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Genero User Interface Programming the AUI

Genero BDL 3.10
Genero Studio 3.10

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The Power of Simplicity

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Goals

You will learn to:

Find the node for the current window.

Dump all the attributes of a node.

Use several methods for finding a node.

Use these techniques to programmatically add new elements to a form.

The AUI

Abstract User Interface is:

A conceptual “meta” user interface

Logical rather than Real

Common interface to all target interfaces

Styles provide a transformation layer to Real interface

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The AUI → DOM → XML

Why use XML for Abstract User Interface?

GUIs are typically defined as hierarchical object trees.

XML is ideal for describing hierarchical object trees.

DOM is an internal (memory) representation of *XML* document.

XML and *DOM* are open industry standards defined by *W3C.*

Simple standard APIs can be used for navigating and manipulating a *DOM* object tree.

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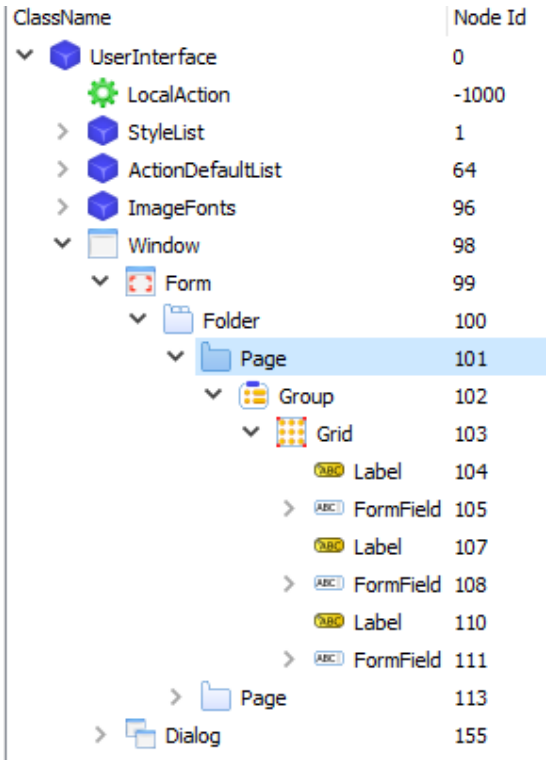
The AUI → DOM → XML

How does XML relate to an object?

An *XML* document is a tree of *Nodes*
A *Node* represents an *Object* or *Event*
Screen elements are *Objects*
A *Node* may have *Attributes*
Nodes have a unique *i-node* identifier
Some *Objects* are instances of *Classes* eg: *Form, Combobox*
An *XML* tag may be a *Class* or *Attribute*
Objects may be a *Container* for *Attributes* or other *Objects*
Recursive and hierarchical

The AUI → DOM → XML




```
<?xml version='1.0' encoding='windows-1252'?>
<UserInterface name="prog1" text="prog1" charLengthSemantics="0" procId="neilm-win10:564" dbDate="MDY4/" d
  <StyleList fileName="S:\slide_forms\default.4st">
  <ActionDefaultList fileName="S:\slide_forms\default.4ad">
  <ImageFonts>
  <Window name="screen" commentLine="-2" commentLineHidden="0" formLine="2" messageLine="1" menuLine="0" p
    <Form name="form2" build="3.10.08" text="Example" style="main" width="51" height="5" formLine="2">
      <Folder>
        <Page text="Page 1">
          <Group text="Customer Details">
            <Grid width="16" height="3">
              <Label text="Name:" posY="0" posX="0" gridWidth="5"/>
              <FormField name="formonly.name" colName="name" fieldId="0" sqlTabName="formonly" tabIndex="1
                <Edit width="6" posY="0" posX="9" gridWidth="6"/>
              </FormField>
              <Label text="Phone:" posY="1" posX="0" gridWidth="6"/>
              <FormField name="formonly.phone" colName="phone" fieldId="1" sqlTabName="formonly" tabIndex=
                <Edit width="6" posY="1" posX="9" gridWidth="6"/>
              </FormField>
              <Label text="Address:" posY="2" posX="0" gridWidth="8"/>
              <FormField name="formonly.address" colName="address" fieldId="2" sqlTabName="formonly" tabIn
                <Edit width="6" posY="2" posX="9" gridWidth="6"/>
              </FormField>
            </Grid>
          </Group>
        </Page>
        <Page text="Page 2">
      </Folder>
      <RecordView tabName="formonly">
    </Form>
  </Window>
</UserInterface>
```

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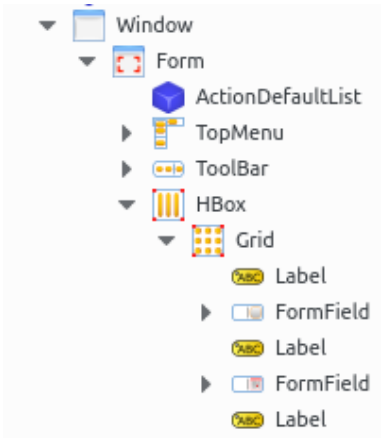
The AUI → DOM → XML

What standard UI Elements are defined from XML documents?

Styles (.4st)
Start Menus (.4sm)
Toolbars (.4tb)
Topmenus (.4tm)
Forms (.42f)



BUT - Any part of the UI can defined from an XML document

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What is the relationship between Forms and XML?

A *Form* is part of the *User Interface* (*UI*)

A compiled *Form* (.42f) is an *XML* document

An *XML* document can be loaded to the *User Interface* or as a subtree of the *User Interface*

The *User Interface* can also be saved as an *XML* document

The Programming the AUI

ui.Interface - Provides an interface to the *AUI* tree

ui.Window - Provides an interface to the **window** objects

ui.Form - Provides an interface to **form**s used in the program

ui.ComboBox – Provides an interface to **ComboBox** objects

ui.Dialog – Provides an interface to interactive instructions in the program.

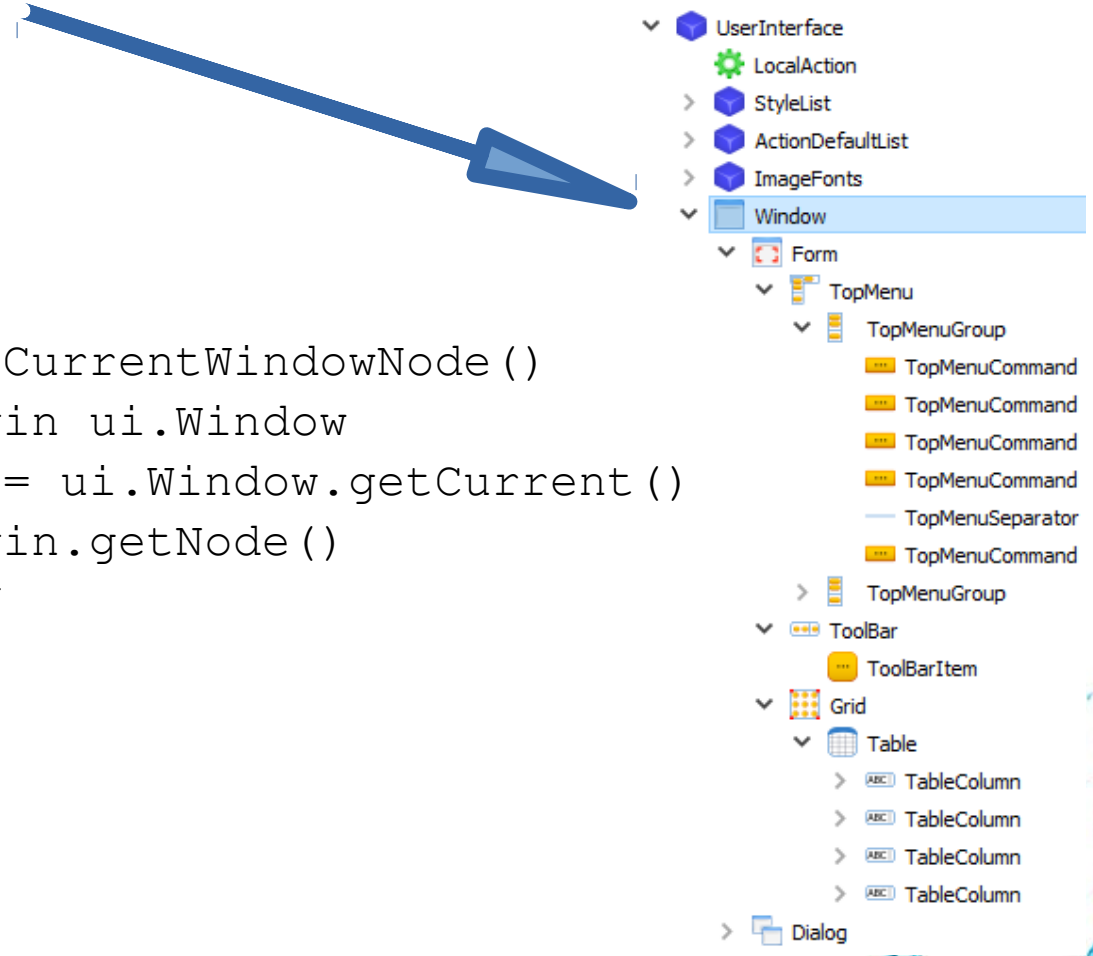
om.DomDocument - Provides methods to manipulate a data tree, using *DOM* standards

om.DomNode - Provides methods to manipulate a node of a data tree, using *DOM* standards

om.NodeList - Holds a list of *DomNode* objects created from a selection method

The Programming the AUI

How do you find the DomNode for the current window?




```
FUNCTION getCurrentWindowNode()
  DEFINE l_win ui.Window
  LET l_win = ui.Window.getCurrent()
  RETURN l_win.getNode()
END FUNCTION
```

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The Programming the AUI

An example function to display all the attributes of a node.

```
FUNCTION Dump_Node(l_node om.DomNode)
   DEFINE l_idx  INTEGER

    DISPLAY l_node.getTagName(), ": ", l_node.getID() USING "<<&"
    FOR l_idx = 1 TO l_node.getAttributesCount()  -- Print each attribute
        DISPLAY
            l_node.getAttributeName(l_idx), "=",
            l_node.getAttributeValue(l_idx)
    END FOR
END FUNCTION
```

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There are several methods that can be used to select a DomNode:

Recursive Descent

ui.Window.findNode()

om.DomNode.SelectByTagName()

om.DomNode.SelectByPath()

The Programming the AUI – Finding Nodes

ui.Window.findNode()

```
DEFINE n om.DomNode,
       w ui.Window
LET w = ui.Window.getCurrent()
LET n = w.findNode(“Label”, "customer_id")
IF n IS NOT NULL THEN
  CALL n.setAttribute(“color", “Red”)
END IF
```

ui.Window.selectByTagName()

```
DEFINE l_node    om.DomNode,
       l_list    om.NodeList,
       l_str     STRING,
       l_idx     INTEGER
LET l_list = l_node.selectByTagName(“Label")
 -- Upshift all labels
FOR l_idx = 1 TO l_list.getLength()
    LET l_node = l_list.item(l_idx)
    LET l_str = l_node.getAttribute(“text”)
    CALL l_node.setAttribute(“text", l_str.toUpperCase())
END FOR
```

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The Programming the AUI – Finding Nodes

ui.Window.selectByPath()

```
DEFINE l_node    om.DomNode,
       l_list    om.NodeList,
       l_idx     INTEGER

LET l_list =  l_node.selectByPath("//Window[@name='giftcert']")

-- Change the windows text.
FOR l_idx = 1 TO l_list.getLength()
  LET l_node = l_list.item(l_idx)
  CALL l_node.setAttribute("text", "Gift Cert Demo")
END FOR
```

The Programming the AUI – XPath

XPath uses pattern expressions to identify nodes in an XML tree and is a W3C Standard
om.DomNode.SelectByPath() uses a subset of XPath expressions

Pattern	Description
/	Represents an absolute path to the required element.
//	All elements in the document which fulfill following criteria are selected.
*	Selects all elements located by preceding path
[@attrib='value']	Selects elements that have attributes matching a value

The Programming the AUI – Finding Nodes

Finding a Vbox / HBox

```
FUNCTION find_vbox(l_form om.DomNode)
  DEFINE l_box om.DomNode

  LET l_box = l_form.getFirstChild()
  WHILE l_box IS NOT NULL
    IF l_box.getTagName() MATCHES “[VH]Box" THEN
      EXIT WHILE
    END IF
    LET l_box = l_box.getNext()
  END WHILE
  RETURN l_box

END FUNCTION
```

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The Programming the AUI – Finding Nodes

Programmatically add an Element to a form

```
FUNCTION add_label(d_box om.DomNode)
  DEFINE l_node om.DomNode
  LET l_node = l_box.createChild("Label")
  CALL l_node.setAttribute("posX", 1)
  CALL l_node.setAttribute("posY", 0)
  CALL l_node.setAttribute("width", 10)
  CALL l_node.setAttribute("text", "Hello World")
  CALL l_node.setAttribute("color", "magenta")
END FUNCTION
```

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Q&A

Intelligent Business Application Infrastructure