The Future of REXX

Tim S. Browne
IBM Endicott
The Future of REXX

"Classic" REXX

Object Oriented REXX

"Cyberspace" Internet

Networked computing

Agents

Evolution of REXX

T. S. Browne

5/1/95

IBM Endicott
**REXX Mission**

- Continue to support users of "Classic" REXX products
- Continue to evolve "Classic" REXX into Object REXX
- Make Object REXX pervasive across platforms and applications
- Align Object REXX with key technologies and standards
- Facilitate the creation of software agents and the environment they operate in
- Get others to exploit, build, and use our software agent technology
Open Scripting Products

1994 Accomplishments

- OREXX
  - 4/94 OS/2 Beta
  - 10/94 AIX Alpha
  - 11/94 AIX Beta
  - 11/94 OS/2 Developer's Connection
  - 11/94 Windows Alpha

- Classic REXX
  - 3/94 Netware GA
  - 7/94 CICS GA
  - 7/94 DOS GA
  - 12/94 OS/400 GA
# REXX Requirements Summary

<table>
<thead>
<tr>
<th>Requirements#</th>
<th>Description</th>
<th>Current Status</th>
<th>New Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROUIZ9107,</td>
<td>REXX for AIX</td>
<td>AIX/6000: Rejected</td>
<td>AIX/6000: Available as PRPQ#</td>
</tr>
<tr>
<td>SALANG90203</td>
<td></td>
<td>AIX PS/2 Future Objective</td>
<td></td>
</tr>
<tr>
<td>SALANG90206</td>
<td>Remove 500 char. limit on statement length</td>
<td>Available on OS/2 only. Future objective on other systems</td>
<td>Available on all IBM REXX implementations</td>
</tr>
<tr>
<td>SOMVSE93027</td>
<td>IBM should provide a richer suite of debugging tools for REXX</td>
<td>Under study</td>
<td>Future Objective</td>
</tr>
<tr>
<td>SAREXX90210</td>
<td>Pull instruction should not type a &quot;?&quot;</td>
<td>Accepted</td>
<td>Available - OS/2 2.0 GA 3/92</td>
</tr>
<tr>
<td>SAREXX90211</td>
<td>Document PARSE rules explicitly and formally</td>
<td>Accepted</td>
<td>Available</td>
</tr>
<tr>
<td>SOCMSX89023</td>
<td>REXX file I/OON Implement CMS REXX</td>
<td>Accepted</td>
<td>Available</td>
</tr>
<tr>
<td>SALANG89205</td>
<td>Extend DATE function</td>
<td>Long Range Consideration</td>
<td>Accepted</td>
</tr>
<tr>
<td>SALANG89201</td>
<td>Implement REXX File I/O functions that will read/write files both sequentially and randomly</td>
<td>OS/2 Available</td>
<td>VM Available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TSO Long Range Consideration</td>
<td>TSO Accepted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AS/400 Future Objective</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VM Accepted</td>
<td></td>
</tr>
<tr>
<td>SALANG89204,</td>
<td>Allow expressions in Compound variables</td>
<td>Long Range Consideration</td>
<td>Accepted</td>
</tr>
<tr>
<td>SOCMSX89056</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SALAN90204</td>
<td>Share variables between external REXX Functions</td>
<td>Long Range Consideration</td>
<td>Accepted</td>
</tr>
<tr>
<td>SAREXX92002</td>
<td>Object Oriented Extensions</td>
<td>Long Range Consideration</td>
<td>Accepted</td>
</tr>
<tr>
<td>SAREXX91001</td>
<td>Call through expressions</td>
<td>Long Range Consideration</td>
<td>Accepted</td>
</tr>
<tr>
<td>SOCMSX89026</td>
<td>Traverse Stem variables</td>
<td>Long Range Consideration</td>
<td>Accepted</td>
</tr>
<tr>
<td>SAREXX91201</td>
<td>Improve Error Messages</td>
<td>Long Range Consideration</td>
<td>Accepted</td>
</tr>
<tr>
<td>SOCMSX890008</td>
<td>Pausing Stem to Subroutines</td>
<td>Long Range Consideration</td>
<td>Accepted</td>
</tr>
<tr>
<td>SAA REXX</td>
<td>Generic Bindings</td>
<td>Long Range Consideration</td>
<td>Accepted</td>
</tr>
<tr>
<td>GO5CME91003</td>
<td>Date processing in REXX</td>
<td>Long Range Consideration</td>
<td>Accepted</td>
</tr>
</tbody>
</table>
## Pervasiveness

### Platforms

<table>
<thead>
<tr>
<th></th>
<th>Classic</th>
<th>Complier/RTL</th>
<th>OO</th>
<th>OEM Platforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS/2</td>
<td>X</td>
<td></td>
<td>1995</td>
<td></td>
</tr>
<tr>
<td>PPC</td>
<td></td>
<td></td>
<td>1995</td>
<td></td>
</tr>
<tr>
<td>MVS</td>
<td>X</td>
<td>X</td>
<td>1995</td>
<td></td>
</tr>
<tr>
<td>AIX</td>
<td>X</td>
<td></td>
<td>1995</td>
<td></td>
</tr>
<tr>
<td>VM</td>
<td>X</td>
<td>X</td>
<td>1996</td>
<td></td>
</tr>
<tr>
<td>Windows</td>
<td></td>
<td></td>
<td>1996</td>
<td></td>
</tr>
<tr>
<td>LINUX</td>
<td></td>
<td></td>
<td>1995</td>
<td></td>
</tr>
<tr>
<td>NetWare</td>
<td>X</td>
<td></td>
<td>1995</td>
<td></td>
</tr>
<tr>
<td>DOS</td>
<td>X</td>
<td></td>
<td>1995</td>
<td></td>
</tr>
<tr>
<td>CICS</td>
<td>X</td>
<td></td>
<td>1995</td>
<td></td>
</tr>
<tr>
<td>AS/400</td>
<td>X</td>
<td></td>
<td>1995</td>
<td></td>
</tr>
<tr>
<td>VSE</td>
<td>X</td>
<td>X (RTL only)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Future Considerations

PDAs
Object REXX Exploits OO Technologies

- Object Oriented Programming
  - Encapsulation, Inheritance, Polymorphism
    - Object REXX supports IBM's SOM
  - Object Oriented Documents
    - Embedded, Composite documents
    - Documents as a new programming model
      - Object REXX is the OPENDOC scripting language
  - Object Oriented Visual Programming
    - Programming via direct manipulation of icons
      - Object REXX support of VisualAge
Object REXX Programming Environment

Visual Tools/Builder

- ODP
- GUI
- PARTS
- COMM
- PARTS

Generates

SOM CLASS LIBS

APIs

- SOM
- OPENDOC
- NMI

OBJECT REXX

Functional Requirements - Importance
Ratings - Planned Availability

- OpenDoc: 1.0
- Debugger: 1.4
- Class Browser: 1.5
- Visual Programming: 1.7
- Visual Builder: 1.8
- Export Classes to SOM: 2.0
- OLE Support for Windows Version: 2.8

OBJECT REXX SCRIPT

- VOBJ = .IWINDOWS ~ NEW (...)
- VOBJ ~ .SHOW ()
- VOBJ ~ SIZE (...)
- VOBJ ~ SETBACKGROUND COLOR (...)
Shift Towards Network Centric Computing

**Standalone**

- File Server

**Local and wide area private networks**

- Location A
- File Server
- Location B

**Network-centric Computing**

- Customer and supplier
- Public wide area network
- Internal Databases
- External Databases

Environment Shift complexity, heterogeneity, mobility
Making "The Customer" Centric in Network Centric Computing

- Agent Services...
  - Personalized Information Retrieval
    - News Services
    - Mail Filtering
    - Internet Surfing
      - Travel Information
      - Medical Information
    - etc.
  - Personalized Event Notification
    - Network Management
    - Reservation Alerts
    - Personal Scheduler
  - Personal Transaction Services
    - Banking
    - Business Services
      - Food Services
      - Retail Stores
    - etc.
- Agent "Meeting Places"...
  - Store Fronts
  - Information Databases
  - Trading Floors
A Model for Agents and Agent "Meeting Places"
Demonstration

Internet
TCP/IP
WWW Explorer

Auction is **Good Test** of Agent Technology
- Agent working on Users behalf
- Agents have guidelines ($100 maximum bid)
- Agent interaction at meeting place (bidding process)
- Value of a moderator (auctioneer)

**Demonstrates**
- Agent Technology
  - Mobile Agents
- Meeting Place
  - Cooperative Processing
REXX Business

Agent Technology/Services
- PreFabricated Agent
- Integration Service

Agent Tool Kit

Agent Technology Tool Kit

Cost Center

Revenue Source

Compiler

OREXX Development Team

Agent Tool Kit

OREXX Source Code

Ported by IBM

Ported by Interested Parties

OREXX Interpreter

MVS
VM
OS/2 (Intel)
OS/2 (PPC)
AIX
PDA
SET TOP BOX
Windows
HP
SUN
SCO-UNIX

Ported by IBM

Ported by Interested Parties
Summary

- REXX has a bright future:
  - Substantial progress made against existing requirements
  - REXX language is being extended to other platforms
  - REXX is evolving its application development role for network centric computing
Problems "the Shift" Creates

- Access to needed information is:
  - Difficult due to complexity of the environment
    - numerous network services with a multitude of online services
    - mobility in work force increasing
  - Not always timely and/or relevant
    - information overload
    - insufficient technology
  - Labor and effort intensive
    - manual
Our Approach to the Problem

- Provide "Agent Technology" where agents act on behalf of end users
- Turn data sources into "Meeting Places" where agents go to perform assigned tasks
- Turn end-users into information consumers rather than information seekers