"The 2009 Edition of BSF4Rexx"

Part 1, Introduction to BSF4Rexx

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Agenda

- Brief History
- Architecture
- Changes
  - Examples
- New features
  - Examples
- Roundup and Outlook 4.0

BSF4Rexx History, 1

- Wintersemester 2000/01
  - Seminar assignment at the University of Essen
  - Proof of concept by a student (Peter Kalender)
- Spring 2001
  - Introduction of a re-write and w.r.t. BSF complete version of "BSF4Rexx" to the RexxLA
  - Ongoing work and improvements

BSF4Rexx History, 2

- Spring 2003
  - Introduction of the "Augsburg" version of BSF4Rexx to the RexxLA
  - Bug fixing
  - Added a few external Rexx functions to the external function package "BSF4Rexx.dll"
    - E.g. allows to demand load Java on Linux and Windows

Agenda (from 2003)

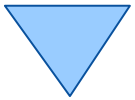
- Revealing the *real* Title
- Brief Architecture
  - The "Essener" Version of BSF4Rexx (2001)
  - The "Augsburg" Version of BSF4Rexx (2003)
- An example
  - A Java program
  - A Rexx program
- Additional new features
- Roundup

The Largest External Function Package for Rexx on Earth !

[And already ported to

all important

operating systems and hardware platforms!]



BSF

http://jakarta.apache.org/bsf

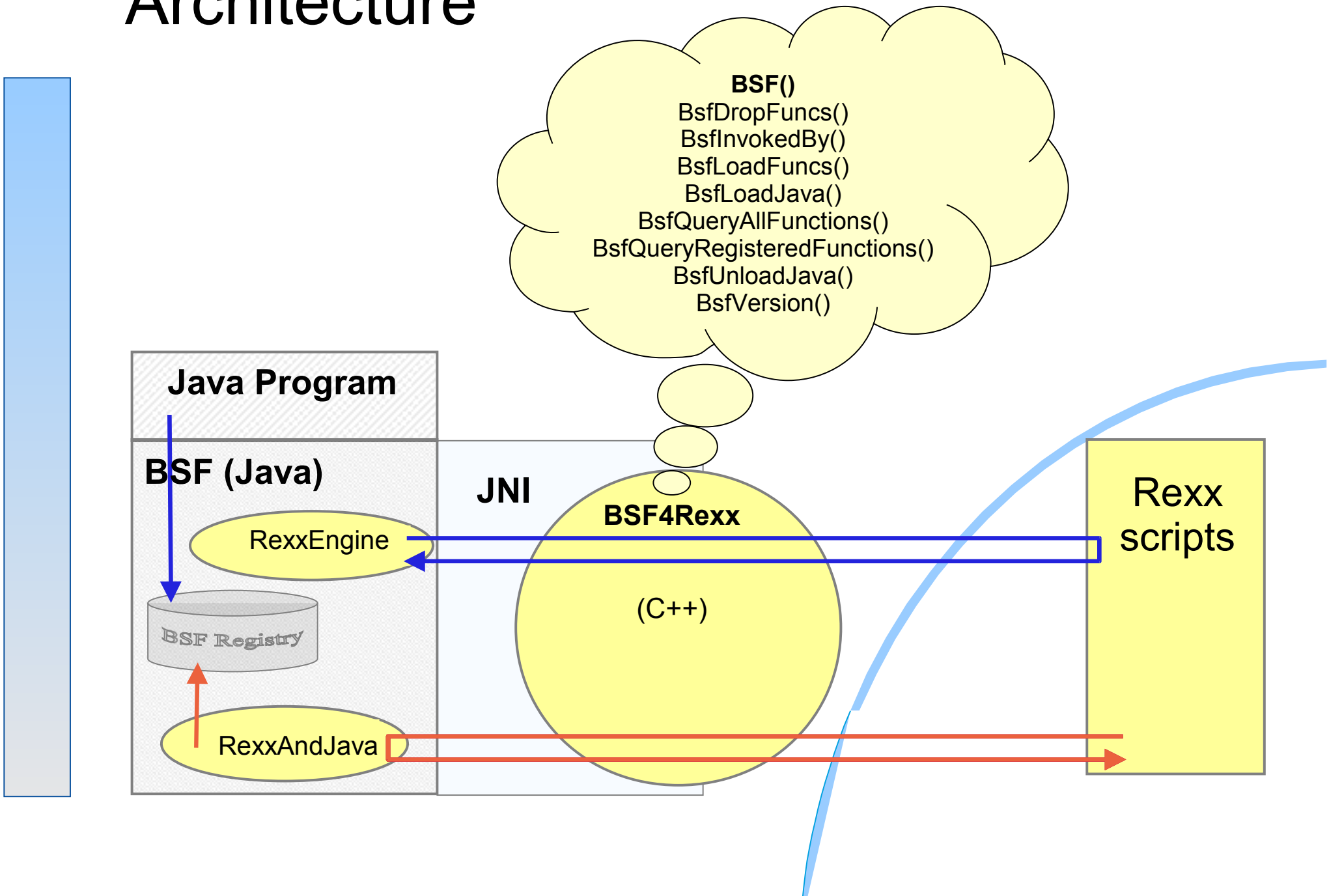
- Bean Scripting Framework
  - A Java framework, making it easy for Java to invoke scripts in non-Java scripting languages
    - E.g. JavaScript, NetRexx
  - Originally developed by IBM as open source
    - Part of IBM's WebSphere to allow scripts to be deployed within Java Server Pages (JSP)
  - Fall 2003 handed over to **jakarta.apache.org**
    - Used e.g. in **ant**, **xerces**

BSF4Rexx

http://wi.wu-wien.ac.at/rgf/rexx/bsf4rexx/current

- BSF with a Rexx engine
  - Allows the usage of Rexx from BSF
    - Any Java program can invoke Rexx
    - Rexx scripts are able to communicate with Java objects, if made available by the Java program
  - Allows Java to be used as a huge Rexx function library
    - The public methods and public fields of every Java object and Java class object can be used by Rexx
    - If necessary, Java can be started up by Rexx

BSF4Rexx Architecture



Java Invoking a Rexx Script
An Example

```
import com.ibm.bsf.*;   // BSF support
import java.io.*;       // exception handling

public class TestSimpleExec {

  public static void main (String[] args) throws IOException
  {
    try {
      BSFManager mgr  = new BSFManager ();
      BSFEngine  rexx = mgr.loadScriptingEngine("rexx");
      String     rexxCode = "SAY 'Rexx was here!'";

      rexx.exec ("rexx", 0, 0, rexxCode);

    } catch (BSFException e) { e.printStackTrace(); }
  }
}
```

Output:

```
Rexx was here!
```

BSF4Rexx
A Rexx Script Interfacing with Java

```
 /* "getJavaVersion.rex": classic Rexx version, querying the installed Java version */

     /* load the BSF4Rexx functions and start a JVM, if necessary  */
if rxFuncQuery("BSF") = 1 then   /* BSF() support not loaded yet ? */
do
  call rxFuncAdd "BsfLoadFuncs", "BSF4Rexx", "BsfLoadFuncs"
  call BsfLoadFuncs /* registers all remaining BSF functions       */
  call BsfLoadJava  /* loads Java                                  */
end

say "java.version:" bsf('invoke', 'System.class', 'getProperty', 'java.version')
```

Invoking the program either with:

```
rexx getJavaVersion.rex
```

or:

```
java org.rexxla.bsf.RexxDispatcher getJavaVersion.rex
```

or (shorthand of the above):

```
{rexxj.cmd|rexxj.sh} getJavaVersion.rex
```

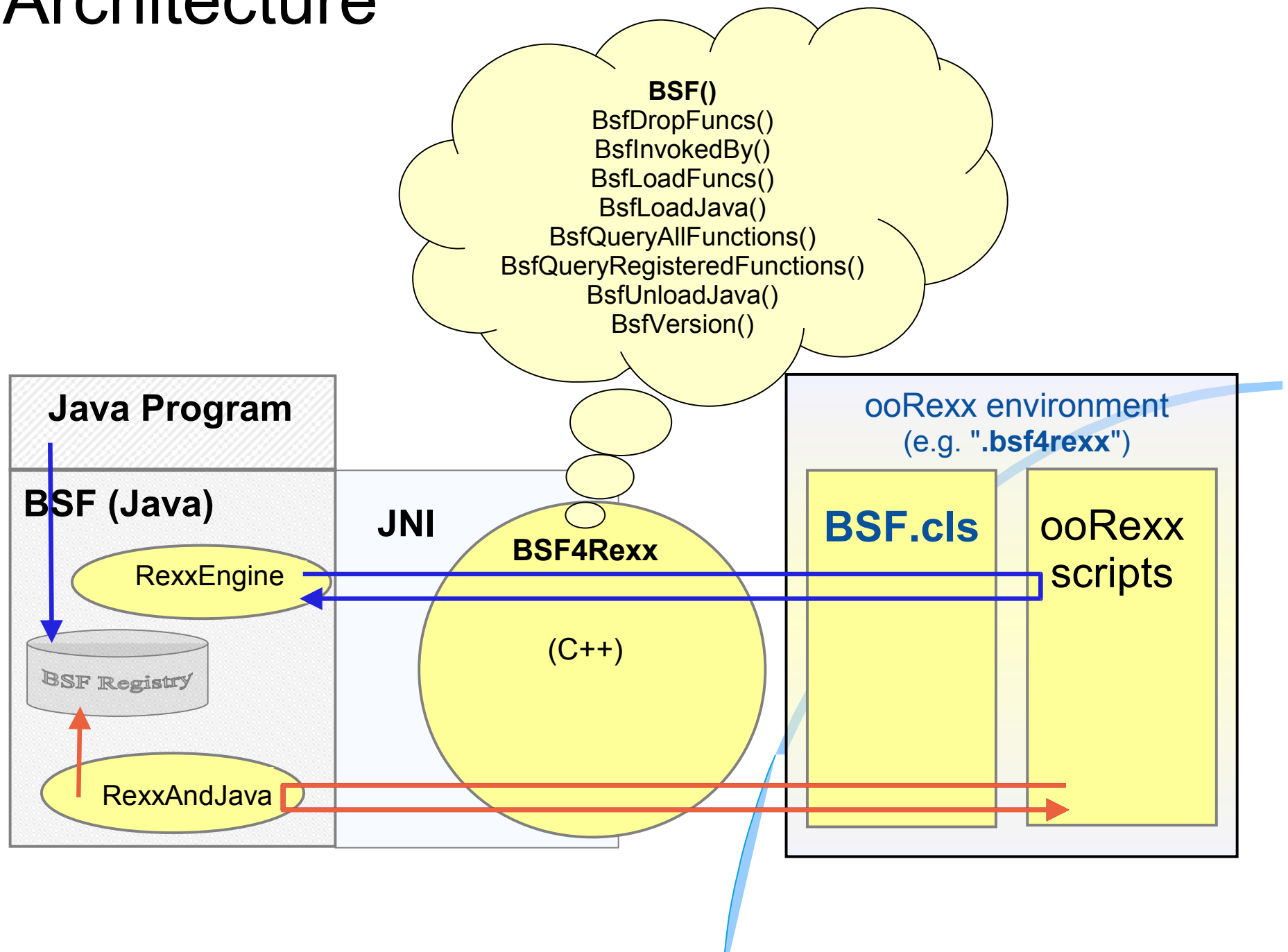
Possible Output:

```
java.version: 1.5.0_06
```

BSF.CLS
Entering ooRexx

- **BSF.CLS**
  - An ooRexx module containing
    - Supporting BSF via the proxy class **BSF**
    - Supporting BSF routines, e.g. `bsf.import(...)`
    - Services like making the most important and pre-registered Java classes directly available via the environment symbol **.bsf4rexx**
  - Will load Java transparently, if not yet loaded
    - Rexx programs

BSF4Rexx with **BSF.CLS** Architecture



BSF4Rexx with BSF.CLS
A Rexx Script Interfacing with Java, 1

```
/* "getJavaVersion.rex": classic Rexx version, querying the installed Java version */

call bsf.cls        /* load the Java support */
say "java.version:" bsf('invoke', 'System.class', 'getProperty', 'java.version')
```

```
/* "getJavaVersion.rex": classic Rexx version, querying the installed Java version */

say "java.version:" bsf('invoke', 'System.class', 'getProperty', 'java.version')
::requires bsf.cls  /* load the Java support */
```

Invoking the program either with:

```
   rexx getJavaVersion.rex
```

or:

```
   java org.rexxla.bsf.RexxDispatcher getJavaVersion.rex
```

or (shorthand of the above):

```
   {rexxj.cmd|rexxj.sh} getJavaVersion.rex
```

Possible Output:

```
java.version: 1.6.0_11
```

BSF4Rexx with BSF.CLS
A Rexx Script Interfacing with Java, 2

```
/* "getJavaVersion.rex": classic Rexx version, querying the installed Java version */

s=bsf.import('java.lang.System')     /* import the Java class 'java.lang.System'   */
say "java.version:" s~getProperty('java.version')

::requires bsf.cls  /* load the Java support */
```

```
/* "getJavaVersion.rex": classic Rexx version, querying the installed Java version */

say "java.version:" .bsf4rexx~system.class ~getProperty('java.version')

::requires bsf.cls  /* load the Java support */
```

Invoking the program either with:

```
   rexx getJavaVersion.rex
```

or:

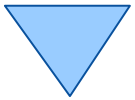
```
   java org.rexxla.bsf.RexxDispatcher getJavaVersion.rex
```

or (shorthand of the above):

```
   {rexxj.cmd|rexxj.sh} getJavaVersion.rex
```

Possible Output:

```
java.version: 1.6.0_11
```



Java's Strong Typing

- Every variable needs to be typed
  - Java compiler must have access to type
  - Java compiler checks whether all variables are used according to their type
  - Java compiler checks whether all arguments are of the correct type
- Hence interfacing with Java means to supply the correct types!

BSF4Rexx Type Indicators, 1

- "Type indicators" preceed the argument in BSF()-subfunctions
- "Type indicators" are one of the following strings
  - **BO**olean, **BY**te, **C**har, **D**ouble, **F**loat, **I**nt, **L**ong, **O**bject, **SH**ort, **S**tring
    - Only bold and uppercase letters need to be given
    - Java type information is given in the HTML documentation
    - "BOolean", "Byte", "Char", "Double", "Float", "Int", "Long", "SHort", "String" are the Java "primitive" data types
    - "Object" is *any* Java object

BSF4Rexx Type Indicators, 2 Vienna Features

- Starting with the Vienna version of BSF4Rexx no need to indicate Java types anymore
  - Makes it simpler to use Java
    - BSF4Rexx will figure out the correct types and supply Java with them!
  - Still, strongly typed subfunctions are made available and start with the word "Strict"
    - May be needed in very rare circumstances

BSF4Rexx Type Indicators, 3
BSF.CLS – Vienna Features

- Sometimes one needs to supply primitive datatypes embedded in Java classes
- Public routines box(), unbox()

```
javaObject=box(TypeIndicator, primitiveValue)
primitiveValue=unbox(javaObject)
```

```
javaObject=box('Long', '123456789012')  /* wrap a long value in a Java object  */
say javaObject                          /* name of object in BSF registry      */
say javaObject~toString                 /* string representation by Java class */
primitiveValue=unbox(javaObject)        /* Rexx string                         */
say primitiveValue

::requires bsf.cls                      /* load the Java support               */
```

Possible Output:

```
java.lang.Long@be991a08
123456789012
123456789012
```

BSF4Rexx
BSF.CLS – Vienna Features

- Camouflaging Java fields as if they were ooRexx attributes
  - Querying the value of a Java field by merely sending the Java field's name
  - Setting the value of a Java field by merely sending the Java field's name followed by the assignment operator and new value

BSF4Rexx: Accessing Static Fields BSF.CLS – Vienna Features

- Sometimes one needs to access static values of Java (interface) classes
- Public routine bsf.wrapStaticFields()

```
dir=bsf.wrapStaticFields(nameOfJavaInterfaceClass)
```

```
javaClassName="org.oorexx.datergf.DTC"   /* interface class defining constants */
dtc=bsf.wrapStaticFields(javaClassName)  /* wrap up interface class           */
say "version:" dtc~version "january:" dtc~january

::requires bsf.cls                      /* load the Java support             */
```

Possible Output:

```
version: 92.20060101 january: 1
```

BSF4Rexx – Getting at Event Objects, 1
BSF.CLS – Vienna Features

- Allows retrieving the Java event object givign further information of the event
  - The event object's bean name (index into the BSF registry) will be encoded in the leading comment inserted by BSF4Rexx
- New subfunction, method of BSF.CLS

  bsf.addEventListenerReturningEventInfos()
- New routine in BSF.CLS

  bsf.getEventInfoObject(eventText)
  - Returns a proxy (array) object that will remove the event Java object from the BSF registry upon deletion

BSF4Rexx – Getting at Event Objects, 2
BSF.CLS – Vienna Features

- Information in the received array object arr
  - [1] ... an array of the arguments that the event generated, usually the respective event object is at the first index, ie. arr[1][1]
  - [2] ... .nil or data as supplied by ooRexx when event adapter was set up
  - [3] ... string denominating the event name that has occurred
  - [4] ... .nil or string of event names to react upon
  - [5] ... a reference to the BSFManager instance

BSF4Rexx - BSF.Dialog
BSF.CLS – Vienna Features

- Public class bsf.dialog
- Multiplatform, uses Java's swing GUI
- Dialog (class or instance) methods

```
res=.bsf.dialog~messageBox(message, [title], [type])

buttonNumber=.bsf.dialog~dialogBox(message, [title], [type], [optionType], [icon],
                                   [txtButtons], [defaultTxtButton])

text=.bsf.dialog~inputBox(message, [title], [type], [icon],
                          [txtOptions], [defaultTxtOption])
```

where "type": error, information, plain, question, warning

Where "optionType": default, OkCancel, YesNo, YesNoCancel

If using the class object (.BSF.DIALOG), then the dialog is centered relative to physical screen, if created for a Java window object the dialog is modal for it and centered relative to it.

BSF4Rexx: BSF.Dialog Examples, 1

```
say "Using class object .BSF.DIALOG, hence centered relative to screen..."
.bsf.dialog~messageBox("Think about it!")

say "dialogBox: returns -1 for escape, 0 for first button, 1 for second button..."
pause
buttonText=.array~of("Save it 0", "Delete 1", "Copy 2", "whoops, that's it!!")
say .bsf.dialog~dialogBox("Please choose one", "Choices", "warning", , , buttonText, "Delete 1")

say "inputBox: returns .nil for escape, text value entered or chosen..."
pause
buttonText=.array~of("Save it 0", "Delete 1", "Copy 2", "whoops, that's it!!")
say .bsf.dialog~inputBox("Please choose one", "Choices", "information", , buttonText, "Delete 1")

say .bsf.dialog~inputBox("Please enter your name:", "Querying stuff", "question")

::requires bsf.cls                      /* load the Java support                */
```

Possible Output:

```
Using class object .BSF.DIALOG, hence centered relative to screen...
dialogBox: returns -1 for escape, 0 for first button, 1 for second button...
Drücken Sie eine beliebige Taste . . .
1
inputBox: returns .nil for escape, text value entered or chosen...
Drücken Sie eine beliebige Taste . . .
Delete 1
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```

BSF4Rexx: BSF.Dialog Examples, 2 (Relative to a Frame)

```
f=.bsf~new("java.awt.Frame", "Hello!") /* create a Java frame object                    */
f~~pack ~~show
fdlg=.bsf.dialog~new(f)                /* create a bsf.dialog instance for this Java frame   */

say "Using an instance of .BSF.DIALOG, hence centered relative to a frame object..."
fdlg~messageBox("Think about it!")

say "dialogBox: returns -1 for escape, 0 for first button, 1 for second button..."
pause
buttonText=.array~of("Save it 0", "Delete 1", "Copy 2", "whoops, that's it!!")
say fdlg~dialogBox("Please choose one", "Choices", "warning", , , buttonText, "Delete 1")

say "inputBox: returns .nil for escape, text value entered or chosen..."
pause
buttonText=.array~of("Save it 0", "Delete 1", "Copy 2", "whoops, that's it!!")
say fdlg~inputBox("Please choose one", "Choices", "warning", , buttonText, "Delete 1")

::requires bsf.cls                     /* load the Java support                          */
```

Possible Output:

```
Using an instance of .BSF.DIALOG, hence centered relative to a frame object...
dialogBox: returns -1 for escape, 0 for first button, 1 for second button...
Drücken Sie eine beliebige Taste . . .
3
inputBox: returns .nil for escape, text value entered or chosen...
Drücken Sie eine beliebige Taste . . .
whoops, that's it!!
```

BSF4Rexx – Installation Scripts Running on Linux, Windows

- setupBSF.rex [path2java.exe [dir4scripts]]
  - installBSF4Rexx.{cmd|sh}
  - uninstallBSF4Rexx.{cmd|sh}
- setupOOo.rex path2OOoSOHomeDir
  - installOOo.{cmd|sh}
  - uninstallOOo.{cmd|sh}
- setupJava.rex
  - Linux only

BSF4Rexx – Vienna Version Goodies, 1

- Date and time arithmetics/manipulations
- Java version of the datergf package, named
  - org.oorexx.datergf
    - DTC ... defines datergf constants
    - DateRGF
      - e.g. subtractions, additions, determining Easter, Labor Day...
    - TimeRGF
    - DateTimeRGF
    - DateFormatRGF
      - Allows formatting of date and time values with easy to apply formatting patterns

BSF4Rexx – Vienna Version Goodies, 2

- org.oorexx.misc
  - Class RgfFilter
    - Implements the Java interface "java.io.FilenameFilter"
    - Needed e.g. for file dialogs that need to filter the files to be displayed
- org.rexxla.bsf
  - Class RexxDispatcher
    - Allows starting BSF4Rexx Rexx programs from the command line via Java, supplying the command line arguments to the Rexx program

BSF4Rexx – Vienna Version Goodies, 3

- org.oorexx.uno
  - RgfReflectUNO
    - A Java class allowing for full reflection/introspection of UNO objects and/or UNO IDL definitions
    - Results are delivered as strings
- Quite a few new nutshell examples
  - Lee's examples of the 2006 Symposium demonstrating platform independent GUI and printing for ooRexx
  - OpenOffice.org/StarOffice automation examples

Roundup and Outlook

- Vienna Version of BSF4Rexx
  - Introduces typeless interaction with Java
  - Adds utility routines for easying interfacing with Java considerably, e.g.
    - box(), unbox(), bsf.wrapStaticFields()
  - Public routines iif(), pp()
  - Public class BSF.Dialog to allow for using cross-platform messageBox(), dialogBox(), inputBox() functionality

Open Issues
Input for BSF4Rexx 4.0

- Real-time handling of events
  - E.g. no canceling possible
- Creating Java proxy objects for Java interfaces
  - E.g. Java Filter interface class
    - At the moment one needs to create a Java class which implements the Java interface and control that from ooRexx
- Creating ooRexx proxy objects to which Java methods can be forward to
  - implementing Java methods in ooRexx