

# 25 years of Rexx

## — a personal view

Böblingen

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# Overview

Questions, questions ...

All the ...



President's

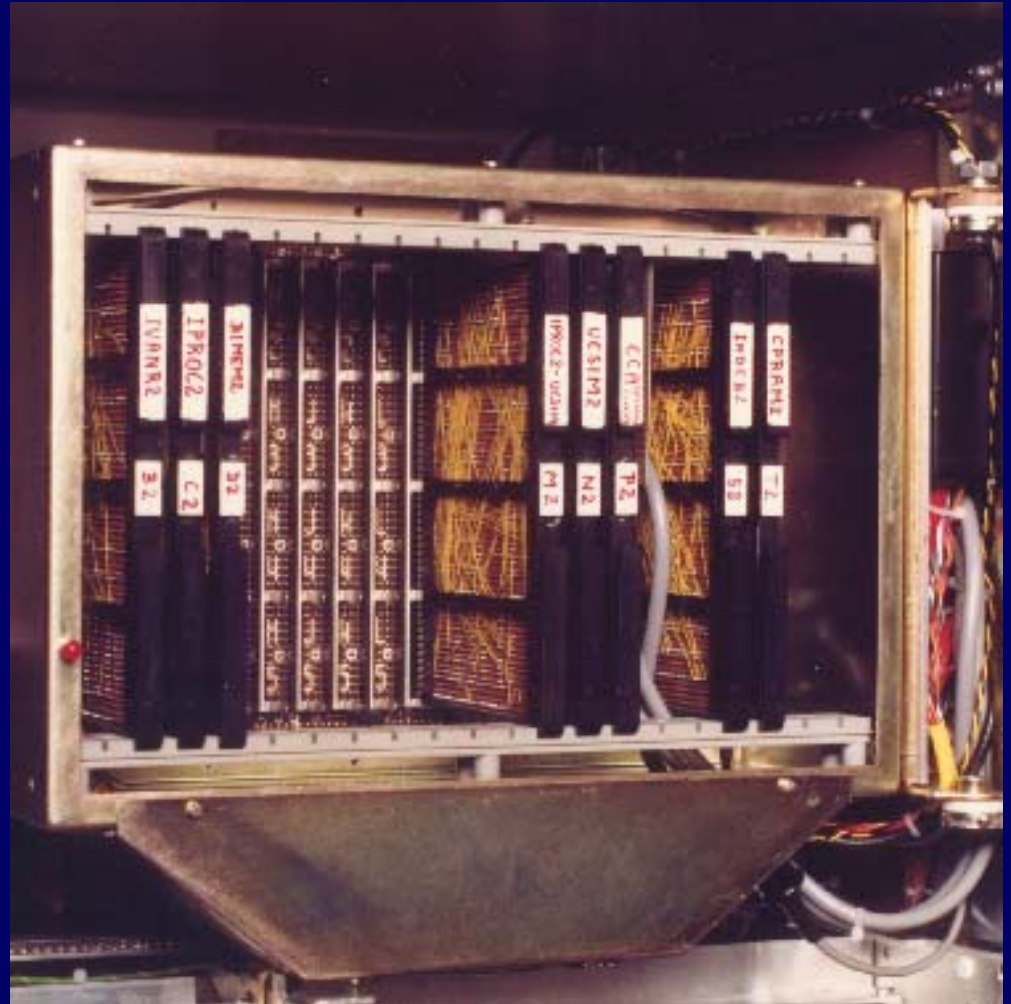
questions ...

# Who was I? My IBM job?

- Pre-University student with IBM (1970)
  - PL/I compiler, *etc.*
- BSc Electronic Engineering
  - Birmingham
- Day job: Test Tools Team
  - designing and building hardware for testing terminals such as the 3279 ...

# Microlink

- Used existing coax terminal link (ANR) to attach bipolar microcomputers (based on the Signetics 8X300) to mainframe



# Own-time projects?

- Mostly PL/I and S/360 Assembler
  - Archaeological mapping (1974)
  - Cave surveying programs (1976)
- STET, a STructured Editing Tool (1977)
  - and lots of other VM/CMS tools
- Rex (1979)
  - a biggie: 4,000 hours to 1982

How old was I?

well, 25 years is 25 years ...

# Why Rex?

- CMS had EXEC ... a bit like DOS BAT

```
&CONTROL OFF
&IF &INDEX EQ 0 &GOTO -GO
EXEC DCOPT DROP
&IF &RETCODE GE 12 &EXIT
-GO
&STACK RT ...
```

- EXEC 2: clean design, but just as ugly
  - language committee (Stephenson *et al.*)
  - hooks for vanilla CMS by Michel Hack



# What were the first Rex programs?

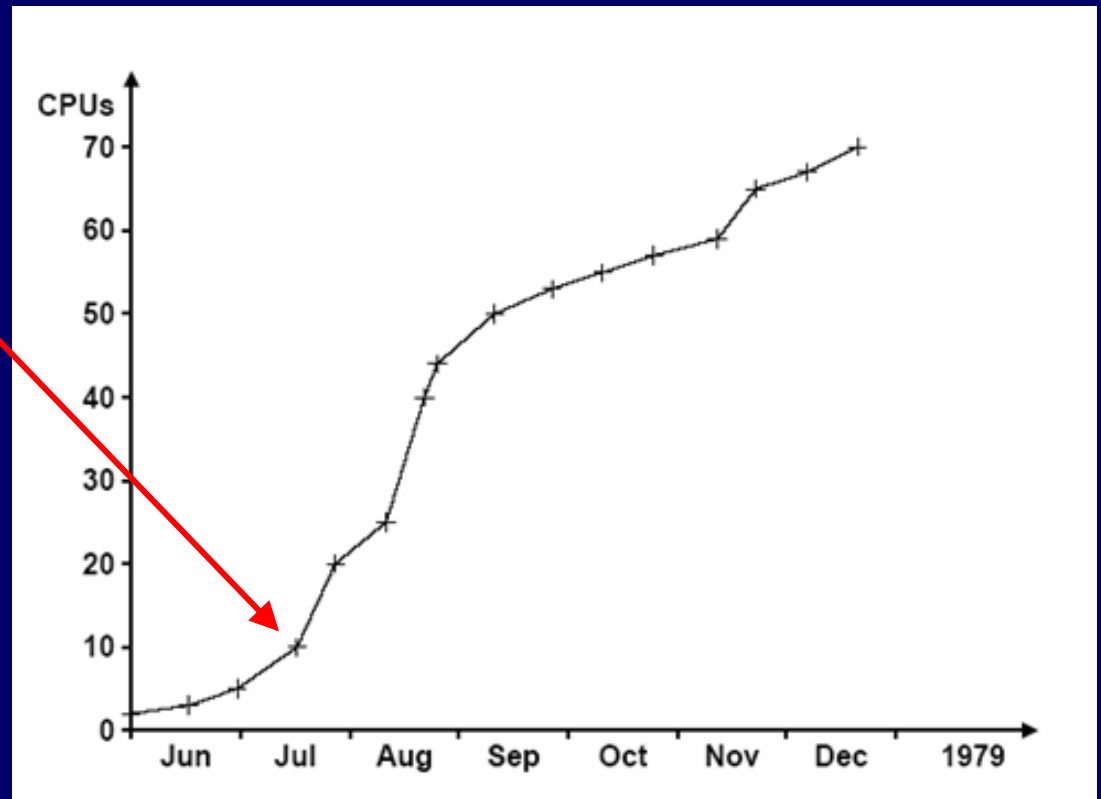
- ADDR EXEC ... searches nickname file for nickname, displays name and address
- SEND EXEC ... send file to a local user
- CONC XEDIT ... concatenate and flow
- ... and lots of testcases

# Who used it?

- First distributable code was in May 1979; until then, only the one user
- The first real users (pioneers, guinea pigs, trend-setters, ...) were
  - Ray Mansell (Hursley, UK)
  - Les Koehler (Raleigh, NC)lots of useful feedback

# How did it catch on?

- Internal IBM network, VNET, rapidly growing
- VM Newsletter (Peter Capek)
- Word of mouth, Xmas card ...
- Add-ons (Steve Davies' functions and others)



# Was there a Rex motto?

- Sort of. Pinned to the wall over my desk in Hursley was ...

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*Keep the language small*

# How did it become 'official'?

- SHARE talk in 1981 ... Ted Johnston (SLAC) asked IBM CEO (Cary) for Rex
- New versions of CMS included usability tools, based on XEDIT, with many macros and Execs developed in Rex
- Claude Hans in Endicott decided to add Rexx even before EXEC 2 shipped

# Why SIGNAL?

- Early addition to Rex (1979)
- Intended as an exception mechanism (quit from deeply nested programs)
  - but there was no way to propagate it up through CMS calling mechanism (SVC 202)
  - NetRexx uses Java exception mechanism, which works just as originally intended:

```
signal NumberFormatException
```

# Why decimal arithmetic?

- One type = characters = decimal
- Current is third iteration, May—July 1981
  - lots of input from language committee
  - ... and from user in 43 countries
  - ... and from a '*no more changes*' lobby
- NUMERIC DIGITS solved the 'what precision?' arguments



# Why are ‘!’ and ‘?’ in symbols?

- I always intended to complete the arithmetic by adding Infinity and NaN
  - ! was to be used for Infinity
  - ? was to be used for NaN
- Code freeze for product meant these and other changes (*e.g.*, stream I/O) omitted
  - so EXECIO had to be used for files

# The idea behind parse templates?

- Designed from the ground up, inspired by VM/CMS commands and macros
  - ‘SET FONT Times Roman’  
**Template:** word1 word2 remainder
  - ‘COPY A A A = = B (REPLACE’  
**Template:** stuff ‘( options ’)’

# Why 'REXX'?

- Trademark search in 1982 found an unrelated product called **Rex-80**
- Lawyers insisted that 'X' be added ...  
... and 'REXX' not be used in product name  
... and acronym was expanded
- Estimated cost of the change: \$1,000,000+

# Rexx is 5. 1984?

- Big Blue was watching me (though I didn't know it) 😊
- Rexx is now public, in VM/CMS
- MFC is working on image processing
- Charles Daney is working on Personal Rexx for the PC

# Rexx, Lexx — any connection?

- Oxford University Press (with IBM) was computerizing the OED (21,000 pages, 60 million words keyed, SGML markup)  
... but they had no good way of editing it
- Hence the Lexx editor for Lexicographers
  - programmable by Rexx macros

<entry>  
 <hwsec><hwgp><hwlem>bungler</hwlem> <pron>b<I>v</I>'ŋgləʊ</pron>.  
 </hwgp><vfl>Also <vd>b</vd> <vf>bongler</vf>, <vd>7</vd>  
 <vf>bunglar</vf>. </vfl><etym>f. as prec. +  
 <xra><xlem>-er</xlem><hom><sup>1</sup></hom></xra>.</etym>  
 <sen>One who bungles; a clumsy unskilful worker. </sen><quot><qdat>1533  
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 <txt>He is euen but a very bungler. </txt></quot><quot><qdat>1642  
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 <txt>If any Carpenter, Smith, or Weaver, were such a bungler in his  
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 </qdat><auth>Hawthorne </auth><wk>Fr. & It. Jrnls. </wk>I. 292 <txt>The  
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 <sen para=t>Hence <blem>bungler-like</blem> <pos>a.</pos> and  
 <pos>adv.</pos>  
 </sen><quot><qdat>1603 </qdat><auth>Florio </auth><wk>Montaigne  
 </wk>(1634) 491 <txt>That Painter..having bungler-like drawn..some Cockes.  
 </txt></quot><quot><qdat>1613 </qdat><auth>Cotgr.,  
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**bungler** (bʊˈŋɡləɹ). Also 6 **bongler**, 7 **bunglar**.  
[f. as prec. + -ER<sup>1</sup>.]

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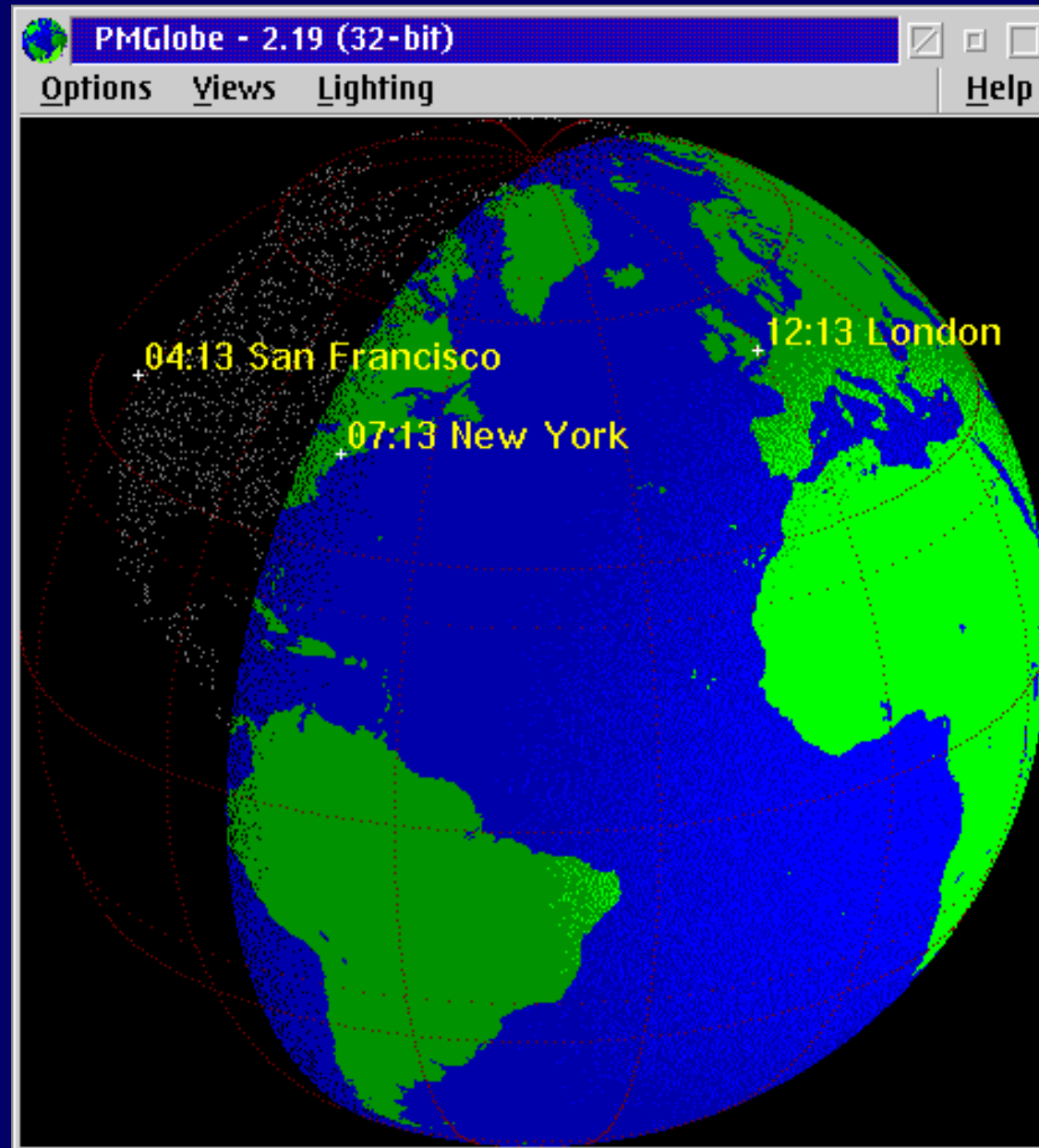
# The second five years?

- Lots of new Rexx implementations (MVS, AIX, AS/400, OS/2, *etc.*, and compilers)
- Rexx added to IBM System Applications Architecture
  - with its own Architecture Review Board, *etc.*
- Object REXX started (1988, shipped in 1996)

# The third five years?

- 20+ Rexx books published 1990–1994 (including *The Rexx Language*, 2<sup>nd</sup> Ed.)
- Works starts on ANSI Rexx (published 1996)
- SLAC has over 5,000,000 lines of Rexx
- MFC writes PMGlobe and a web server (GoServe) ... customized by Rexx

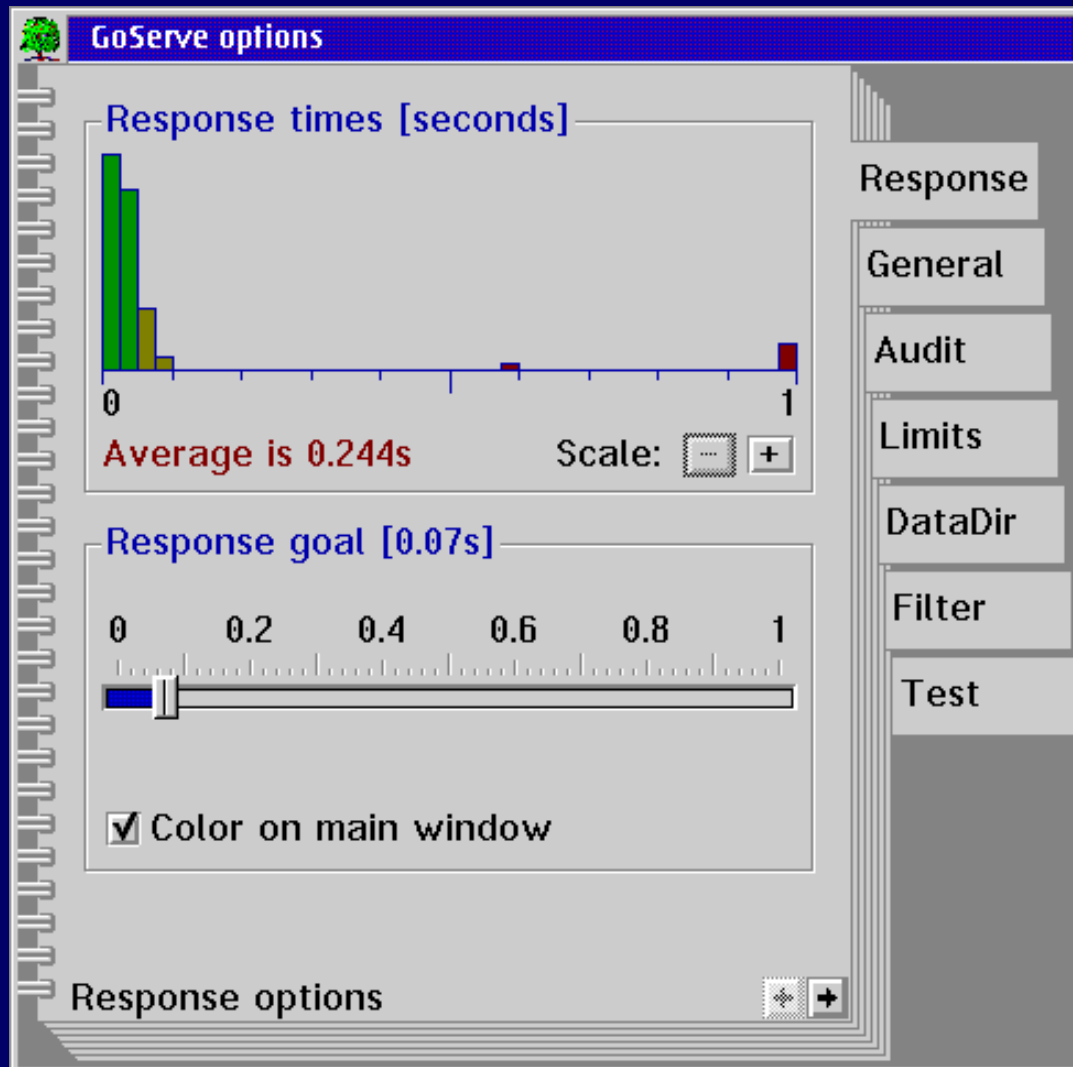
# PMGlobe then ...



# ... and now



# GoServe response time graph



# The fourth five years?

- 14 more Rexx books published
- ANSI Rexx published; Object REXX ships for OS/2, Windows, Linux, and AIX
- MFC ports Java to OS/2 (1995), then bootstraps NetRexx with Rexx (1996/7)

# Rexx improvements in NetRexx?

- Most popular: `--` notation for comments
- Keyword `loop` for `do` constructs that loop
- All constructs integrate exceptions (`catch`) and exit code (`finally`), and can be labeled
- Compare is caseless

## ... more ...

- Truly keyword-free
- Cleaner stem notation: `bark[ 'pup' ] = 'yap'`
  - consistent with arrays: `array[4] = 'four'`
- Self-defining hex constants: `2x81`  $\rightarrow$  `-127`
  - and escapes in string literals
- New `trace var a b c` (Mansell request, 1979)



## ... more

- Select case:

```
select case i+1
  when 1          then say 'one'
  when 1+1        then say 'two'
  when 3, 4, 5    then say 'many'
end
```

- dropped **numeric fuzz**, stack, commands
- function tweaks (e.g., **upper()**, **lower()**)

# The fifth quinquennium?

- NetRexx interpreter in 2000–2001; since then I've been a bit quiet on Rexx ...  
... I've been busy making Rexx arithmetic “mainstream” (Java, IEEE 754, hardware, XML, C, C++)
- yet languages are heading in the Rexx direction ...

# Rexx-like trends?

- Ruby: Rexx-like do-end and other constructs
- Python: similar look and goals as Rexx
- VB.Net: more like NetRexx than BASIC

*... obscure notations have had their day*

# The future for Rexx ...

- Rexx style, goals, and achievements are as important now as they were in 1979
  - readability, simplicity, portability, people time is valuable, decimal arithmetic ...
- There are many ways to evolve Rexx (NetRexx and Object REXX are examples)
  - and other languages can be enhanced with Rexx features

# The future for Rexx?

- Rexx will continue to be successful as long as it continues to evolve along with computing ...

... and that is in **your** hands.

# Questions?