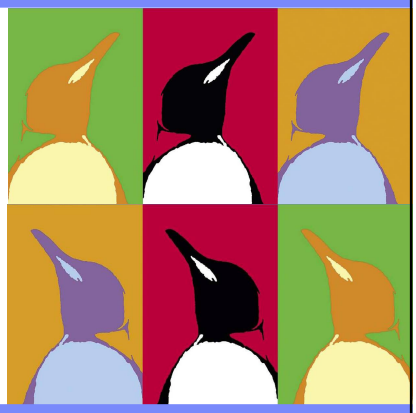
Customer Success Factors
Linux on System z & z/VM



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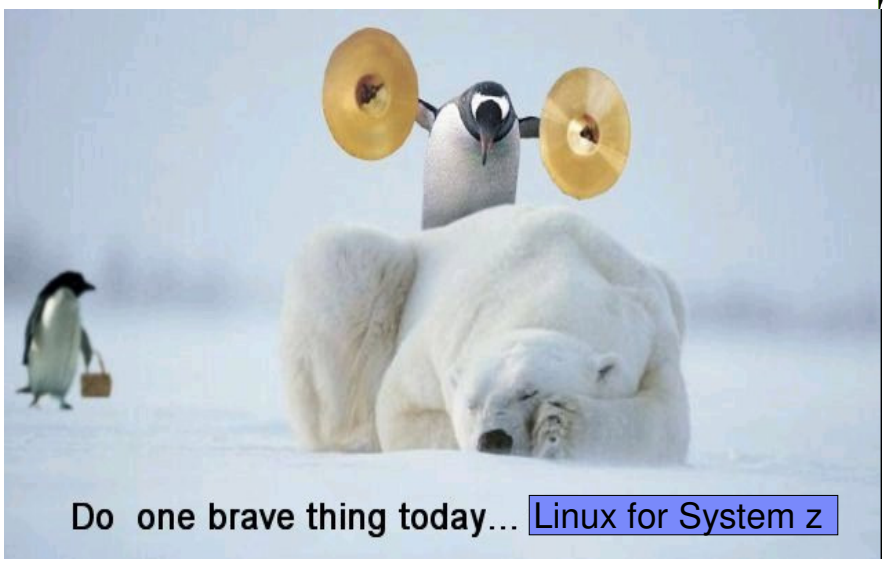
Agenda

1. Project Stage‘s
2. Selecting a Workload
3. Sizing and TCO examples “expectation vs. reality”
4. Customer examples

1 Project Stage‘s

What it takes ??
One brave decision every day



OBJECTION HANDLING

"We don't have the skills to support that"

Linux is Linux !

More & more common components (WAS, DB2, MQ, Tivoli..)

IBM & BP services can provide it and or help

"It's a Mainframe !"

?? Do you mean you'd prefer a large, air-cooled server running open-source software, with fibre-attached SCSI disks, full IP networking, ... ??

Good !

The project phases

- **Phase 1 – Feasibility study**
- **Phase 2 – Architecture design and sizing**
- **Phase 3 –Pilot project / Proof of Concept**
- **Phase 4 –Pilot to production**

Phase 1 - Feasibility study

- **Business context, customer goals and issues**
  - What is the customer business context?
  - What is the customer IT organization?
  - What are the customer objectives with Linux on IBM System z?
  - Is the customer facing some issues with its IT?
- **IT environment description**
  - How the Linux operating system is adopted/used by the enterprise?
  - How the Linux on System z operating system is adopted/used by the enterprise?
  - What are the customer IT standards for the developments and the run time?
  - Overview of the IT environment?
    - Servers (number, model…)
    - Middleware (name, version, …)
    - Applications (language, size…)
    - Network
    - What are the processor server utilization ?
  - Description of the non-function requirements for the main application (security, availability, performance…)?
- **Selection of the best applications to be moved to Linux on IBM System z**
  - Check the customer application/middleware availability on Linux on IBM system z

Phase 2 – Architecture design and sizing

- **Objectives**
  - Definition of the target architecture based on the selected workload
  - Provide an initial sizing based on the real resources consumption of the customer's servers.
  - Build a project plan
  - Discuss education roadmap
- **One possible output**
  - PowerPoint presentation summarizing the architecture design and the sizing.

Phase 3 – Pilot project / Proof of Concept

- **Define the objectives and the scope of the pilot (very often is a subset of the global architecture)**
- **3 options are available to prove the feasibility:**
  - Pilot at customer site
    - Require some resources from customer (Hardware, People)
    - Possible support from IBM Technology Center
      - Workshop at customer site (skill transfer, environment review, regular technical calls…)
  - Remote Proof of Concept using remote system
  - Proof of Concept at TMCC Boeblingen
    - 1-2 weeks project led at Boeblingen with IT specialists & customer
- **Build a project plan for the Pilot project/Proof of Concept**
- **Define the skill and resources for the Pilot project/Proof of Concept**

Phase 4 – Pilot to production

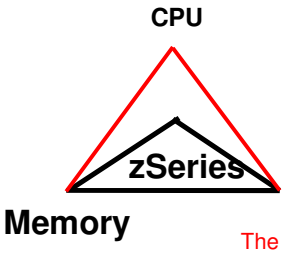
- **Objective**
  - Provide technical support during the production environment implementation phase at customer site
- **Description**
  - New Workload Assistance Program
    - This program assists leading edge customers with their adoption of applications on IBM System z technology.
    - Support through regular conferences call (bi-monthly)
    - Workshop at customer location
      - Health check of the customer environment
      - Skill transfer
    - Customer accept to become an IBM reference for the Linux solutions implementation on IBM System z.

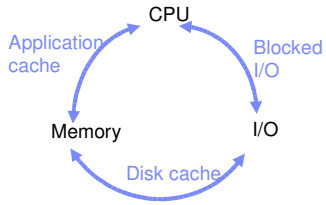
Selecting a Workload

2

Relative System Capacity

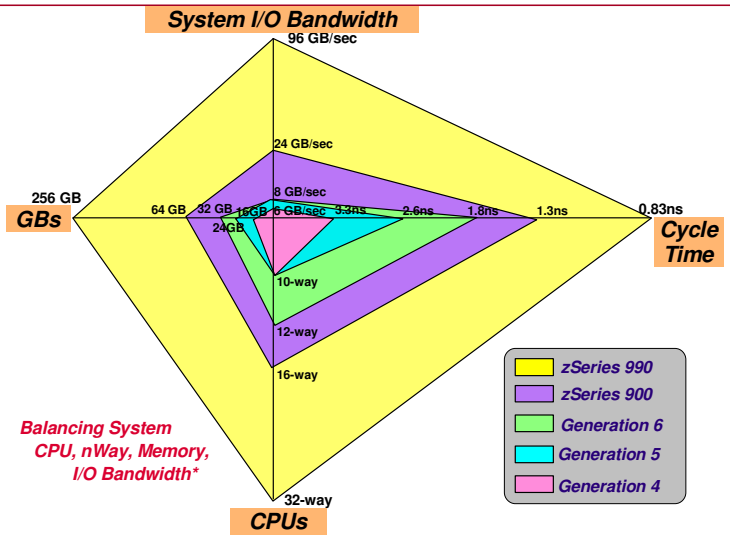
- A system provides different types of resources
- Capacity for each resource type may be different
- The ideal machine provides enough capacity of each type
- Don't forget additional Resources (Network, Skilled staff, Money, availability of software, reliability, time ...)





The ideal platform requires a mix of resources in right quantity

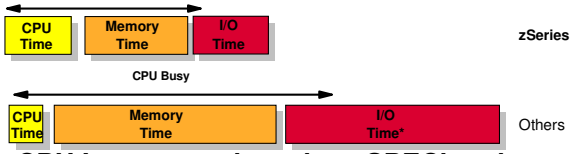
IBM zSeries Servers - Balanced Scaling and Design



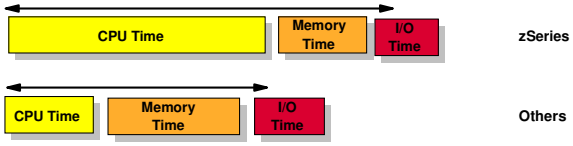
* External I/O or STI bandwidth only (Internal Coupling Channels and HiperSockets not included) zSeries MCM internal bandwidth is 500 GB/s. Memory bandwidth not included (not a system constraint)

Relative System Capacity ...

- Data Intense work such as business intelligence, very large data base, classical OLTP or "cache killer" workloads (object oriented code or context switching) will potentially run much better on zSeries

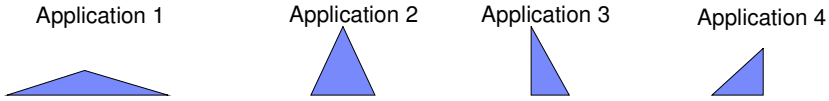


- CPU Intense work such as SPECint, deep computing, graphic rendering, will perform relatively poorly on zSeries



Profile your Resource/Application

- Each application has its specific requirements
  - CPU intensive
  - I/O intensive
  - Memory intensive
- Applications can often be tuned to change the resource profile
  - Exchange one resource for the other
  - Requires knowledge about available resources
- Some platforms can be extended better than others
  - Not every platform runs every application well
  - It's not easy to determine the resource profile of an application



So, a mainframe is.....

A server which has:-

- The ability to run multiple workloads of different types with unpredictable demands
- A secure, auditable, well-managed environment
- A highly available and reliable environment
- Compatibility with previous levels of operating systems and applications
- The ability to run at high utilisation over long periods whilst maintaining good service levels

Where should the zSeries play today?

- If you have a centralised business model
- If security is a high priority
- If floor space or power supply is an issue
- If managing a distributed environment is a problem
- If high availability of applications is important
- If disaster recovery is important
- If creating new images very quickly is important

Where should the zSeries play today?

- If running mixed workloads and maintaining the SLA is important
- If you want to improve the AD life-cycle
- If your workload has unpredictable spikes
- If you have data intensive workloads
- If you want to keep the applications close to the data
- If you have many SSL calls

zSeries consolidation 'sweet spots'

- **Ideally suited for data processing applications**
- **Enhance existing zSeries investment with Linux applications**
- **Consolidate infrastructure servers on available zSeries logical partitions or virtual servers**
- **Support large numbers of servers with zSeries virtualization technology**
- **Most effective for consolidation of low / moderately loaded servers**
- **Most effective for consolidating servers which peak at different times**
- **Single server, multiple applications**
  - Web serving, e-mail, Domain name serving, DHCP
  - Consolidating applications from other platforms (UNIX or Windows)
- **Workload management**
  - z/VM management functions

Linux applications on zSeries

Getting Started

Analyze your server farms
- small/medium servers
- low/medium utilized servers

Check for already installed Linux servers

Choose a Linux distributor

Install Linux on zSeries

Start with a non-critical business application
- File/print serving
- email serving
- news/discussion group serving
- Web serving
- Domain Name serving etc.

Consolidate other servers on Linux on zSeries
- Initiate a Server Consolidation study
- Select candidates for consolidation based on apps
- Consolidate for simplicity and scalability

Port a specific Linux or Unix application

For sizing support request SIZE390 assistance

Application Porting Considerations

From Linux on other architectures or Open Source
- many binaries (RPMs) already available
- generally recompile
- S/390 is big endian
- X applications work

From other UNIX
- generally straightforward
- proprietary APIs and system calls

From NT
- replacement by equivalent application
- porting can be significant effort (system calls and APIs)
- there are ways of running Windows apps under Linux (WINE, Bochs)

For more information:
- Porting UNIX applications to Linux - Hints and Tips (GM13-0115-00)
- Solaris-to-Linux porting guide: ibm.com/developerworks/linux/library/l-solar
- Linux on zSeries hints and tips: ibm.com/servers/esdd/articles/linux_s390/index.html

Pick your fights – fight where you will win

- **Will Win Fights:** On-Demand, Disaster Recovery, Security, Availability, Reliability, Spikes, Mixed WL, Long-term
- **May Win Fights:** TCO (if customer understands concept)
- **May Not Win Fights:** Cost of Acquisition, Simple WL

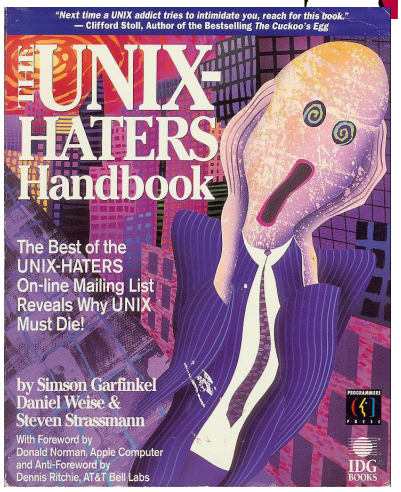
Sizing and TCO examples "expectation vs. reality"

3

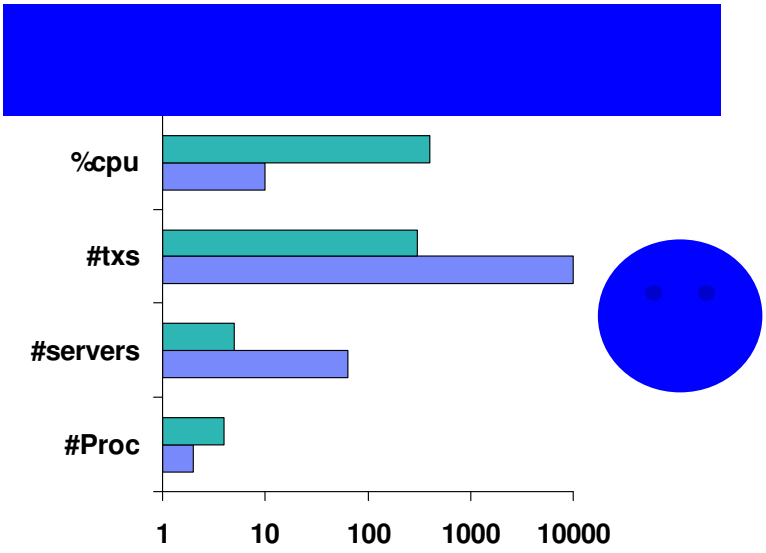
Are there Performance issues/challenges ??

- **The problem is not that the zSeries proc. Is always to slow !!!**
  - –It is the expectation and the sizing
- **Avoid synthetic benchmarks**
  - –Best results are with real application test/benchmark

- **So it Depends**



Real-application-Performance sample



Define the race – then pick the vehicle

- Typical industry benchmarks for Linux and UNIX tend to measure the performance of a single server running a single application
- Results tend to be highly dependent upon processor speed
- Stand alone processor may run a higher speed than mainframes, hence they look better in typical industry benchmarks
- Mainframes distinguish themselves through outstanding capacity, usually not measured by typical industry benchmarks
- The work performed by multiple stand alone servers is a good candidate for consolidation when:
  - The servers are lightly to moderate loaded
  - The servers do not peak at the same time

TCO, TCA ???

- Which Jet is more expensive ??
- The Learjet is a great deal less expensive so !! BUT
- So all airlines should start buying Learjet's instead 744's (A380s)
- Of course it is not that simple. It depends

The Race or does speed (GHz) matter ???

- A race car goes faster than a trailer truck, BUT
- if the Race is to move 100 refrigerators across the country fastest, bet on the truck

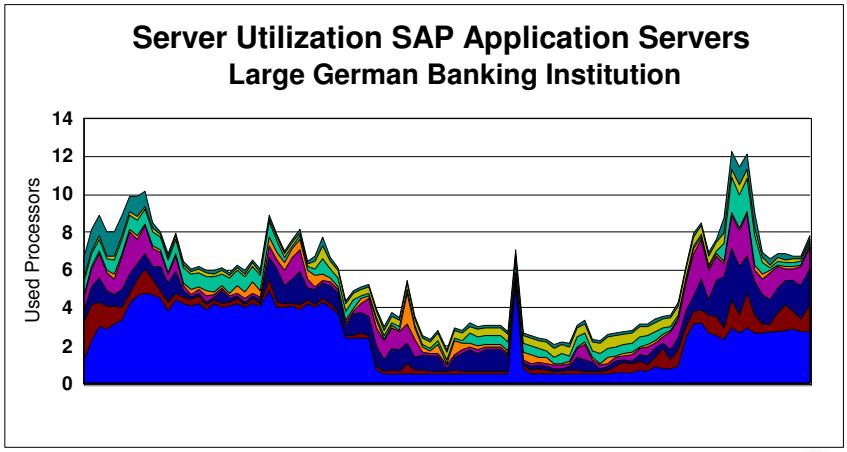
Sizing

How to estimate the capacity needed on zSeries?

- See Chapter 2 "Sizing" in the Redbook "Linux for zSeries and S/390: ISP/ASP Solutions", SG24-6299
- Gartner Research Note (June 2001): "There is no easy way of initially sizing how many MIPS an S/390 or zSeries will require to handle projected loads, especially with the varying system utilization of a large number of servers."
- The magic formula used by IBM's sizing experts ("SIZE390") is:
  - MIPS needed = %Utilization * Current Capacity / WLF
    - *Current Capacity* can be measured in tpm according to TPC-C benchmarks
    - *WLF* ("Workload Factor") depends heavily on the kind of workload (usually is in the 30 - 200 tpm/MIPS range)
    - *%Utilization* (the "accumulated peak") can easiliy be measured with vmstat, sysstat or sar - but should not be estimated!

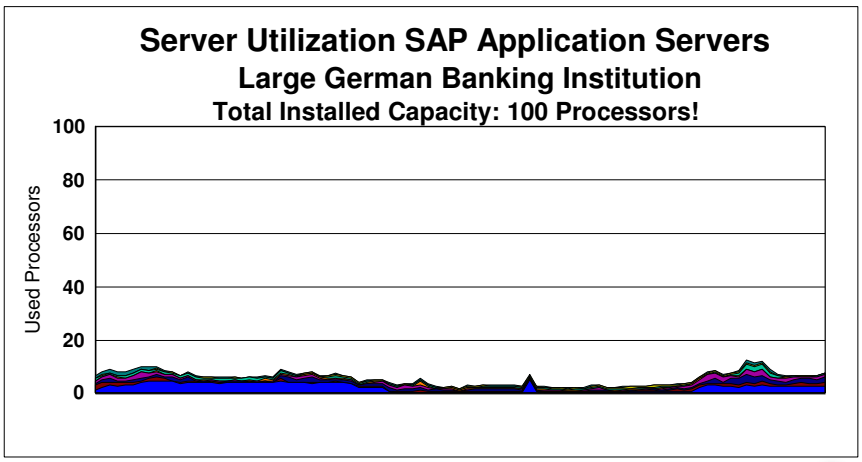
Typische Server Utilization

SAP Application Servers



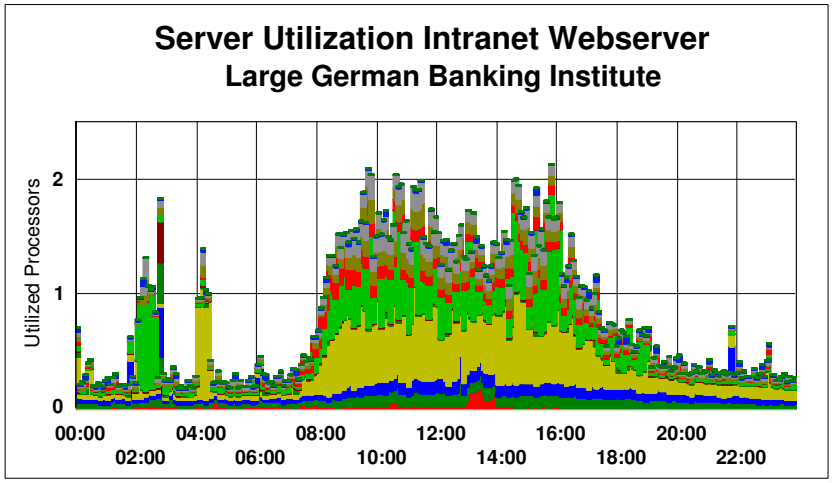
Typische Server Utilization ...

SAP Applications Server -- The whole story



Typische Server Utilization

Intranet Server (Web App)



Typische Server Utilization ...

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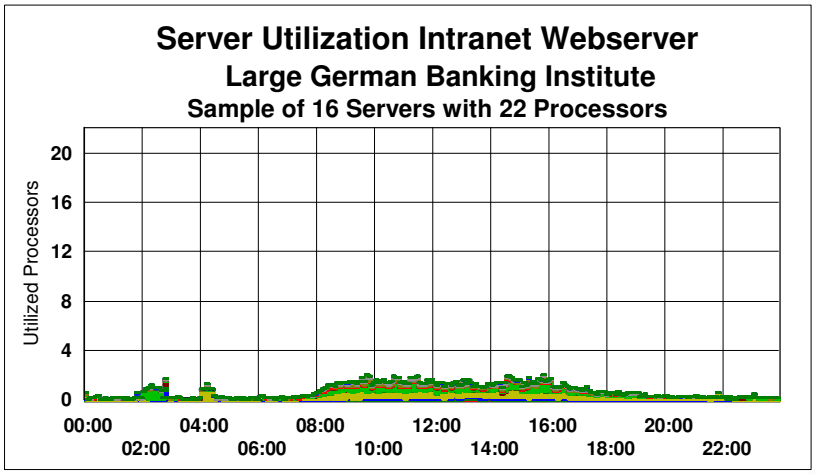


Major TCO Factors

- **Hardware**
- **Software**
- **Other (Soft factors like Environmental, …)**
- **People**

Other TCO Factors

- **Availability**
  - High availability
  - Hours of operation
- **Backup/Restore/Site Recovery**
  - Backup
  - Disaster Scenario
  - Restore
  - Effort for Complete Site Recovery
  - SAN effort
- **Infrastructure Cost**
  - Space
  - Power
  - Network Infrastructure
  - Storage Infrastructure
- **Additional development and implementation**
  - Investment for one platform – reproduction for others
- **Controlling and Accounting**
  - Analyzing the systems
  - Cost
- **Operations Effort**
  - Monitoring, Operating
  - Problem Determination
  - Server Management Tools
  - Integrated Server Management – Enterprise Wide

Other TCO Factors …

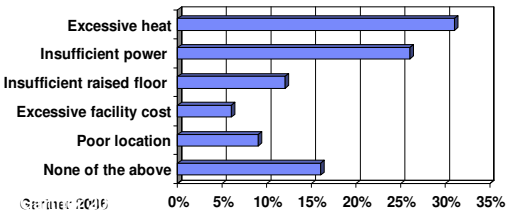
- **Security**
  - Authentication / Authorization
  - User Administration
  - Data Security
  - Server and OS Security
  - RACF vs. other solutions
- **Deployment and Support**
  - System Programming
    - Keeping consistent OS and SW Level
  - Middleware
    - SW Maintenance
    - SW Distribution (across firewall)
  - Application
    - Database Effort
    - Technology Upgrade
    - Non-disruptive System Release change
- **Operating Concept**
  - Development of an operating procedure
  - Feasibility of the developed procedure
  - Automation
- **Resource Utilization and Performance**
  - Mixed Workload / Batch
  - Resource Sharing
    - Shared nothing vs. shared everything
  - Parallel Sysplex vs. Other Concepts
  - Response Time
  - Performance Management
  - Peak handling / scalability

Other TCO Factors …

- **Integration**
  - Integrated Functionality vs. Functionality to be implemented (possibly with third-party tools)
  - Balanced System
  - Integration of / into Standards
- **Skills and Resources**
  - Personnel Education
  - Availability of Resources
- **Further Availability Aspects**
  - Planned outages
  - Unplanned outages
  - Automated Take Over
  - Uninterrupted Take Over (especially for DB)
  - Workload Management across physical borders
  - Business continuity
  - Availability effects for other applications / projects
  - End User Service
  - End User Productivity
  - Virtualization

Inexpensive, flexible and scalable dense computing and increasing power costs are shifting requirements and spending

What is the greatest facility problem with your primary data center?



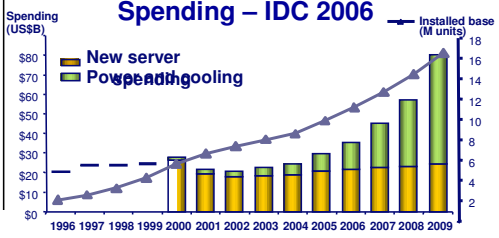
"Power and cooling costs will increase to more than one-third of the total IT budget"

Robert Frances Group, January 2006

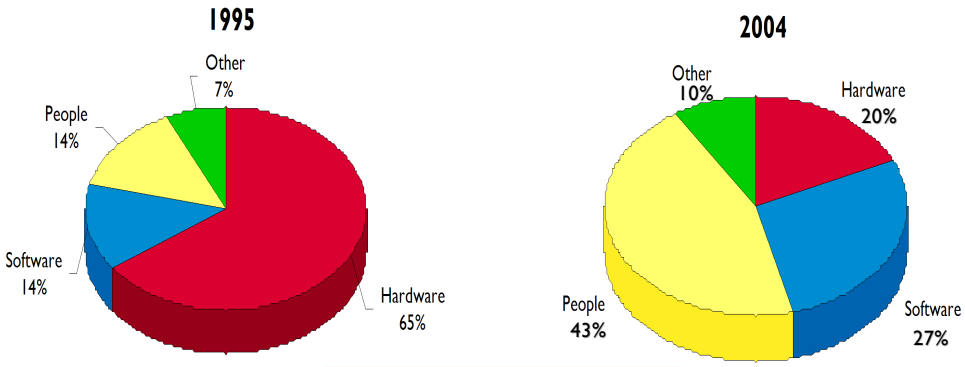
"Power and cooling will be a top 3 issue with all CIO's in the next 6-12 months"

Michael Bell – Gartner Group

Power and cooling exceeds server Spending – IDC 2006



Cost Profile is Changing

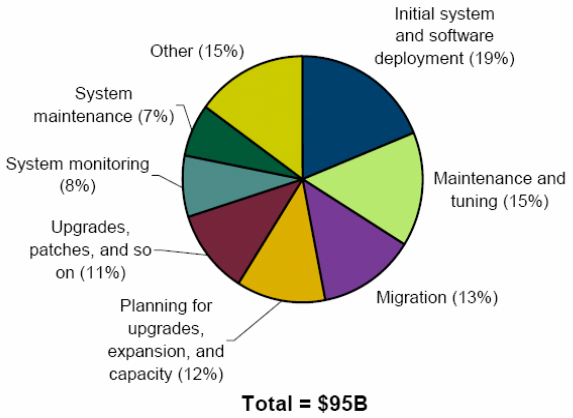


People expense is now the dominant component!

Based on IBM Scorpion customer analyses

Server Management and Administration Tasks

Worldwide Server Management and Administration Cost Share by Category, 2004



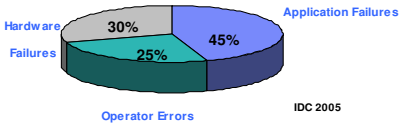
Source: IDC, 2004

Business Issue of Availability

Financial Impact of Downtime Per Hour
(by various Industries)

Brokerage Retail	$6.5 Million
Credit Card Sales Authorization	$2.6 Million
Airline Reservation Centers	$90,000
Package Shipping Services	$28,250
Manufacturing Industry	$26,761
Banking Industry	$17,093
Transportation Industry	$9,435

Unplanned Outage Causes

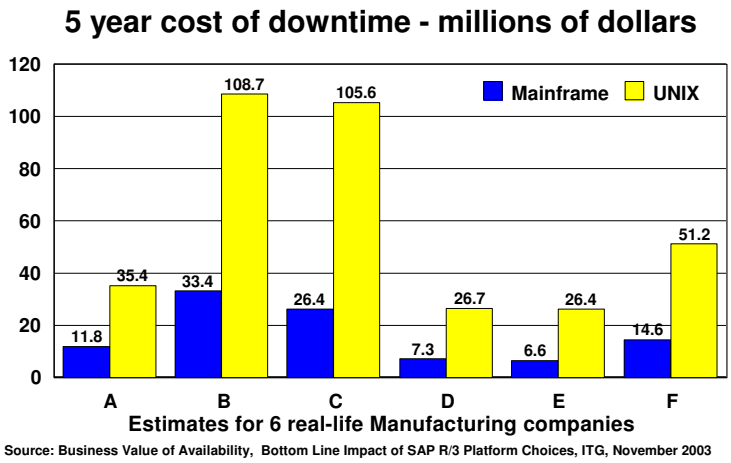


IDC 2005

- On demand challenges
  - Downtime unaffordable
  - Heterogeneous by nature
  - Complex to manage
- Customer pressures
  - Application availability
  - Operations complexity and costs
  - Automation implementation and maintenance costs
  - Rapid change of I/T infrastructure
  - Adding new workloads

- **Loss** of business
- **Loss** of customers – the competition is just a mouse click away
- **Loss** of credibility, brand image and stock value

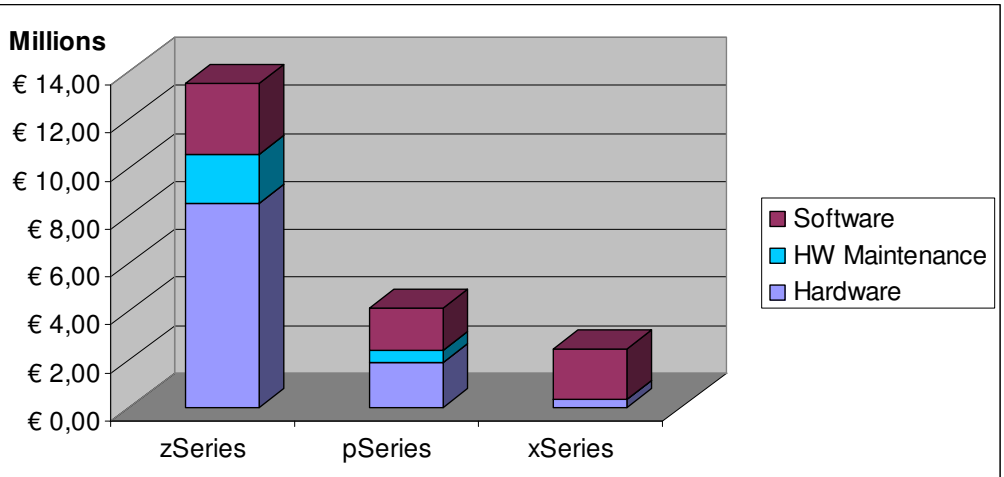
Cost of downtime ? Over 5 year



Source: Business Value of Availability, Bottom Line Impact of SAP R/3 Platform Choices, ITG, November 2003

Taking only TCA Into Consideration

Cost over 4 Years



The Total Cost of Acquisition may be a Misleading Indicator for Large Enterprise Deployments

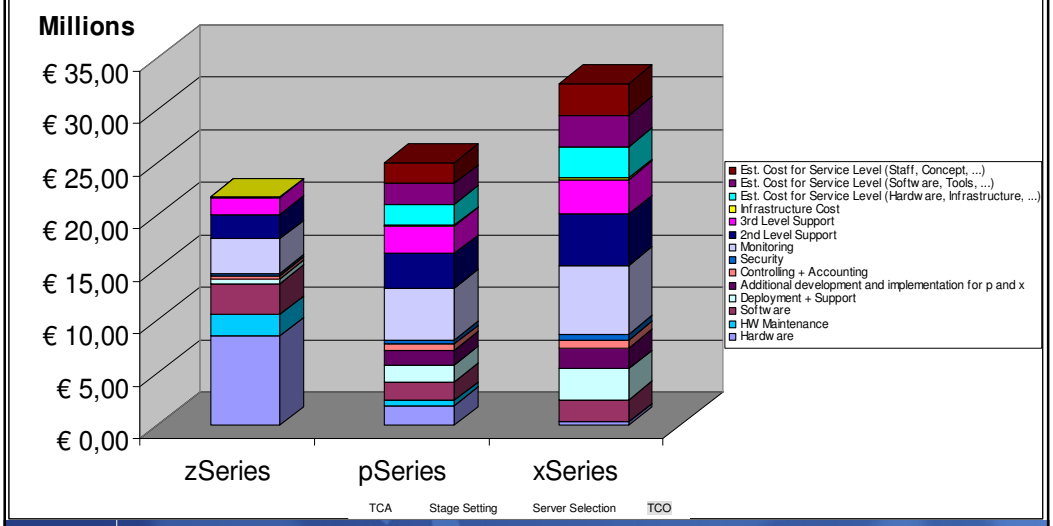
Source: Gartner; ID Number: IGG-03102004-01 - CIO Update: The March of Linux in the Enterprise

George J. Weiss
Vice President and Distinguished Analyst in Gartner Inc.

Only the Holistic View will give you the Entire Picture!

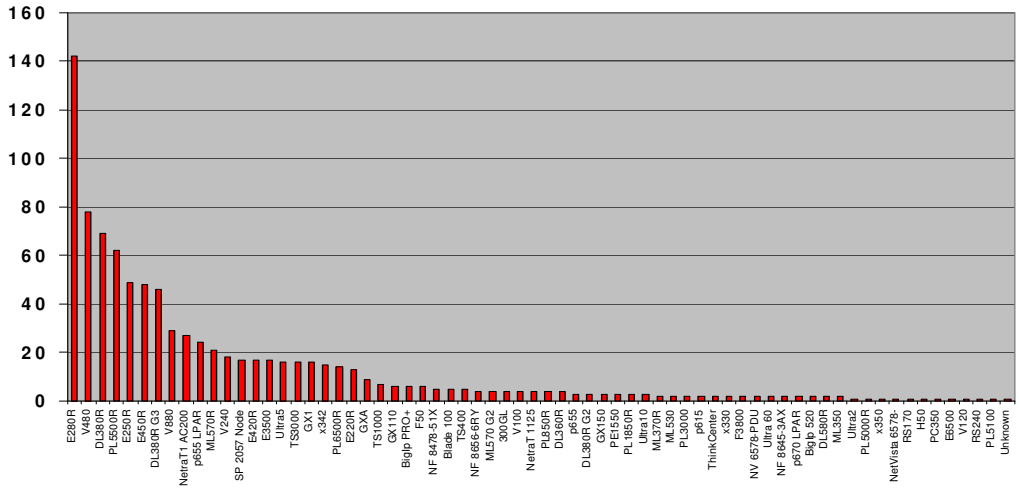
Taking Relevant Cost Into Consideration - TCO

Cost over 4 Years



How Many Servers do you have?

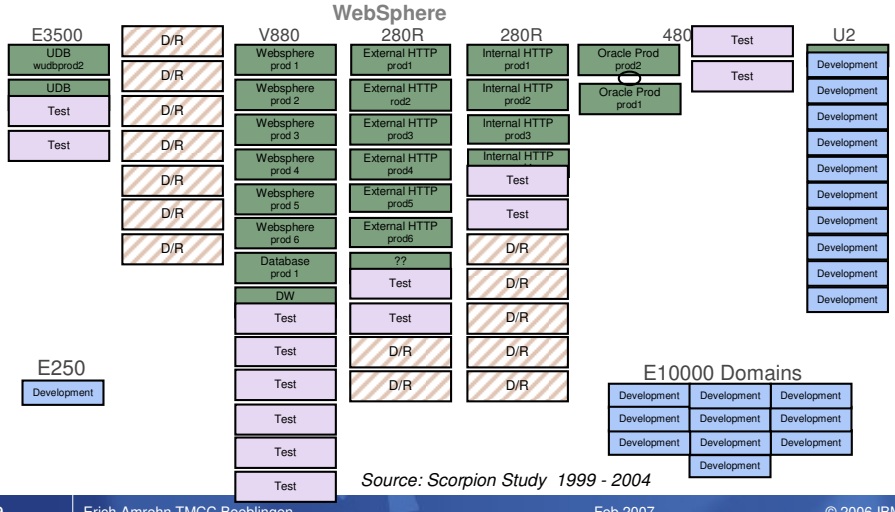
We counted 67 different models alone (40+ of those are Intel based).



Customer Example: Distributed SUN Server Solution – perception…

isn't always reality!

- **A customer thought they only had 24 UNIX servers**
  - But these were just the PRODUCTION servers
  - In addition they had 49 servers for Development, Test and Disaster Recovery



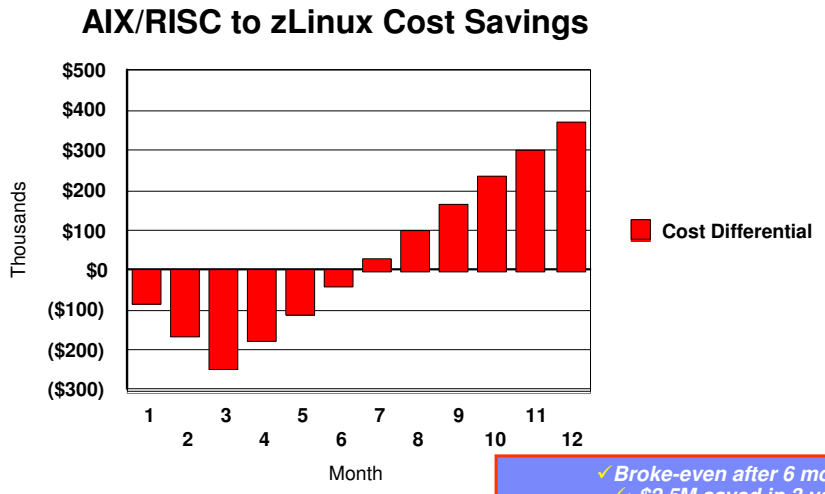
Source: Scorpion Study 1999 - 2004

Another example Bank in US

	Servers	*Reliability*	*Utilization*	*Staff*
First move: **Implemented distributed computing architecture that became** too difficult to monitor, maintain, upgrade and scale	▪ **30+ Sun Solaris servers** ▪ **560+ Intel servers**	**Un-acceptable**	**12%**	**24 people growing at 30% year**
Next move: **Consolidated back on the mainframe**	**z990**	**Much improved**	**80% with additional reserve capacity** on-demand	**Reduced to 8 people**

*Under-utilization affects the efficiency of **all** associated costs (not just the hardware but also software and labor)*

Another example: IGS US consolidates 62 images to 1 zLinux image



✓*Broke-even after 6 months*
✓*>$2.5M saved in 3 years*
✓*In Europe, $440K headcount saved in Year 1*

TCO Examples

Baldor Electric, Arkansas

'Baldor migrated to a z990 in January, and consolidated Unix-based servers onto a single IBM z990, or "T-Rex," with 24 separate, secure partitions on Linux and z/OS. According to (Baldor Electric IS director Mark) Shackleford, this has allowed Baldor to increase application performance by 40% and cut IT expenditures from 1.7% of total sales to 1.2%. He expects to get that figure under 1% by the end of 2005.

From "Tech Target August 2005

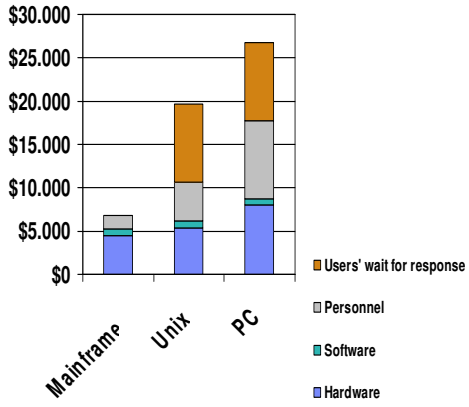
First National Bank of Omaha

Their disparate computing environment was becoming extremely expensive, requiring FNBO to hire more people as more boxes were brought online. "I looked at our infrastructure in 2002 and saw we were growing servers at a rate of 30 percent per year. For every application I had, I needed another one to five servers behind that, for things like development and application and Web serving. And every 20 servers translates to another body to administer them."

Ken Kucera, senior vice president and division head of FNBO Enterprise Technology Services

"There are plenty of other people in the same business that we are …. so we have to be able to differentiate ourselves in the quality of service that we give to our customers and the efficiency with which we operate. The most cost effective for us , on a per transaction basis, is still the mainframe environment" Kevin Campbell, Chief Application

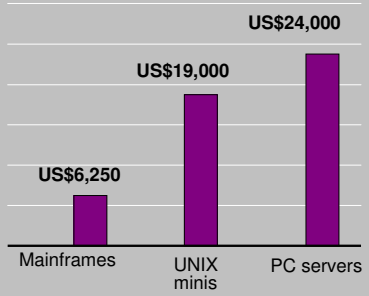
Server Support Costs



Current Total Cost per User

Arcati

Predicted average cost
per end user in 2010



Five-year costs for hardware, software and maintenance

Arcati Research 2005.
"The Dinosaur Myth 2004 Update."

Kevin Campbell Video

UNIVAR

"For Univar, the ROI model that we have used for this consolidation takes into account all of the hard costs that we're comfortable with predicting;

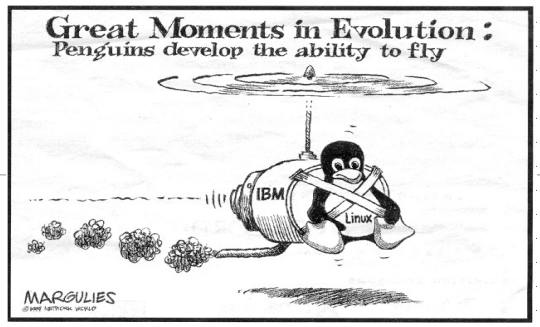
the elimination of hardware leases,

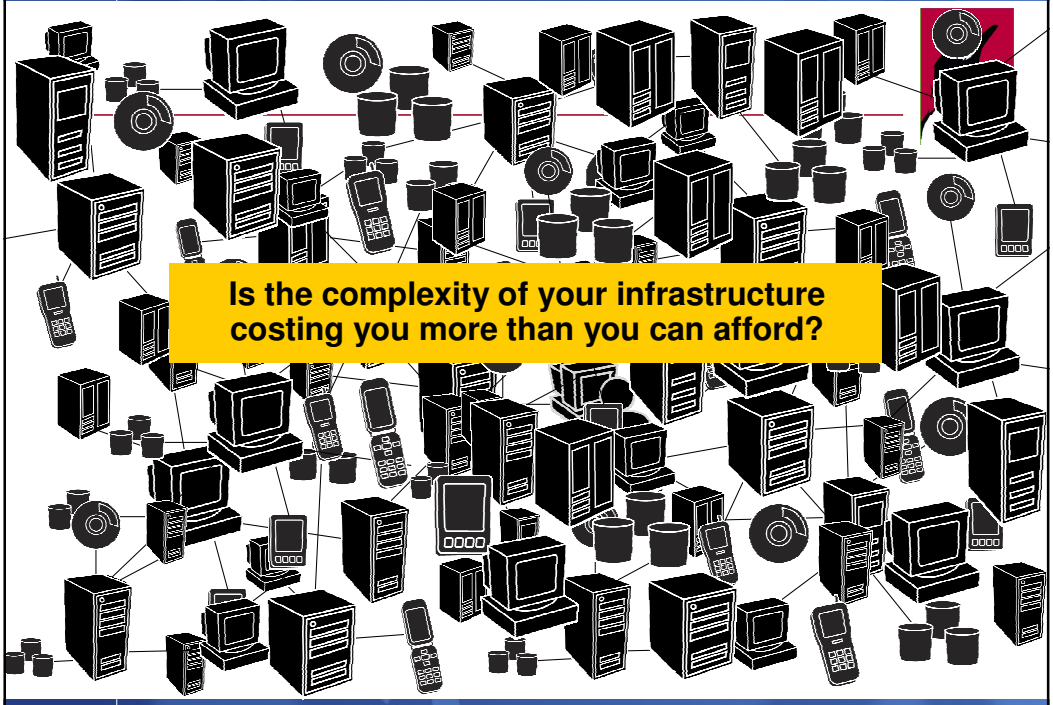
the elimination of software maintenance

suggests that we should see a return on our migration investment within three to four years.

What that doesn't try to quantify are the soft benefits such as simplifying the process we currently have to move data from platform to platform. It doesn't attempt to quantify the costs inherent in maintaining all of that. Also - eliminating racks of equipment - we have drastically reduced the cooling and power supply demands on our datacenter. All of these are what we regard as soft benefits that are well worth having, but which we didn't attempt to quantify".

4 Customer examples





Dundee City Council
Information Technology

- 90 minutes from 90% of the Scottish population

Dundee City Council
Information Technology

Facts

We Manage:

8,500 Desktops

5,000 Business Users

21,000 School Pupil accounts

350 Public access devices

Infrastructure:

Linux	Solaris		UnixWare
NT4	W2000	W2003	
Citrix	Oracle	PHP	
SAN	Blades		Z-Series

Applications:

Payroll	Social Care	Revenues
Housing	Personnel	Planning
E-Gov.	Schools Admin	Web Sites
Intranet	Active Directory	E-Mail

Policies:

Tight Procurement control

Retain ownership of Infrastructure

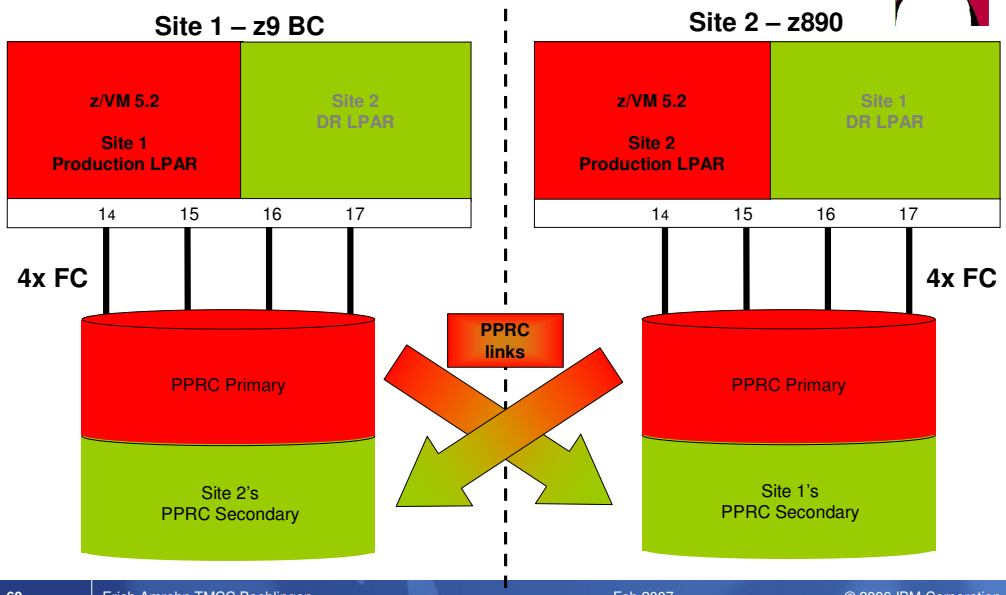
Centralised IT Budget

Centralised IT Infrastructure topology

Dundee distributed Server (51)list

Server Group	Server Name	Manufacturer	OS	Model	Database Platform	Applications Name	Ram	Disk Storage	Cpu	Application Function
Other	Macdonn02	Macdonell Douglas	Pick		Pick	?				
Windows	Nav-Master	Dell	NT4	Poweredge 2	n/a	Anti Virus	512mb	40gb	866mhz	Main Server for Anti Virus Software
Windows	Nav-external	Compaq	W2k		n/a	Anti Virus	128mb	8gb	350mhz	Main Server for Anti Virus Software on the External Network
Other	Schools Firewall	Borderware	S-core		n/a	Borderware Firewall				Corporate Firewall
Other	Council FireWall	Borderware	S-core		n/a	Borderware Firewall				Schools Firewall
Unix Intel	Casherec?	Dell	Linux Redhat 7.1	Poweredge 2	Postgres	Cash Receipting Serve	800mb	40gb	1133mhz	In house Cash Receipting system
Windows	Galaxy	Compaq	W2k		SQL	Commvault	256mb	12gb	350mhz	Enterprise Backup
Unix Intel	sserv02	Fujitsu Teamserver	Unixware 2.1.3	M754i	Oracle	Council Tax	1024mb	48gb	x Pentium Pro 200mhz	Archive Council Tax System
Unix Intel	Comms XL	Compaq	Linux Redhat 7.1	Proliant ML3	n/a	Credit Card Server	384mb		993mhz	Isdn Link to Credit Card for Cash receipting system
Windows	Datamap	Compaq	NT4		n/a	Datamap	500mb	27gb		Mapping Application
Sun	Dcas	Sun	Solaris	Netra	Cobol	Dcas	64mb	2.4gb	Sparc 117 mhz	District Courts system
Unix Intel	Ns2	Mitsubisi	Linux		n/a	DNS Server				Backup Name Server
Unix Intel	NS1	Compaq	Linux		n/a	DNS Server	320mb	24gb	450mhz	Main Name Server
Windows	NTDDC	Compaq	W2k	Proliant 2500	n/a	Domain Controller	512mb	8gb		NT Domain Controller
Windows	E-works-data01	Dell	W2k	Poweredge 2	SQL	Eworks	1000mb	20gb	2 x 1ghz Pentium III	Public Eworks Server IIS Sql
Sun	ct3500	Sun Enterprise 3500	Solaris 8	Enterprise 35	Oracle ?	First Software	6144mb	486gb	4 x 400 mhz UltraSparc	Current Council Tax System
Unix Intel	dccftp	Dell	Linux Redhat 7.3	Poweredge 2	n/a	Ftp Server	800mb	40gb	1133mhz	Architects Department Ftp server for External Companies
Unix Intel	tserv02	Fujitsu Teamserver	Unixware 2.1.3	J654i	Ingres	Housing	512mb	40gb	x Pentium Pro 200mhz	Rents/Repairs/Allocations etc
Windows	Icsjis Mail	Compaq	W2k	Proliant400	Exchange	ICSJIS	128mb	10gb		Disrtict Court Secure Mail
Sun	schools-proxy	Sun Enterprise 450	Solaris 7	E450	n/a	I-Gear	1280mb	16gb	2 x 400mhz UltraSparc	Web Proxy and Filtering
Sun	Proxy	Sun Enterprise 450	Solaris 7	E450	n/a, Oracle	I-Gear, Intranet	1280mb	88gb	2 x 250mhz UltraSparc	Web Proxy and Filtering
Windows	Planing Scan Ser	Dell	W2k	Poweredge 2	n/a	Image Server	1000mb	200gb	2 x 1ghz Pentium III	Planning and Transport Application
Unix Intel	k2backup	Compaq	Unixware 2.1.3	3000	Oracle 8	K2	1024mb	36gb	4 x 500mhz	Backup Server for k2
Unix Intel	k2	Compaq	Unixware 2.1.3	3000	Oracle 8	K2	1024mb	36gb	4 x 500mhz	Social Client Database/Home Help system
Windows	Mail-in	Dell	W2k	Poweredge 2	SQL	MailSweeper	256mb	10gb	866mhz	Virus and Content Filtering for incoming mail
Windows	Mail-Out	Dell	W2k	Poweredge 2	SQL	MailSweeper	256mb	10gb	866mhz	Virus and Content Filtering for outgoing mail
Windows	legal-mf-001	Compaq	W2k		n/a	Metaframe Server	512mb	36gb	500mhz	Application Server
Windows	sserv-mf-001	Compaq	W2k		n/a	Metaframe Server	1024mb	36gb	4 x 2.4 mhz	Application Server
Windows	sserv-mf-002	Compaq	W2k		n/a	Metaframe Server	1024mb	36gb	4 x 2.4mhz	Application Server
Unix Intel	tserv03	Fujitsu Teamserver	Unixware 2.1.3	J532i	Ingres, Oracle	OfficePower	512mb	40gb	2x 133 pentium	Planning, Teacher Staffing Database
Sun like	tserv01	Fujitsu Teamserver	DRSnx 7mp	H422s	n/a	Officepower, Samba	128mb	14gb	2x 50mhz Sparc	Previous Word Processing System
Unix Intel	tsrv6003	Fujitsu Teamserver	Unixware 2.1.3	J532i	Ingres	OfficePower, Uniq, Sam	512mb	30gb	2 x 133 pentium	Corporate Print Server, Share provision for Telephone database, Housing Debtors system
Unix Intel	sserv01	Fujitsu Teamserver	Unixware 2.1.3	J654i	Ingres	Powersolve	768mb	45gb	x Pentium Pro 200mhz	Ledger System 3rd Party
Windows	SmartCard	Compaq	Win2k		?	Smart Card	1024mb	50gb	1130mhz	Smart Card System
Windows	twserver1	Dell	W2k	Poweredge 2	n/a	Teamware	1000mb	60gb	2 x 1ghz Pentium III	Teamware Calendar Server
Windows	Twdir	Dell	W2k	Poweredge 2	n/a	Teamware	1000mb	60gb	2 x 1ghz Pentium III	Teamware Directory Server
Windows	Twmail1	Dell	W2k	Poweredge 2	n/a	Teamware	1000mb	60gb	2 x 1ghz Pentium III	Teamware Mail Server
Windows	Twmail2	Dell	W2k	Poweredge 2	n/a	Teamware	1000mb	60gb	2 x 1ghz Pentium III	Teamware Mail Server
Windows	Twmail3	Dell	W2k	Poweredge 2	n/a	Teamware	1000mb	60gb	2 x 1ghz Pentium III	Teamware Mail Server
Windows	tw spare	Dell	W2k	Poweredge 2	n/a	Teamware	1000mb	60gb	2 x 1ghz Pentium III	Teamware Spare Server
Unix Intel	Test2000	Fujitsu				Unused	1024mb	40gb	4 x 450mhz Xeon	Test system
Windows	sserv-mf-data01	Compaq	W2k		n/a	W2k Server	780mb	72gb	1400mhz	Data Server for 3 previous systems
Sun	WWW	Sun	Solaris 7	Ultra 5	n/a	Web Server	320mb	30gb	250 Mhz Sparc ??	Council Web Server
Windows	Webstats	Compaq	W2k		n/a	Webstats	130mb	8gb	200mhz	Personnel Intranet
Windows	New-Webstats	Dell	W2k	Poweredge 2550		Webstats	1000mb	20gb	2 x 1ghz Pentium III	Web Statistics Server
Windows	ISE	Compaq	W2k		n/a	Workflow	756mb	90gb	2 x 550mhz	Finance Dept 3rd Party Workflow/document Management System
Other	EMC	Clarion FC4700								EMC SAN to Support the previous 7 servers
Windows	Icsjis Firewall	Compaq	w2k	Proliant800	n/a		128mb	4gb		Firewall for District Court/Scottish Office
Unix Intel	Schools Test We	Tulip	Linux Redhat 7.?				64mb	10gb	200mhz Pentium Pro	Test system
Windows	Old Cash Reciepting		Winnt	AMD					200mhz ??	

Dundee CC final picture 2005

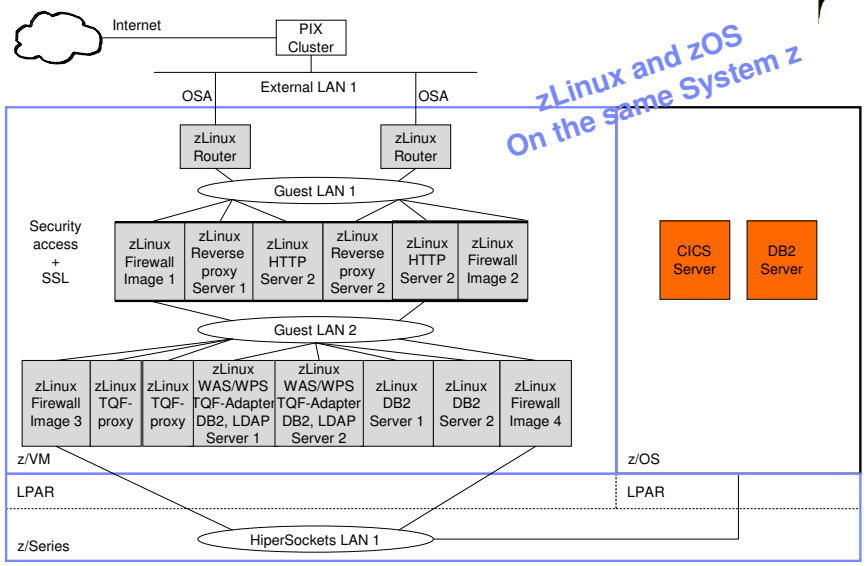


GaVI Domino and Insurance framework

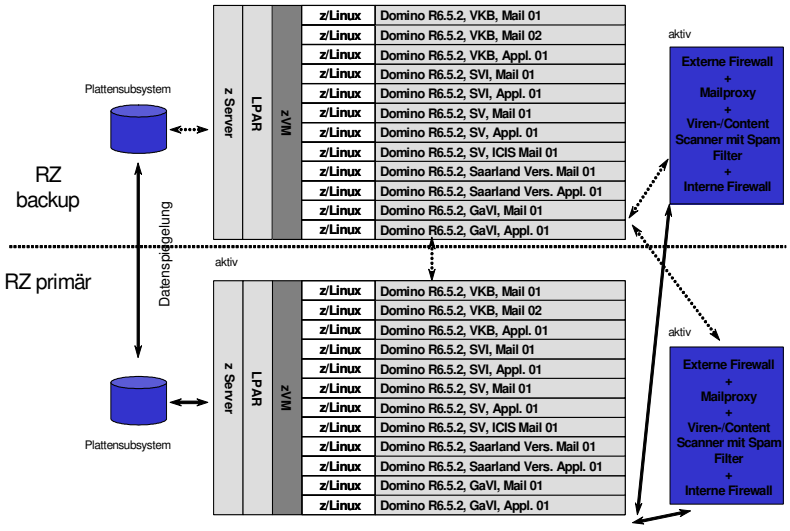
Gesellschaft für angewandte Versicherungs-Informatik mbH

- **Timeline**
  - Started 2003 discussion of a new insurance Infrastructure
  - 2004 build the first PoC and started Domino discussion
  - 2005 Domino PoC and production, adding test&dev. Servers (2xz990 14IFLs)
    - Problems with the setup due to z/VM 2GB constraints, and Domino mem. leaks
  - 2006 full production Domino 15000+ user (2 x z9 14IFLs)
    - In addition we have many Linux and WAS test systems fro development etc.

WebSphere-environment Virtualization on IBM System z



Productions environment for Domino Linux for System z

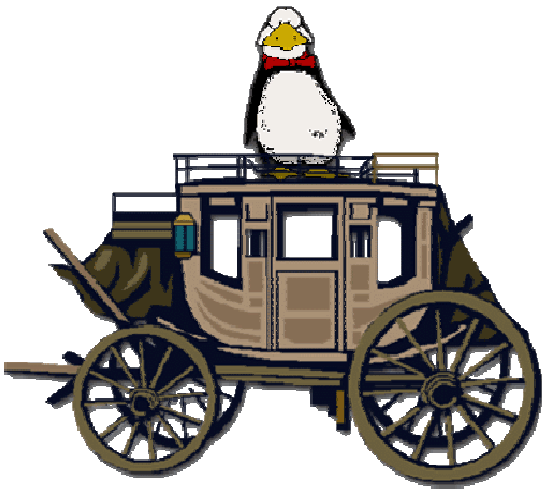


NRI Japan

LinuxWorld Tokyo key note speech by Toru Kanazawa, Managing Director, Group IT Strategy Department Nomura Holdings,inc.
http://www.computerworld.jp/topics/srv/41121.html

Nomura Research Institute adopted solutions rebuilding the backend mission critical database servers by Linux(Novell SUSE Linux), IBM mainframe (IBM System z9), and Oracle Real Application Clusters. This mission critical system has already been running, and Mr. Kanazawa says "the system shows the performance to process 1,000 transactions per second now." He also says that "the performance will reach over 2,000 transactions per second by judging from the current CPU usage."

Linux on the Mainframe at Wells Fargo



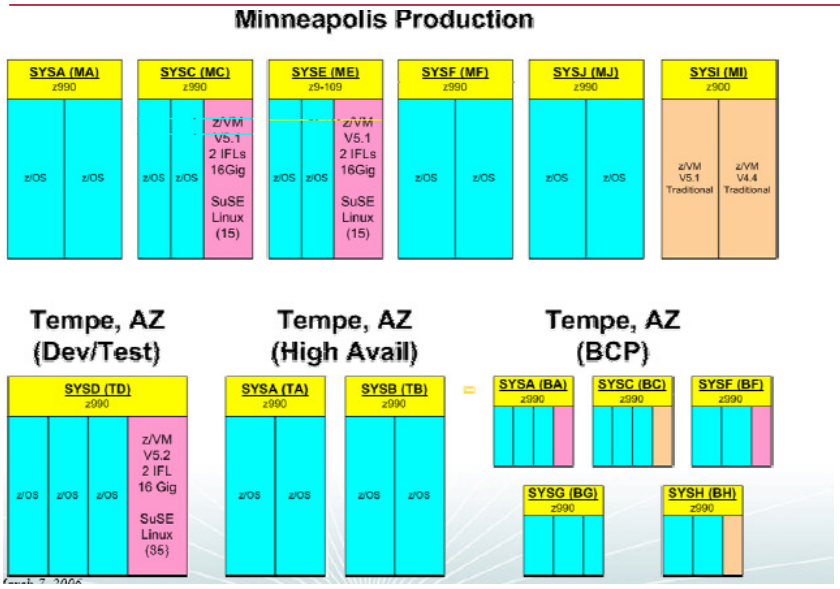
Marcy Cortes

Presented at Share 2007

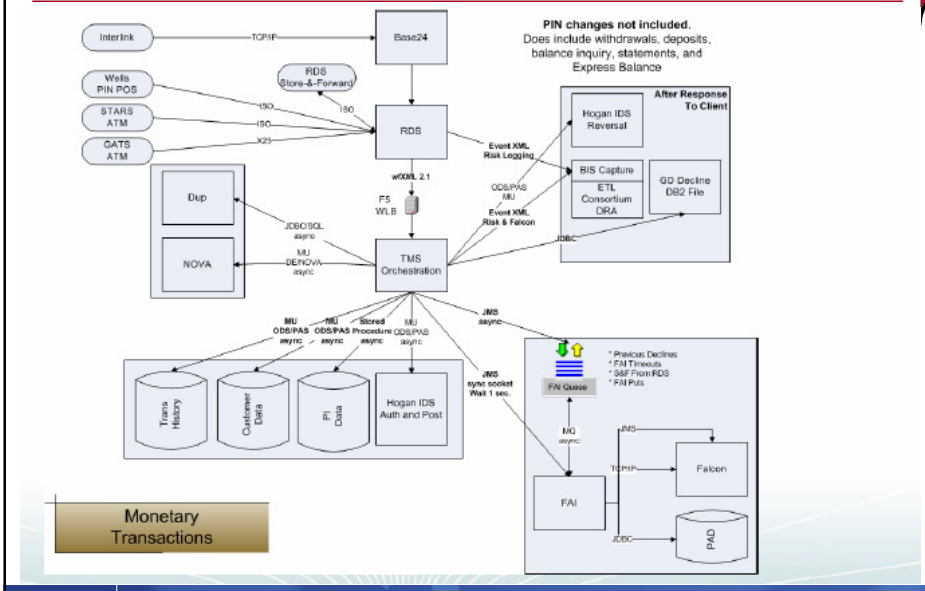
Wells Fargo History

- **Dec 2001 moved some internal website to Linux on zSeries (9762-G5)**
- **2002 added phone book, MySQL and Perl servers, Backup of Intel TSM**
  - Internal hurdles ----- security, resistance from other groups
- **2003 more internal web servers**
  - Project stopped mid 2003 until there will be
    - Deployment and maintenance product
    - Proper hardware (zSeries, DASD, new z/VM LPARs)
- **4Q2003 turning point Management buy-in (reorg and IBM influence)**
  - Moved existing 20+ server from G5 to z900 IFL
- **2004 more servers WAS, Oracl, TMS appl. (WAS-AS & MQ) 2 add. IFLs z990**
- **2005 more servers test & development added more IFLs (4) and Memory (8GB)**
- **2006 adding serves on a weekly base new projects & split off test & dev, prod.**
  - RMD appl., Lien appl., EPS/OpsCons appl, Cash Vault CVS appl., test-servers

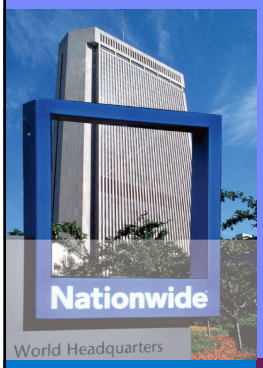
Wells Fargo Mainframe environment



TMS Architecture



ONE IT COMMUNITY



Nationwide

zLinux virtualization @ Nationwide

Guru Vasudeva, AVP & Chief Architect, Jim Vincent, Rick Barlow Presented at Share 2006

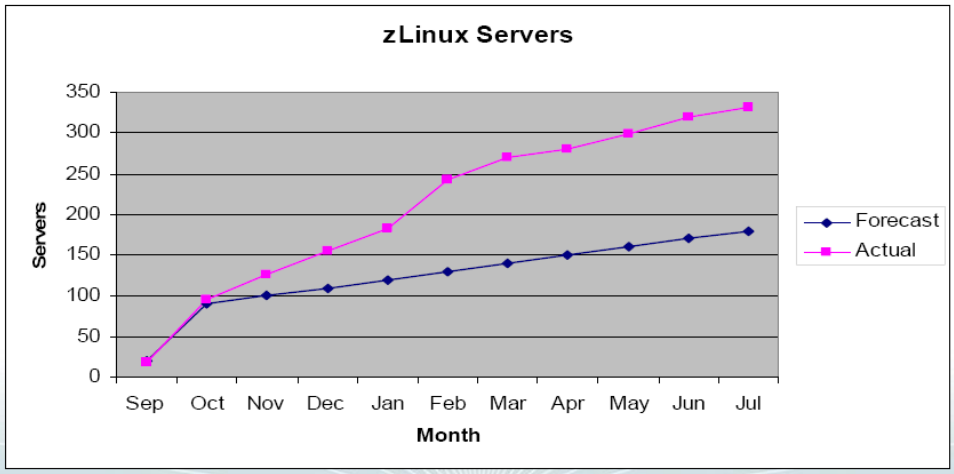
Nationwide On Your Side™

Nationwide History

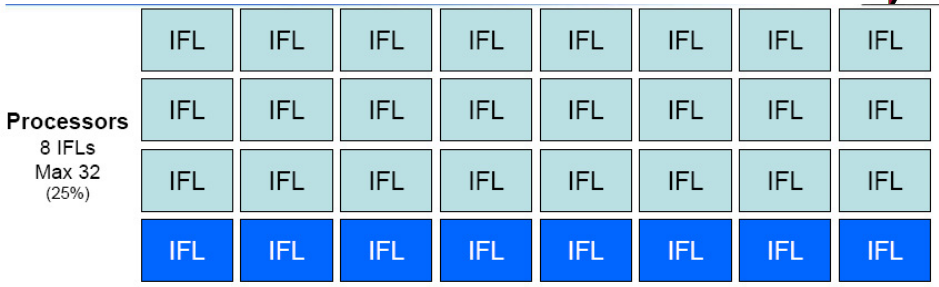
- **2000 Marist distribution (built in-house to play around)**
- **2002 SUSE SLES 7 (demo of Apache and Samba) no interest**
- **2004 ReHat Poc Intel, pSeries, zSeries**
- **2005 The fun begins, new emphasis on virtualization (fasten your seat belts !!)**
  - PoC with 3 applications demand grow to 7 and more requests ASAP
  - J2EE, WAS, WAS-portal, DB2
  - Plan was to have about 120 virt. Server by YE2005
- **2006 more virt. Server ~600+ by YE2006**

Be careful what you ask for! ☺

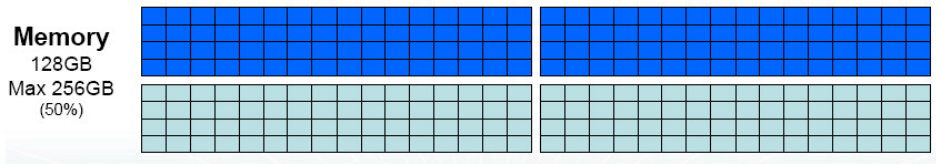
*And I thought we were busy **before** we got Linux!*
Rick Barlow, Aug 1, 2006

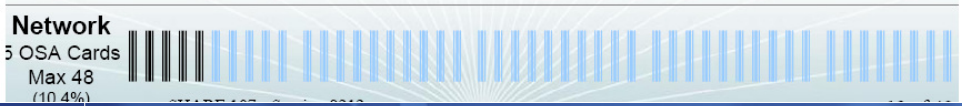


IBM z9 Platform (test&dev) 1Q2006



Max MIPS on the z990 is >10,000. zSeries Linux (dev/test + prod) has already out-MIPd the z/OS & z/VM traditional z environments combined!





Vision and Expectations

- Physical space and environmental reduction
  - One z990 IFL engine can support 10-30 (or more) virtual servers
  - A z990 can have up to 32 IFL engines so it *could* replace 300+ servers **Fact: we have 330+ large servers running on 15 IFLs between two z990s**
  - Significant savings in physical space, power, cooling
- Reduce network complexity
  - A small number of physical network connections (OSAs with VSWITCH) can support all of the virtual servers in contrast to every stand-alone server having 2 or more interfaces it must manage
- Quicker provisioning
  - Setting up new server can be as fast as your disk copy tool
    - Depends on software needed on server and amount of manual effort

So, where are we now?

- zLinux Total Cost of Ownership is far lower, provides faster roll-out (provisioning) and more services (DR) are included than any other platform alternative
- Over 330 virtual Linux servers active as of Jul 25 2006
- 12 live production applications as of Jul 25 2006
  - http://www.nationwide.com – the web front door to Nationwide Insurance (try it – see for yourself!) It was tested at 22 times its anticipated peak and still performed acceptably
  - More production applications in progress
- Latest forecast shows that we will have over 800 virtual servers before year-end 2006 and that is just the *start* of the growth
- zLinux currently estimated to save **over $16 million dollars** over the next three years

What are the overall benefits?

- **Significantly Better TCO – $16million savings over 3 years**
  - More than 50% reduction in web hosting monthly cost
  - Significant savings on middleware costs (WebSphere, UDB, Oracle, etc.)
  - Significant Data center floor space (80% reduction) and power conservation.
  - Higher CPU utilization
  - 50% less FTEs are needed to support hardware & OS due to shared read only libraries
    (Standalone Unix environment 1FTE:30 Servers; zSeries Virtualized environment 1FTE:80 Virtual Servers)
- **Significantly Faster Provisioning Speed**
  - Reduce web hosting environment provisioning from months to days
- **Dynamic Allocation of Compute Power**
  - Allocate more compute power to applications when they need it
  - Ability to dynamically upgrades compute power – On Demand Model
- **Leverage tried and true technology over 40 year for virtualization**

Question's ???

