Regina Rexx
and other cool features

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(Thanks to imc for background image)
Overview

- ANSI features
- OPTIONS
- Other interpreter features
- API additions
- Other platforms
ANSI features

- ADDRESS environments
- LOSTDIGITS
- .RS, .RC, .RESULT variables
- LINES(,'C'), CHARS(,'C')
ADDRESS env command [IO redir]

eenv is one of

- SYSTEM or OS2ENVIRONMENT or ENVIRONMENT
- PATH or CMD or COMMAND
- REGINA or REXX
ADDRESS REXX  `scriptname` [args] [IOredir]

- SYSTEM INDEPENDENT
- INTERPRETER INDEPENDENT

nearly equivalent to

ADDRESS PATH "rexx" `scriptname`…

but the same execution program is used if the path can be determined.
ADDRESS ...WITH

IOredir = WITH [INPUT in] [OUTPUT out] [ERROR out]

in = NORMAL | IO
out = NORMAL | [APPEND | REPLACE] IO
IO = STEM symbol
    | STREAM symbol
    | STREAM string /* ANSI extension */
    | LIFO string_or_symbol /* ANSI extension */
    | FIFO string_or_symbol /* ANSI extension */

""-strings are equivalent to standard IO or current queue.

External queues are supported.
ADDRESS speed comparisons

118 files, 137836 lines, 4195774 chars (machine: 2*350MHz PentiumII)
------------- executed all files at once ---------------------
cat >/dev/null = 0.067
cat | cat >/dev/null = 0.102
cat | ADDRESS STREAM | cat >/dev/null = 0.289
cat | ADDRESS STREAM w/IO | cat >/dev/null = 6.847
cat | ADDRESS STEM | cat >/dev/null = 57.684
cat | ADDRESS FIFO | cat >/dev/null = 1.651
---------- executed individually, summarised -------------
cat >/dev/null (using ADDRESS SYSTEM) = 4.766
cat >/dev/null (using ADDRESS PATH WITH) = 1.873
cat >/dev/null (using ADDRESS SYSTEM WITH) = 4.515
catb>/dev/null (using ADDRESS SYSTEM) = 4.530
catb>/dev/null (using ADDRESS PATH WITH) = 1.866
catb>/dev/null (using ADDRESS SYSTEM WITH) = 4.482
cat | cat >/dev/null = 5.171
cat | ADDRESS STREAM | cat >/dev/null = 9.386
cat | ADDRESS STREAM w/IO | cat >/dev/null = 16.128
cat | ADDRESS STEM | cat >/dev/null = 18.993
cat | ADDRESS FIFO | cat >/dev/null = 16.018
ADDRESS quotation

- ADDRESS PATH and ADDRESS REXX emulate ADDRESS SYSTEM's quotation rules
- double quotes and single quotes group words (default is whitespace)
- system depending escape character is used
  - "^" for OS/2 & Win32
  - "\" otherwise
ADDRESS signals

- conditions except syntax errors are raised only if enabled by SIGNAL
- FAILURE is raised if the desired program could not be loaded
- ERROR is raised if the called program terminates without success
- NOTREADY *is not* raised for streams
- NOVALUE *is* raised for stems
- SYNTAX is raised always for wrong values
External call signals

- conditions are raised only if enabled by SIGNAL
- FAILURE is raised if the desired script could not be loaded
- ERROR is raised if the called script terminates without success
LOSTDIGITS condition

- LOSTDIGITS are not raised by default
- LOSTDIGITS are raised when a math op needs to truncate digits in the input where math op is
  - +
  - -
  - /
  - *
  - **
  - //
  - %
  - loop iterations
• Regina supports a separate pool for .vars
• access by name always uses "pool 0"
• Current variables are
  – .RC copy of RC
  – .RESULT copy of RESULT
  – .SIGL copy of SIGL
  – .RS -1=FAILURE, 1=ERROR, 0=success when using ADDRESS or ext. functions
  – .MN x or x.x for syntax error numbers
Variable pools

- hierarchically structured
- one pool structure per thread
- pool 0 contains dot-variables
- BIF POOLID() returns current pool id
- BIF VALUE() accepts a valid pool id as third parameter
LINES('C') and CHARS('C')

- LINES() and CHARS() take optionally 2 arguments
  - Stream name (as usual)
  - OPTION
    - 'N' default – return 0, 1 or actual number
    - 'C' count – returns actual number of lines/chars remaining in stream
OPTIONS

• STRICT_ANSI
• QUEUES_301
• TRACE_HTML
• STDOUT_FOR_STDERR
• CALLS_AS_FUNCS
• Environment variable REGINA_OPTIONS
Other interpreter features

- Error messages and Locale
- External queues
- PARSE LOWER and CASELESS
- TIME('T') and DATE('T')
- ARexx functions
- Regina invocation
Error Messages

- Support ANSI feature of ERRORTEXT BIF
  - ERRORTEXT( num, 'S' )
    - Where num can be x.y
- Implemented with binary message files
- REGINA_LANG specifies language and optionally locale
- REGINA_LANG_DIR specifies location
- Regina Translation Project:
  http://www.bn.pl/~bk/serv/rrtp/index.rsp
Locale support

- Locale support for whitespace and character translations like TRANSLATE(), UPPER() and LOWER()
- Consistency with locale irrespective of external influences
- Planning implementation for future enhancements (DATE, TIME, FORMAT BIFs)
- Implications of enhancements
External Queues

- Used to communicate between processes on any machine
- Queue name: name[@machine[:port]]
- Internal queues have no '@'
- Insecure – no access control
- Supported in RXQUEUE(), ADDRESS...WITH, RXQUEUE executable
- PARSE LOWER similar semantics to PARSE UPPER
- PARSE CASELESS allows strings in parse template to be matched irrespective of case
- CASELESS can be used with UPPER or LOWER
TIME(T) and DATE(T)

- 'T' option is for Unix time_t
- The number of seconds since 1 Jan 1970
- Advantage of date and time together
- NUMERIC DIGITS 10 minimum
ARexx Functions

- Introduced in 3.1
- Implemented by Staf Verhaegen
- Most BIFs implemented
- Requires OPTIONS AREXX_BIFS on platforms other than AmigaDOS or AROS
Regina invocation

- Run as Subroutine (-a)
- Tokenising (-c, -e)
- Safe Rexx (-r)
  - Can also be set in RexxStart() API with RXRESTRICTED in CallType arg
- Pause at end (-p)
- Known suffixes
  - rexx
  - rex
  - cmd
  - rx
- Environment variable REGINA_SUFFIXES has form
  - suffix_w/o_dot[,suffix_w/o_dot]...
  - e.g. REGINA_SUFFIXES=ipret,regina
**REGINA_SUFFIXES Algorithm**

- if path given, look there
- if REGINA_MACROS given, look there
- if not "root" look in "."
- if PATH given, look there

- first found file wins always
- PATH-paths search without extensions
- known suffix forces other suffixes to ignore
- try REGINA_SUFFIXES
- try known suffixes

planned suffix "rxc" for precompiled scripts
Threading Model

- each thread has its own set of
  - variables
  - hooks
  - files
  - state
- ORexx (and Classic Rexx) and Regina have a different approach
- Environment variables are shared
API Additions

- ReginaCleanup(): Cleans up an interpreter instance
- RexxAllocateMemory(): Allocate memory passed to interpreter
- RexxFreeMemory(): Free memory allocated by interpreter
- RexxCallBack(): Call back into the running Rexx program
ReginaCleanup()

- Allows the API to reset the complete Rexx interpreter on a per-thread basis
- Variable pools are reset
- External libraries will be unlinked
**RexxAllocateMemory()**

- Move interpreter or platform-specific code into interpreter

**RexxAllocateMemory()** replaces code like:

```c
#if defined(WIN32)
ret = ( char * )GlobalLock( GlobalAlloc (GMEM_FIXED, len));
#elif defined(OS2)
if ((BOOL)DosAllocMem((void **)&ret, len, fPERM|PAG_COMMIT ) )
    ret = (char *)NULL;
#else
ret = (char *)malloc(len);
#endif

with:
ret = (char *)RexxAllocateMemory(len);
```
RexxFreeMemory() replaces code like:

```c
#if defined(WIN32)
    GlobalFree( shv.shvvalue.strptr );
#elif defined(OS2)
    DosFreeMem( shv.shvvalue.strptr );
#else
    free( shv.shvvalue.strptr );
#endif
```

with:

```c
RexxFreeMemory( shv.shvvalue.strptr );
```
RexxCallBack()

- Allows the API to execute a Rexx procedure inside the running program
- Necessary for event-driven libraries like GUI interfaces
- Parameter passing with no interpretation
- Procedure executed within context of event handler
RxFuncErrMsg()

- Returns the actual error that caused RxFuncAdd() to fail
- More meaningful than a non-zero return code from RxFuncAdd()
Other platforms

- Regina is the standard interpreter for:
  - AROS
    - http://www.aros.org
  - OSFree
    - http://www.osfree.org
Resources

- Regina home page:  
- API programming examples:  
  - Available from SourceForge downloads page in regina-documentation subproject
Questions