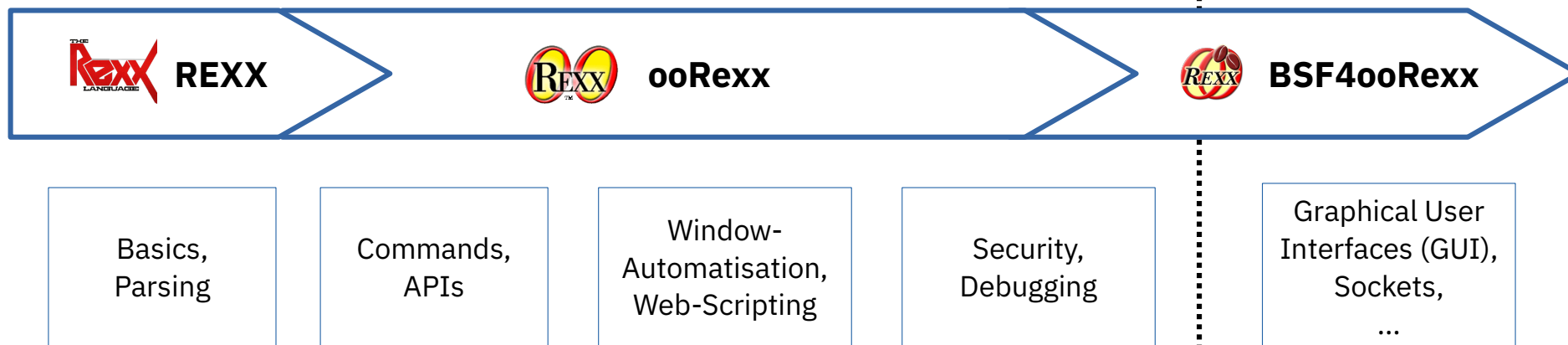


Windows-Automatisation 1

OLE-Automation/ActiveX-Automation, ooRexx Proxy Class "OLEObject"

Business Programming 1

Business Programming 2



OLE (ActiveX) Automation, 1



- **COM: Component Object Model**
 - RPC ("remote procedure call")
 - Defines standard *interface* function "**IUnknown**"
 - Developed further
 - DCOM, COM+
- **OLE : Object Linking and Embedding**
 - COM-based, *interface* function "**IDispatch**"
 - Linking of documents (dynamic data exchange, DDE)
 - Cold link
 - Warm link
 - Hot link
 - Embedding of alien/foreign documents



OLE (ActiveX) Automation, 2



- VBX, OCX, ActiveX
 - Set of COM-Interfaces for defining Windows "components"
 - Windows programs, which can be combined as building stones
 - Defined interface for communicating with components
 - Acronyms
 - Visual Basic Extension
 - Mostly developed for GUI
 - Object Component Extension and ActiveX
 - Independent of Visual Basic, therefore usable for all Windows programs



OLE (ActiveX) Automation, 3



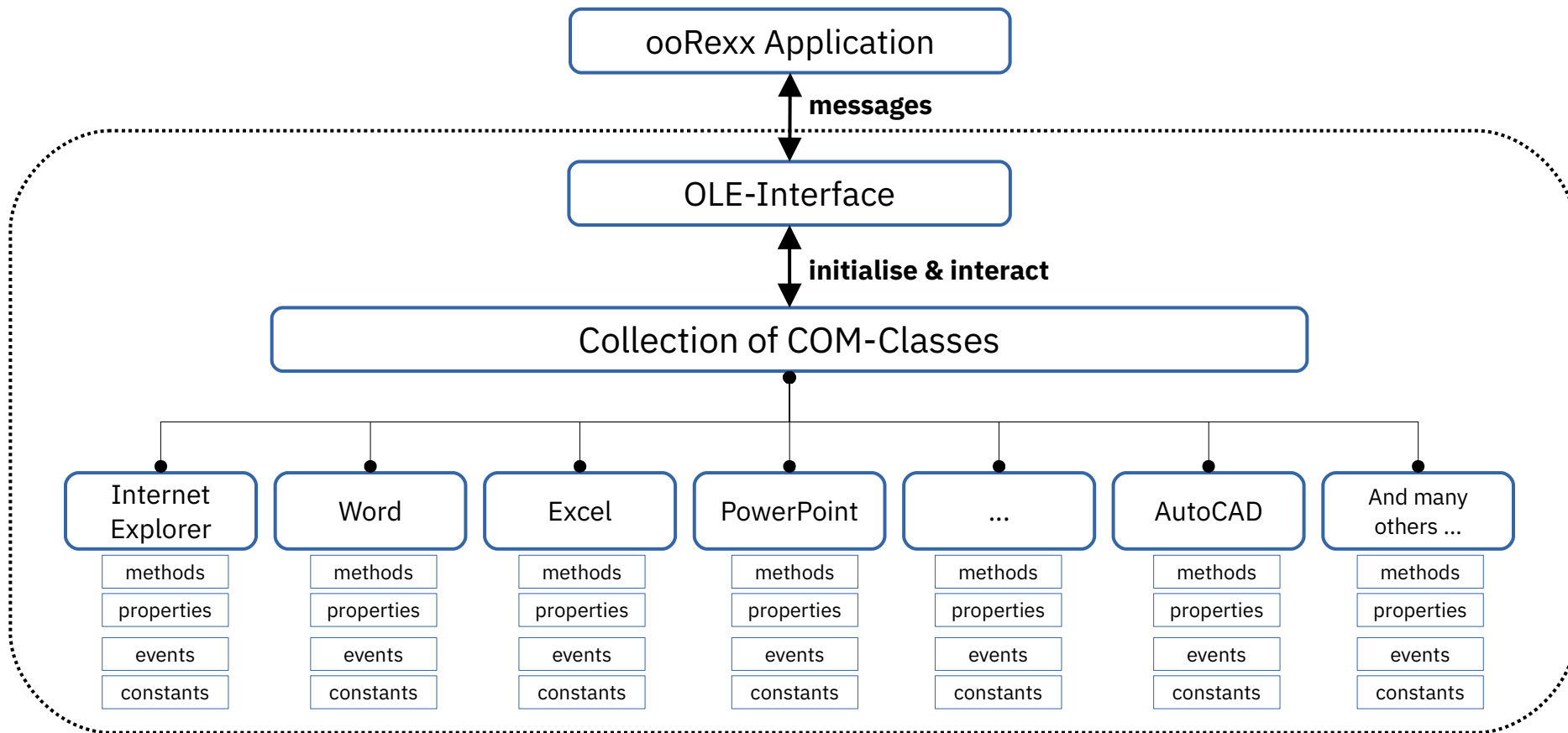
- OLE (ActiveX) Automation
 - Interface for remotely controlling Windows applications/components
 - Set of COM-based interface functions
 - Standardized definition of programming interfaces for (scripting) languages
 - Invocation of *methods* (functions) in a Windows program/component
 - Querying and setting *property* ("attribute") values of a Windows program/component
 - Intercepting of *events* that get raised by a Windows program/component
 - Querying of *constant* values in a Windows program/component
 - Logging of user actions, which can be transformed into a "script" ("macro") program



OLE (ActiveX) Automation, 4



COM Class Provider



OLE (ActiveX) Automation, 5



- Information about Windows applications and components is stored in the Windows Registry
 - HKEY_CLASSES_ROOT
 - CLSID
 - GUID resp. UUID
 - Global resp. Universal Unique Identifier
 - ProgID
 - A string that can be easily comprehended and memorized by humans
- Identifying (addressing) of a COM Windows component can be done via a *CLSID*, a *ProgID* or a "*moniker*" (a human readable string)



ooRexx Class ".OLEObject", 1



- Reference documentation available with the Windows version of ooRexx
 - "ooRexx Windows Reference": [winextensions.pdf](#)
- "Proxy" class for addressing OLE resp. ActiveX Windows programs, which allows for
 - Locating and addressing running OLE/ActiveX programs
 - Creating new instances of OLE/ActiveX programs
 - Querying the *published* programming interfaces (methods, properties, constants, events)
 - Sending ooRexx messages to invoke the interfaces
 - Arguments are automatically converted by ooRexx
 - Return values are automatically converted by ooRexx



ooRexx Class ".OLEObject", 2



- Querying/setting of property values using ooRexx messages
 - Windows properties can be used as if they were ooRexx attributes
- Can intercept events and invoke ooRexx methods by the same name
- Automatically carries out the necessary datatype conversion between Windows and ooRexx, ie. between ooRexx and the following (COM) Windows datatypes
 - VT_EMPTY, VT_NULL, VT_VOID, VT_I1, VT_I2, VT_I4, VT_I8, VT_UI1, VT_UI2, VT_UI4, VT_UI8, VT_R4, VT_R8, VT_CY, VT_DATE, VT_BSTR, **VT_DISPATCH**, *VT_VARIANT*, **VT_PTR**, VT_SAFEARRAY





Methods (1 of 2)

- **Init(ProgID | CLSID [, NOEVENTS|WITHEVENTS])**
 - Creates a new instance of the OLE/ActiveX program ("COM class")
 - Returns an ooRexx (proxy) object for it
- **GetObject(Moniker [, SubclassOfOLEObject])**
 - Class method, which searches an existing instance of a COM class
 - Returns an ooRexx (proxy) object for it
- **GetConstant([someConstantName])**
 - Returns the value for the constant named *someConstantName*
 - Returns all published constants with their defined values as a Rexx stem



Methods (2 of 2)



- **GetKnownEvents, GetKnownMethods**
 - Returns a stem containing all published events and methods of the COM class
- **GetOutParameters**
 - Returns an array object with the "out" parameters of the last invocation
- **Dispatch(MessageName [, Argument1, Argument2, ...])**
 - Invokes a method on the Windows side which has the same name as "MessageName" and forwards any supplied arguments
- **UNKNOWN(MessageName [, ArrayWithArguments])**
 - This method processes all unknown messages and forwards them to the OLE/ActiveX program, which gets represented by the proxy object
 - The reason why one can send ooRexx messages successfully to Windows objects!

Hint about the examples



- The Windows version of Open ooRexx (ooRexx) is delivered with numerous OLE/ActiveX examples, which can be found under the ooRexx installation directory:

`?\ooRexx\samples\ole`

- Attention!
 - The following foils only depict a subset of the supplied examples
 - Therefore please study and run all examples in all of the samples subdirectories
 - These examples do not change your computer settings permanently!



"InternetExplorer.Application" # 1

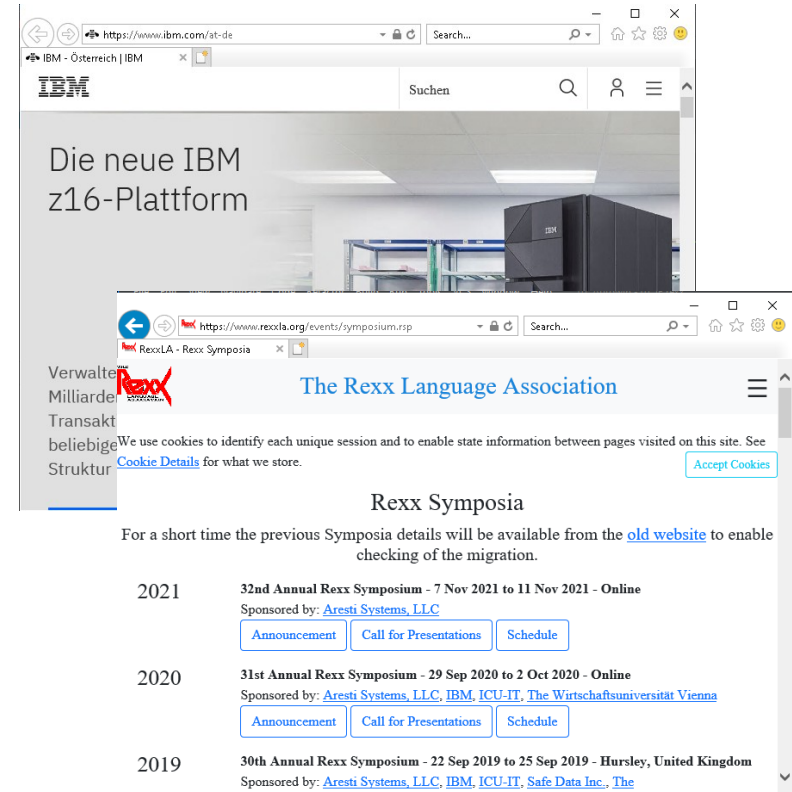


- ...\\ole\\apps\\MSInternetExplorer_navigate.rex (executed on 2022-05-03)

```
/* create an object for IE */  
myIE = .OLEObject~New("InternetExplorer.Application")  
  
myIE~Width = 1000  
myIE~Height = 800  
Say "current dimensions of IE are:" myIE~Width "by" myIE~Height  
  
/* set new dimensions and browse IBM homepage */  
myIE~Width = 1280  
myIE~Height = 1024  
myIE~Visible = .True -- now show the window  
myIE~Navigate("https://www.ibm.com")  
  
/* wait for 10 seconds */  
Call SysSleep 10  
  
/* wait for 10 seconds */  
myIE~Navigate("https://www.rexxla.org/events")  
Call SysSleep 10  
myIE~quit
```

Output:

```
current dimensions of IE are: 1000 by 800
```



"WScript.Shell"



- ...\\ole\\apps\\WScriptShell.rex

```
WshShellObj = .OLEObject~New("WScript.Shell")
```

```
WshEnv = WshShellObj~Environment  
Say "Operating system:" WshEnv["OS"]  
Say "You have" WshEnv["NUMBER_OF_PROCESSORS"] "processor(s) of",  
    WshEnv["PROCESSOR_ARCHITECTURE"] "architecture in your system."
```

```
Say "The following directories represent special folders on your system:"  
Do Folder Over WshShellObj~SpecialFolders  
    Say " " Folder  
End
```

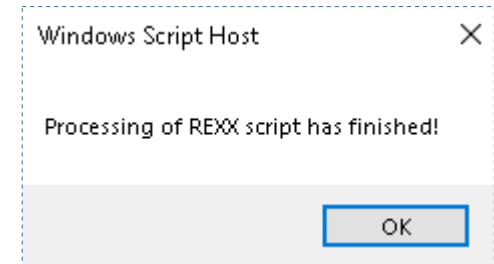
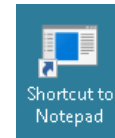
```
Say "Creating a shortcut for NOTEPAD.EXE on your Desktop..."  
Desktop = WshShellObj~SpecialFolders("Desktop")  
ShortCut = WshShellObj~CreateShortcut(Desktop || "\\Shortcut to Notepad.lnk")  
ShortCut~TargetPath = "%WINDIR%\\notepad.exe"  
ShortCut~Save
```

```
WshShellObj~Popup("Processing of REXX script has finished!")
```

Possible Output:

```
Operating system: Windows_NT  
You have 2 processor(s) of AMD64 architecture in your system.  
The following directories represent special folders on your system:  
    C:\\Users\\Public\\Desktop  
    C:\\ProgramData\\Microsoft\\Windows\\Start Menu  
    ... cut ...
```

```
Creating a shortcut for NOTEPAD.EXE on your Desktop...
```



"WScript.Network"



- ...\ole\apps\WScriptNetwork.rex

```
WshNetObj = .OLEObject~New("WScript.Network")

Say "Computer Name:" WshNetObj~ComputerName
Say "User Domain:" WshNetObj~UserDomain
Say "User Name:" WshNetObj~UserName

Say "The following network drives are currently mapped:"
MappedDrives = WshNetObj~EnumNetworkDrives
Do i=0 To MappedDrives~Count/2 - 1
  Say "  Drive" MappedDrives[i*2] "is mapped to" MappedDrives[i*2 + 1]
End

Say "The following network printers are currently connected:"
Printers = WshNetObj~EnumPrinterConnections
Do i=0 To Printers~Count/2 - 1
  Say "  Port" Printers[i*2] "is connected to" Printers[i*2 + 1]
End
```

```
MappedDrives:
[0] Z:
[1] \\192.168.122.1\Shared

Printers:
[0] PORTPROMPT:
[1] Microsoft Print to PDF
[2] SHRFXAX:
[3] Fax
```

Possible Output:

```
Computer Name: DESKTOP-NS1T6G3
User Domain: DESKTOP-NS1T6G3
User Name: waldi
The following network drives are currently mapped:
  Drive Z: is mapped to \\192.168.122.1\Shared
The following network printers are currently connected:
  Port PORTPROMPT: is connected to Microsoft Print to PDF
  Port SHRFXAX: is connected to Fax
```

"Excel.Application" # 1 (1 of 3)



- ...\\ole\\apps\\MSEExcel.rex

```
excelApplication = .OLEObject~new("Excel.Application")
excelApplication~visible = .true           -- make Excel visible
Worksheet = excelApplication~Workbooks~Add~Worksheets[1]
colTitles = "ABCDEFGH"                   -- define first nine column letters
lastLine = 12                             -- number of lines to process
sumFormula = "=sum(?2:?\"lastLine-1\")"   -- English formula: question marks will be changed to column letter
say "sumFormula:      " sumFormula "(question marks will be changed to column letter)"
xlHAlignRight = excelApplication~getConstant("xlHAlignRight") -- get value of "horizontal align right" constant
do line = 1 to lastLine                   -- iterate over lines
  do col = 1 to colTitles~length           -- iterate over columns
    colLetter = colTitles[col]             -- get column letter
    cell = Worksheet~Range(colLetter||line) -- e.g. ~Range("A1")
    if line = 1 then do                     -- first row? yes, build title
      cell~value = "Type" colLetter        -- header in first row
      cell~font~bold = .true               -- make font bold
      cell~Interior~ColorIndex = 36        -- light yellow
      cell~style~horizontalAlignment = xlHAlignRight -- right adjust title
    end
    else if line = lastLine then do         -- last row? yes, build sums
      /* set formula, e.g. "=sum(B2:B9)" */
      cell~formula = sumFormula~changeStr("?",colLetter) -- adjust formula to column to sum up
      cell~Interior~ColorIndex = 8         -- light blue
    end
    else do -- a row between 2 and 9: fill with random values
      cell~value = random(999999) / 100    -- create a random decimal value
      cell~font~ColorIndex = 11           -- set from black to violet
    end
  end
end
end
```

"Excel.Application" # 1 (2 of 3)



- ...\\ole\\apps\\MSEExcel.rex (continued)

```
sumCell = WorkSheet~range("A"lastLine)      -- get sum-cell of column A
if sumCell~text = "#NAME?" then
do
  say
  say "** Excel reports a '#NAME?' error for the 'sum' function! Probable cause: **"
  say "** your local Excel user interface language is not set to English, therefore you need **"
  say "** to adjust the function name 'sum' in the variable 'sumFormula' to your user interface **"
  say "** language and rerun this program (e.g. in German you need to rename 'sum' to 'summe') **"
  say "** sumCell~formula:" sumCell~formula
  say "** sumCell~text:   " sumCell~text
  say "** sumCell~value:  " sumCell~value
  say
end
formatString = "#"excelApplication~thousandsSeparator"##0"excelApplication~decimalSeparator"00"
say "formatString:   " formatString          -- show format string
excelApplication~useSystemSeparators = .false -- allow our format string to be used everywhere
stringRange="A2:"colTitles~right(1)lastLine
say "formatting range:" stringRange
WorkSheet~range(stringRange)~numberFormat = formatString -- get range and set its number format
excelApplication~DisplayAlerts = .false      -- no alerts from now on
homeDir = value("USERPROFILE",,"ENVIRONMENT")-- get value for environment variable "USERPROFILE"
fileName = homeDir"\samp09_ooRexx.xlsx"      -- build fully qualified filename
say "fully qualified fileName:" fileName     -- show fully qualified filename
Worksheet~SaveAs(fileName)                  -- save file
-- let the user inspect the Excel file
say "Excel sheet got saved to file, press enter to continue ..."
parse pull .                                 -- wait for user to press enter
excelApplication~Quit                        -- close Excel
```



"Excel.Application" # 1 (3 of 3)



	Type A	Type B	Type C	Type D	Type E	Type F	Type G	Type H	Type I											
1	Type A	Type B	Type C	Type D	Type E	Type F	Type G	Type H	Type I											
2	5.405,21	2.333,91	7.690,32	6.741,79	2.432,08	5.534,71	2.250,68	1.041,91	1.704,58											
3	5.977,23	1.663,05	7.036,27	5.888,64	5.379,29	€11,76	5.854,23	2.910,67	7.159,54											
4	5.491,20	460,89	712,59	9.543,39	7.432,93	3.035,22	6.376,13	280,28	6.333,71											
5	2.087,54	2.261,28	4.790,89	8.818,59	3.064,15	4.206,19	1.847,89	3.358,03	5.806,12											
6	4.594,11	1.766,36	5.910,86	8.502,30	7.681,97	2.578,19	4.060,79	7.619,96	3.763,36											
7	6.481,73	5.503,83	3.836,89	8.068,71	7.860,47	395,53	1.955,18	7.713,36	4.427,26											
8	4.676,82	1.695,93	8.173,23	2.292,13	9.258,17	7.075,24	3.123,52	4.548,93	9.575,97											
9	8.682,94	568,55	5.077,22	5.270,33	3.304,41	9.401,29	803,32	7.044,62	6.950,55											
10	3.980,68	6.922,40	3.987,05	9.435,04	5.960,85	9.489,29	7.108,44	4.442,55	4.455,69											
11	2.116,21	5.277,43	1.241,05	8.095,84	4.285,35	627,06	9.423,42	9.530,24	5.754,83											
12	48.493,67	28.413,63	48.456,25	72.656,76	56.659,67	42.958,48	42.803,60	48.490,55	55.539,61											

Possible Output:

```
sumFormula:      =sum(???:?11) (question marks will be changed to column letter)
formatString:    #.##0,00
formatting range: A2:I12
fully qualified fileName: C:\Users\waldi\samp09_ooRexx.xlsx
Excel sheet got saved to file, press enter to continue ...
```



"Scripting.FileSystemObject"



- ...\ole\apps\ScriptingFileSystemObject.rex

```
fsObject = .OLEObject~new("Scripting.FileSystemObject")
allDrives = fsObject~drives
if allDrives = .NIL then do
  say "The object did not return information on your drives!"
  exit 1
end

do i over allDrives
  info = i~DriveLetter "-"
  /* show the DriveType in human-readable form */
  j = i~DriveType
  select
  when j=1 then info = info "Removable"
  when j=2 then info = info "Fixed"
  when j=3 then info = info "Network"
  when j=4 then info = info "CD-ROM"
  when j=5 then info = info "RAM Disk"
  otherwise info = info "Unknown"
end

/* append the ShareName for a network drive... */
if j=3 then info = info i~ShareName
/* ...and the VolumeName for the other ones */
else if i~IsReady then info = info i~VolumeName
say info
end
```

Possible Output:

```
C - Fixed
Z - Network \\192.168.122.1\Shared
```



"Excel.Application" # 2

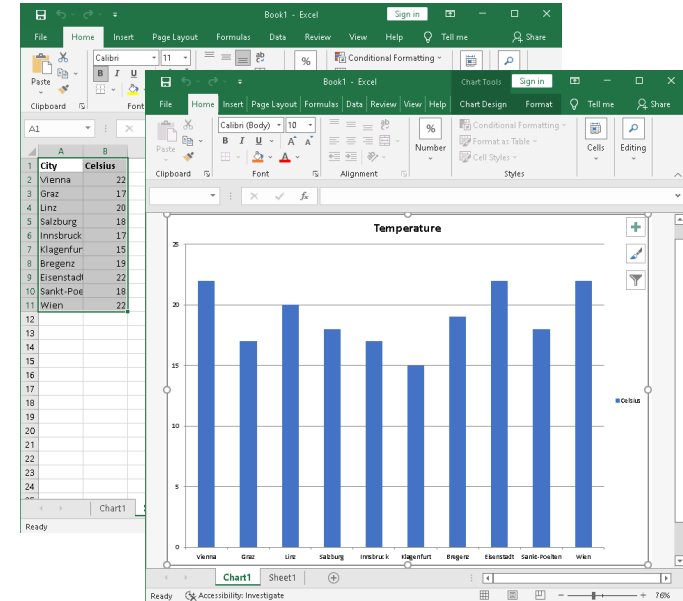


..\ole\apps\MSEExcel_cURL.rex

```
-- Get information using curl
cityArr = .array-of("Vienna", "Graz", "Linz", "Salzburg", "Innsbruck", "Klagenfurt", "Bregenz", -
    "Eisenstadt", "Sankt-Poelten", "Wien")
cityWeather = .array-new                                -- array for weather information
do counter i name over cityArr
    command='curl https://wttr.in/'name'?format="%l:+%t' -- https://github.com/chubin/wttr.in
    say "#" i"." command -- give user feedback
    outArr = .array-new -- array for stdout
    ADDRESS SYSTEM command with output using (outArr) error using (.array-new)
    cityWeather~append(outArr[1]) -- append output to array
end
```

```
-- Start Excel with empty worksheet
excelApplication = .OLEObject-new("Excel.Application")
excelApplication~visible = .true -- make Excel visible
Worksheet = excelApplication~Workbooks~Add~Worksheets[1] -- add worksheet
-- Create bold collum header in first row
colhead = .array-of("City", "Celsius") -- array with header text
do counter col name over colhead
    colLetter = colTitles[col]
    Worksheet~cells(1,col)~Value = name -- insert items from array
    Worksheet~cells(1,col)~font~bold = .true -- make bold
end
-- Insert information from gained with curl
do counter row name over cityWeather
    row +=1 -- always add to start in second row
    parse var name city ":" temperature "°C" -- parse curled informations
    Worksheet~cells(row,1)~Value = city -- city in collum 1
    Worksheet~cells(row,2)~Value = temperature -- temperature in collum 2
end
-- Select range
colTitle = "ABCDEFGH"
Worksheet~Range("A1:"colTitle[2]||row)~Select
```

```
-- Add Chart
excelApplication~Charts~Add -- create new chart
excelApplication~ActiveChart~HasTitle = .True -- add title
excelApplication~ActiveChart~ChartTitle~Characters~Text = "Temperature"
```



Output:

```
# 1: curl https://wttr.in/Vienna?format="%l:+%t"
# 2: curl https://wttr.in/Graz?format="%l:+%t"
# 3: curl https://wttr.in/Linz?format="%l:+%t"
# 4: curl https://wttr.in/Salzburg?fozmat="%l:+%t"
# 5: curl https://wttr.in/Innsbruck?format="%l:+%t"
# 6: curl https://wttr.in/Klagenfurt?format="%l:+%t"
... cut ...
```

"InternetExplorer.Application" # 2



- ...\\ole\\apps\\MSInternetExplorer_events.rex

```
/* instantiate an instance of the Internet Explorer */
myIE = .watchedIE-new("InternetExplorer.Application","WITHEVENTS")
myIE-visible = .true
myIE-navigate("http://www.ibm.com/")

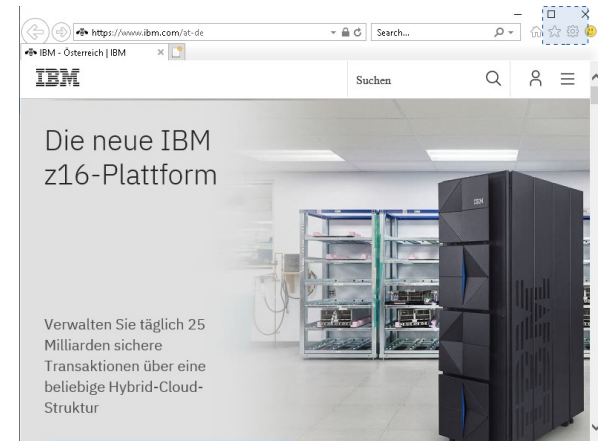
/* wait for the OnQuit event of the browser to change */
/* the !active attribute of the REXX object to false */
myIE-!active = .true
do while myIE-!active = .true
  call sysssleep(2)
end

::CLASS watchedIE SUBCLASS OLEObject
/* ... Cut ... Lines deleted, please lookup the original file in your installation ! */
/* this is an event of the Internet Explorer */
::METHOD TitleChange
  use arg Text
  say "The title has changed to:" text
/* this is an event of the Internet Explorer */
::METHOD OnQuit
  self-!active = .false -- terminates the waiting loop in main code

::METHOD !active ATTRIBUTE -- store the active attribute
```

Output:

```
The title has changed to: IBM - Österreich | IBM
```



"Word.Application"



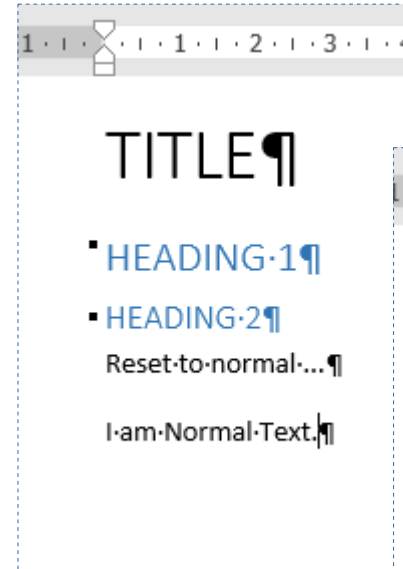
...\ole\apps\MSWord_useStyles.rex

```
Word = .OLEObject-New("Word.Application")
Word-Visible = .TRUE -- make Word visible
Document = Word-Documents-Add -- add document
Selection = Word-Selection -- selection object
say "# 1: Create: title style..."
Selection-Style = "Title" -- Create selection with style: Title
Selection-TypeText("TITLE") -- give selection a text
Selection-TypeParagraph -- add paragraph (go to next line)
say "# 2: Create: heading 1 style..."
Selection-Style = "Heading 1" -- Create selection with style: Heading 1
Selection-TypeText("HEADING 1") -- give selection a text
Selection-TypeParagraph -- add paragraph (go to next line)
say "# 3: Create: heading 2 style..."
Selection-Style = "Heading 2" -- Create selection with style: Heading 2
Selection-TypeText("HEADING 2") -- give selection a text
Selection-TypeParagraph -- add paragraph (go to next line)
-- Note: Usually the style "Normal" follows heading styles
Selection-TypeText("Reset to normal ...") -- "Normal" follows "Heading 2"
Selection-TypeParagraph -- add paragraph (go to next line)
say "# 4: Create: normal text style..."
Selection-Style = "Normal" -- Create selection with style: normal
Selection-TypeText("I am Normal Text.") -- give selection a text

say "Press any key to change style!"
parse pull -- wait for key press

-- Go through each sentence
SentenceCount = Document-Sentences-Count -- get sentence count
Font = Selection-Font -- get font object
do SentenceNumber = 1 to SentenceCount -- go through each sentence

    Document-Sentences(SentenceNumber)-Select -- select sentence
    StyleName = Selection-Style-NameLocal -- get style name of sentence
    Select case StyleName -- make changes depending on style name
        when "Title" then do
            Font-Name="Arial"
            Font-Size="38"
            Font-Bold = .TRUE
        end
        when "Heading 1" then do
            Font-Name="Times New Roman"
            Font-Size="22"
            Font-Italic = .TRUE
        end
        otherwise NOP
    end
end
```



Output:

Press any key to change style!

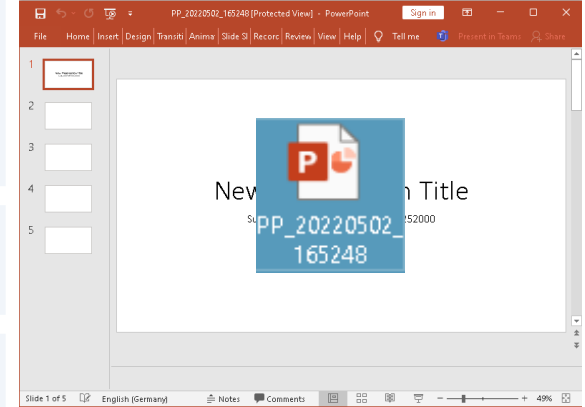


"PowerPoint.Application"



...\ole\apps\MSPowerPoint_layouts.rex

```
-- Start PowerPoint
PP = .OLEObject~New("PowerPoint.Application")
PP~Visible = .TRUE -- make PP visible
-- Add first Slide
PP~Presentations~Add~Slides~Add(1, 1) -- add: Title-Slide
FirstSlide = PP~ActivePresentation~Slides(1)
FirstSlide~Shapes(1)~TextFrame~TextRange = "New Presentation Title" -- first Shape is Title
FirstSlide~Shapes(2)~TextFrame~TextRange = "Subtitle at: " .dateTime~new -- second Shape is SubTitle
-- Append several Slides
ActivePresentation = PP~ActivePresentation
ActivePresentation~Slides~Add(2, 1) -- append: second Title-Slide
ActivePresentation~Slides~Add(3, 2) -- append: Title and Text Slide
ActivePresentation~Slides~Add(4, 3) -- append: Title and 2-Columnne Text
ActivePresentation~Slides~Add(5, 5) -- append: Title, Text and Chart
-- Check what on Slide
SlideCount = ActivePresentation~Slides~Range~Count -- get amount of Slides
say "Your Presentation has" SlideCount "Slides"
do SlideNumber = 1 to SlideCount -- go through each Slide
  ShapeCount = ActivePresentation~Slides(SlideNumber)~Shapes~Range~Count -- get amount of Shapes per Slide
  say " Slide" SlideNumber "has" ShapeCount "Shapes"
  do ShapeNumber = 1 to ShapeCount -- go through each Shape
    -- List names of Shapes on Slide
    say " ("ShapeNumber"/"ShapeCount").:" ActivePresentation~Slides(SlideNumber)~Shapes(ShapeNumber)~name
  end
end
-- Save and Close
parse source . . s -- get fully qualified path of this script
-- create unique file name
fileOut = filespec('location',s)\PP_" || date("S") || "_" || changeStr(":",time(),"") || ".pptx"
ActivePresentation~SaveAs(fileOut) -- save pptx file
PP~Quit -- close PP
```



Possible Output:

```
Your Presentation has 5 Slides
Slide 1 has 2 Shapes
(1/2): Title 1
(2/2): Subtitle 2
Slide 2 has 2 Shapes
(1/2): Title 1
(2/2): Subtitle 2
Slide 3 has 2 Shapes
(1/2): Title 1
... cut ...
```



"Outlook.Application"



```
...\\ole\\apps\\MSOutlook.rex
```

```
Outlook = .OLEObject~new("Outlook.Application")
Namespace = Outlook~GetNamespace("MAPI")

-- In Outlook folder have numbers:
-- DeletedItems (3), Outbox (4), SentMail (5), Inbox (6),
-- Calendar (9), Contacts (10), Journal (11), Notes (12),
-- Tasks (13)
Inbox = Namespace~GetDefaultFolder("6")      -- selects Inbox

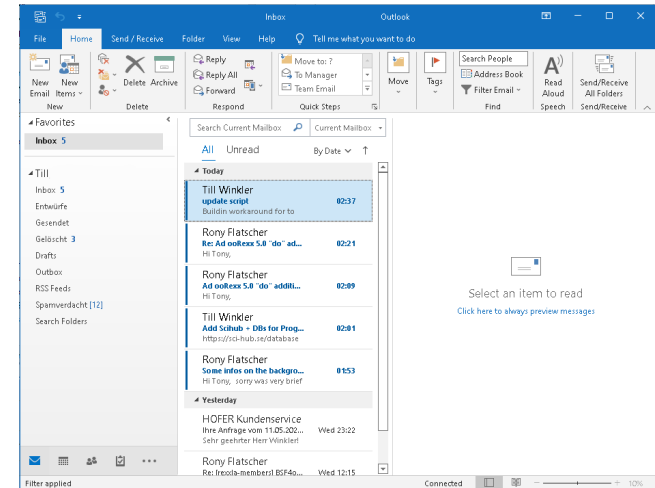
-- makes Outlook visible and shows Inbox
Inbox~Display

InboxItems = Inbox~Items
MailCount = InboxItems~Count                -- count items in Inbox
say "You have" MailCount "Mail(s) in your Inbox:"

Do ItemNumber = 1 to MailCount              -- go through each item
  Item = Inbox~Items(ItemNumber)
  Sender = Item~Sender~Name                 -- sender of item
  say "#" ItemNumber "." Sender
end
```

Possible Output:

```
You have 8 Mail(s) in your Inbox:
# 1. Rony Flatscher
# 2. Rony Flatscher
# 3. Till Winkler
# 4. Rony Flatscher
... cut ...
```



"Access.Application"



- ...\\ole\\apps\\MSAccess_contacts.rex

```
-- Initialize string to database path.
strDB = "c:\\temp\\newdb.mdb"
-- Create new instance of Microsoft Access.
appAccess = .OLEObject~new("Access.Application")
-- Open database in Microsoft Access window.
appAccess~NewCurrentDatabase("strDB")
-- Get Database object variable.
dbs = appAccess~CurrentDb
-- Create new table.
tdf = dbs~CreateTableDef("Contacts")
-- Create field in new table.
/* Please note how to access the constant.
   Microsoft documentation and the MS OLEViewer output
   these constants as dbText, dbBinary, etc. - the type library
   however prints them as DB_TEXT, DB_BINARY, etc.. Unless
   documentation is found why the names should be translated,
   the OLE code will *NOT* convert the names. */
fld = tdf~CreateField("CompanyName", appAccess~getConstant("db_Text"), 40)
-- Append Field and TableDef objects.
tdf~Fields~Append(fld)
dbs~TableDefs~Append(tdf)

appAccess~quit
```



ADS – Active Directory Services



- Authentication and authorization of users and computers
 - Users
 - Access rights
 - ...
- Wikipedia overview article
 - https://en.wikipedia.org/wiki/Active_Directory



Collecting Information Using ADS, 1



Retrieve information about a computer with ADSI.

- ...\\ole\\adsi\\adsi1.rex

```
ComputerName = value("COMPUTERNAME",,"ENVIRONMENT")
myComputer = .OLEObject~GetObject("WinNT://"||ComputerName||",computer")

say "Standard properties of this computer:"
say left("Name:"      ,10) myComputer~name
say left("Class:"     ,10) myComputer~class
say left("GUID:"      ,10) myComputer~guid
say left("ADsPath:"   ,10) myComputer~adspath
say left("Parent:"    ,10) myComputer~parent
say left("Schema:"    ,10) myComputer~schema
```

Possible Output:

```
Standard properties of this computer:
Name:      DESKTOP-NS1T6G3
Class:     Computer
GUID:      {DA438DC0-1E71-11CF-B1F3-02608C9E7553}
ADsPath:   WinNT://WORKGROUP/DESKTOP-NS1T6G3
Parent:    WinNT://WORKGROUP
Schema:    WinNT://WORKGROUP/Schema/Computer
```



Collecting Information Using ADS, 2



Get a user's full name and change it..

- ...\\ole\\adsi\\adsi2.rex
(Note: this program requires administrator permissions)

```
ComputerName = value("COMPUTERNAME",,"ENVIRONMENT")    -- get ComputerName
UserID       = value("USERNAME",,"ENVIRONMENT")        -- get UserName

userObject = .OLEObject-GetObject("WinNT://||ComputerName||"/"/||UserID||",user")

/* using the object property */
say "The full name for" UserID "is" userObject-FullName

/* using the standard get method for ADSI objects */
say "The full name for" UserID "is" userObject-Get("FullName")

say "Would you like to rename the full name (y/n)?"
pull answer

if answer = "Y" then do
  say "New full name:"
  parse pull answer

  /* set the property */
  /* as an alternative, the property can also be set with the standard put */
  /* method of ADSI objects: */
  /* userObject-Put("FullName",answer) */
  userObject-FullName=answer

  /* because properties are cached to avoid network calls, changing the */
  /* properties of an object will only affect the cache at first. */
  /* the object gets updated with the SetInfo method: */
  userObject-SetInfo

  say "updated the full name for" UserID
end
```

Possible Output:

```
rexex adsi2.rex
The full name for Administrator is John Doe
The full name for Administrator is John Doe
Would you like to rename the full name (y/n)?
y
New full name:
John Doe's Mother
updated the full name for Administrator
```

Collecting Information Using ADS, 3



Displaying namespaces and domains.

- ...\ole\adsi\adsi5.rex

```
myADS = .OLEObject~GetObject("ADs:")  
  
do namespace over myADS  
  say "Domains in" namespace~Name  
  do domain over namespace  
    if domain \= .nil then  
      say "    " domain~name  
    else  
      say domain  
  end  
end
```

Possible Output (on a standalone Windows PC):

```
Domains in WinNT:  
Domains in LDAP:
```



Collecting Information Using ADS, 4



Inspecting properties of an object.

- ...\\ole\\adsi\\adsi6.rex

```
ComputerName = value("COMPUTERNAME",,"ENVIRONMENT")

myDomain = .OLEObject~GetObject("WinNT://"|ComputerName)
mySchemaClass = .OLEObject~GetObject(myDomain~schema)

say "Properties for the" myDomain~name "object:"
say

if mySchemaClass~container = 1 then do
  say myDomain~name "may contain the following objects:"
  do i over mySchemaClass~Containment
    say " " i
  end
end
else
  say myDomain~name "is not a container."

say
say "Mandatory properties:"
do i over mySchemaClass~MandatoryProperties
  say " " i
end

say
say "Optional properties:"
do i over mySchemaClass~OptionalProperties
  say " " i
end
End
```

Possible Output:

Properties for the DESKTOP-NS1T6G3 object:

DESKTOP-NS1T6G3 may contain the following objects:

- User
- Group
- Service
- FileService
- PrintQueue

Mandatory properties:

Optional properties:

- Owner
- Division
- OperatingSystem
- OperatingSystemVersion
- Processor
- ProcessorCount
- Name

Collecting Information Using ADS, 5



Create a group and several users in it.

- ...\\ole\\adsi\\adsi7.rex

(Note: this program requires administrator permissions)

```
ComputerName = value("COMPUTERNAME", "ENVIRONMENT") -- get ComputerName
computer = .OLEObject~GetObject("WinNT://"||ComputerName)
/* create a new group */
newGroup = computer~Create("group", "REXX-TestGroup")
newGroup~Description = "A test group created with REXX"
newGroup~SetInfo

/* make sure the information in the object cache is up-to-date */
newGroup~GetInfo
say "Created new group" newGroup~Name
say "Description:" newGroup~Description; say
say "Creating 15 users in this group:"
say "User01..User15 with passwords demo01..demo15"
/* create several new users */
do i = 1 to 15
  /* create name and other information */
  userName = "User"right(i,2,'0')
  userFullName = "Demo User Number" i
  userDescription = "A demo user that was created with REXX"
  userPassword = "demo"right(i,2,'0')

  newUser = computer~Create("user", userName)
  newUser~FullName = userFullName
  newUser~Description = userDescription
  newUser~SetPassword(userPassword)
  newUser~SetInfo
  newGroup~Add(newUser~ADsPath)
end
```

Output:

```
Created new group REXX-TestGroup
Description: A test group created with REXX

Creating 15 users in this group:
User01..User15 with passwords demo01..demo15
```

Collecting Information Using ADS, 6



Remove the users and the group that were created in *adsi7.rex*.

- ...\\ole\\adsi\\adsi8.rex

(Note: this program requires administrator permissions)

```
ComputerName = value("COMPUTERNAME",,"ENVIRONMENT") -- get ComputerName
computer = .OLEObject~GetObject("WinNT://"||ComputerName)

say "Removing the fifteen users..."
do i = 1 to 15
  computer~Delete("user", "User"||right(i,2,'0'))
end

say "Removing the test group..."

computer~Delete("group", "REXX-TestGroup")

say "done"
```

Possible Output:

```
Removing the fifteen users...
Removing the test group...
```

WMI – Windows Management Instrumentation



- Allows to get information of instrumented components and notifications
 - Local and remote computers and devices
 - ...
- Wikipedia overview article
 - https://en.wikipedia.org/wiki/Windows_Management_Instrumentation



Collecting Information Using WMI, 1



- ...\\ole\\wmi\\accounts.rex

```
WMIObject = .OLEObject~GetObject("WinMgmts:{impersonationLevel=impersonate}")
userAccounts = WMIObject~InstancesOf("Win32_Account")

do instance over userAccounts
  say
  say "="~copies(16) instance~name "="~copies(16)
  do i over instance~properties_
    say left(i~name":",20,' ') i~value
  end
end
```

Possible Output:

```
===== Everyone =====
Caption:          DESKTOP-NS1T6G3\Everyone
Description:      DESKTOP-NS1T6G3\Everyone
Domain:           DESKTOP-NS1T6G3
InstallDate:     The NIL object
LocalAccount:    1
Name:             Everyone
SID:              S-1-1-0
SIDType:         5
Status:          OK

===== LOCAL =====
Caption:          DESKTOP-NS1T6G3\LOCAL
... cut ...
```

Collecting Information Using WMI, 2



- ...\\ole\\wmi\\process.rex

```
WMIObject = .OLEObject~GetObject("winmgmts:{impersonationLevel=impersonate}")  
  
say "Here is a list of currently running processes"  
  
do process over WMIObject~InstancesOf("win32_process")  
    say process~processid process~name  
end
```

Possible Output:

```
Here is a list of currently running processes  
0 System Idle Process  
4 System  
92 Registry  
328 smss.exe  
436 csrss.exe  
508 wininit.exe  
516 csrss.exe  
600 services.exe  
608 winlogon.exe  
620 lsass.exe  
752 svchost.exe  
...cut...
```

Further Links, 1



- Rexx Language Association (RexxLA)
 - Numerous additional links
<<http://www.RexxLA.org/>> (2022-04-22)
- OLE-/Active-X Query Tool written in ooRexx
<<https://wi.wu.ac.at/rgf/wu/lehre/autowin/material/resources/oleinfo.zip>> (2022-05-03)
- ooRexx related OLE/ActiveX page, a **must** to visit!
<https://wi.wu.ac.at/rgf/wu/lehre/autowin/material/resources/pragmaticlee_archive_edited.zip>
(2022-05-03)



Further Links, 2



- Microsoft Office VBA Reference
 - <<https://docs.microsoft.com/en-us/office/vba/api/overview/>> (2022-05-03)
- A collection of Microsoft of administrative scripts for Windows
 - A self unarchiving Windows help file
 - <<http://download.microsoft.com/download/.NetEnterpriseServer/Utility/1.0/NT5XP/EN-US/netscrpt.exe>> (2022-04-22)
 - Collection of Visual Basic scripts for administrative tasks
 - Simply transcribable to ooRexx
 - ➔ *Hint:* simply replace the dot (.) in Visual Basic programs with the ooRexx message operator (the tilde: ~)