Scripting Apache OpenOffice

Introductory Nutshell Programs (Writer, Calc, Impress)

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FOSDEM’13
Overview

• Overview of AOO
  - Bird eye's view of AOO's architecture
• Scripting AOO
• Nutshell examples
  - “swriter” (word processor), “scalc” (spreadsheet), “sdraw” (drawing), “simpRESS” (presentation)
• Roundup
• Links
Bird Eye's View, 1

- Set of services that may contain interfaces with attributes, other services, structs and properties
- All common functionality of all types of documents is extracted and organized as a set of interfaces that define methods and possibly attributes
  - E.g. loading, saving, printing documents, …
- Services are created and get managed by service managers
Bird Eye's View, 2

- Client-/Server-Architecture
  - Communication via TCP/IP
  - Employing distributable components ("UNO")
    - Server can run on any computer in the world!
    - Operating systems of the server and the client are irrelevant for the purpose of communication!
  - Client may run on the same machine as the server
    - Default installation and configuration
Bird Eye's View, 3

- **“UNO”**
  - Universal Network Objects
  - Distributable, interconnected infrastructure
  - All functionality is organized in the form of classes (“UNO classes”)
  - UNO classes (types) get defined in an IDL (Interface Description Language)

- **“urp”**
  - UNO remote protocol
  - CORBA-like
Bird Eye's View, 4
Bird Eye's View, 5
Bird Eye's View, 6

UNO component
UNO component
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swriter

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UNO component

scalc

UNO component
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UNO component
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UNO component
UNO component

8
Bird Eye's View, 7

- “Service Managers” (a.k.a. “factories”)
  - Supplied by servers
    - Also cf. XComponentContext.getServiceManager()
  - Can be used to request/create services
  - Returned service allows access to a part of the "office" functionality, e.g.
    - com.sun.star.frame.Desktop
    - com.sun.star.configuration.ConfigurationProvider
    - com.sun.star.sdb.DatabaseContext
Bird Eye's View, 8
Bird Eye's View, 9

- “Services”
  - Can be comprehensive
  - May contain
    - "Interfaces" (group of methods and attributes)
    - Other "Services"
    - “properties” (com.sun.star.beans.PropertyValue)
  - Depending on the desired task you need to query (request) the appropriate interface, e.g.
    - com.sun.star.view.XPrintable
    - com.sun.star.frame.XStorable
    - com.sun.star.text.XTextDocument
An example

- Two services with seven interfaces
  - "OfficeDocument"
    - Four interfaces
  - "TextDocument"
    - Three interfaces
Scripting AOO Programming Languages

- Programming languages
  - C++ \((query\text{I}nterface)\)
  - Java \((query\text{I}nterface)\)
  - Basic (implicit \(query\text{I}nterface\))
  - Python (implicit \(query\text{I}nterface\))

- Java-based scripting framework
  - BeanShell \((query\text{I}nterface)\)
  - JavaScript \((query\text{I}nterface)\)
  - ooRexx \((query\text{I}nterface)\)
  - ...
Scripting AOO Documentation

- Extremely important
  - Wealth of services and interfaces
  - Created in pure German ;) engineering style
  - To miss the the forest for the trees!
- AOO API documentation
  - http://www.openoffice.org/api/
    - Developer's guide, API wiki, UNO wiki, extensions, examples, tutorials
    - Extensive, HTML-linked API reference
    - Use its Index to locate services, interfaces, etc.
OpenOffice graduates from the Apache Incubator!

Content for Apache OpenOffice version 3.4.

Overview Module Use Devguide Index

:: com :: sun ::

module star

Nested Modules

accessibility
animations auth
avt beans
bridge chart
chart2

UNO Accessibility API

security and authenticates interfaces
Java AWT-like user interface toolkit interface specifications for UNO.
Java beans-like property access and introspection.
Interfaces for building bridges to other component models.
Charting diagram interfaces.
New implementation of Charting diagram interfaces. This module contains only a rather small public API. In addition there is a private API in the chart2 project.
OpenOffice graduates from the Apache Incubator!

Content for Apache OpenOffice version 3.4.

Overview  Module  Use  Devguide  Index

Global Index A

A - constant in constants group; com.sun.star.awt: Key
aArgs - field in struct; com.sun.star.frame: DispatchStatement
abbreviateString() - function in interface; com.sun.star.util: XStringAbbreviation
ABBREVIATION - constant in constants group; com.sun.star.linguistic2: ConversionPropertyType
AbbrevName - field in struct; com.sun.star.awt: CalendarItem
aBitmapMode - field in struct; com.sun.star.chart2: FillBitmap
ABORT - value in enum; com.sun.star.ucb: IOException
abort() - function in interface; com.sun.star.ucb: XCommandProcessor
Aborted - property in service; com.sun.star.document: MediaDescriptor
aborted() - function in interface; com.sun.star.sheet: XRangeSelectionListener
abortRangeSelection() - function in interface; com.sun.star.sheet: XRangeSelection
ABOVE - constant in constants group; com.sun.star.awt: FontEmphasisMark
AboveCenter - constant in constants group; com.sun.star.awt: ImagePosition
AboveLeft - constant in constants group; com.sun.star.awt: ImagePosition
OpenOffice graduates from the Apache Incubator!

DEVELOPER'S GUIDE
Content Table
IDL reference
API
Module structure
SDK
Examples
Java UNO Reference
C++ UNO Reference
Download
TIPS 'N' TRICKS
FAQ
Internal OO Spots
External Resources
MISCELLANEOUS
Developer Projects
Mailing List Rules

Content for Apache OpenOffice version 3.4.

Overview Module Use Devguide Index

Global Index X

ABCDEFGHIJKLMNOPQRSTUVWXYZ

X - field in struct::com.sun.star.awt:: Point
X - constant in constants group::com.sun.star.awt:: PosSize
X - field in struct::com.sun.star.awt:: Rectangle
X - field in struct::com.sun.star.geometry:: IntegerPoint2D
X - field in struct::com.sun.star.awt:: MouseEvent
X - field in struct::com.sun.star.geometry:: RealPoint2D
X - field in struct::com.sun.star.awt:: WindowEvent
X - constant in constants group::com.sun.star.awt:: Key
X - constant in constants group::com.sun.star.awt:: FontStrikeout
XAbortChannel - interface::com.sun.star.task:: XAbortChannel
XAbstractView - interface::com.sun.star.beans:: XAbstractView
XAcceleratorConfiguration - interface::com.sun.star.ui:: XAcceleratorConfiguration
X ACCEPTOR - interface::com.sun.star.connection:: X ACCEPTOR
XAccessControlContext - interface::com.sun.star.security:: XAccessControlContext
Scripting AOO
Querying an Interface

● **queryInterface() examples**
  - `sDispatchHelper`, a service of type `com.sun.star.frame.DispatchHelper`

● **queryInterface() in Java**

```java
import com.sun.star.frame.XDispatchHelper;
// ...
XDispatchHelper xDispatchHelper = (XDispatchHelper)
    UnoRuntime.queryInterface(XDispatchHelper.class, sDispatchHelper);
```

● **queryInterface() in JavaScript**

```javascript
importClass(Packages.com.sun.star.frame.XDispatchHelper);
// ...
xDispatchHelper = UnoRuntime.queryInterface(XDispatchHelper, sDispatchHelper);
```

● **queryInterface() in ooRexx**

```rexx
xDispatchHelper = sDispatchHelper ~ com.sun.star.frame.XDispatchHelper
-- or simpler:
xDispatchHelper = sDispatchHelper ~ XDispatchHelper
```
Scripting AOO

- Two kinds of scripting (programming)
  - Stand-alone
    - Need to bootstrap OpenOffice in order to initialize the AOO environment to interact with
    - Full control about addressing different AOO servers, if needed
  - Dispatched by AOO (“macro”)
    - AOO supplies a script context that allows access to the initialized AOO environment (getDesktop, getComponentContext) and to the document (getDocument) for which the dispatch occurred
Scripting AOO
Bootstrapping in Java

```java
// import ...
XComponentContext xLocalContext =
    com.sun.star.comp.helper.Bootstrap.createInitialComponentContext(null);
    // initial serviceManager
XMultiComponentFactory xLocalServiceManager = xLocalContext.getServiceManager();
    // create a URL resolver
Object urlResolver = xLocalServiceManager.createInstanceWithContext(
    "com.sun.star.bridge.UnoUrlResolver", xLocalContext);
    // query for the XUnoUrlResolver interface
XUnoUrlResolver xUrlResolver = (XUnoUrlResolver)
    UnoRuntime.queryInterface(XUnoUrlResolver.class, urlResolver);
    // Import the object
Object rInitialObject = xUrlResolver.resolve(
    "uno:socket,host=localhost,port=8100;urp;StarOffice.ServiceManager";)
    // test whether we got a reference to the remote ServiceManager
if (null != rInitialObject) {
    System.out.println("initial object successfully retrieved");
} else {
    System.out.println("given initial-object name unknown at server side");
}
```

... cut ...
scripting AOO

bootstrapping in ooRexx

url="uno:socket,host=localhost,port=8100;urp;StarOffice.ServiceManager"
rInitialObject=uno.connect(url)

if rInitialObject<> .nil then
    say "initial object successfully retrieved"
else
    say "given initial-object name unknown at server side"

::requires UNO.CLS -- get UNO support
Scripting AOO
Creating/Loading Documents

```python
xDesktop = uno.createDesktop()  # bootstrap & get access to XDesktop
xcl = xDesktop.XComponentLoader  # get XComponentLoader interface
uri = "private:factory/swriter"  # new swriter document
doc = xcl.loadComponentFromURL(uri, "_blank", 0, uno.noProps)

-- ... now do whatever you want or need to do ...
::requires UNO.CLS  # get UNO support

"file:///c:/docs/aFile.odt"
"http://www.RexxLA.org/aFile.ods"
"ftp://www.OpenOffice.org/aFile.odp"
```
Nutshell examples
Word Processor (“swriter”), 1

- 3 Services
  
  (com.sun.star.text.TextDocument)

- 35 Interfaces (unqualified)
  
  XBookmarksSupplier, XChapterNumberingSupplier,
  XDocumentEventBroadcaster, XDocumentIndexesSupplier,
  XDocumentInfoSupplier, XDocumentPropertiesSupplier, XEmbeddedScripts,
  XEndnotesSupplier, XEventBroadcaster, XEventsSupplier, XFootnotesSupplier,
  XLineNumberingSupplier, XModel, XModifiable, XMultiServiceFactory,
  XNumberFormatsSupplier, XPagePrintable, XPrintJobBroadcaster, XPrintable,
  XPropertySet, XReferenceMarksSupplier, XRefreshable, XReplaceable,
  XSearchable, XStorable, XStyleFamiliesSupplier, XTextDocument,
  XTextEmbeddedObjectsSupplier, XTextFieldsSupplier, XTextFramesSupplier,
  XTextGraphicObjectsSupplier, XTextSectionsSupplier, XTextTablesSupplier,
  XUndoManagerSupplier, XViewDataSupplier
Nutshell examples

Word Processor ("swriter"), 2

- 37 Properties

ApplyFormDesignMode, ApplyWorkaroundForB6375613, AutomaticControlFocus, BasicLibraries, BuildId, CharFontCharSet, CharFontCharSetAsian, CharFontCharSetComplex, CharFontFamily, CharFontFamilyAsian, CharFontFamilyComplex, CharFontName, CharFontNameAsian, CharFontNameComplex, CharFontPitch, CharFontPitchAsian, CharFontPitchComplex, CharFontStyleName, CharFontStyleNameAsian, CharFontStyleNameComplex, CharLocale, CharacterCount, DialogLibraries, ForbiddenCharacters, HasValidSignatures, HideFieldTips, IndexAutoMarkFileURL, LockUpdates, ParagraphCount, RecordChanges, RedlineDisplayType, RedlineProtectionKey, RuntimeUID, ShowChanges, TwoDigitYear, WordCount, WordSeparator
Nutshell examples
Word Processor ("swriter"), 3

• Interface \texttt{com.sun.star.text.XTextDocument}
  
  - Get access to the text object representing the text of the entire document using \texttt{getText()}
    
    • Returns \texttt{XText}, which is derived from \texttt{XSimpleText}, which is derived from \texttt{XRangeText}, hence the methods of all three interfaces are available!
  
• Concept of “cursors”, e.g.
  
  - Paragraphs, Sentences, Words, Characters
  
• Possible to also insert tables, fields, pictures, drawings, …
Nutshell examples

Word Processor, Example 1/1

- Example 1
  - Create a word processor document
  - Add text “Hello, FOSDEM 2013!”
  - Closing the word processor document manually will cause the “Save”-dialog to appear
Nutshell examples
Word Processor, Example 1/2

```
xDesktop=uno.createDesktop()    -- bootstrap & get access to XDesktop
xcl=xDesktop~XComponentLoader  -- get XComponentLoader interface
uri="private:factory/swriter"  -- new swriter document
doc=xcl~loadComponentFromURL(uri,"_blank",0,uno~noProps)

xText=doc~XTextDocument~getText  -- get text object
xText~setString(“Hello, FOSDEM 2013!”)
::requires UNO.CLS            -- get UNO support
```
Nutshell examples
Word Processor, Example 1/3
Nutshell examples
Word Processor, Example 2/1

● Example 2
  - Create a word processor document
  - Add text “Hello, FOSDEM 2013!”
  - Change state of document to “unmodified”
    - Leftover document can be closed without a save dialog
    - Using interface com.sun.star.util.XModifiable
  - Sleep five seconds, then close document
    - Using interface com.sun.star.util.XCloseable
Nutshell examples
Word Processor, Example 2/2

```plaintext
xDesktop=uno.createDesktop() -- bootstrap & get access to XDesktop
xcl=xDesktop->XComponentLoader -- get XComponentLoader interface
uri="private:factory/swriter" -- new swriter document
doc=xcl->loadComponentFromURL(uri,"_blank",0,uno-noProps)

xText=doc->XTextDocument->getText -- get text object
xText->setString("Hello, FOSDEM 2013!")

doc->XModifiable->setModified(.false) -- set document to unmodified
call SysSleep 5 -- sleep 5 seconds
doc->XCloseable->close(.false) -- close document (window)
::requires UNO.CLS -- get UNO support
```
Nutshell examples
Word Processor, Example 3/1

• Example 3
  - Create a word processor document
  - Add text “Hello, FOSDEM 2013!”
  - Access and show property CharacterCount
  - Change state of document to “unmodified”
    • Leftover document can be closed without a save dialog
      • Using interface com.sun.star.util.XModifiable
  - Sleep five seconds, then close document
    • Using interface com.sun.star.util.XCloseable
Nutshell examples
Word Processor, Example 3/2

```
xDesktop=uno.createDesktop() -- bootstrap & get access to XDesktop
xcl=xDesktop-XComponentLoader -- get XComponentLoader interface

uri="private:factory/swriter" -- new swriter document
doc=xcl~loadComponentFromURL(uri,"_blank",0,uno-noProps)

xText=doc~XTextDocument~getText -- get text object
xText~setString("Hello, FOSDEM 2013!")

xprops=doc~XPropertySet -- get access to the properties
say "character count:" xprops~getPropertyValue("CharacterCount")

doc~XModifiable~setModified(.false) -- set document to unmodified
call SysSleep 5 -- sleep 5 seconds
doc~XCloseable~close(.false) -- close document (window)

::requires UNO.CLS -- get UNO support
```

```
E:\rony\Vortraege\2013\FOSDEM\code>rexx swriter3.rxo
character count: 29
```
Nutshell examples
Word Processor, Example 4/1

• Example 4
  - Create a word processor document
  - Add text “Hello, FOSDEM 2013!”
  - Replace “FOSDEM” with “FOSDEM Conference”
    • Change the color to red
    • Change the font name to “DejaVus Sans Mono”
Nutshell examples
Word Processor, Example 4/2

```java
xDesktop = uno.createDesktop()  -- bootstrap & get access to XDesktop
xcl = xDesktop.XComponentLoader  -- get XComponentLoader interface

uri = "private:factory/swriter"   -- new swriter document
doc = xcl.loadComponentFromURL(uri,"_blank",null,uno-noProps)

xText = doc.XTextDocument.getText  -- get text object
xText.setString("Hello, FOSDEM 2013!")

-- change second word
xTextCursor = xText.createTextCursor  -- character based cursor
xTextCursor.gotoStart(false)  -- make sure we are at start

xWordCursor = xTextCursor.XWordCursor  -- get the XWordCursor interface
xWordCursor.gotoNextWord(false)  -- XTextRange represents first word
xWordCursor.gotoNextWord(true)  -- select second word, includes blank!
xWordCursor.setString("Apache Conference ")  -- note trailing blank

-- change color
red = box("int", "FF 00 00"x ~c2d)  -- color red (RGB color) as integer
xWordCursor.XPropertySet.setPropertyValue("CharColor", red)

-- change font
fontName = "DejaVu Sans Mono"
xWordCursor.XPropertySet.setPropertyValue("CharFontName", fontName)
say ppd(xWordCursor.uno.getDefinition)

::requires UNO.CLS  -- get UNO support
```
Hello, FOSDEM Conference 2013!
Nutshell examples
Word Processor, Example 5/1

- Example 5
  - Create a word processor document
  - Add text “Hello, FOSDEM 2013!”
  - Demonstrate creating and styling paragraphs
    - Get access to the paragraph properties
    - Access `com.sun.star.text.ControlCharacter` constants
    - Access to `com.sun.star.style.ParagraphAdjust` enums
    - Demonstrate adjusting paragraphs to “right”, “center”, “block”, “left” using a string that contains the adjustment verb
xDesktop=uno.createDesktop()  -- bootstrap & get access to XDesktop
xcl=xDesktop-XComponentLoader  -- get XComponentLoader interface

uri="private:factory/swriter"  -- new swriter document
doc=xcl~loadComponentFromURL(uri,"_blank",0,uno-noProps)

dText=doc-XTextDocument~getText  -- get text object
dText~setString("Hello, FOSDEM 2013!")

dTextCursor=dText~createTextCursor  -- create the character based cursor
   -- make paragraph's properties accessible:
dxParaProps=dTextCursor~XParagraphCursor~XPropertySet

ctlChars=.uno_constants~new("com.sun.star.text.ControlCharacter")  -- UNO_CONSTANT
teraBreak=ctlChars~paragraph_break  -- get paragraph break constant

paraAdj =.uno_enum~new("com.sun.star.style.ParagraphAdjust")  -- UNO_ENUM

arr=.array-of("right", "center", "block", "left")  -- adjustments
do adj over arr  -- iterate over adjustments, create string, adjust
dTextCursor~goToEnd(.false)  -- position at end
dText~insertControlCharacter(dTextCursor, paraBreak, .false)
string="This paragraph will be" adj"-adjusted. ")~copies(8)
dText~insertString(dTextCursor, string, .true)
dxParaProps~setPropertyValue("ParaAdjust", paraAdj~send(adj))
end

::requires UNO.CLS  -- get UNO support
Nutshell examples
Word Processor, Example 5/3
Nutshell examples
Spreadsheet ("scalc"), 1

- 3 Services
  SpreadsheetDocument (com.sun.star.sheet.SpreadsheetDocument),
  SpreadsheetDocumentSettings
  (com.sun.star.sheet.SpreadsheetDocumentSettings)

- 26 Interfaces (unqualified)
  XActionLockable, XCalculatable, XConsolidatable, XDocumentAuditing,
  XDocumentEventBroadcaster, XDocumentInfoSupplier,
  XDocumentPropertiesSupplier, XDrawPagesSupplier, XEmbeddedScripts,
  XEventBroadcaster, XEventsSupplier, XGoalSeek, XLinkTargetSupplier, XModel,
  XModifiable, XMultiServiceFactory, XNumberFormatsSupplier,
  XPrintJobBroadcaster, XPrintable, XPropertySet, XProtectable,
  XSpreadsheetDocument, XStorable, XStyleFamiliesSupplier,
  XUndoManagerSupplier, XViewDataSupplier
Nutshell examples
Spreadsheet ("scalc"), 2

- 40 Properties

ApplyFormDesignMode, AreaLinks, AutomaticControlFocus, BasicLibraries, BuildId, CalcAsShown, CharLocale, CharLocaleAsian, CharLocaleComplex, CodeName, ColumnLabelRanges, DDELinks, DatabaseRanges, DefaultTabStop, DialogLibraries, ExternalDocLinks, ForbiddenCharacters, HasDrawPages, HasValidSignatures, IgnoreCase, IsAdjustHeightEnabled, IsChangeReadOnlyEnabled, IsExecuteLinkEnabled, IsIterationEnabled, IsLoaded, IsUndoEnabled, IterationCount, IterationEpsilon, LookUpLabels, MatchWholeCell, NamedRanges, NullDate, ReferenceDevice, RegularExpressions, RowLabelRanges, RuntimeUID, SheetLinks, SpellOnline, StandardDecimals, VBAGlobalConstantName
Nutshell examples
Spreadsheet ("scalc"), 3

- Interface `com.sun.star.sheet.XSpreadsheetDocument`
  - Get name access to the collection of `XSpreadsheets`
  - Numeric (0-based) access with `XIndexAccess`
- Concept of "table" consisting of a collection of `rows`, which each have `columns`
  - `XCellRange` (a tabular area of a spreadsheet)
  - Origin "0,0" represents upper left-hand corner
    - Offsets relative to upper left-hand corner
Nutshell examples
Spreadsheet ("scalc"), 4

- Addressing a cell
  - Numerically (0-based) representing offsets from origin
    - e.g. "0,1" (first column, second row)
      - `getCellByPosition(columnOffset,rowOffset)` returns a XCell
  - By name
    - a named range, or
    - column: a name, row: a 1-based number), e.g. "A2"
      - `getCellRangeByName(Name)` returns a XCellRange, then
      - `getCellByPosition(0,0)` returns a XCell
  - Possible to also insert charts, drawings, …
Nutshell examples
Spreadsheet, Example 1/1

- Example 1
  - Create a spreadsheet document
  - Add text “Hello, FOSDEM 2013!” to A1
  - Demonstrate how to store a document
Nutshell examples
Spreadsheet, Example 1/2

```plaintext
import uno

# bootstrap & get access to XDesktop
xDesktop = uno.createDesktop()

# get XComponentLoader interface
xcl = xDesktop.queryXComponentLoader()

# new calc document
uri = "private:factory/scalc"
doc = xcl.loadComponentFromURL(uri, "_blank", 0, uno.NO_PROPERTIES)

# get first spreadsheet
xSheets = doc.getSheets().getByIndex(0)

# add entry to "A1"
xSheet.getCellByPosition(0, 0).setFormula("Hello, FOSDEM 2013!")

# save document in local directory
storeURL = directory("/scalc1.ods")
storeURL = uno.convertToURL(storeURL)
doc.storeAsURL(storeURL, uno.NO_PROPERTIES)

doc.close(false)
::requires UNO.CLS
```
Nutshell examples
Spreadsheet, Example 1/3

```
<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>= &quot;Hello, FOSDEM 2013!&quot;</td>
</tr>
</tbody>
</table>
```

Apache OpenOffice

45
Nutshell examples
Spreadsheet, Example 2/1

• Example 2
  – Create a spreadsheet document
  – Add text “Hello, FOSDEM 2013!” to A1
  – Demonstrate how to change the height of table rows
Nutshell examples
Spreadsheet, Example 2/2

```java
xDesktop = uno.createDesktop() -- bootstrap & get access to XDesktop
xcl = xDesktop.XComponentLoader -- get XComponentLoader interface
uri = "private:factory/scalc" -- new calc document
doc = xcl.loadComponentFromURL(uri, "_blank", 0, uno.noProps)

xSheets = doc.XSpreadSheetDocument.getSheets.XIndexAccess
xSheet = xSheets.getByIndex(0).XSpreadSheet -- get first spreadsheet
-- add entry to "A1"
xSheet.getCellByPosition(0, 0).setFormula("Hello, FOSDEM 2013!")

xRows = xSheet.XColumnRowRange.getRows -- get XTableRows

do i = 1 to 5 -- 0-based, hence lines # 2 through # 6
    xRow = xRows.getByIndex(i) -- fetch XRow
    props = xRow.XPropertySet -- get access to its properties
    oldHeight = props.getPropertyValue("Height") -- get current value
    newHeight = oldHeight + i*250 -- increase by i*0.250 cm
    props.setPropertyValue("Height", box(int, newHeight)) -- set new Height
    text = "oldHeight="oldHeight", newHeight="newHeight -- create info text
    xSheet.getCellByPosition(0, i).setFormula(text) -- set cell to info text
end
::requires UNO.CLS -- get UNO support
```
Nutshell examples
Spreadsheet, Example 2/3

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hello, FOSDEM 2013!</td>
</tr>
<tr>
<td>2</td>
<td>oldHeight=432, newHeight=882</td>
</tr>
<tr>
<td>3</td>
<td>oldHeight=432, newHeight=932</td>
</tr>
<tr>
<td>4</td>
<td>oldHeight=432, newHeight=1182</td>
</tr>
<tr>
<td>5</td>
<td>oldHeight=432, newHeight=1432</td>
</tr>
<tr>
<td>6</td>
<td>oldHeight=432, newHeight=1682</td>
</tr>
</tbody>
</table>

...
Nutshell examples
Spreadsheet, Example 3/1

• Example 3
  - Create a spreadsheet document
  - Add text “Hello, FOSDEM 2013!” to A1
  - Demonstrate how to change the width of table columns
Nutshell examples
Spreadsheet, Example 3/2

```plaintext
xDesktop=uno.createDesktop() -- bootstrap & get access to XDesktop
xcl=xDesktop-XComponentLoader -- get XComponentLoader interface

uri="private:factory/scalc" -- new calc document
doc=xcl~loadComponentFromURL(uri,"_blank",0,.uno~noProps)

xSheets=doc~XSpreadSheetDocument~getSheets~XIndexAccess
xSheet =xSheets~getByIndex(0)~XSpreadSheet -- get first spreadsheet
-- add entry to "A1"

xSheets~getCellByPosition(0,0)~setFormula("Hello, FOSDEM 2013!")

xCols=xSheet~XColumnRowRange~getColumns-- get XTableColumns

do i=1 to 5 -- 0-based, hence columns # 2 (B) through # 6 (F)
xCol=xCols~getByIndex(i) -- fetch xCol
props=xCol~XPropertySet -- get access to its properties
oldWidth=props~getPropertyValue("Width") -- get current value
newWidth=oldWidth-i*250 -- decrease by i*0.250 cm
props~setPropertyValue("Width", box("int",newWidth)) -- set new Width

text="oldWidth="oldWidth", newWidth="newWidth" -- create info text
xSheet~getCellByPosition(i,i)~setFormula(text) -- set cell to info text
end

::requires UNO.CLS -- get UNO support
```
**Nutshell examples**

**Spreadsheet, Example 3/3**

![Spreadsheet](image)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A1</strong></td>
<td>Hello, FOSDEM 2013!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>oldWidth=2287, newWidth=2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>oldWidth=2287, newWidth=1787</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>oldWidth=2287, newWidth=1517</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>oldWidth=2287, newWidth=1287</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>oldWidth=2287, newWidth=1017</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Nutshell examples
Spreadsheet, Example 4/1

• Example 4
  - Create a spreadsheet document
  - Add text and a date
  - Demonstrate how to format individual cells and a cell range
Nutshell examples
Spreadsheet, Example 4/2

```plaintext
xDesktop = uno.createDesktop()  -- bootstrap & get access to XDesktop
xcl = xDesktop.XComponentLoader  -- get XComponentLoader interface
uri = "private:factory/scalc"  -- new calc document
doc = xcl.loadComponentFromURL(uri, "_blank", 0, uno.noProps)

xSheets = doc.XSpreadSheetDocument.getSheets.XIndexAccess
xSheet = xSheets.getByIndex(0).XSpreadSheet  -- get first spreadsheet

call uno.setCell xSheet, 0, 0, "Name:"  -- cell "A1"
call uno.setCell xSheet, "B1", "John Doe"  -- cell "B1"
call uno.setCell xSheet, "A2", "Date:"  -- cell "A2"
call uno.setCell xSheet, 1, 1, "=TODAY()"  -- cell "B2"

-- format individual cells
xCellA2 = xSheet.getCellByPosition(1, 0)  -- get access to cell "B1"
cbc = box("int", "CF E7 F5"x ~ c2d)  -- define a RGB color
xCellA2.XPropertySet.setPropertyValue("CellBackColor", cbc)  -- set color

xCellB1 = xSheet.getCellByPosition(1, 1)  -- get access to cell "B2"
cc = box("int", "c5 00 0b"x ~ c2d)  -- define a RGB color
props = xCellB1.XPropertySet
props.setPropertyValue("CharColor", cc)  -- set color
fontWeight = .uno_constants.new("com.sun.star.awt.FontWeight")
props.setPropertyValue("CharWeight", fontWeight~semiBold)

-- format using the properties of a XCellRange for "A1:A2"
props = xSheet.XCellRange.getCellRangeByName("A1:A2").XPropertySet
props.setPropertyValue("CharWeight", fontWeight~bold)
```

::requires UNO.CLS  -- get UNO support
Nutshell examples
Spreadsheet, Example 4/3
Nutshell examples
Spreadsheet, Example 5/1

• Example 5
  - Create a spreadsheet document
  - Generate data for four quarters for 2011 and 2012
    • Format column headings
    • Format numbers
  - Create a chart from the generated data
xDesktop=uno.createDesktop()  -- bootstrap & get access to XDesktop
xcl=xDesktop->XComponentLoader  -- get XComponentLoader interface

uri="private:factory/scalc"  -- new calc document
doc=xcl->loadComponentFromURL(uri,"_blank",0,uno-noProps)

xSheets=doc->XSpreadSheetDocument->getSheets->XIndexAccess
xSheet =xSheets->getIndex(0)->XSpreadSheet  -- get first spreadsheet

call uno.setCell xSheet, "A1", "Quarter"
call uno.setCell xSheet, "B1", "2011"
call uno.setCell xSheet, "C1", "2012"
do i=1 to 4
   call uno.setCell xSheet, 0, i, "Q"i
call uno.setCell xSheet, 1, i, random(0,5000)
call uno.setCell xSheet, 2, i, random(0,5000)
end

props=xSheet->XCellRange->getCellRangeByName("A1:C1")->XPropertySet  -- column headings
fontWeight=.uno_constants->new("com.sun.star.awt.FontWeight")
props->setPropertyValue("CharWeight", fontWeight->bold)

props=xSheet->XCellRange->getCellRangeByName("B2:C5")->XPropertySet  -- format numbers
props->setPropertyValue("NumberFormat", 4)  -- predefined style, format: ",,##0.00"

--> ... code to create a chart on next slide ...

::requires UNO.CLS  -- get UNO support
Nutshell examples
Spreadsheet, Example 5/2b

--> ... continued from previous slide: create a chart ...

structRect = .bsf~new("com.sun.star.awt.Rectangle") -- position & size of chart
structRect~X = 300 -- x-offset: 0.300 cm
structRect~Y = 2250 -- y-offset: 2.250 cm
structRect~Width = 16000 -- width: 16.000 cm
structRect~Height = 8000 -- height: 8.000 cm

xRange = xSheet~XCellRange~getCellRangeByName("A1:C5") -- data to be used for chart
rangeAddr = xRange~XCellRangeAddressable~getRangeAddress
arrAddr = bsf.createArrayOf(rangeAddr~getClass, rangeAddr) -- create array

xTableCharts = xSheet~XTableChartsSupplier~getCharts -- get Chart collection & insert
xTableCharts~addNewByName("FirstChart", structRect, arrAddr, .true, .true)

::requires UNO.CLS -- get UNO support
### Nutshell examples

**Spreadsheet, Example 5/3**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quarter</td>
<td>2011</td>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1</td>
<td>3,637.00</td>
<td>743.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>1,385.00</td>
<td>726.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>53.00</td>
<td>3,883.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>2,041.00</td>
<td>2,823.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Bar chart showing quarterly sales for 2011 and 2012]
Nutshell examples
Drawing ("sdraw"), 1

- 4 Services

- 20 Interfaces (unqualified)
  XDocumentEventBroadcaster, XDocumentInfoSupplier,
  XDocumentPropertiesSupplier, XDrawPageDuplicator, XDrawPagesSupplier,
  XEmbeddedScripts, XEventBroadcaster, XEventsSupplier, XLayerSupplier,
  XMasterPagesSupplier, XModel, XModifiable, XMultiServiceFactory,
  XPrintJobBroadcaster, XPrintable, XPropertySet, XStorable,
  XStyleFamiliesSupplier, XUndoManagerSupplier, XViewDataSupplier
Nutshell examples
Drawing ("sdraw"), 2

- 12 Properties
  
  ApplyFormDesignMode, AutomaticControlFocus, BasicLibraries, BuildId, CharLocale, DialogLibraries, ForbiddenCharacters, HasValidSignatures, MapUnit, RuntimeUID, TabStop, VisibleArea
Nutshell examples
Drawing ("sdraw"), 3

• A collection of draw pages
• Each draw page
  – Allows any kind of drawing
  – Allows animation effects to be applied
• The draw concepts are fully reused for presentation documents!
Nutshell examples
Drawing, Example 1/1

- **Example 1**
  - Create a drawing document
  - Fetch the drawing component's service manager
    - Used to create shapes that can be stored with the document
  - Create and draw a rectangular shape, add it to the document
    - Set the shape's text to “Hello, FOSDEM 2013!”
    - Break up the text such that it fits into the rectangle
Nutshell examples
Drawing, Example 1/2

```java
xDesktop=uno.createDesktop()  -- bootstrap & get access to XDesktop
xcl=xDesktop~XComponentLoader  -- get XComponentLoader interface
uri="private:factory/sdraw"  -- new sdraw document
doc=xcl~loadComponentFromURL(uri,"_blank",0,uno~noProps)

xsf=doc~XMultiServiceFactory  -- get the service manager (factory)
    -- get access to the first draw page
xDrawPage = doc~XDrawPagesSupplier~getDrawPages~getByIndex(0)~XDrawPage

    -- create a Rectangle shape and determine its position and size, add it to the page
xShape=xsf~createInstance("com.sun.star.drawing.RectangleShape")~XShape
xShape~setPosition(.bsf~new("com.sun.star.awt.Point", 3000, 3000))
xShape~setSize(.bsf~new("com.sun.star.awt.Size", 5000, 2500))
xDrawPage~add(xShape)  -- add new shape to first draw page

cr="0d"x  -- ASCII carriage return char
xShape~XText~setString("Hello,"cr"FOSDEM"cr"2013!")  -- now set string

::requires UNO.CLS  -- get UNO support
```
Nutshell examples
Drawing, Example 1/3
Nutshell examples
Presentation ("simpresse"), 1

- 4 Services

  PresentationDocument (com.sun.star.presentation.PresentationDocument)

- 23 Interfaces (unqualified)

  XCustomPresentationSupplier, XDocumentEventBroadcaster,
  XDocumentInfoSupplier, XDocumentPropertiesSupplier, XDrawPageDuplicator,
  XDrawPagesSupplier, XEmbeddedScripts, XEventBroadcaster,
  XEventsSupplier, XLayerSupplier, XLinkTargetSupplier, XMasterPagesSupplier,
  XModel, XModifiable, XMultiServiceFactory, XPresentationSupplier,
  XPrintJobBroadcaster, XPrintable, XPropertySet, XStorable,
  XStyleFamiliesSupplier, XUndoManagerSupplier, XViewDataSupplier
Nutshell examples
Presentation ("simpress"), 2

- 12 Properties

  ApplyFormDesignMode, AutomaticControlFocus, BasicLibraries, BuildId, CharLocale, DialogLibraries, ForbiddenCharacters, HasValidSignatures, MapUnit, RuntimeUID, TabStop, VisibleArea
Nutshell examples
Presentation (“simpress”), 3

- A collection of draw pages
- Each draw page
  - Allows any kind of drawing
  - Allows animation effects to be applied
- Concept of “Master Pages”
  - Allows definition of specific layouts
- Layouts for title, listings, charts, etc.
- Presentation mode
Nutshell examples
Presentation, Example 1/1

• Example 1
  - Create a presentation document
  - Fetch its component's service manager
    • Used to create shapes that can be stored with the document
  - Create and draw a rectangular shape, add it to the document
    • Set the shape's text to “Hello, FOSDEM 2013!”
    • Break up the text such that it fits into the rectangle
  - Except for URL, the same code as for “sdraw”!
Nutshell examples
Presentation, Example 1/2

```plaintext
xDesktop=uno.createDesktop() -- bootstrap & get access to XDesktop
xcl=xDesktop->XComponentLoader -- get XComponentLoader interface
uri="private:factory/simpress" -- new simpress document
doc=xcl->loadComponentFromURL(uri,"_blank",0,uno-noProps)

xsf=doc->XMultiServiceFactory -- get the service manager (factory)
    -- get access to the first draw page
xDrawPage = doc->XDrawPagesSupplier->getDrawablePages()->getByIndex(0)->XDrawPage
    -- create a Rectangle shape and determine its position and size
xShape=xsf->createInstance("com.sun.star.drawing.RectangleShape") ->XShape
xShape->setPosition(.bsf->new("com.sun.star.awt.Point", 3000, 3000))
xShape->setSize(.bsf->new("com.sun.star.awt.Size", 5000, 2500))

xDrawPage->add(xShape) -- add new shape to first draw page
cr="0d"x -- ASCII carriage return char
xShape->XText->setString("Hello,"cr"FOSDEM"cr"2013!") -- now set string
::requires UNO.CLS -- get UNO support
```
Nutshell examples
Presentation, Example 1/3
Example 2

- Create a presentation document
- Create two pages with different layouts
  - One “Title Slide” page, layout number: 0
  - One “Title, Content” page, layout number: 1
- Start the presentation at the end
Nutshell examples
Presentation, Example 2/2

```
xDesktop=uno.createDesktop()  -- bootstrap & get access to XDesktop
xcl=xDesktop-XComponentLoader  -- get XComponentLoader interface
uri="private:factory/simpress"  -- new simpress document
doc=xcl-loadComponentFromURL(uri,"_blank",0,.uno-noProps)
xDrawPages = doc-`XDrawPagesSupplier-getDrawPages`  -- get DrawPages
xDrawPage=xDrawPages~`getByIndex(0)`  -- get first (empty) page
xDrawPage-XPropertySet-setPropertyValue("Layout", box("short",0))  -- "Title Slide"
xShapes=xDrawPage-XShapes  -- get access to its shapes
xShapes-getByIndex(0)-XText-`setString("FOSDEM 2013")`
xShapes-getByIndex(1)-XText-`setString("Scripting Apache OpenOffice")`
xDrawPage=xDrawPages~insertNewByIndex(1)-getByIndex(1)  -- insert at end, get access
xDrawPage-XPropertySet-setPropertyValue("Layout", box("short",1))  -- "Title Content"
xShapes=xDrawPage-XShapes  -- get access to its shapes
xShapes-getByIndex(0)-XText-`setString("Scripting Apache OpenOffice")`

lf="0a"x  -- define line-feed character
tab="09"x  -- define tabulator character
str="First" lf"Second" lf tab "Second, 1" lf tab "Second, 2" lf"Third"
xShapes-getByIndex(1)-XText-`setString(str)`
doc-`XPresentationSupplier-getPresentation`--bsf.dispatch("start")  -- start presentation
::requires UNO.CLS  -- get UNO support
```
Nutshell examples
Presentation, Example 2/3a
Nutshell examples
Presentation, Example 2/3b
Nutshell examples
Presentation, Example 3/1

• Example 3
  - Create a presentation document
  - Create two pages with different layouts
    • One “Title Slide” page, layout number: 0
    • One “Title, Content” page, layout number: 1
      - Use AOO's impress outline levels!
      - Kudos to Christoph Jopp, who found the property to use!
  - Start the presentation at the end
Nutshell examples
Presentation, Example 3/2

... xText=xShapes~getByIndex(1)~XText  -- content's XText
call addItem xText, "First", 0  -- add string, determine level
call addItem xText, "Explored by many", 0
call addItem xText, "Kudos! go to", 1
call addItem xText, "Christoph Jopp!", 1
call addItem xText, "On 2012-11-07", 0,.false
...

::routine addItem  -- adds string at the given (0-based outline) level
    use arg xText, string, level, bNewParagraph=.true

    xTR=xText~XTextRange~getEnd  -- get end, a XTextRange
    xTR~XPropertySet~setPropertyValue("NumberingLevel",level)  -- set XTextRange level
    xTR~setString(string)  -- set string

    if bNewParagraph=.true then  -- add new paragraph
        xTR~getEnd~setString("0a"x)  -- add linefeed character -> new paragraph

::routine dumpItems  -- show level and string from XText
    use arg xText

    enum=xText~XEnumerationAccess~createEnumeration  -- enumerate paragraphs
    do i=1 while enum~hasMoreElements
        xtr=enum~nextElement~XTextRange  -- we need XTextRange's string & properties

        nl=xtr~XPropertySet~getPropertyValue("NumberingLevel")
        say "     item #" i": NumberingLevel="pp(nl) pp(xtr~getString)
    end
Nutshell examples
Presentation, Example 2/3

Scripting Apache OpenOffice

- First
- Explored by many
  - Kudos! go to
  - Christoph Jopp!
- On 2012-11-07
Nutshell examples
URE (UNO Runtime Environment)

- There are UNO types that can be used independently of the AOO GUI! E.g.
  - "com.sun.star.lang.Locale"
  - "com.sun.star.linguistic2.LinguServiceManager"
- Can therefore be used by/incorporated into any other application!
- Need to bootstrap and connect to the UNO runtime environment (URE)
  - Fetch its service manager
  - Instantiate services
    - Use services, request their interfaces
Nutshell examples
URE, Spellchecker Example 1/1

- Example “Spellchecker”
  - Create a connection to URE
  - Get its service manager
    - Used to create the spellchecker service via "com.sun.star.linguistic2.LinguServiceManager"
  - Use all locales available to the spellchecker
    - In this example: some English locales
  - Spellcheck the word “thru” with the different English locales
    - If not correct, list the alternatives of the locale
Nutshell examples
URE, Spell Checker Example 1/2

```
xContext = UNO.connect() -- bootstrap and connect to URE
xSM = xContext~getServiceManager -- get the service manager

serviceName="com.sun.star.linguistic2.LinguServiceManager"
lsm=xsm~createInstanceWithContext(serviceName, xContext) -- create the service
xSpellChecker = lsm~XLinguServiceManager~getSpellChecker -- get the spell checker
locales=xSpellChecker~XSupportedLocales~getLocales -- get all supported locales

word="thru" -- word to spellcheck
do locale over locales -- iterate over all available Locales
  str=locale~language"/"locale~country"/"locale~variant "-> word:" pp(word)":"
  ok=xSpellChecker~isValid(word, locale, .UNO~noProps) -- check word
  if ok then str=str "correct"
  else str=str "NOT correct! Available alternatives:"
  say str
  if \ok then -- not correct, get & show alternatives
    do alternatives=xSpellChecker~spell(word, locale, .UNO~noProps)
      if alternatives <> .nil then
        do a over alternatives~getAlternatives
          do pp(a)
        end end
end
::requires UNO.CLS -- get UNO support
```
Nutshell examples
URE, Spell Checker Example 1/3

```shell
E:\2013\FOSDEM\vortrag\code>rexx spellcheck1.rxo
en/US/ -> word: [thru]: correct
en/GB/ -> word: [thru]: NOT correct! Available alternatives:
    [thrum]
    [thou]
    [thrush]
    [thrust]
    [Thur]
    [truth]
    [three]
    [threw]

en/AU/ -> word: [thru]: NOT correct! Available alternatives:
    [threw]
    [throe]
    [through]
    [thrum]
    [thou]

en/CA/ -> word: [thru]: correct
en/NZ/ -> word: [thru]: NOT correct! Available alternatives:
    [through]
    [thrum]
    [thou]

en/ZA/ -> word: [thru]: NOT correct! Available alternatives:
    [thrum]
    [thou]
    [thrush]
    [thrust]
    [Thur]
    [truth]
    [through]
    [three]
```
Roundup

- UNO
- Very Powerful
  - Complex
  - Documentation, examples very important
- Creating, editing AOO documents
  - swriter, calc, sdraw, simpress
- URE
- Need for many more nutshell examples in all programming languages!
Links to ooRexx/BSF4ooRexx

● ooRexx (as of 2013-01-31, version: 4.1.2)
  - An easy to learn and easy to use scripting language
    • Compatible to (“classic”) Rexx
    • Developped originally by IBM (“Object REXX”)
  - Source code was received by the non-for-profit SIG “Rexx Language Association (http://www.RexxLA.org)”
    • Opensourced as “Open Object Rexx (ooRexx)”
  - Home: http://www.ooRexx.org
  - Downloads: http://sourceforge.net/projects/oorexx/files/oorexx/
  - Brief overview (since opensourcing a lot got added):
  - Authoring a new book that introduces ooRexx
Links to ooRexx/BSF4ooRexx

• BSF4ooRexx (with built-in AOO/LO support)
  - Allows to use all of Java from ooRexx as if it was an interpreted, typeless and caseless language!
  • “Camouflaging Java as ooRexx” (package “BSF.CLS”)
    - All Java classes and Java objects look like ooRexx' ones!
  • Includes specific AOO support (package “UNO.CLS”)
  - Developed since 2000 to allow the creation of platform independent Rexx and ooRexx scripts