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The Reality Of Rehosting

Learning Objectives

- zEnterprise Workloads Are Already Optimized
- Customers Have An Inflated View Of Mainframe Cost
- Rehosting Costs More
- Rehosting Introduces Risk and Delay
- Rehosting Freezes The Business From Innovation

Different Workloads have Different Characteristics

- High volume OLTP workload
- High I/O bandwidth
- High quality of service requirements

- High processing intensity
- Integer or floating point

- Light to moderate processing
- Modest quality of service requirements

zEnterprise Environments Are Optimized For Different Workload Types

What Is System z Optimized For?

- Optimized for transaction processing and master data base
  - Linear scalability with Parallel Sysplex and streamlined middleware
- Optimized for high I/O bandwidth workloads (e.g. batch)
  - Dedicated I/O processing plus DS8000 and Easy Tier
- Optimized for managing mission-critical data
  - Built-in DFSMS capability automates efficient data management
- Optimized for ultra high availability
  - Multi-layered strategy for reliability and serviceability
- Optimized for business critical workloads
  - Centralized data mirroring and systematic disaster recovery
- Optimized for easy growth in processing capacity
  - Elastic scaling through Capacity On Demand
- Optimized to achieve full use of processing resources
  - Intelligent prioritization of multiple workloads/ensembles to service objectives

Most Workloads on System z are Already Best-Fit

- **IBM Eagle Studies are TCO analyses for customers**
  - Cost and risk analysis of mainframe vs. alternative
  - Tailored to individual customer workloads
    - Cost factors unique to each enterprise
    - Costs evaluated over five-year period
- **63 out of 67 IBM Eagle studies concluded that System z offered a better solution than the distributed alternative**
  - System z is 52% the cost of distributed when offloading from z/OS
  - System z is 60% the cost of distributed when consolidating Linux applications
- Contact *Craig Bender* (csbender@us.ibm.com)

Results may vary

Moving Transaction Processing Off System z Rarely Reduces Cost

Typical Eagle TCO Study For A Financial Services Customer

4 HP Proliant DL 980 G7 servers

Production

Development

256 cores total

Hardware	$1,594,801
Software	$80,617,966
Labor (additional)	$8,250,000
Power and cooling	$43,756
Space	$79,385
Disaster Recovery	$4,210,728
Migration Labor	$24,000,000
Parallel Mainframe costs	$31,474,052
Total (5yr TCO)	**$150,270,688**

System z z/OS Sysplex

2760 MIPS

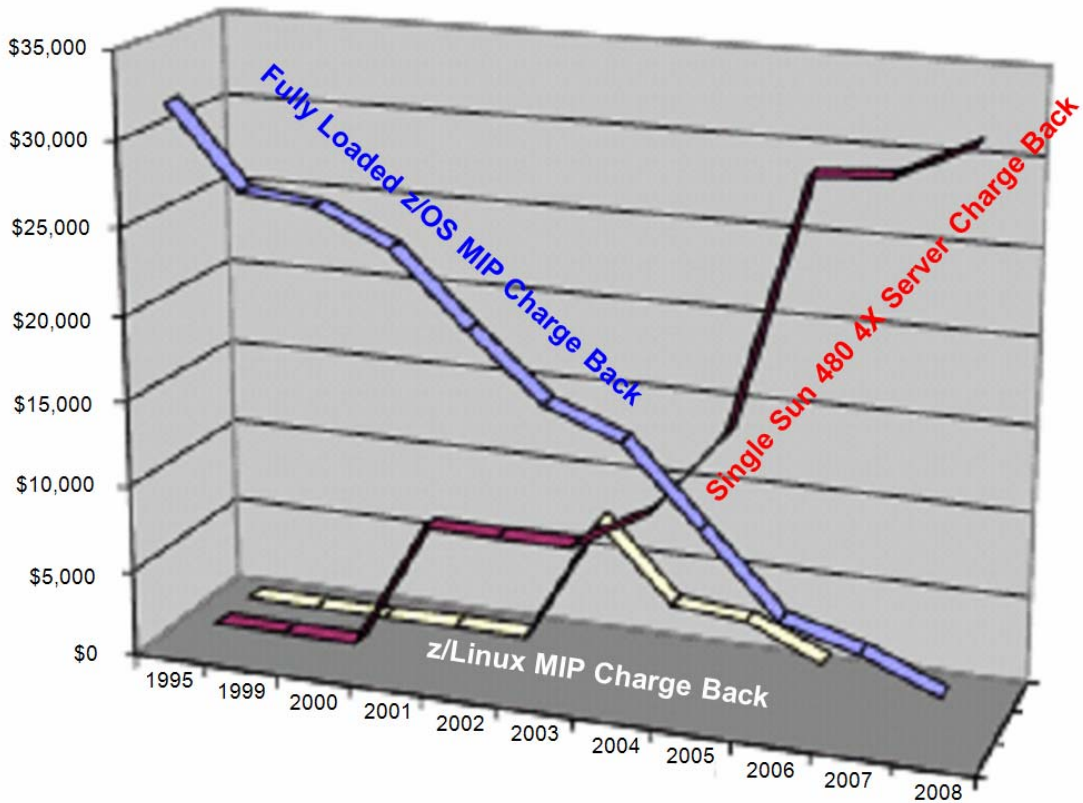
Hardware	$1,408,185
Software	$49,687,845
Labor	Baseline
Power and cooling	$31,339
Space	$79,385
Disaster recovery	$1,250,000
Total (5yr TCO)	**$52,456,754**

65% less

Why Do People Think Distributed Computing Is Cheaper?

Inaccurate charge back!

Charge Back Practices Were Improved Over Time at a Large Financial Institution



Eagle Studies Can Correct Misperceptions of Relative Costs

Re-hosting Dynamics

- Competitors team up to promise substantial cost savings by offloading
  - Oracle, HP, Micro Focus, Clerity, TmaxSoft, Microsoft…
  - Projections of cost savings and benefits are unproven
  - Benefits of successful projects often glorified

- Clients likely to be approached for re-hosting
  - Outdated hardware and software (less cost-effective)
  - Smaller footprints
  - Poor understanding of mainframe cost and value
    - Inaccurate charge backs
    - High mainframe costs due to high cost ISV software, failure to exploit price concessions…

What Happens When You Try To Move A Best Fit Workload On System z To Another Platform?

1. Core Proliferation
   - Long-term costs go up
2. Missing Function & Processes
   - Long-term costs go up
3. Sub-optimized Performance
   - Long-term costs go up
4. Risks – Failure, Delay, Degraded Qualities Of Service
   - Business case does not close

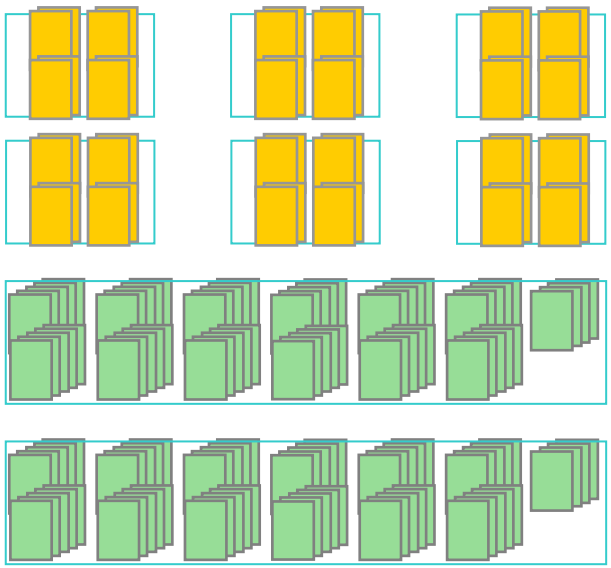
Bottom line – you spend MORE, not less

1. Why Core Proliferation Happens

- De-consolidation of applications to dedicated servers
  - Dedicated servers for functional roles - application, database, security, batch, systems management
  - Separate servers for production, development, quality assurance test
  - Low utilization due to provisioning for the peak on each server and pre-provisioning for growth
- Disaster Recovery
  - 100% coverage doubles the number of cores required
- Processing comparisons
  - Language expansion (CICS/COBOL path lengths are highly optimized)
  - Zero network on mainframe reduces computation (and latency)
  - Mainframe has dedicated processors for I/O operations, distributed does not
  - Converting IMS hierarchical database to relational results in a 3x expansion

Core Proliferation for a Mid-sized Offload Project

6x 8-way Production / Dev
2x 64-way Production / Dev
Application/MQ/DB2/Dev partitions

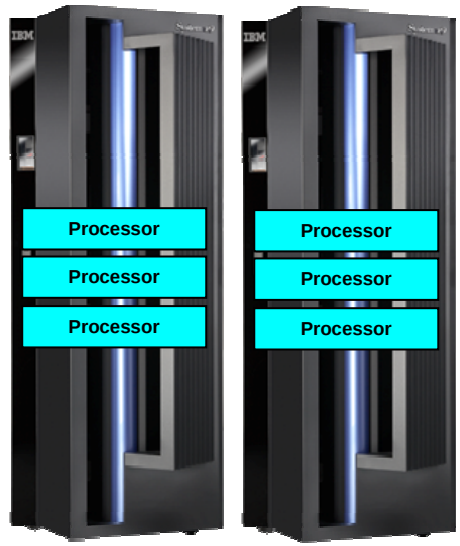


$25.4M TCO (5yr)

6 processors
(1,660 MIPS)

176 distributed processors
(800,072 Performance units)

2x z900 3-way Production / Dev / QA / Test

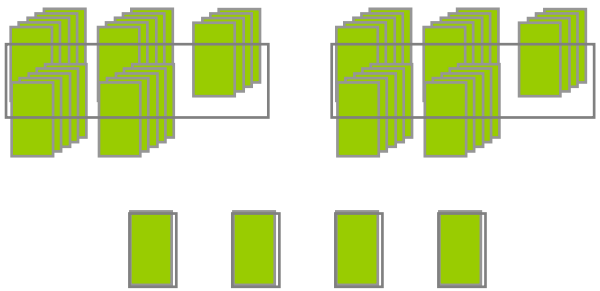


$17.9M TCO (5yr)

482 Performance Units per MIPS

Core Proliferation for a Small Offload Project

2x 16-way Production / Dev / Test / Education
App, DB, Security, Print and Monitoring
4x 1-way Admin / Provisioning / Batch Scheduling

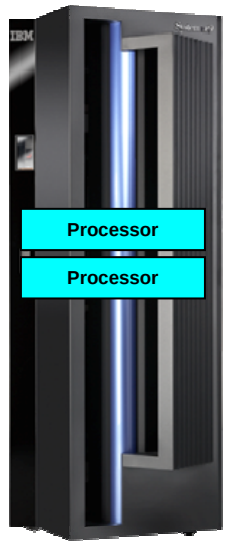


36 Unix processors
(222,292 Performance Units)

$17.9M TCO (4yr)

z890 2-way Production / Dev / Test / Education
App, DB, Security, Print, Admin & Monitoring

2 processors
(332 MIPS)



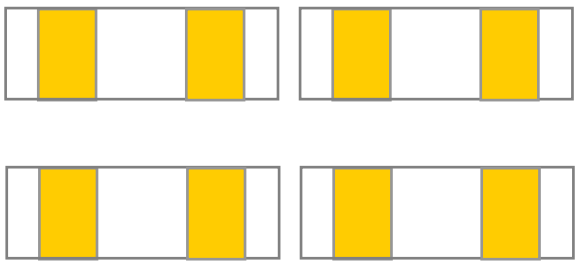
$4.9M TCO (4yr)

Plus:
2x HP SAN Servers (existing)
Many (existing) Windows servers

670 Performance Units per MIPS
No Disaster Recovery

Core Proliferation for a Smaller Offload Project

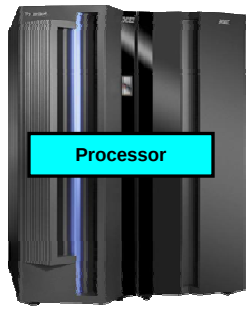
4x p550 (1ch/2co)
Application and DB



0.24 processors
(88 MIPS)

8 Unix processors
(43,884 Performance Units)

1x z890
(production + test)



$8.1M TCO (5yr)

$4.7M TCO (5yr)

499 Performance Units per MIPS

Migration duration 3 years

2. Missing Function

- No distributed alternatives to handle large transactional workloads against a single-image database
- Systematic error and disaster recovery is not well-supported in distributed environments
- Storage capabilities of DFSMS and DS8000 may be missing
- Replacement technologies aren't always available
  - Languages, batch environments, JCL, JES, 3270-style user interfaces, BMS maps, APIs, File structures, Print, Tape, VSAM, Encryption, Sysplex, ASM, PL/I …

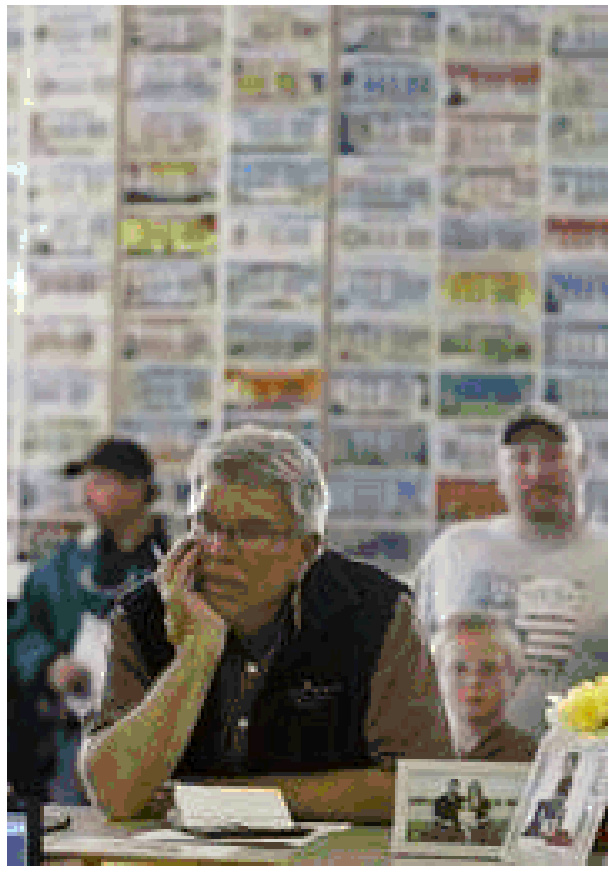
Missing Systems Management Function

- Case Study (US retailer):
  - 200 system management products used on the mainframe
  - Only 15 of them had equivalent distributed replacements (7.5% coverage)
  - Cost of those 15 products was $8.4M OTC plus $1.8M annual
  - Distributed system management pricing is generally based on the number of cores to be managed
- Case Study (another US retailer):
  - 261 system management products used on the mainframe
  - Only 37 of them had equivalent distributed replacements (14% coverage)
- If replacement product unavailable:
  - Need to re-write applications to not need it
  - Or write code to perform the function from scratch
  - Or add operations labor to do the function manually

3. Sub-Optimized Performance

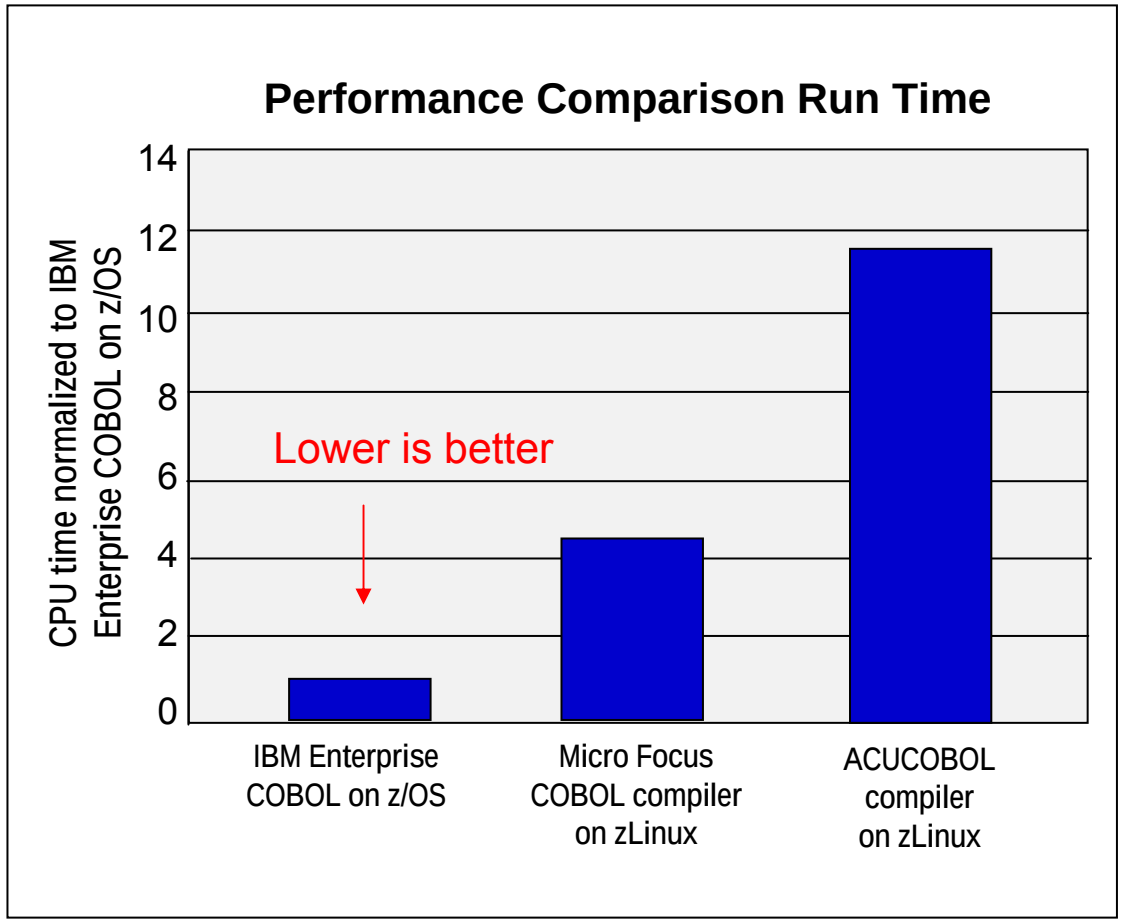
- Offload project to move State of Montana Department of Motor Vehicles license registration system (MERLIN) from CICS to Microsoft
- Performed by Microsoft and Bearing Point
- CICS solid sub-second response times
- Microsoft 30 second response times
- Cost of project $28.3M, 3 years late

"Transferring titles is taking two to three hours instead 15 minutes," Anderson said. One employee told him she had never heard so many "four-letter words" from customers.



COBOL Recompiled With Micro Focus Had Inferior Performance

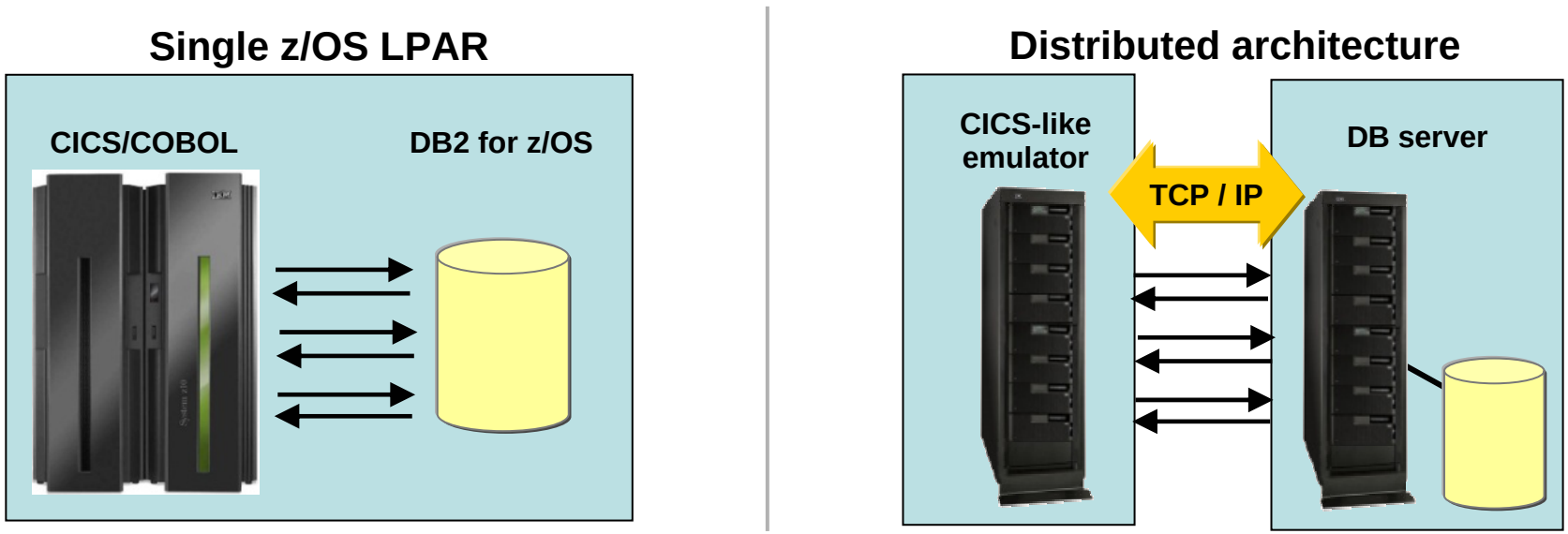
- Offloads require a different COBOL compiler
- IBM Enterprise COBOL on z/OS performed best in customer benchmarks
- Micro Focus COBOL is a COBOL interpreter, so code is over 4.5 times less efficient
- ACUCOBOL, a compiler acquired by Micro Focus, was 12 times less efficient
- Micro Focus functional differences required additional debugging



Internal customer study

Some Applications Originally Designed With Co-located Data

- A large insurance company rehosted a portion of an application as a Proof Of Concept
  - *"When folks wrote screen-based transactions many years ago, they wrote it at a business function viewpoint…"* = very 'chatty' (and no separation of presentation, business logic, data logic)
  - SQL suboptimized for networking (comms performance wasn't originally an issue)
- Various tuning/tweaking done for several months, but ultimately the POC was stopped
- TCP/IP stack consumes considerable CPU overhead/resource AND introduces security considerations (firewalls …) and latency (network delay)



Some transactions are not easily moved

Source: Phil Murphy, Forrester Research

4. Risk of Migration Failure

Lombard Canada Ltd., one of the oldest property and casualty insurance operations in Canada, partnered with Micro Focus to replace old mainframe

- 200 MIPS S/390
- CICS, COBOL, VSAM, DB2

"We estimate this project will save us in excess of $1 million a year, but more importantly, it will enable us to become more competitive in our industry both today and in the future."

VP of IT
Lombard Canada Ltd., 2005

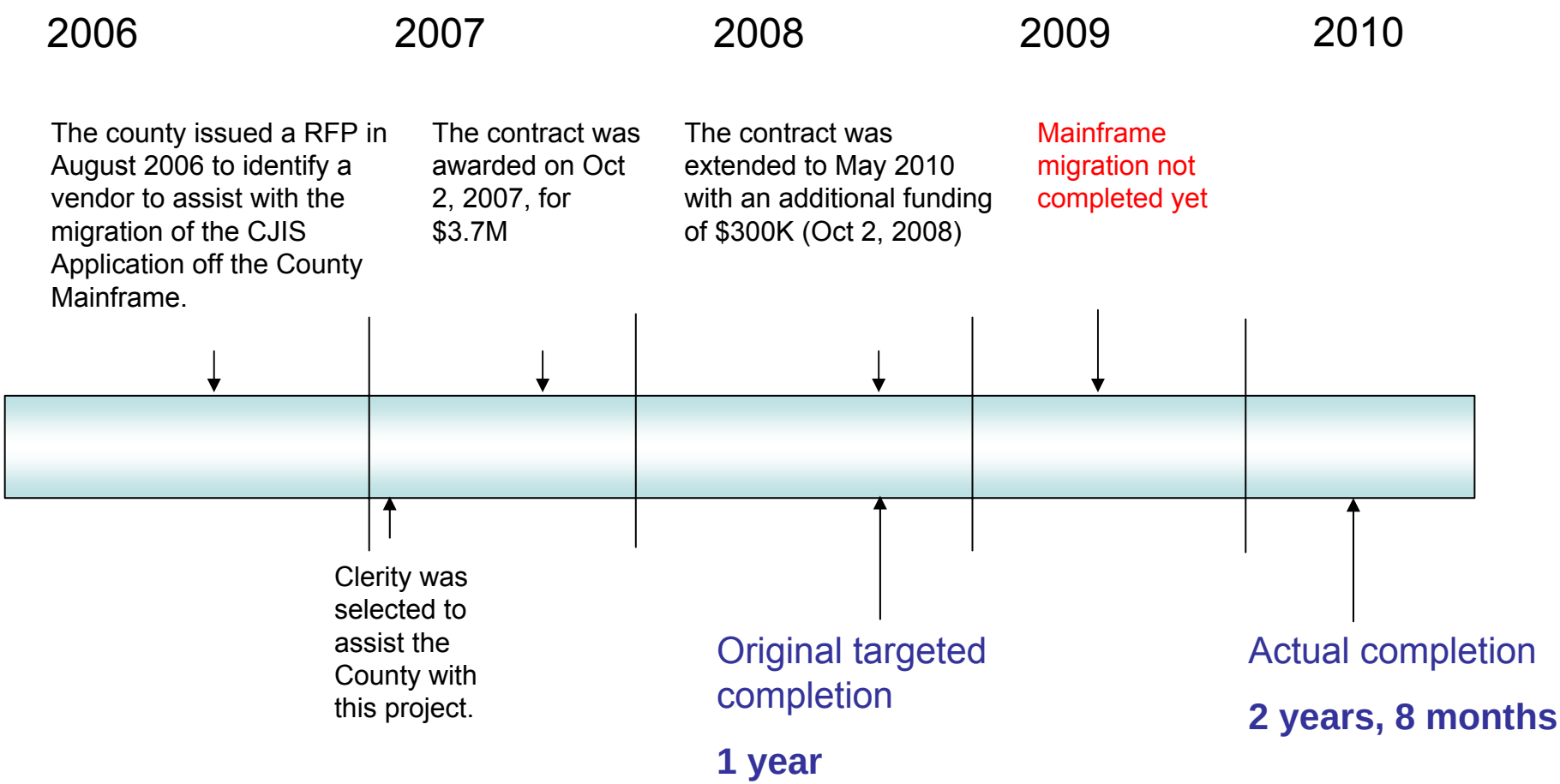
Project abandoned in 2006:

- System Integrator and Micro Focus did not have the skills
- Lombard spent millions on conversion with no results
- VP lost his position
- Installed a new z890 platform and re-architected front end to access CICS
- New VP stated Disaster Recovery capability of System z as a key benefit

Source of quote: http://www.finextra.com/news/Announcement.aspx?pressreleaseid=4858

Project Delay Can Be Greater Than Anticipated

US County Government Offload Project Delayed By Complexity



Degraded Quality Of Service

DB2 for z/OS Security

- Less than 10 security-related patches in the last 10 years

Oracle's Security Exposures

- Oracle.com – October 2011
  57 security patches, including **5** for the database
- Oracle.com – July 2011
  78 security patches, including **13** for the database
- Oracle.com – April 2011
  73 security patches, including **6** for the database
- Oracle.com – January 2011
  66 security patches, including **6** for the database

In the last year Oracle has issued 274 security patches, 30 for the database

Source: http://www.oracle.com/technetwork/topics/security

Bottom Line: Actual Costs Go Up

- Core proliferation is underestimated
  - Distributed solutions require far more cores than suggested by simple benchmarks
  - Drives up hardware and software costs (priced per core)
- Equivalent system management costs can be significantly more
  - Multiple products needed to achieve equivalent function
  - Also priced per core
- Re-architecture may require to work-arounds for missing function
  - E.g. to contain “batch window”
- Repurchase distributed servers after 4-5 years
  - No credit for existing processing capacity when upgrading
- Operational labor costs increase

Case Study – A Recent “Success” Story

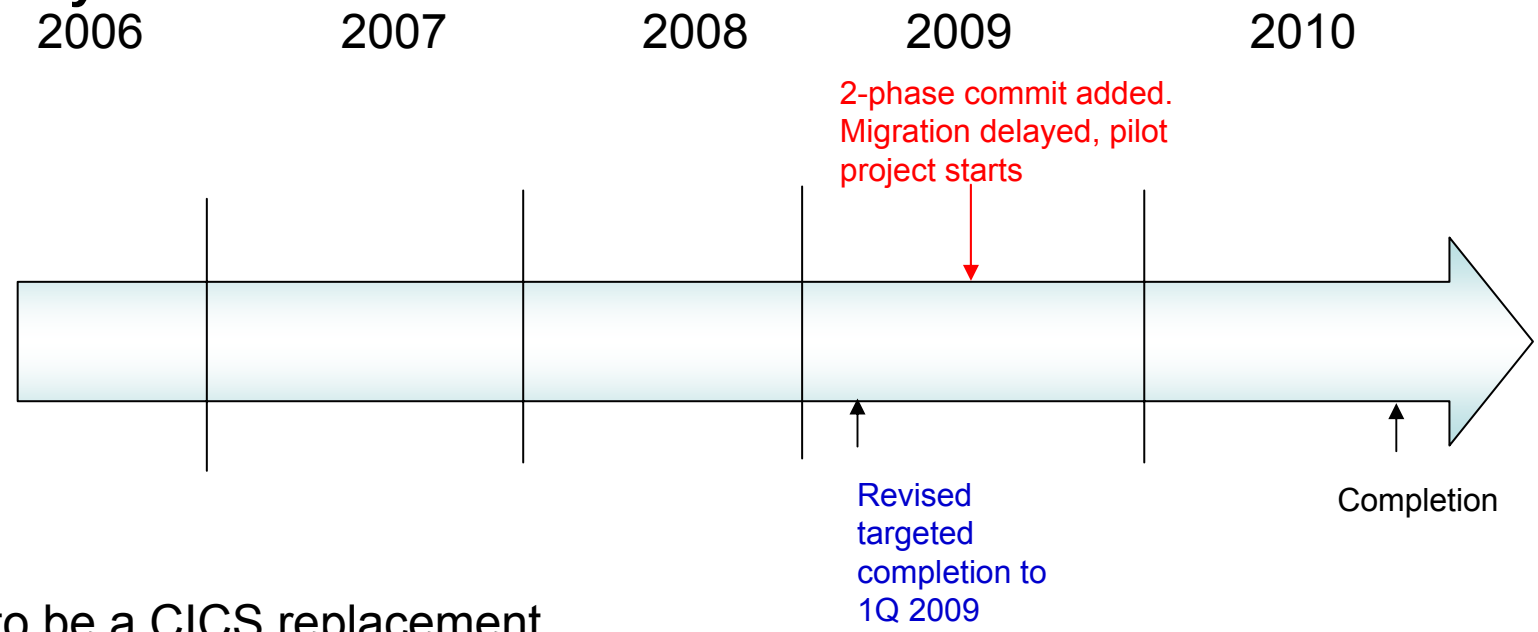
IBM

Customer Feedback Confirms Our Analysis

1. 6:1 Core Proliferation
   - 900 MIPS rehosted by 6 z10 EC IFLs, utilization rate dropped (100% to 75%)
2. Missing Function
   - 2,500 COBOL lines changed in 50 programs AND all Assembler rewritten
   - Micro Focus COBOL integrating/debugging problems
3. Sub-optimized performance
   - Micro Focus COBOL compiler less efficient and required more hardware
4. Risk Of Failure
   - Qualities of Service (Non Functional Requirements) compromised
   - Very costly extensive testing by professionals to protect against subsequent customer problems
   - 1st attempt failed using different COBOL compiler
   - Migration to UniKix on zLinux had never been done before

Delays Greater Than Anticipated

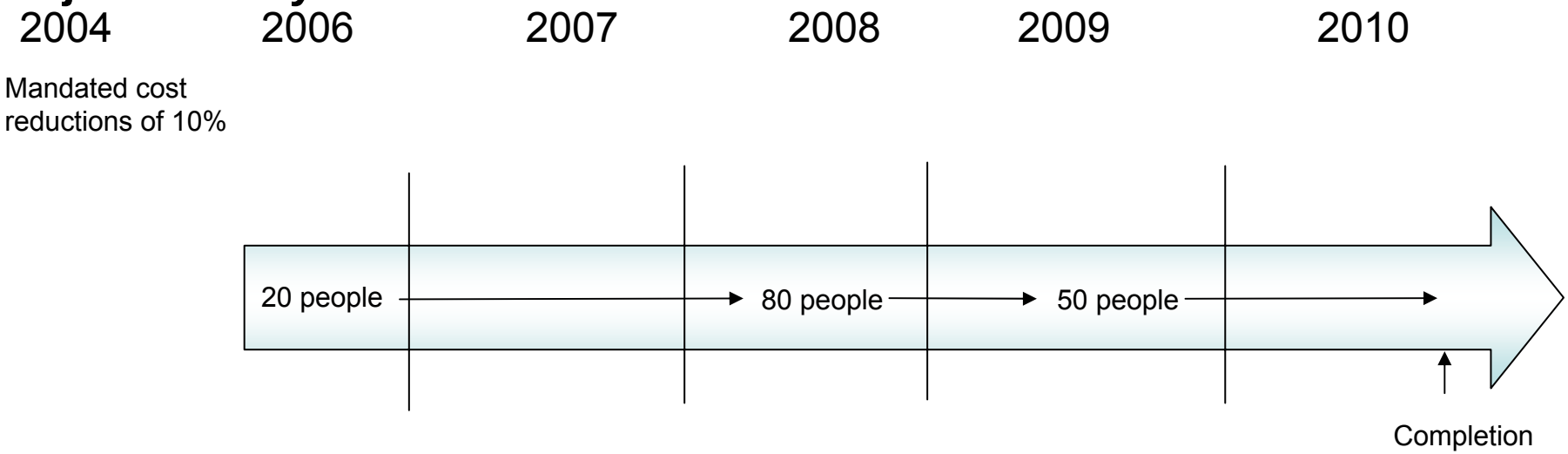
Project History



- Claimed to be a CICS replacement
- Project delay upon discovery of missing 2-phase commit support
- 3+ months to switch compilers (estimated $1M labor)
- Change-management issues

Bottom Line: Actual Costs Increased

Project History



- 170 person years @ $100K/PY **$17M to migrate, $19.6M with hw/sw**
- Best-case estimate savings on operating cost **$0.77M per year**
- Payback > **29 years**
- After 10 Years NPV = **-$13.15M,** IRR = **-25%**
- Mainframe was **NOT** removed (kept DB2 and batch on z/OS to lessen risk)

Conclusions

- Offloading existing System z workloads rarely saves money, increases risk, and freezes innovation
- Instead, zEnterprise enables a new strategy for cost reduction
  - Consolidate peripheral workloads using fit for purpose assignments to reduce cost of acquisition
  - Multiple virtualized architectures managed as one system reduces operational costs
  - No other vendor offers this choice

Related Learning For Growth Modules

- zEnterprise Economics
- Why zBX is better than Do-It-Yourself
- Improving Service Delivery With A Private Cloud
- Business Analytics and zEnterprise
- End-to-end Application Development for zEnterprise