    Row nodeRow = node.getRow();
    if (nodeRow != null) {
        for (int i = 0; i < searchAttributes.length; i++) {
            String compareString = "";
            try {
                Object attribute =
                    nodeRow.getAttribute(searchAttributes[i]);
                if (attribute instanceof String) {
                    compareString = (String)attribute;
                } else {
                    // try the toString method as a simple fallback
                    compareString = attribute.toString();
                }
                // not all nodes have all attributes. In this case an exception
                // is thrown that we don't need to handle as it is expected
            } catch (oracle.jbo.JboException attributeNotFound) {
                // node does not have attribute. Exclude from search
            }
            // compare strings case insensitive.
            if (_searchType.equalsIgnoreCase("CONTAIN") &&
                compareString.toUpperCase().indexOf(searchString.toUpperCase()) > -1)
            {
                // get row key
                rowKeys.add(node.getKeyPath());
            }
        }
    }
    return rowKeys;
}
} else if (_searchType.equalsIgnoreCase("START") &&
   compareString.toUpperCase().startsWith(searchString.toUpperCase()))
{
   // get row key
   rowKeys.add(node.getKeyPath());
} else if (_searchType.equalsIgnoreCase("END") &&
   compareString.toUpperCase().endsWith(searchString.toUpperCase())){
   // get row key
   rowKeys.add(node.getKeyPath());
}
}

List<JUCtrlHierNodeBinding> children = node.getChildren();
if (children != null) {
   for (JUCtrlHierNodeBinding _node : children) {
      // Each child search returns a row key set that must be added to the
      // row key set returned by the overall search
      RowKeySet rks = searchTreeNode(_node, searchAttributes,
         this.searchType, searchString);
      if (rks != null && rks.size() > 0) {
         rowKeys.addAll(rks);
      }
   }
}
return rowKeys;

/**
 * Helper method that returns a list of parent node for the RowKeySet
 * passed as the keys argument. The RowKeySet can be used to disclose
 * the folders in which the keys reside. Node that to disclose a full
 * branch, all RowKeySet that are in the path must be defined
 * @param  treeBinding ADF tree binding instance read from the PageDef
 * @param  keys  RowKeySet containing List entries of oracle.jbo.Key
 * @return RowKeySet of parent keys to disclose
 */
private RowKeySet buildDiscloseRowKeySet(
   JUCtrlHierBinding treeBinding,
   RowKeySet keys) {
   RowKeySetImpl discloseRowKeySet = new RowKeySetImpl();
   Iterator iter = keys.iterator();
   while (iter.hasNext()) {
      List keyPath = (List)iter.next();
      JUCtrlHierNodeBinding node =
treeBinding.findNodeByKeyPath(keyPath);
if (node != null && node.getParent() != null &&
    !node.getParent().getKeyPath().isEmpty()) {
    //store the parent path
    discloseRowKeySet.add(node.getParent().getKeyPath());
    //call method recursively until no parents are found
    RowKeySetImpl parentKeySet = new RowKeySetImpl();
    parentKeySet.add(node.getParent().getKeyPath());
    RowKeySet rks =
        buildDiscloseRowKeySet(treeBinding, parentKeySet);
    discloseRowKeySet.addAll(rks);
}
return discloseRowKeySet;
}
private void log(String message) {
    logger.log(ADFLogger.WARNING, message);
}
public void setSearchString(String searchString) {
    this.searchString = searchString;
}
public String getSearchString() {
    return searchString;
}
public void setSearchType(String searchType) {
    this.searchType = searchType;
}
public String getSearchType() {
    return searchType;
}
public void setSearchAttributes(List searchAttributes) {
    this.searchAttributes = searchAttributes;
}
public List getSearchAttributes() {
    return searchAttributes;
}
//To learn what the code below is doing, please see Sample #58 on ADF
//Code Corner
//http://www.oracle.com/technetwork/developer-tools/
//adf/learnmore/index-101235.html

private void findTreeInView() {
FacesContext fctx = FacesContext.getCurrentInstance();
UIViewRoot root = fctx.getViewRoot();
//hard coding tree component Id with its surrounding naming container
//ID PanelCollection
root.invokeOnComponent(fctx, "pc1:tree1", new ContextCallback() {
    public void invokeContextCallback(FacesContext facesContext,
            UIComponent uiComponent) {
        tree1 = (RichTree)uiComponent;
    }
});
}

Sample Download

The Oracle JDeveloper 11.1.1.3 workspace is available for download as sample #061 from the ADF Code Corner website:

Configure the model project to connect to a local database with the HR schema installed and enabled.
Run the JPX page, choose attributes to search in and provide a search string. Then hit the search button.

RELATED DOCUMENTATION

- Sample 026 "How-to access the selected row data in ADF bound TreeTable and Tree" on ADF Code Corner