The Modern Mainframe – At the Heart of Your Business

Consolidate and Save with Mainframe Linux

ODI is Wasting Money!

Your last report showed an average utilization of less than 5% for our distributed Linux servers – isn't that wasteful?
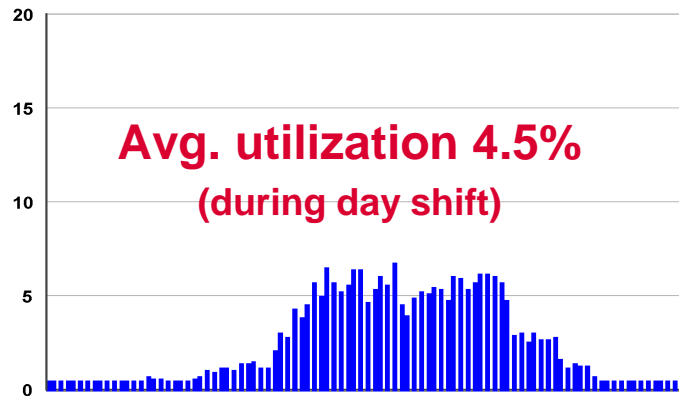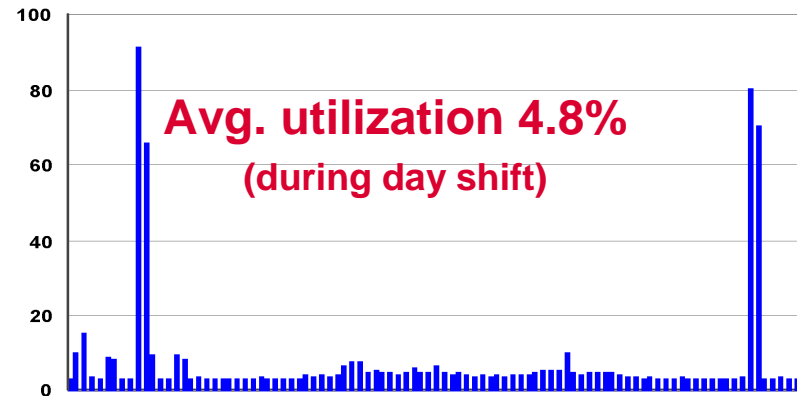
**On Demand Insurance
CEO**

**On Demand Insurance
CIO**

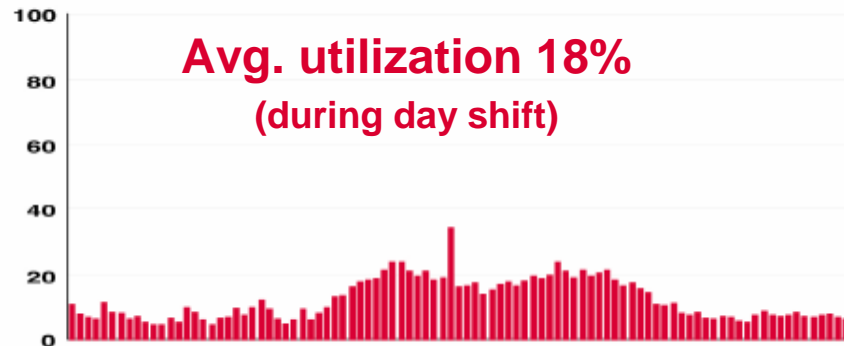# UNIX and Windows Server Utilization – Typical Examples

App Server, Prod, PL6400R 4-way, Win2K

Avg. utilization 4.5%
(during day shift)

Exchange, Prod, PL 6400R 1-way, Win2K

Avg. utilization 4.8%
(during day shift)

App Server, Sun E10000 24--way, Solaris

Avg. utilization 18%
(during day shift)

Mainframes Aggregate Daytime Utilization 70-100%
Unix Servers Aggregate Daytime Utilization 15-20%
Windows Servers Aggregate Daytime Utilization < 5%
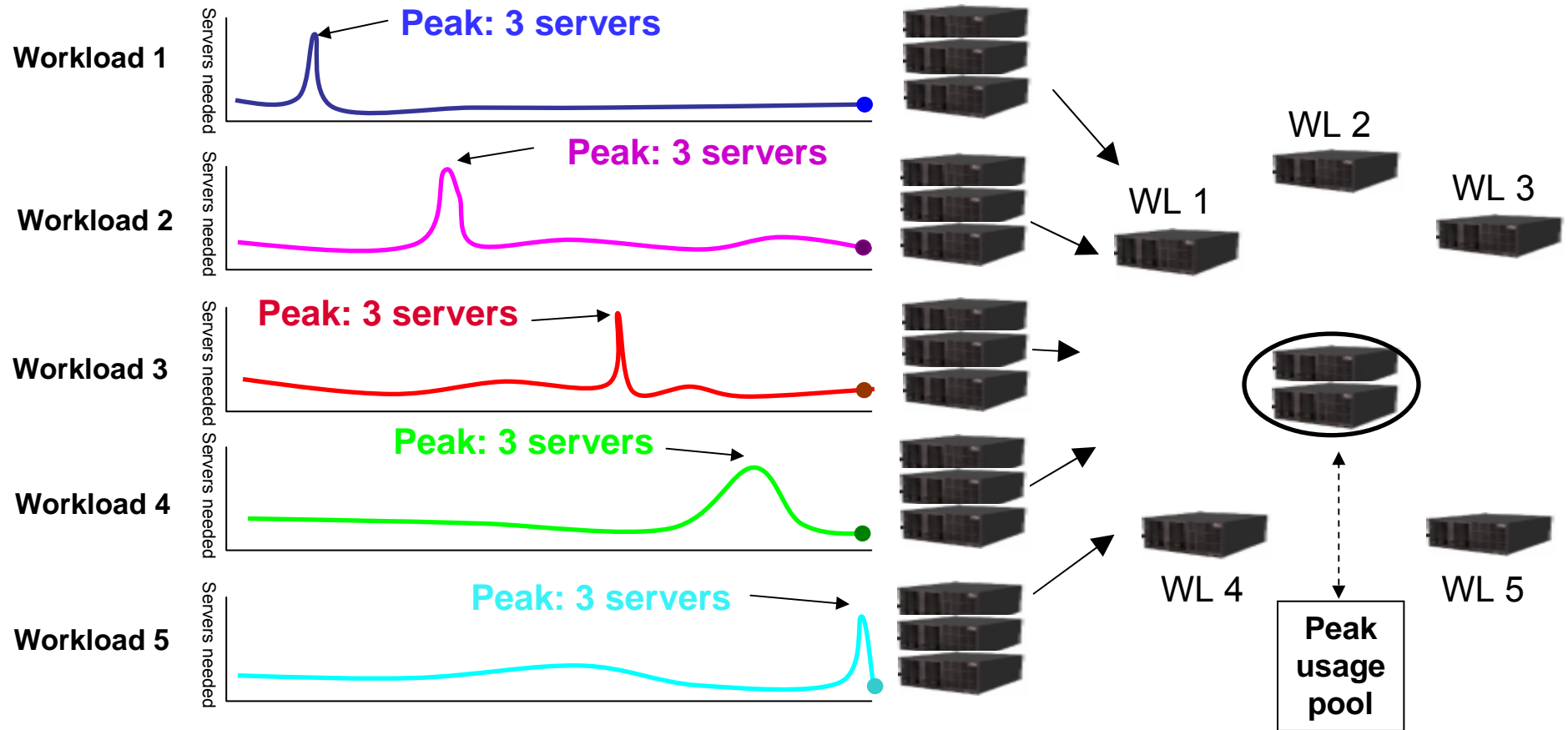
Sprawling Server Farms Are Also Costly To Manage

- **A Financial Services Company**
  - ▶ 68 Windows support staff at $100K/year, fully burdened
  - ▶ 16 servers per person
  - ▶ $6,000 per year per server for labor

- **Another Financial Services Organization**
  - ▶ 7 Windows support staff at $125K/year fully burdened rate
  - ▶ 19 servers per person
  - ▶ $6,500 per year per server for labor

Source: IBM Scorpion Customer Studies

Why Does Server Sprawl Happen?

- **Applications cannot run together**
  - ▶ Distributed server architecture strongly favors single application deployment
    - – Low level hardware architecture affects performance & integrity
    - – Need to isolate applications from intrusive software maintenance (reboot!)

- **Many sets of servers required per application**
  - ▶ Production, Development, Testing, Disaster/recovery, Training, Support
  - ▶ New versions require new stacks, often leading to new server-sets

- **Branch-style deployment scaled out over time or through acquisitions**

- **Deployed by different lines of business using 'private' resources**
  - ▶ Ease and speed of acquisition and deployment
  - ▶ Little concern for standardization
  - ▶ Centralization is perceived as slow, inflexible & expensive
  - ▶ Politically difficult to centralize important line of business resources

Theoretically Run the Same Workloads with Less Resources

Workload 1 — Peak: 3 servers

Workload 2 — Peak: 3 servers

Workload 3 — Peak: 3 servers

Workload 4 — Peak: 3 servers

Workload 5 — Peak: 3 servers

WL 1 · WL 2 · WL 3 · WL 4 · WL 5

Peak usage pool

What's Required: Virtualization and Intelligent Workload Management to Accommodate Shifting Workloads – automatic on the mainframe!

Mainframe Supports Virtualization and Workload Management

- Virtualization is where the available resources remain pooled

- Each OS sees a 'truly virtual' machine

- As workload demands, real resources are *dynamically* allocated

- Enables massive over-commitment of real resources

- Works well for real-life, mixed business workloads

- Works significantly better on mainframe hardware
  - Mainframe architecture is "shared-everything", distributed is not

- Extremely fine granularity in memory, CPU, I/O bandwidth etc.

Consolidate Branch-style Linux Workloads onto System z to Save Money

New York

Tokyo

London
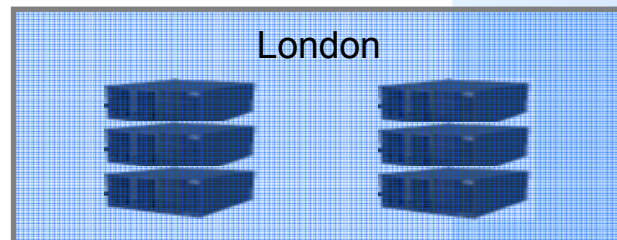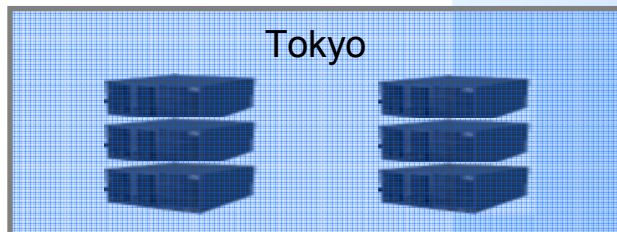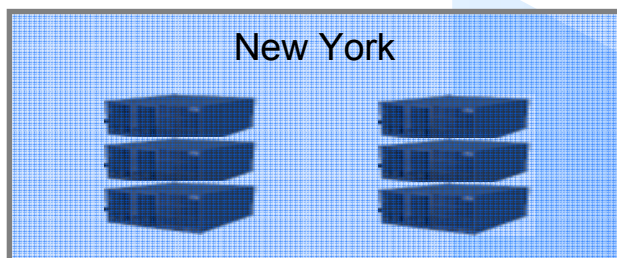
5% utilization

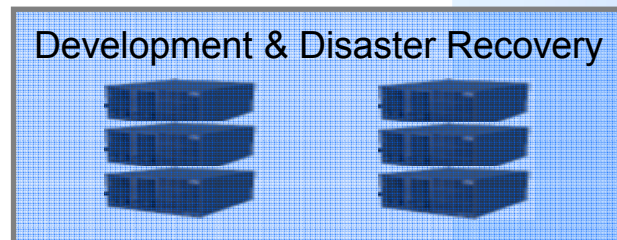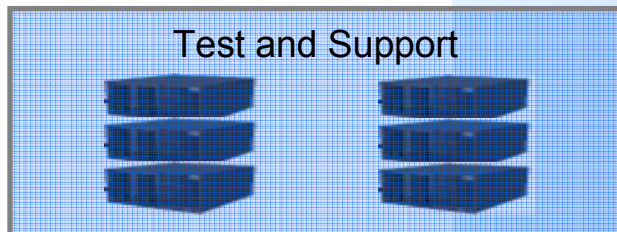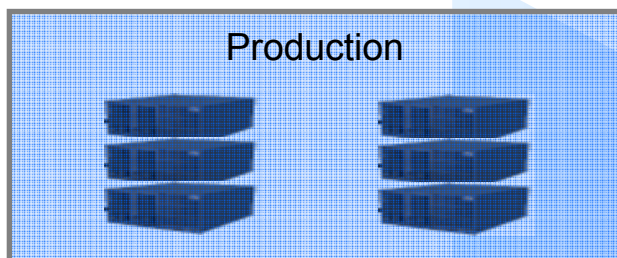**Local staffing and infrastructure required in each location**

95% utilization of fewer processors

All of the qualities of services of the System z platform

Consolidate Server Farm Linux Workloads onto System z to Save Money

Production

Test and Support

Development & Disaster Recovery

5% utilization

**Separate servers for each task – all require infrastructure, staff**

95% utilization of fewer processors

All of the qualities of services of the System z platform

Integrated Facility for Linux (IFL) Makes Linux Consolidation Even More Attractive

- **Same as general purpose processor**
  - ▶ Specifically limited to Linux workloads

- **Attractive pricing**
  - ▶ Hardware is $95K - $125K per processor one time charge (14% of general purpose price)
  - ▶ IBM Linux middleware is charged one license per IFL
    - − The same rate as a distributed processor

- **Requirements**
  - ▶ z9-109, z990, z900, z890 or z800 hardware platform
  - ▶ No z/OS requirements
  - ▶ No limit on the number of IFLs
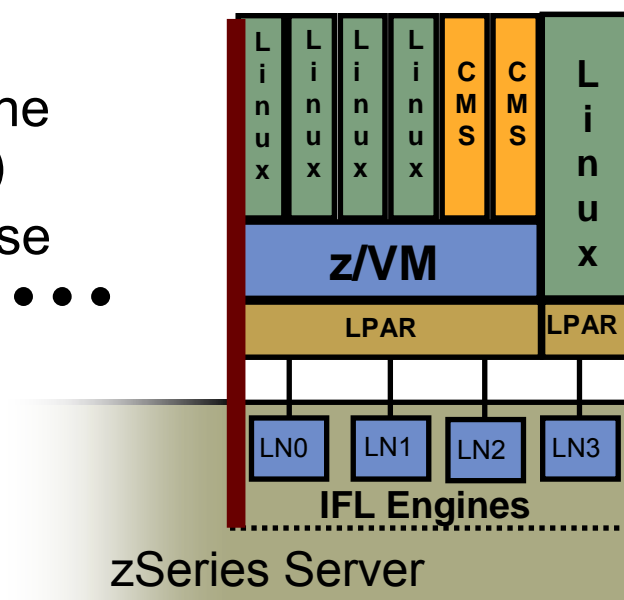
DEMO: Linux Server Provisioning

- ODI wants a proof-of-concept of automated provisioning
  - ▶ Allow developers and testers to obtain machines immediately
  - ▶ Fully configured machines 'created' in minutes

- For their POC, the ODI mainframe system administrator decides to 'learn a little Linux'
  - ▶ There are tools from IBM and others for automated provisioning…
  - ▶ …but also plenty of freely accessible tools and redbooks

- Let's see what they managed to create…

ODI Will Save with Linux Consolidation

$1.1M saving over 3 years

60 Linux Servers
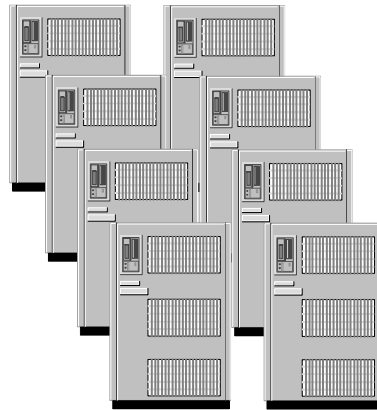
1 IFL

	Distributed Linux/Intel @ low utilization				Mainframe IFL @ high utilization			
	Unit cost	Quantity	Sub Total	3 year total	Unit cost	Quantity	Sub Total	3 year total
Hardware & OS - every 3 years	$4,000	60	$240,000	$240,000	$125,000	1	$125,000	$125,000
HW Maintenance		Included			$19,944	1	$19,944	$39,888
VM virtualization		N/A			$22,500	1	$22,500	$22,500
VM S&S (25%)		N/A			$5,625	1	$5,625	$16,875
Annual Linux support	$1,000	60	$60,000	$180,000	$14,000	1	$14,000	$42,000
OTC Software license – WAS*	$4,000	60	$240,000	$240,000	$4,000	1	$4,000	$4,000
WAS S&S for 2 years	$800	60	$48,000	$96,000	$800	1	$800	$1,600
Annual labor for support	$3,333	60	$200,000	$600,000	$60,000	1	$60,000	$180,000
Annual power & cooling	$920	60	$55,188	$165,564	$920	1	$920	$2,759
Grand Total				**$1,521,564**				**$434,622**

* IBM WebSphere Application Server for Linux

Background to Financial Case Study

- **Approach**
  - Compared the costs of 60 distributed Lintel servers doing Web (including some J2EE), File and Print Serving and one IFL
    - 60 distributed servers to 1 IFL is a typical ratio according to customer studies
    - OS standardization and guest automation enables significantly lower staffing
  - Used a 3 year horizon, savings continue linearly over longer (eg. 9 years)
 - Included hardware maintenance and software support

- **Assumptions**
  - PC service included in the price
  - Base WAS used, 1st year's service included in license
  - Used z/VM to optimize virtualization, 24 by 7 hour operation
  - PC servers consume 400W each, 15¢/kWh
    - Cooling costs ~ power costs
  - Cost of capital/inflation ignored

Staffing ratios and costs for distributed versus mainframe consolidated environment from customer data Nationwide in USA, DGTIC (Directorate General of Communication & Information Technology) in Canada

Hannaford Supermarket Chain Goes Real Time with Linux on System z

- North-eastern United States supermarket chain

- Reduced costs while improving customer and partner satisfaction using Linux on System z

- Consolidated 300 store servers on to a single mainframe
  - ▶ Running 62 virtual servers instead
  - ▶ Orders now direct from the aisles, just-in-time inventory management
  - ▶ Introduced new web portal for business partners
  - ▶ Significant labor savings across the IT organisation

- See http://biz.yahoo.com/iw/051205/0103015.html

300 servers

. . .

1 System z server
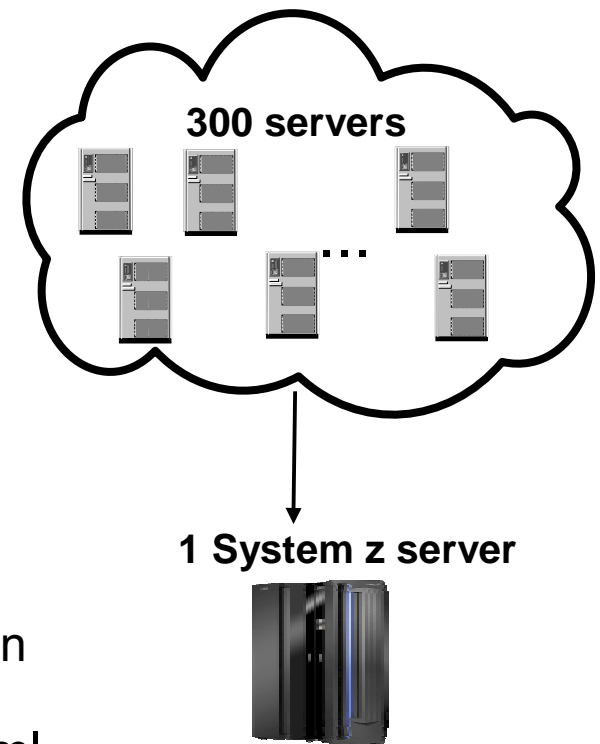
"The only way we'd consider consolidating critical data from hundreds of servers onto one system was by choosing an IBM mainframe for its legendary reliability and availability,"

Bill Homa, senior vice president and CIO of Hannaford
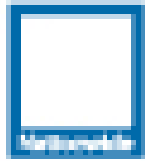
Nationwide Saves $16+ Million with Linux on System z

- **Nationwide** is a US-based Fortune 100 insurance & financial services company
    - $21B+ revenue, 30,000+ employees (6,000 in IT)

- **Situation:**
    - 5000+ distributed servers under management with low utilizations
    - Linux and J2EE being used for new applications, with no single point of failure

- **Problems:**
    - High TCO including data center power and floor space scarcity (new facility would cost $10M+)
    - Long server provisioning process
    - Need to "over-provision" for peaks leading to inefficient utilization

- **Solution:**
    - Server Consolidation using System z Virtualization (System z990, IFLs, z/VM…)

- **Result:**   <u>Vastly improved TCO, Speed & Simplification</u>
    - 50% reduction in Web hosting monthly costs, 80% reduction in floor space & power conservation
    - 50% reduction in hardware & OS support efforts; significant savings on middleware costs
    - 350 servers virtualized with 15 z990 IFLs, supported by 3 FTEs
        - 12 mission critical applications with 100,000+ users/day
    - Fast deployment (4 months)
    - Significantly faster provisioning speed (months → days)
        - Provisioned 22x the anticipated load for SuperBowl AD using CoD (1 processor for 2 weeks)
    - Dynamic allocation of compute power eliminates need to "over-provision"
    - Simple, robust mainframe high availability & disaster recovery

PGATOUR.COM Move to Utility Computing with Linux on System z

- PGATOUR.COM website provides fee-based live golfing data and views

- Faces huge surges of demand for the application when events are ongoing

- An early Linux adopter across their entire shop, wanted to use Linux

- Serve the main PGATOUR.COM application from virtual Linux servers
  - The System z server is hosted by IBM
  - PGATOUR.COM only pay for the capacity they use
  - Linux servers are automatically provisioned on demand
  - Save the time and expense associated with many new Linux servers
  - Application won a 2005 Emmy award (Emmy for Outstanding Achievement in the category of Advanced Media Technology)
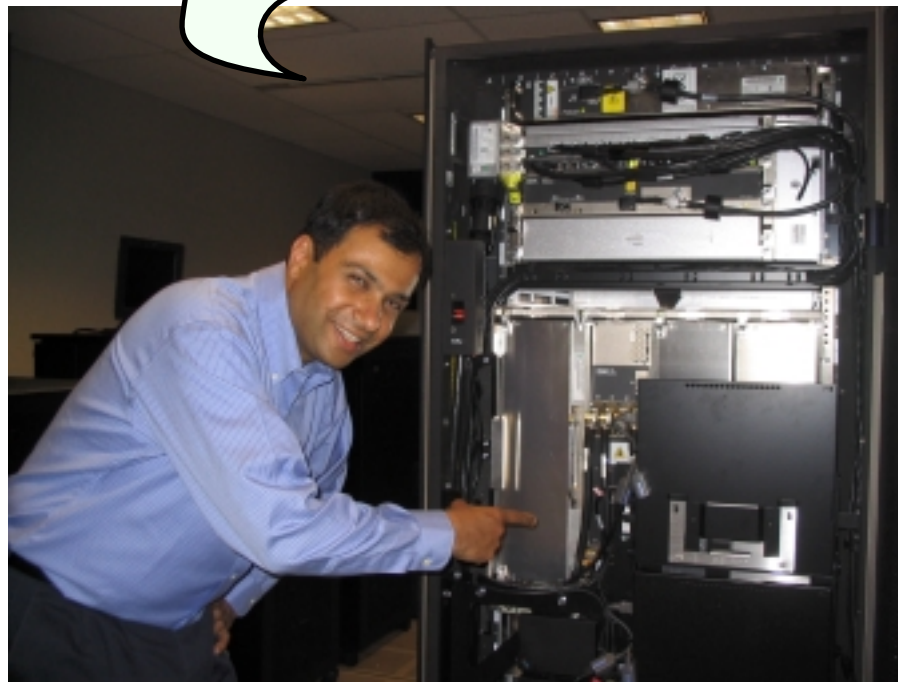
- See http://esj.com/news/article.aspx?EditorialsID=396

"On Sunday night at 6:00 p.m., there's not much planning you can do for the next day. You can't just roll a pile of servers in for Monday morning…"

Steve Evans, PGA TOUR's Vice President of Information Systems

ODI Linux Server Consolidation Solution

I saved $3.1M over 9 years by consolidating our Linux servers to System z!

On Demand Insurance CIO