



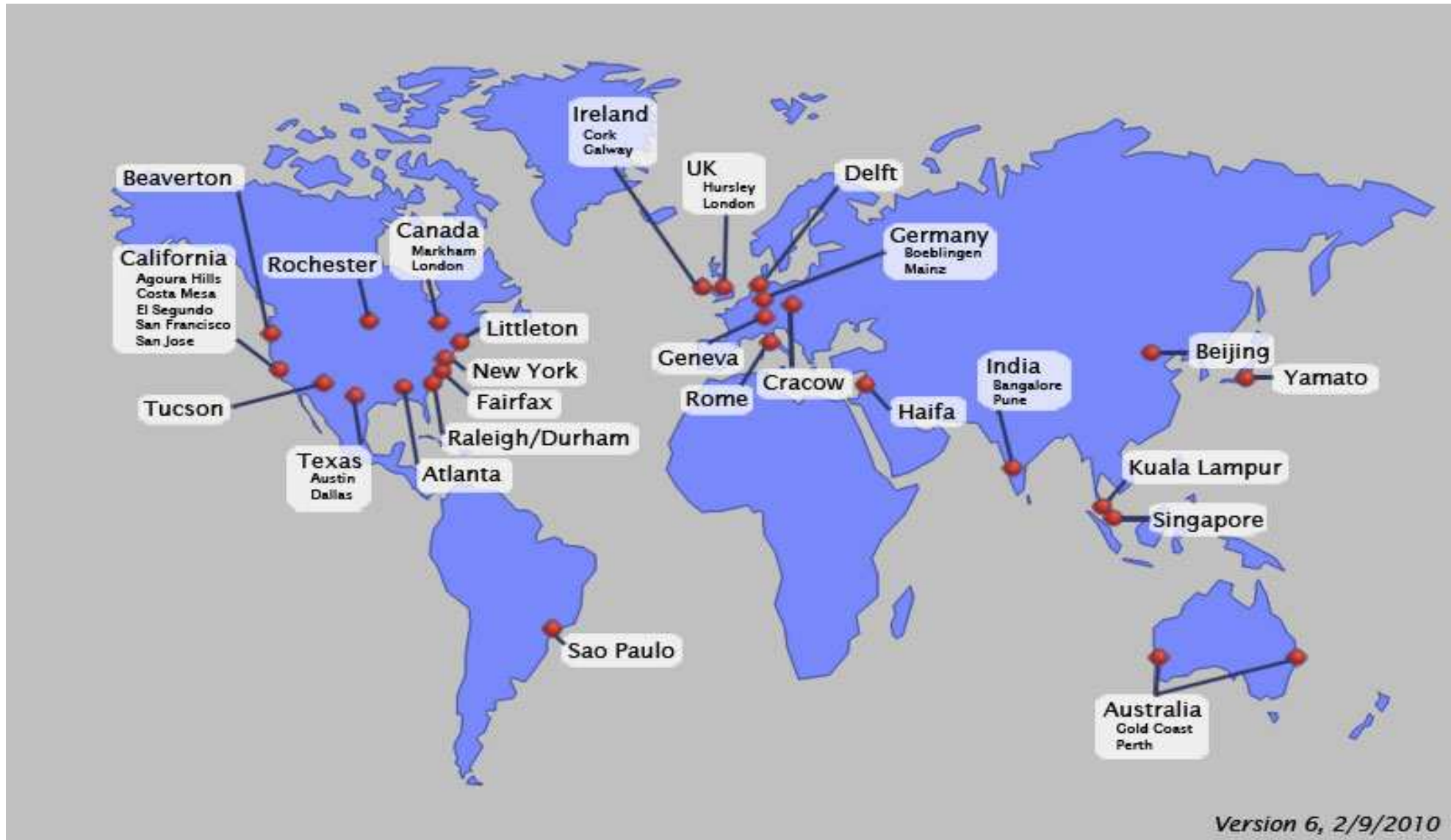
IBM Tivoli's Business Transformation Leveraging Cloud

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- Introduction
- Approach
- Lessons learned
- Implementation detail
- 2010 strategy
- Summary





* Geographically dispersed team of ~6000 team members

Tivoli's approach to delivering IT needed to become *smarter* ... about delivering "services"



- IT footprint expanded to 38 labs through growth and acquisitions, creating inefficiencies, increased capital & operational expense
- The growing complexity of our IT systems demanded that sprawling processes become standardized services that are efficient, secure and easy to access
- A **Service Management System** to provide visibility, control and automation across IT and business services to ensure consistent delivery
- New model consumption and delivery for IT services

Deliver automated IT services to support dynamic needs of an agile focussed Development organization

Reduce capital expense and maximize existing investment

- Underutilized hardware: average of 5-9% utilization per server
- Duplication in the capital request and procurement process

Standardize & Automate end-user services and mitigate schedule risk

- Provide predictable, rapid access to reserve, provision and deploy servers
- Development and IT labs had a variety of tooling from homegrown to matured implementations
- Teams heavily leveraging hypervisor mgmt tools, images were everywhere!!
- Infrastructure and virtualization strategies not unified

Learn how to more to effectively manage resources and IT services in the cloud with Tivoli Service Management

- Our teams needed educating on Tivoli's solution capability
- Development, Test teams saw the face of IT as a 'ticket system'



- Consolidate underutilized IT resources into larger, denser, scalable clusters
- Pool resources
- Manage and control pooled resources

Consolidate

Lab Consolidation Plan

Centralize

Infrastructure Anchor Sites

- Establish an enterprise data center strategy that aligns with the business needs, continuity requirements and geopolitical considerations
- Implement strategy to all locations and geographies including site relocation, consolidation, and new construction

- Reserve resources for applications through standardized images
- Provision and de-provision resources based on reservations
- Manage workloads with advanced scheduling, integrated security and information virtualization

Virtualize

Implement vCells

- Define virtual resources to separate physical IT resources from its use to deliver services
- Establish single management system for virtual resources
- Integrate security and workload management
- Schedule and control virtual resources based on application requirements and SLAs

Automate

Utilize TSAM

- Optimize workloads to maximize performance and efficiency
- Prioritize workloads to attain SLAs
- Move workloads to appropriate virtualized infrastructures to reduce costs
- Define policies for workload management
- Schedule and orchestrate workloads based on policies

Orchestrate

Leverage ISM Stack

Over 12month period, avoided over 40% capital and 15% in expense through consolidation and virtualization

- Expecting large growth in expense efficiencies
- Re-use of images rather than procurement of hardware
- Virtualized infrastructure running an average of 60% utilization (cpu,mem,storage)
- Each VM saves ~\$2,700 in expense per year (provisioning, security, green)
- Consolidation of sites saw large reduction in facilities cost (power/cooling)

Improved service levels by delivering services more rapidly, consistently and with fewer errors

- Automated self service provisioning (from 10hrs down to ~15mins)
- Mitigate the procurement of hardware 'risk' when placing test/dev plans together
- IT staff now focus on providing additional value to it's customers
- Ability to capture and rapidly share environments during development & testing phases

Manage & Leverage experiences

- Our journey to a smarter infrastructure is what we see clients go through
- Facilitate sales engagements and help clients through Executive Briefings and demonstrations



Lessons Learned

Architecture is key

–Delivering a cloud solution requires integration of multiple products with existing and new business processes and the consumability of that solution is the critical factor in success

Use cases must be clearly identified

- Cloud infrastructures have multiple dimensions with a broad set of roles
- Validate that you are addressing everyone's needs and not just a particular role
- Not everything can be tested/developed in a cloud environment*

Implementation should be phased

- Establishing a cloud is a true transformation of both IT and Development business processes
- The alignment of IT and Development operational strategies is key

Return on Investment

- Engage early and often on the topic of ROI – Trust but Verify!!!

Financial Processes – (Smarter investment strategy)

- Appointed single capital approver operating across Tivoli pillars
- Virtualization is default and physical machines require exception approval

Development Processes - (Efficiency)

- Education on self-service provisioning technologies
- Understanding what workloads to transition
- Think about images rather than physical machines
- Think about capacity at planning stages of a project



Cloud Service Provider Processes

- Went from ticket based system to self service
- Full ISM education program worked into schedule
- Move homegrown and use of Hypervisor Mgmt tools into IBM service management

Test objectives that are best suited for the Cloud are those focused on functionality:

- Agile development methodologies work exceptionally well
- Unit, functional and build verification testing
- Testing of integration/interoperability points between software products
- Install, upgrade, and migration testing
- Globalization, security, time-to-value, and serviceability testing

Physical machines are still needed:

- Many of our clients still use physical machines
- For large customer simulations (high load, long duration)
- For performance, scalability, and capacity planning studies
- In support of “persistent test configurations” which don't benefit from the flexibility of virtualization

It's important to understand that not all testing can be achieved with virtualization

Developer & IT Specialist Efficiency

- “When using the cloud service for a complex SVT scenario of 7 machines, the total lifecycle took 2.5 hours. In our own lab we'd have had to find the machines, install & configure the OS, patch the OS, potentially network. (assuming person availability, hardware capacity & parallel bootloads), this represents an improvement of ~70% on the time it would have taken us.”
- The ISM stack gives me single point visibility into the cloud storage and utilization allowing me to focus on increasing our service with additional offerings

Process Optimization

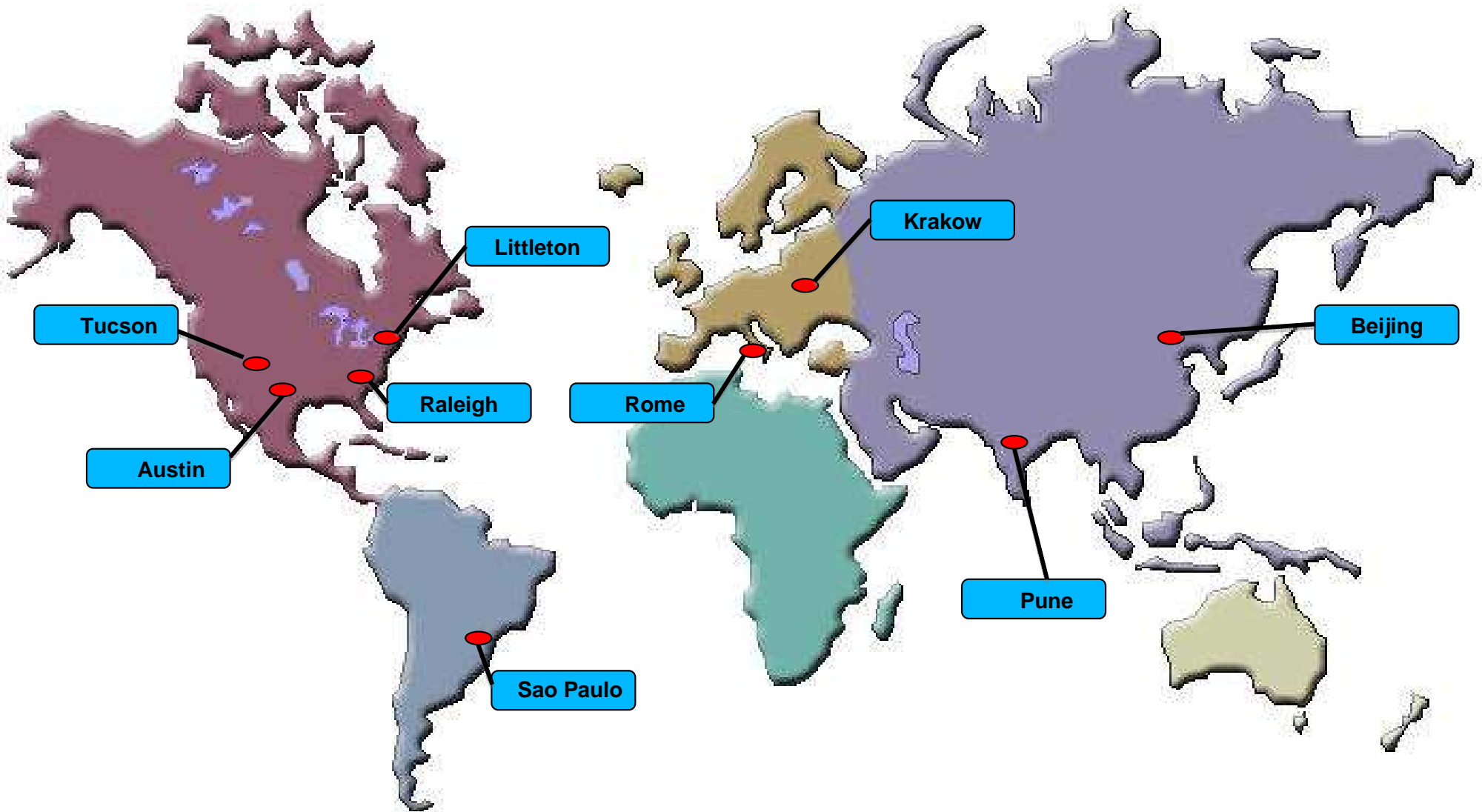
- “It is certainly easier, quicker and more logical than any capital ordering process!”
- “For standard specification machines i no longer need to raise an IT ticket”

Dynamic Infrastructure

- “I can request a machine and within a couple hours it will be available. That is really nice and makes it easier to give up the machine when testing is done
- “A great thing about the cloud is that you can request for more memory and disk space when you need to expand the system.”

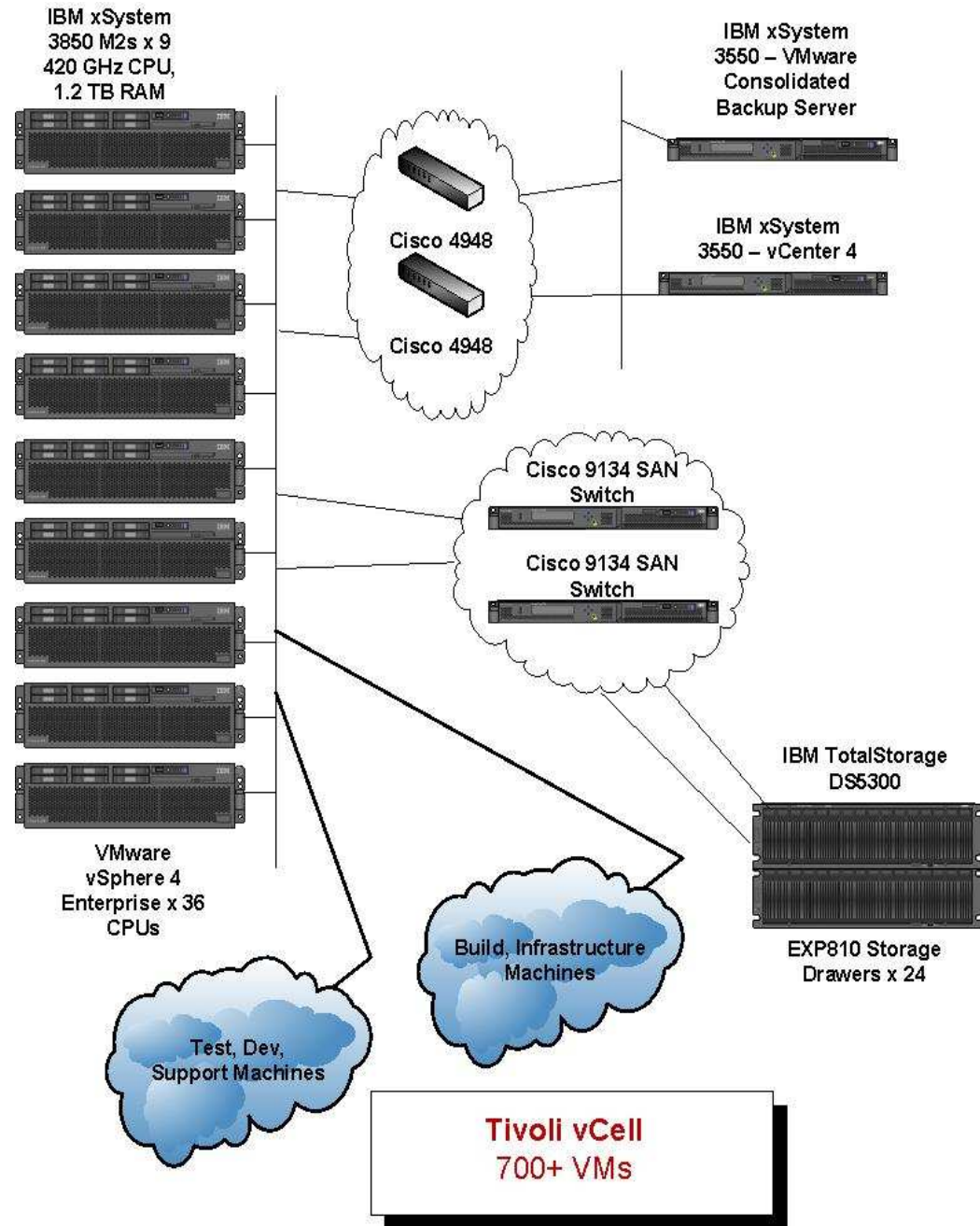
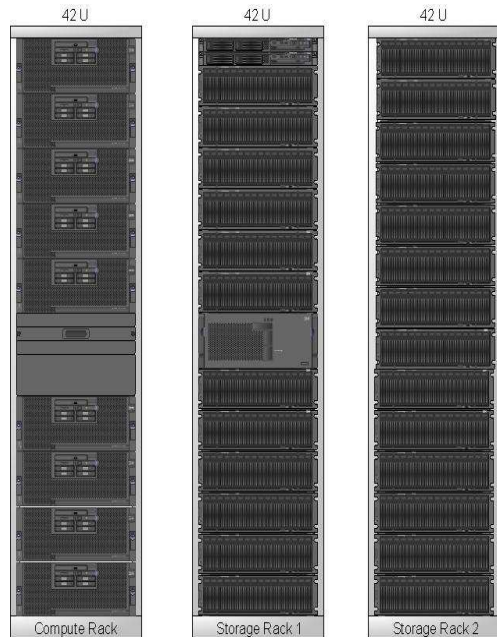
Implementation Detail

Tivoli IT Infrastructure Anchor Sites



Core of the Dynamic Infrastructure

- UPS Backup
- 10 GB uplink to the network core
 - Redundant network & SAN
 - “RAID 5” of servers
 - Design based on:
 - IBM Redbook - Implementing an IBM System x iDataPlex Solution
 - IBM RedPaper - “IBM Systems Virtualization: Servers, Storage, and Software”



TBSM Dashboard – Tivoli/ISST Global Dynamic Infrastructure

Tivoli View: All tasks Welcome dmatt Help Logout

vCell Top L... vCell DataS... -- Select Action --

vCell Top Level

| Service | State | Events | #VMs | #VMs On | Avg CPU | Avg Mem |
|-------------------|----------|----------|------|---------|---------|---------|
| ISST | OK | OK | 208 | 159 | 21.0% | 50.75% |
| Krakow | OK | OK | 200 | 259 | 64.667% | 63.167% |
| Rome GymLab | CRITICAL | CRITICAL | 375 | 115 | 22.0% | 64.833% |
| Singapore | OK | OK | 163 | 70 | 9.333% | 42.167% |
| vCell #1 (RTP) | CRITICAL | CRITICAL | 451 | 358 | 23.667% | 39.778% |
| vCell #2 (Austin) | CRITICAL | CRITICAL | 618 | 540 | 42.870% | 68.889% |
| vCell #3 (RTP) | OK | OK | 321 | 242 | 13.644% | 36.887% |

Service Viewer

Tivoli Development Cloud Top Level

Virtual Machines
VMs On: 1739.0
Total VMs: 3891.0

Service Details

SLA: Events Rules

https://tdstbsm.tivlab.raleigh.ibm.com:16315/RawEvents_70

| Node | BSM_Identity |
|---------------------|---|
| VM:rtmagan-gymc | VM:rtmagan-gymlab1-OSX |
| VM:ausvcell0-ausvhd | VM:ausvcell0-aus-hos000-CSX Austin_Datastore_Freesp |
| VM:rtvcell7-rtvhd | VM:rtvcell7-rtv-hos070-ESX RTP_Datastore_Freesp |

29/20 All [29/20]

29 Rows Matched dmatttdstbsm.tivlab.raleigh.ibm.com:16316

#VMs by Project (Top Ten)

| | |
|--|----|
| IBM Tivoli Monitoring | 54 |
| IBM Change and Configuration Management Database | 45 |
| Content Delivery System | 40 |
| IBM Tivoli Identity Manager | 25 |
| IBM Tivoli Business Service Manager | 20 |
| IBM Tivoli Composite Application Manager for Response Time | 18 |
| Common Agent Services | 18 |
| IBM Tivoli Workload Scheduler | 17 |
| IBM Tivoli Application Dependency Discovery Manager | 17 |
| IBM Tivoli Asset Management for IT | 16 |

Standardized Service Access – TSAM 7.2

Tivoli Service Automation Manager Welcome Denis Mattimoe About Help Logout IBM

Home > Request a New Service > Virtual Server Management

Manage Users | Modify Project | Modify Server | Cancel Project

Use this task to cancel a project. All of its virtual servers will be returned and made available for other users. Any saved images will also be deleted.

Create Project with VMware Servers

My Requests

Resolved (275) Failed (31) Total (306)

Recent Activity

| | |
|---|----------|
| Add VMware Servers My Project | Resolved |
| Create Project with VMware Servers DM Project 2 | Resolved |
| Create Project with VMware Servers OLI-eenev | Resolved |
| Create Project with VMware Servers My Project | Resolved |
| Create Project with VMware Servers OLI-senev | Resolved |

Manage Requests...

My Projects

Operational (12) Decommissioned (73)
Canceled (10) In Transition (2) Total (97)

Recent Activity

| | |
|--------------|----------------|
| DM Project 2 | Operational |
| olitest | Decommissioned |
| OLI-eenev | Operational |
| My Project | Operational |
| OLI-senev | Operational |

Upcoming Projects

No upcoming projects

Manage Projects... | Manage Servers...

Create Project with VMware Servers

Create Project with VMware Servers

*Project Name: My Project | *Team to Grant Access: VCELLTM

Project Description: This is my project

*Start Date: 4/13/2010 | *End Date: Until this date (4/27/2010)

Requested Image

Resource Group Used to Reserve Resources: RTP vCell03 | Monitoring Agent to be Installed:

Virtual Machine Usage (DDC): BYT | Tivoli Product List (DDC): IBM Tivoli Business Serv

*Image to be Deployed

| Select | Name | Hypervisor | CPUs | Memory | Storage |
|----------------------------------|-------------------------|------------|------|--------|---------|
| <input checked="" type="radio"/> | RHEL 5.4 64bit | VMware | 1 | 1 GB | 8 GB |
| <input type="radio"/> | Windows XP 32 bit | VMware | 1 | 1 GB | 6 GB |
| <input type="radio"/> | Windows XP 64 bit | VMware | 1 | 1 GB | 6 GB |
| <input type="radio"/> | Windows 2008 EE 32 bit | VMware | 1 | 1 GB | 27 GB |
| <input type="radio"/> | Test - Slec 9.04 32 bit | VMware | 1 | 1 GB | 21 GB |

Resources

To adjust the settings of the requested resources, press the setting button. After making the necessary adjustment, press the setting button to save the configuration.

Servers

*Number of Servers to be Provisioned: 1
563 available at above configuration and schedule

| CPU | Memory | Disk |
|-----------------------------|----------------------------------|-------------|
| Virtual: 2 Physical: 0.1 | Main: 2,000 GB Swap: 0,000 GB | Local: 8 GB |

OK Cancel

Usage Accounting Manager Integration - TUAM


Invoice Publish Close Help

1 of 4 100% Find | Next Select a format Export

Document Map

- Invoice
 - DEPT_43BG3 019868758
 - DEPT_43BG3 041246758
 - DEPT_43BG3 I69792754
 - DEPT_43BG3 PMRDPCAUSR

Usage and Accounting Manager



Invoice

Invoice Number 1
Date Range: 01/02/2010 to 08/02/2010

TDS
Building 510
3901 S MIAMI BLVD
RTP, North Carolina
United States of America

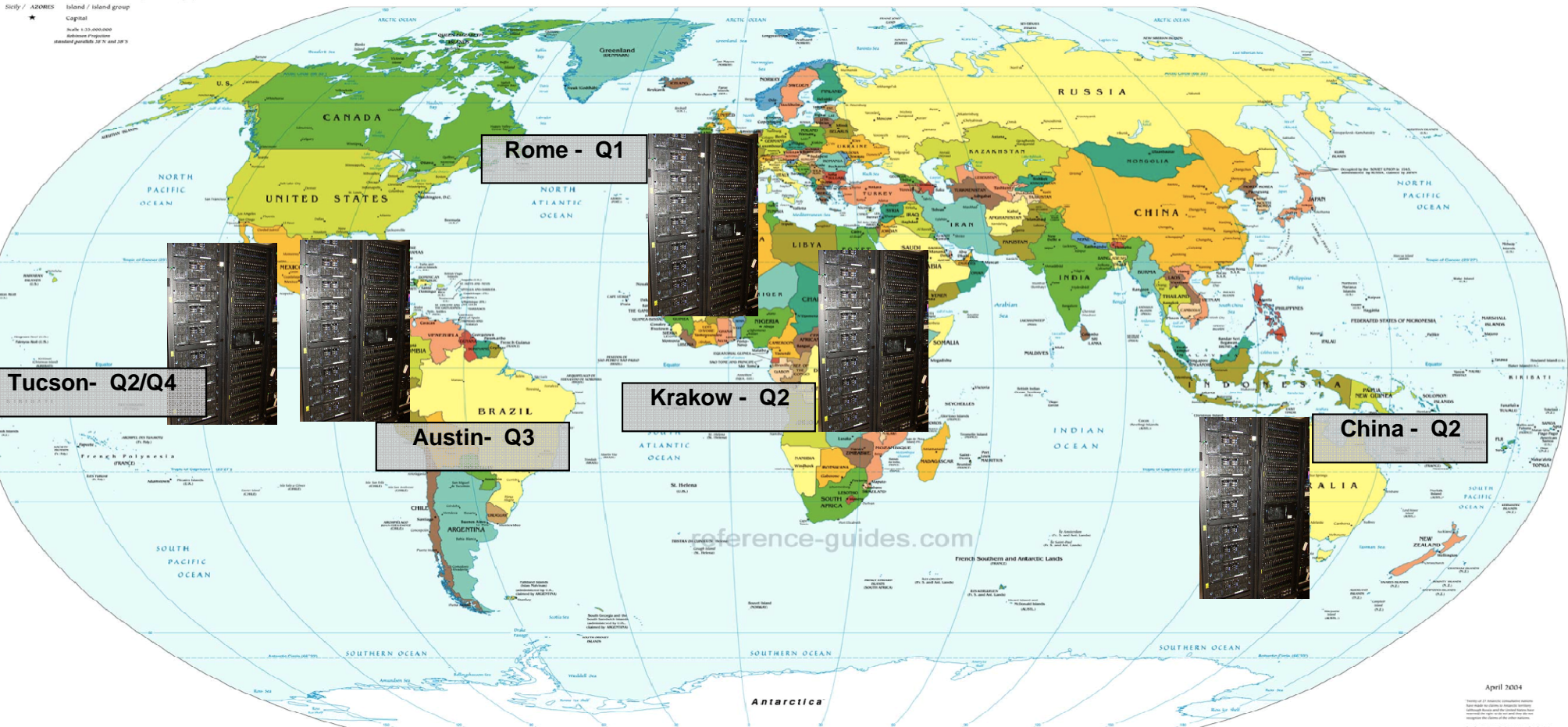
DEPT_43BG3 019868758

| | <u>Units</u> | <u>Rate</u> | <u>Charge</u> |
|--|--------------|-------------|-----------------|
| TivSAM - Assigned CPU hours | 1,485.40 | 0.25000000 | 371.33 |
| TivSAM - Assigned server hours | 1,485.40 | 0.50000000 | 742.71 |
| TivSAM - Assigned memory in MBs per hour | 1,521,051.56 | 0.00300000 | 4,563.26 |
| TivSAM | | | 5,677.30 |

Total for: DEPT_43BG3 019868758 **5,677.30**

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2010 Strategy



- ❑ Physical footprint reduction target 1500 – current
- ❑ Current capacity 3000 VMs across RTP, Rome, Austin
- ❑ KVM & ‘Systems P’ offering
- ❑ Continued consolidation of IT from 8 labs

- ❑ TSAM 7.2 deployed and used as the standardized interface for accessing cloud services
- ❑ Standardized implementations of ITNM, TADDM, TAM-IT at key anchor sites
- ❑ TUAM rolled into production to provide on demand usage reports
- ❑ Federated image library & TPMxImages to convert image formats
- ❑ Saas Pilot – Rational Team Concert



Consolidate & Virtualize

- Over 12 month period, avoided over 40% capital and 15% in expense through consolidation and virtualization
- Single Development, Test & IT infrastructure strategy
- Seven sites had IT consolidated, further eight in plan for 2010
- Virtualized infrastructure running an average of 60% utilization from an original average of 5-9% utilization per server
- 1055 servers have been relocated, 280 ‘scrapped’, and 174 virtualized

Standardize & Automate -

- Process for accessing provisioning and scheduling services with TSAM
- Process for managing IT services with ISM
- With automation reduced time to provision a server from 12 hrs to ~15mins
- Rapid deployment of image based configurations, reduction in debugging phases

Optimization

- IT staff have bandwidth to focus on continued service improvements
- Over 1000 users, growing daily!
- Management of the cloud globally whilst being serviced locally



SMALLER. FLATTER. SMARTER.