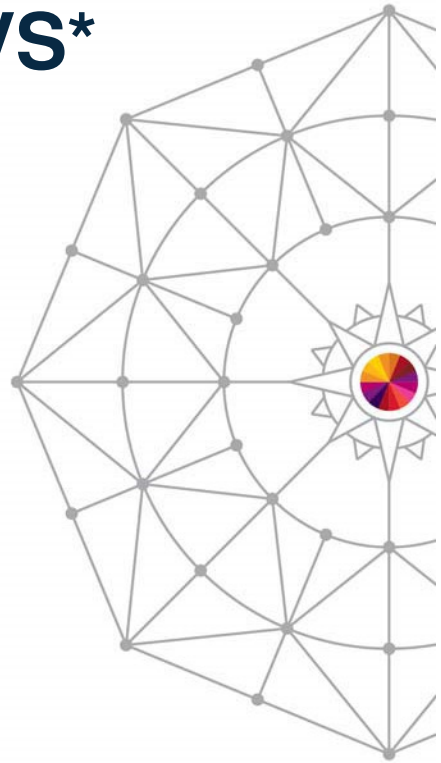
Western Civilization Still Runs on MVS*

Bob Rogers
IBM Distinguished Engineer, Retired
Trident Services, Inc.



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Abstract

It's difficult to predict the future of any technology, although many attempt it. In this presentation, the speaker will instead draw the trajectory of the mainframe over its history so that some idea of its role in the future of western civilization can be projected.

"Prediction is difficult, especially of the future."
Yogi Berra

"Those who cannot remember the past are condemned to repeat it" **George Sanayana**

Bob Rogers, retired Distinguished Engineer at IBM, is one of the most popular speakers in the System z world. He currently does consulting for Trident Services, Inc. and is a Technical Editor and Writer for IBM Systems Magazine Mainframe Edition.

A Great Start

- Early history (sort of quickly)
  - In the beginning, great variety thus little compatibility
    - RCA, Burroughs, Sperry, etc.
  - Overwhelming Success
    - S/360 covers business and scientific
    - A compatible line from low-end to high-end into the future
    - OS/360 software wins the day with function and efficiency
  - Standardization on S/370
    - The birth of Plug Compatable Mainframes: ITEL, Amdahl, Hitachi
  - The Balkanization of the Platform
    - A multitude of business units whose objectives didn't always perfectly align (processor, disk, printer, etc.)
    - OS/370 is broken into dozens of products (MVS, DFP, TSO, Compilers, Communications, etc., etc., etc.)

Trouble for Armonk

- IBM Falters
  - The 3090S was not a very good machine
- The economy was not particularly strong
- The Competition Stiffened
  - Amdahl and Hitachi put out good machines and undercut IBM's price
- John Akers tells Wall Street that IBM is getting out of the mainframe business

The Beginning of the End

- A time of pain for mainframers
  - Predictions of the death of the mainframe
  - Stewart Alsop becomes famous – then infamous
  - The New York Times prints some news not fit to print*
- A voice crying in the wilderness (or was it sounding brass)
  - "Western Civilization Runs on MVS"

*The motto of the New York Times is: All the news that's fit to print. The motto of the Rolling Stone is: All the news that fits.

So that I Get the Quotes Right (Them)

- Stewart Alsop wrote in the March 1991 issue of Infoworld, *"I predict that the last mainframe will be unplugged on March 15, 1996".* (In 2002, Stewart Alsop symbolically ate his words and apologized to Lou Gerstner, the CEO of IBM at that time.)
- Robert Cringely, a well-known PC pundit, said , "On December 31, 1999 at midnight, when the big ball drops and people are kissing in Times Square, the era of the mainframe computing will be over."
- Even back as early as March 1989, Forbes Magazine had said, "A fairly well accepted notion in computing is that the mainframe is going the way of the dinosaur."
- The New York Times parroted this message, saying, "The mainframe computer is rapidly being turned into a technological Dinosaur...".
- In 1993, the NYT wrote: "…the mainframe seems to be hurtling towards extinction."
- As late as January 1994, George Colony of Forrester Research wrote in Business Week, "It's the end of the end for the mainframe."

So that I Get the Quotes Right (Me)

- In early 1992, I said: “If every Mach system failed, it would be front page news in The New York Time. But if every MVS system failed, The New York Times would not publish. And if every MVS system failed for a week, The New York Times would never publish again. Western Civilization would fall because Western Civilization runs on MVS.” *
- I also said: “How can these PC people possibly get the answers right when they don’t even seem to understand the questions?”

*This statement was made to a young lady who was extolling the virtues of the Mach operating system kernel which was part of the Macintosh operating system at that time.

Rebirth
Why the end only began but did not end

- The mainframe is dead, long live the mainframe.
  - In September of 1994, IBM makes “mainframe” a misnomer with announcement of a rack-mounted CMOS* system (the 9672 Parallel Enterprise Server)
  - Parallel Sysplex takes availability up a notch or two
  - Unix on MVS shows an intent to be “open”
  - OS/390 de-Balkanizes the operating system
    - Over 70 separate products re-integrated into OS/390
  - Later, a smooth transition to a 64-bit architecture

* CMOS is the same chip technology used in PCs and workstations.

Why Near-Death was Survived

- Philosophy of MVS
  - MVS is designed for high availability
    - Any failure must be isolated to the smallest unit
    - The MVS RAS guidelines say every line of code must be covered by a recovery routine
    - Diagnostics must be gathered for First Fault Data Capture
    - Net: 50% of MVS code is devoted to RAS
  - MVS System Integrity Statement
    - Allowing access to even one bit of data that a user is not authorized to see is considered a defect
    - Solid foundation for Security

Why Near-Death was Survived

- Discipline of Sysprogs (just a few examples)
  - Installation and Maintenance with SMP
    - Study what fixes are available and what can go wrong with them (hold data, PEs)
  - Change Management - Documentation and Control beyond the external security manager*
    - **Take a backup** before making changes to z/OS configuration
    - **Research the history** of prior changes before attempting new ones
    - **Test changes** to system libraries before committing them to production
    - **Document actual changes** at the point where the change takes place
    - **Notify** those with a need to know that a change has been made
  - Gather failure documentation (dump, traces, logs, etc)
  - Strict Quality Assurance (QA) procedures for promotion
    - Development -> Test -> Production

*Change Management bullets borrowed from a presentation on The Control Editor by NewEra Software.

Holding Our Own, and Better

- Technology Vitality
  - The current IBM mainframe, the zEC12:
    - fastest superscalar chip at 5.5 GHz
    - first commercially available general purpose processor to implement Transactional Execution (aka Hardware Transactional Memory)
  - Enhanced Unified Resource Manager and zBX*
  - IDAA for analytics on the same platform as operational
- Platform Vitality
  - 27% YTY MIPS growth
  - 200~ new accounts since 3Q10
  - 90 new ISVs in 2012 (over 7200 apps total)

* “In a sense this brings us full circle. One of the original S/360 design objectives was to satisfy the needs of disparate application communities (principally the business and scientific communities). The zEnterprise effectively addresses this issue by enabling the exploitation of application appropriate hardware/software architectures while continuing to build on traditional mainframe strengths. “

Ron Higgin, Mainframe Philosopher

Into the Future

- A new era for CMOS technology
  - CMOS speed-up has historically addressed a good portion of workload growth
    - 100x growth since 1995
    - 30% CAGR
  - CMOS growth is slowing down drastically
    - Can't make single thread processor faster
    - zEC12 at 5.5 GHz may not be surpassed
    - CMOS technology problems
    - Running out of engineering tricks
    - Expect ~5% CAGR for the foreseeable future
    - It's not just a mainframe problem

Into the Future

- Simultaneous Multithreading (SMT)
  - A processor design technique that builds on superscalar and out-of-order execution
  - Enable more efficient use of the multiple execution pipes in modern processors
  - IBM Power Systems and Intel already exploit it
  - Makes a singe core behave as if it is multiple CPUs executing multiple independent instruction streams
  - Two-way SMT yields an additional 40% throughput

Into the Future

- Cloud Computing*
  - Cloud is a pool of resources w/o boundaries
  - The boundaries are on consumption and access to data and processes.
  - The mainframe has been doing this for decades
  - z/OS runs multiple heterogeneous workloads with resource and access controls
  - zVM has provided control through virtualization for decades.

*For people who took Latin, I find Cloud to be pretty nebulous

Into the Future

- Analytics
  - Real time transactional analytics
    - Integrate analysis into OLTP transactions
    - Eliminates network latency
    - Detect fraud sooner
  - Batch and near real-time analytics
    - IDAA to accelerate select queries through DB2
    - Enables integration of business insight into operational processes

Into the Future

- The mainframe is well position for this trend
  - Will rely more on multiprocessing, clustering, special purpose widgets
    - Superior N-way support
      - z/OS support up to 100 processors in a single image
    - Parallel Sysplex Clustering
      - z/OS supports up to 32 systems in a plex
      - Overhead of 10% + .5% per system is fantastic
    - zEnterprise zBX with IDAA, etc.
      - Hybrid computing for specific CPU intense activities and other applications
- Expect enhanced architectures for analytics and other growing application areas
  - Enhancements to z/Architecture instruction set
  - Some functions to be provided with ASICs and FPGAs.

Into the Future

- Probable Trends
  - System z will increase total box MIPS by at least 50% per generation
    - The number of cores (processors) in a box will continue to grow healthily
    - System z will exploit Simultaneous Multithreading (SMT) to get more throughput from each core
  - System z software will further exploit multiprocessing
    - Transactional Execution (Tx) will be used to increase scalability by lock elision

*The IBM System zEC12 is the first commercially available general purpose processor to implement Transactional Execution (aka Hardware Transactional Memory)