

Commercial Data Systems

Design Considerations and Benefits of a Virtualized Maximo Environment

Charles Rarick
Director, Storage Practice
rarick@cdsinc.com

Agenda

- What is Virtualization?
- Who is CDS?
- The CDS/TRM Total Asset Management Solution
- Storage as the Cornerstone of Virtualization
- Server and Desktop Virtualization Considerations
- City of Albuquerque (ABCWUA) Case Study
- Questions?

CDS History

- Began operations in 1986 in Honolulu as a developer of UNIX software
- 92 Employees
- Estimated revenue of \$95 million in FY 2008-09
- One of the top ten Federal IT integrators and resellers
 - Oracle Certified Partner for DoD Security
 - #5 Sun Federal Reseller
 - #3 NetApp Federal Reseller
 - NetApp's Federal Virtualization Partner of the Year
- Focused on S&L, Commercial growth

CDS Presence

- Corporate Headquarters: Honolulu, Hawaii
- West Coast Regional Headquarters:
Albuquerque, New Mexico
- East Coast Regional Headquarters: Herndon, Virginia
- Sales Offices:
 - Denver and Colorado Springs, Colorado
 - Houston and San Antonio, Texas
 - Orlando, Florida
 - Huntsville, Alabama
 - San Diego, California
 - Newport City, New York

CDSolutions:



Trusted Computing Architecture

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

Server/Storage/Desktop Virtualization Technology



Peak Performance Computing



Application and Technology Consulting



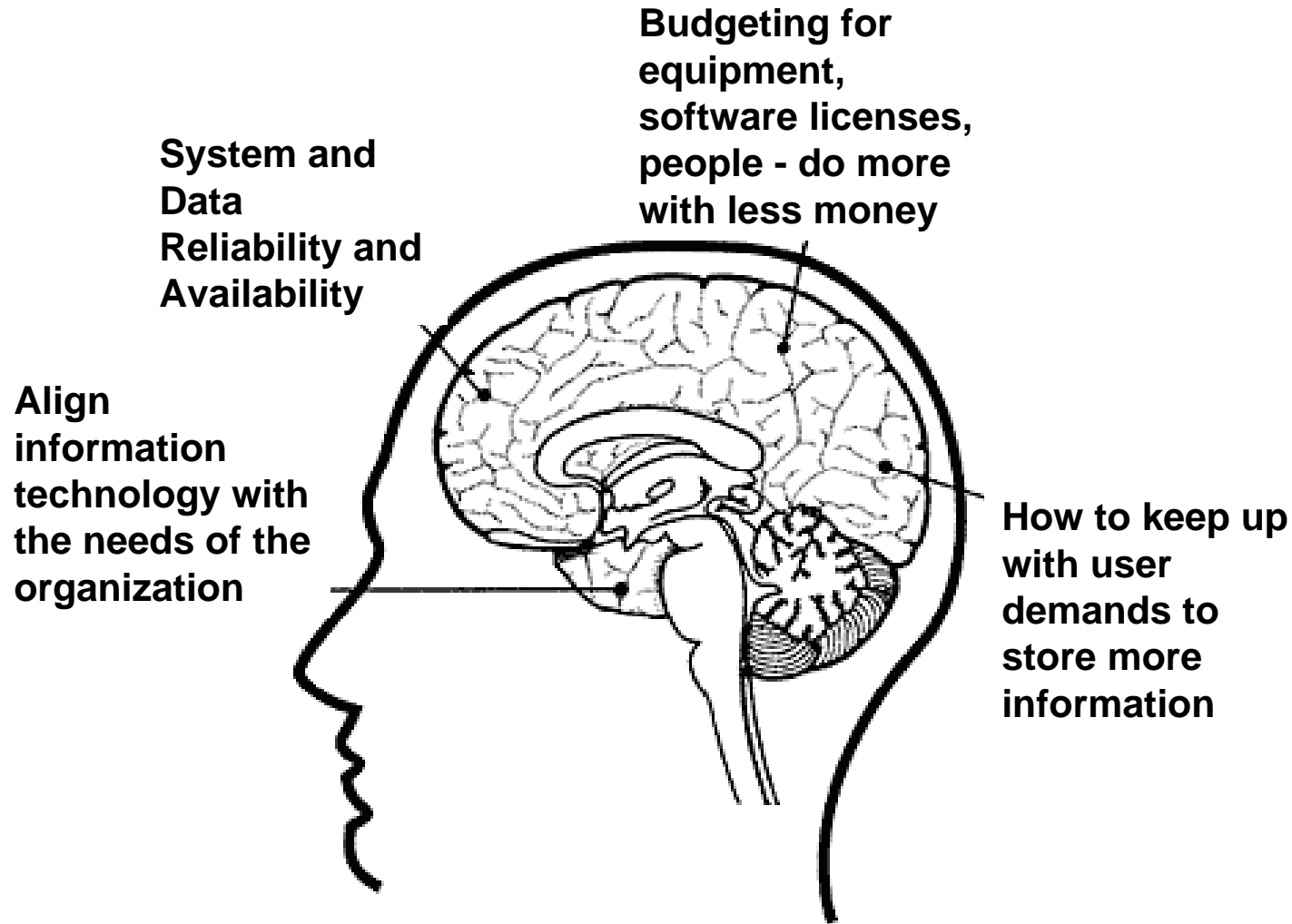
CDS Support Services

TRM & CDS Roles

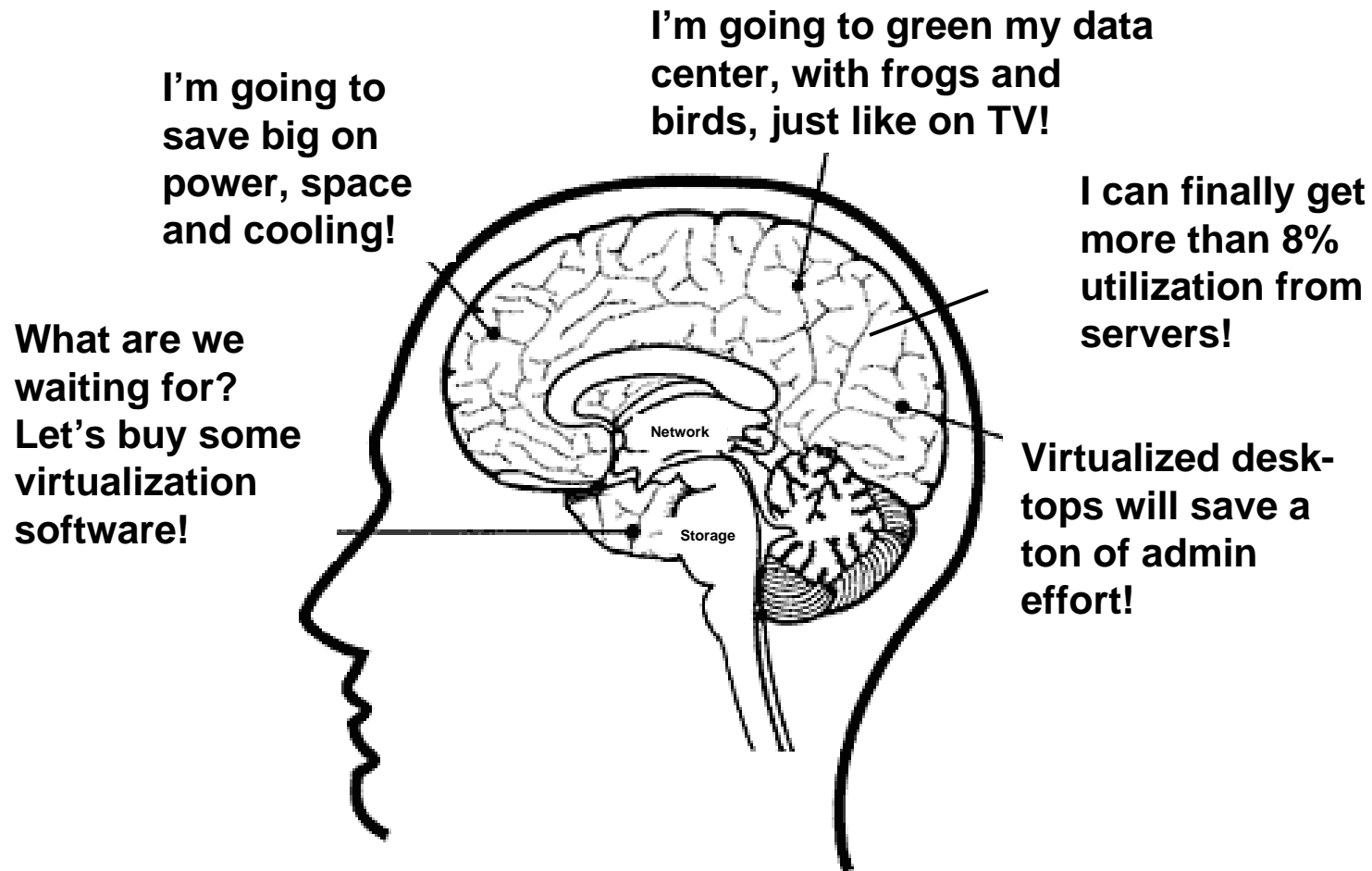
| | | |
|----------------------|--|------------------------------|
| T R M | EAM and ITSM Consulting | |
| | Systems Engineering | |
| | Maximo Professional Services | |
| | Maximo Training | |
| | TRM Software Products | |
| C D S | Backup-Recovery/DR for All Elements | |
| | Infrastructure Integration | |
| | Virtualization Technology (Server, Storage, Desktop) | |
| | Network (Performance, Availability, Manageability) | |
| | Open System Servers and Operating Systems | Unified Architecture Storage |

Storage Best Practices For Virtualization

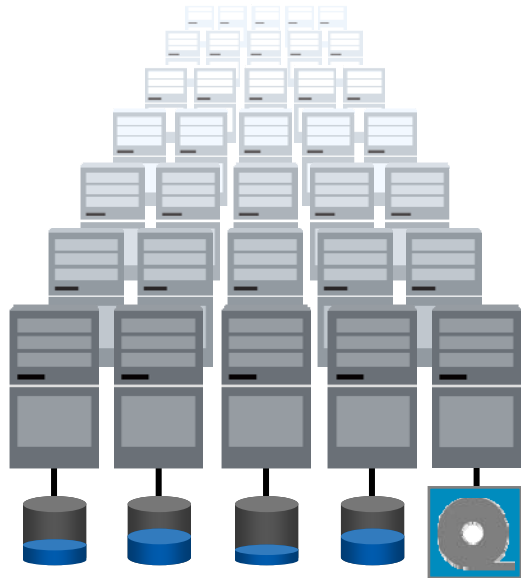
IT Manager's Brain



IT Manager's Brain Pondering Virtualization



Before Virtualization



Escalating power, cooling, space

Performance & reliability issues

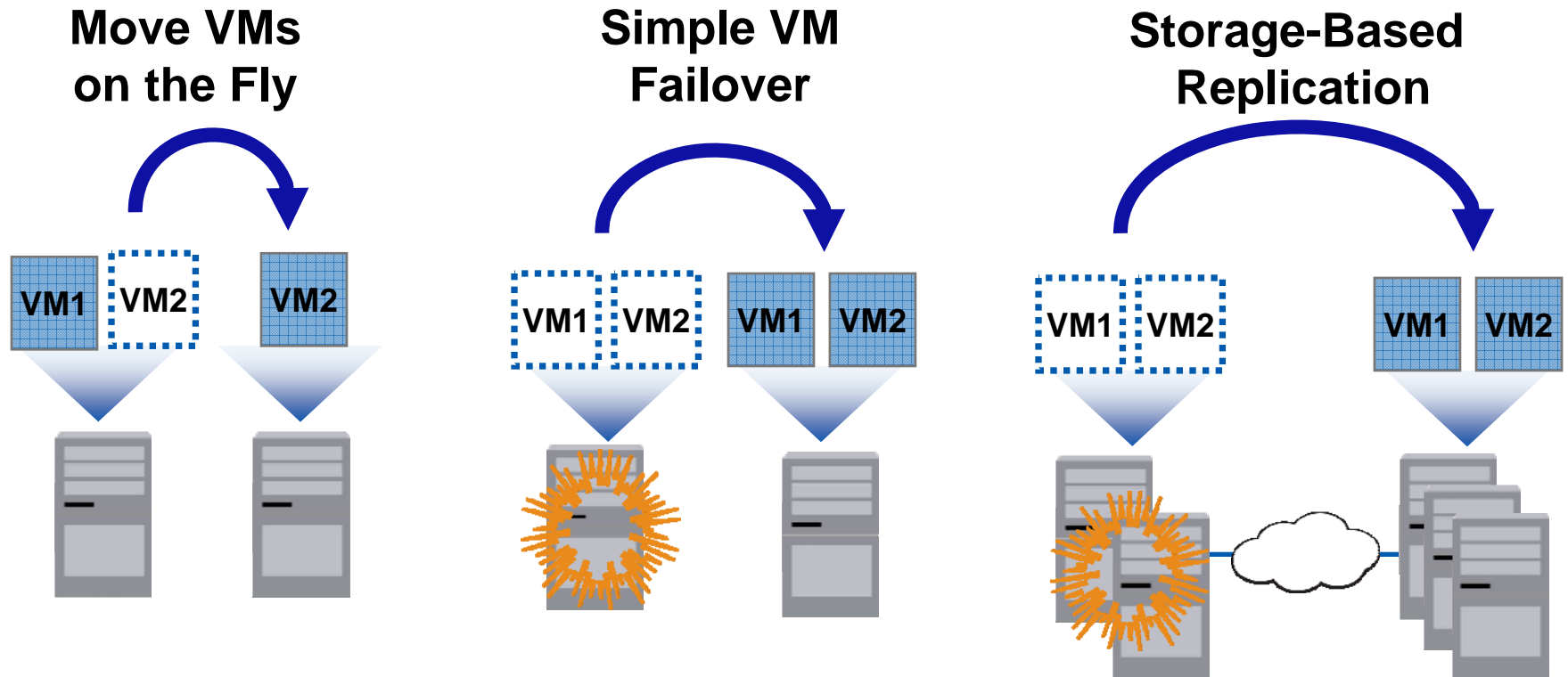
Data recovery can take days

Provisioning can take weeks

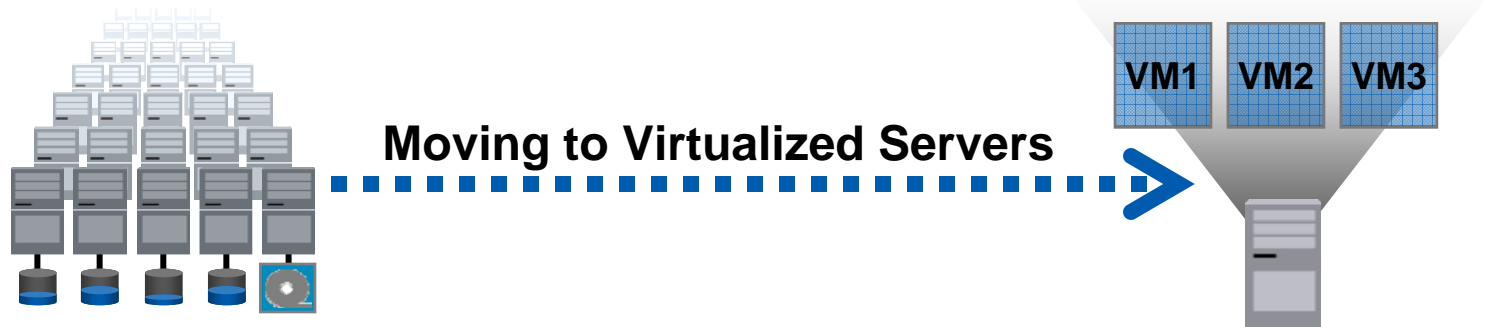
DR limited to a few critical services

The Requirement for Networked Storage

The advanced features of server virtualization are only enabled through the use of networked storage



The Impact of Storage on Virtualization



Storage Concerns

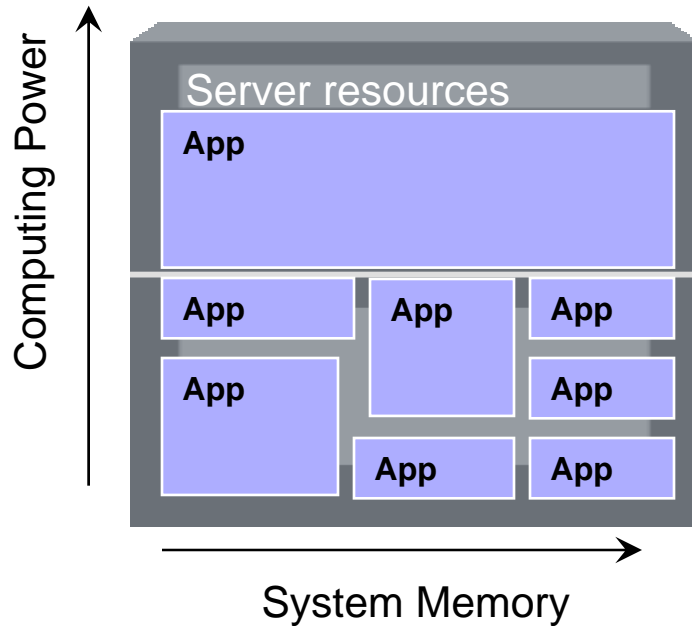
- ▶ Need cost-effective storage
- ▶ Storage reliability becomes critical
- ▶ Server-based backups no longer practical
- ▶ Need rapid/efficient storage provisioning for VMs

Storage Technologies

- ▶ Data deduplication
- ▶ Dual-parity RAID protection
- ▶ D2D Backup/Recovery, DR across all applications
- ▶ Flexible Volumes and Clones

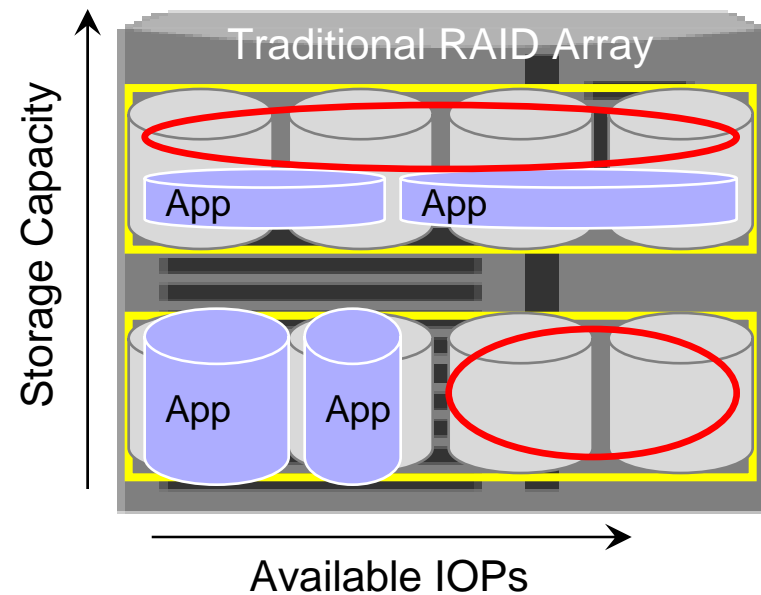
Virtualization makes a difference

Server Virtualization



- Efficient resource utilization
- Creates a fluid environment

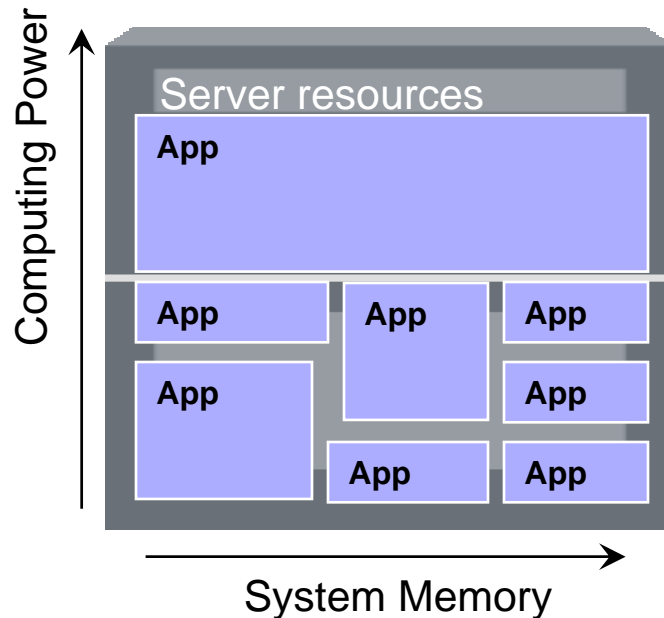
Traditional Storage



- Inefficient resource utilization
- Pockets of orphaned I/O and space

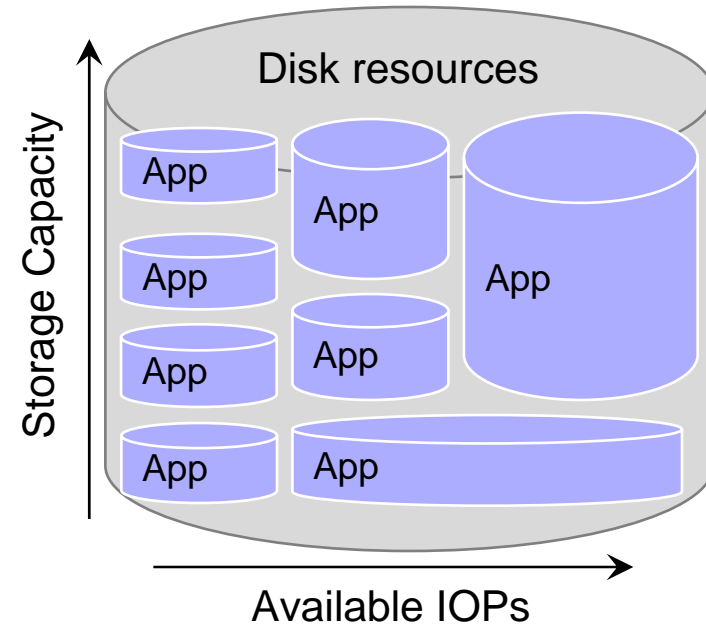
Virtualization makes a difference

Server Virtualization



- Efficient resource utilization
- CPU and memory are pooled

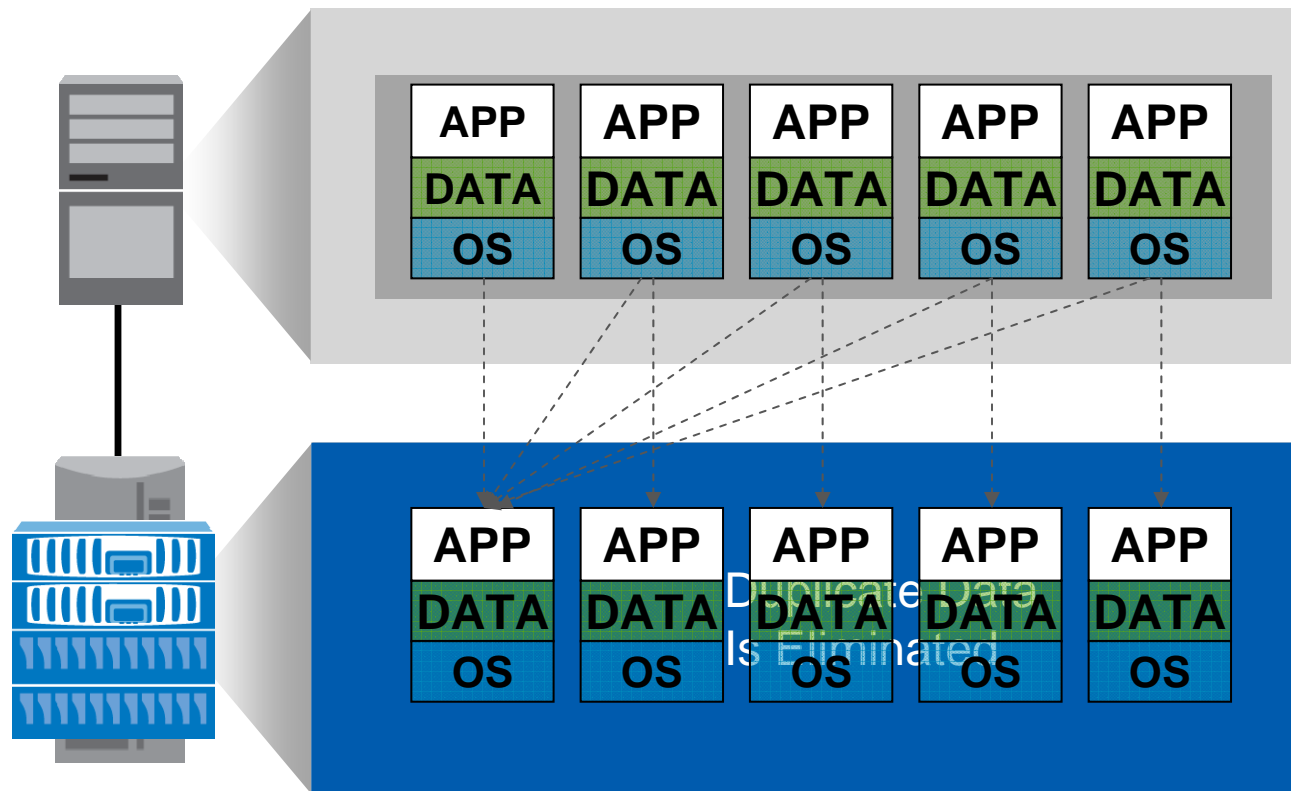
Storage Virtualization



- Efficient resource utilization
- Capacity and IOPs are pooled

An Opportunity for Deduplication

- VM images consume storage equal to size of template
- VM images are 100% identical
 - OS software, patches, software drivers, application data
- Save 50% on primary storage requirements after deduplicating



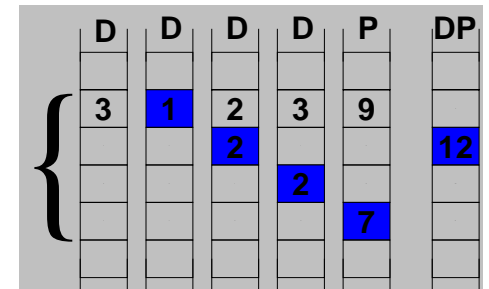
RAID-DP

- Diagonal Dual-Parity data protection

- >4,000 times more data protection than RAID 4
- Strict superset of RAID-4: simple up/downgrade
- Performance equivalent to RAID-4

- Impact

- Significantly improves *system reliability*
 - Enterprise-class system reliability using SATA drives
- Enables use of larger disks
 - Mitigates risk of double disk failure during longer reconstruction
- Enables larger RAID groups
 - Enhanced performance through wider striping



Cost-Effective Data Reliability

The Problem

- Double-disk failure is a mathematical certainty
- RAID 5 (single parity disk)
 - Insufficient protection
- RAID 10 (mirrored copy)
 - Double the cost
- RAID 6
 - Major Performance Penalty

Dual Parity (RAID-DP)

- Protects against double-disk failure
- High performance and fast rebuild
- Same protection and performance as RAID 10 at half the cost

| | RAID 5 | RAID 6 | RAID 10 | RAID-DP |
|-------------|--------|--------|---------|---------|
| Cost | Low | Low | High | Low |
| Performance | Low | Low | High | High |
| Resiliency | Low | High | Med | High |

Storage reliability for server consolidation

Consolidated Servers = Consolidated Risk

▶ Yesterday's world

Server = Single application
Downtime is low impact

▶ Today's reality

Server = Many applications
Downtime is **HIGH** impact

Data protection for virtualized servers

The challenge:

Shrinking backup windows and growing data sets

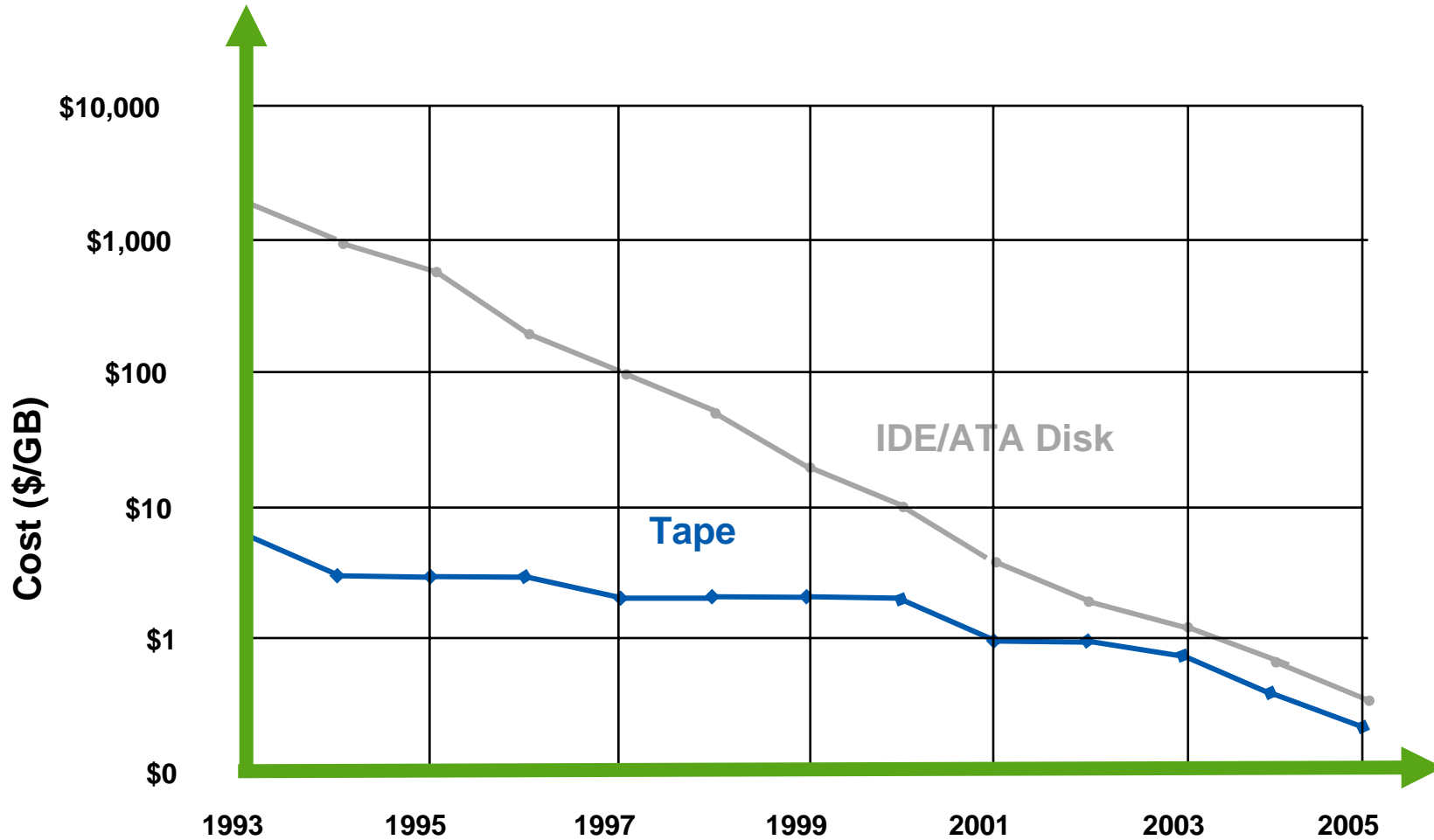
Losing a server has much larger impact than before

Virtualized servers make this problem far worse

- More data behind each server
- VMware® shared model does not provide enough I/O
- Backup windows have not grown

Is tape backup viable in a virtual world?

Disk and Tape Pricing Trends



Can you handle the tape?

Your backup environment:

- 6-month tape retention
- Start with 10TB data
- 2% daily change (block)
- 10% daily change (file)
- 5% monthly growth
- Weekly full, daily incremental

Which one of these tapes will be unusable for restore?

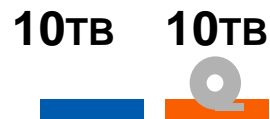
How do you *know* that everything is scheduled for backup?

It gets more challenging with virtualization.

What is your RTO??

 **Disk to Disk Backup**

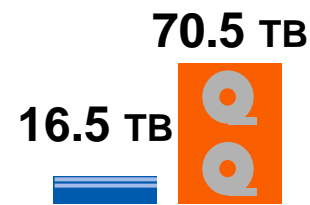
 **Tape Backup**



Day 1



Day 8

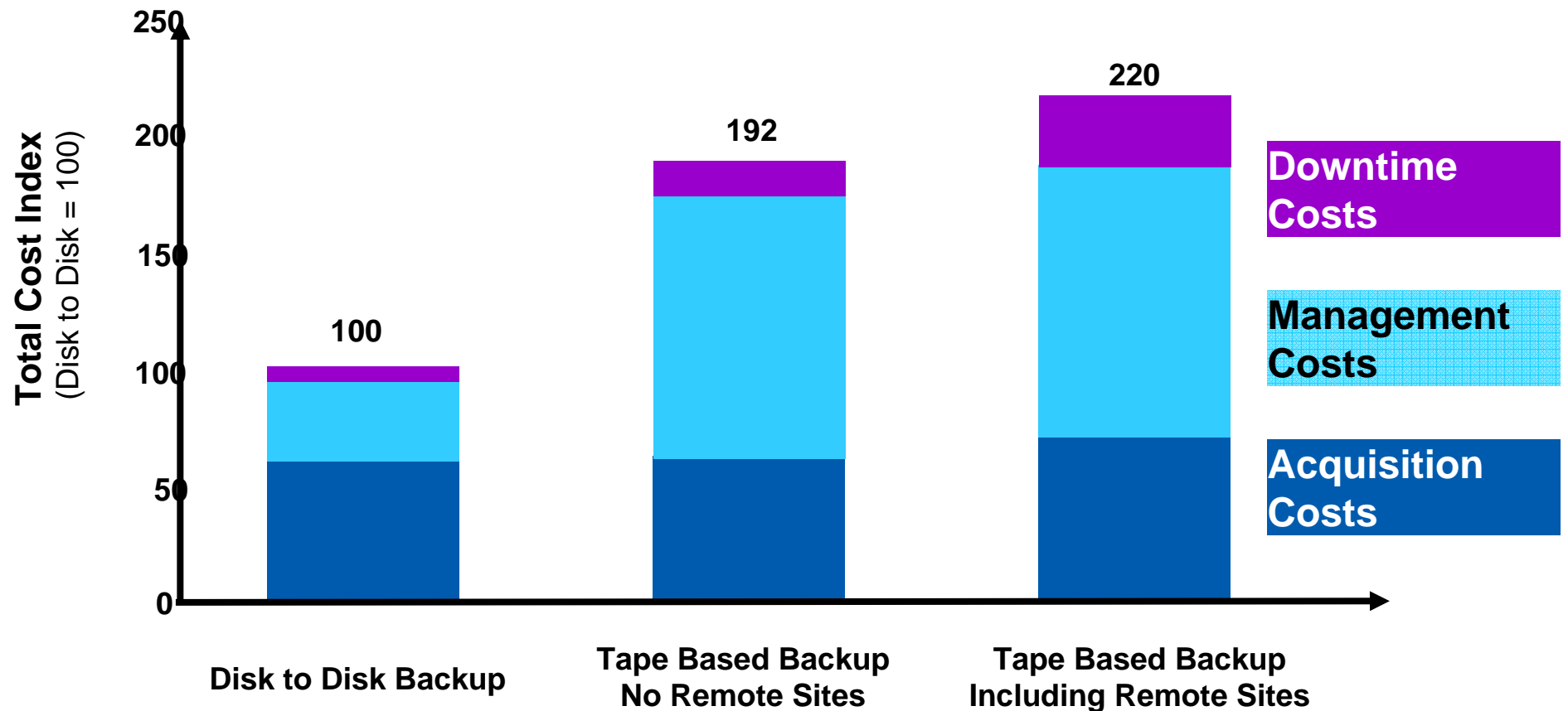


Month 1



Month 6

The Disk-to-Disk Advantage



Disk to Disk Backup = **54% lower TCO** than tape based backup

Source: Mercer Backup Technologies Total Cost Comparison Interviews - February 2006.

Test, dev, and QA – simple, fast, *and* cheap

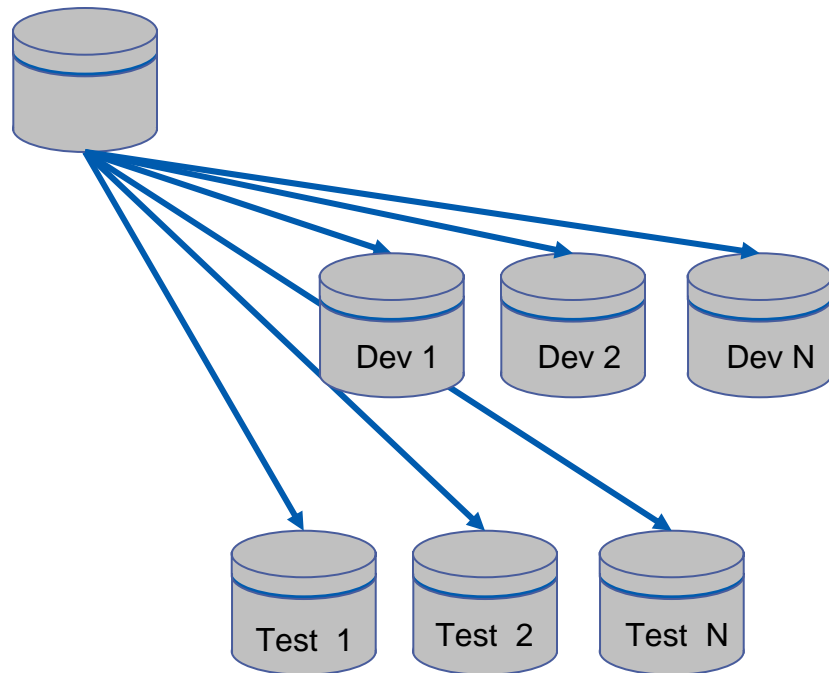
The challenge:

Creating many VMs

- Takes a lot of time
- Uses a lot of space
- Is managed serially, one at a time

VMware® cloning

Production VM



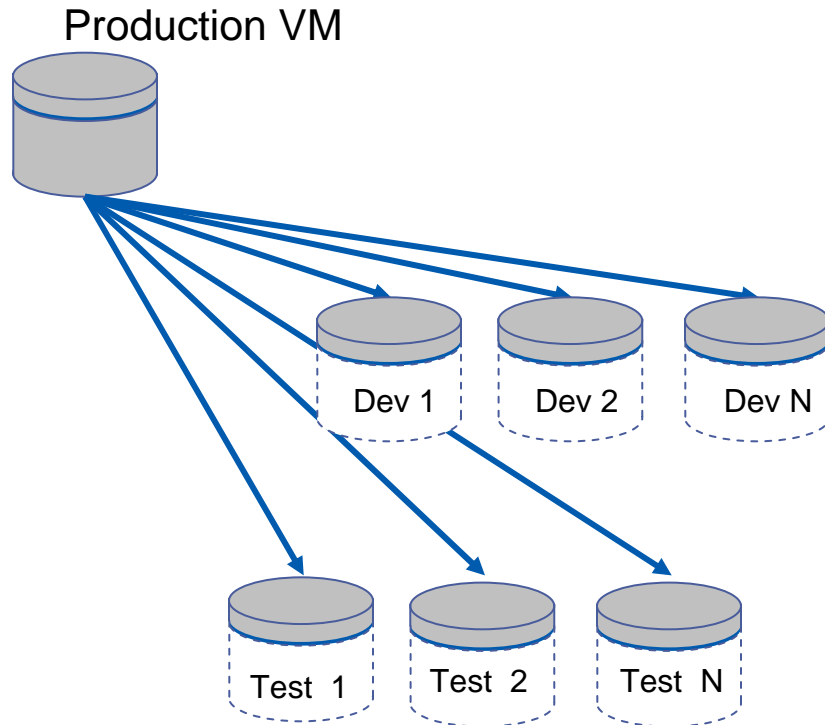
VMware Cloning

Full data copies

Time and server I/O lost

100% additional storage for each clone

Advanced cloning technology



Flexible Clones Offer...

Instantaneous copies

No additional space required

No server resources

Zero space consumption clones without the traditional array hassle

Albuquerque/Bernalillo County Water Utility Authority

ABCWUA Case Study

- Maximo is considered a mission critical application
- 2 Maximo environments exist
 - Maximo 4.1.1 (Water Treatment Plant, Water Distribution)
 - Maximo 6.1 (Reclamation)
- Maximo running on old Sun equipment (V240s, V880s, V890s)
- Replace both with Single Maximo 6.2 and include Sewer operations
- Between 200-300 users (Laptop, Desktop, Wireless Handhelds)
- Interfaces include GIS, Permitting, Billing, HR, and SCADA
- Go Live scheduled May 1, 2009
- CC&B went live March 27

ABCWUA – IT Challenges

- Total Cost of Ownership
- Enterprise Scalability (performance, storage)
- Business Continuity Planning (high availability, backup/recovery, disaster recovery, continuity of operations)
- Support Staff (bandwidth, expertise)

ABCWUA – Solution

Primary Site

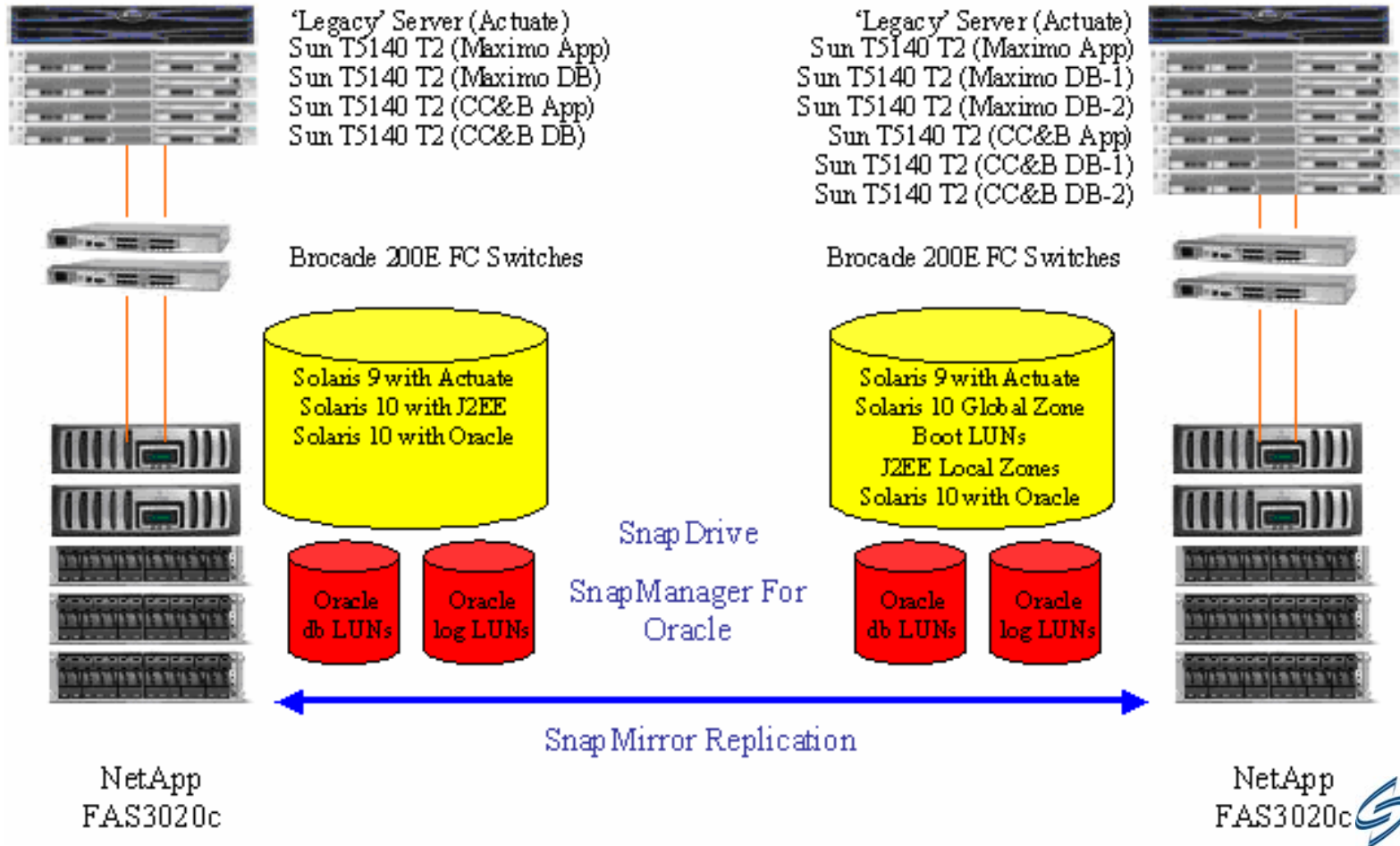
Maximo: PROD

CC&B: PROD


Secondary Site

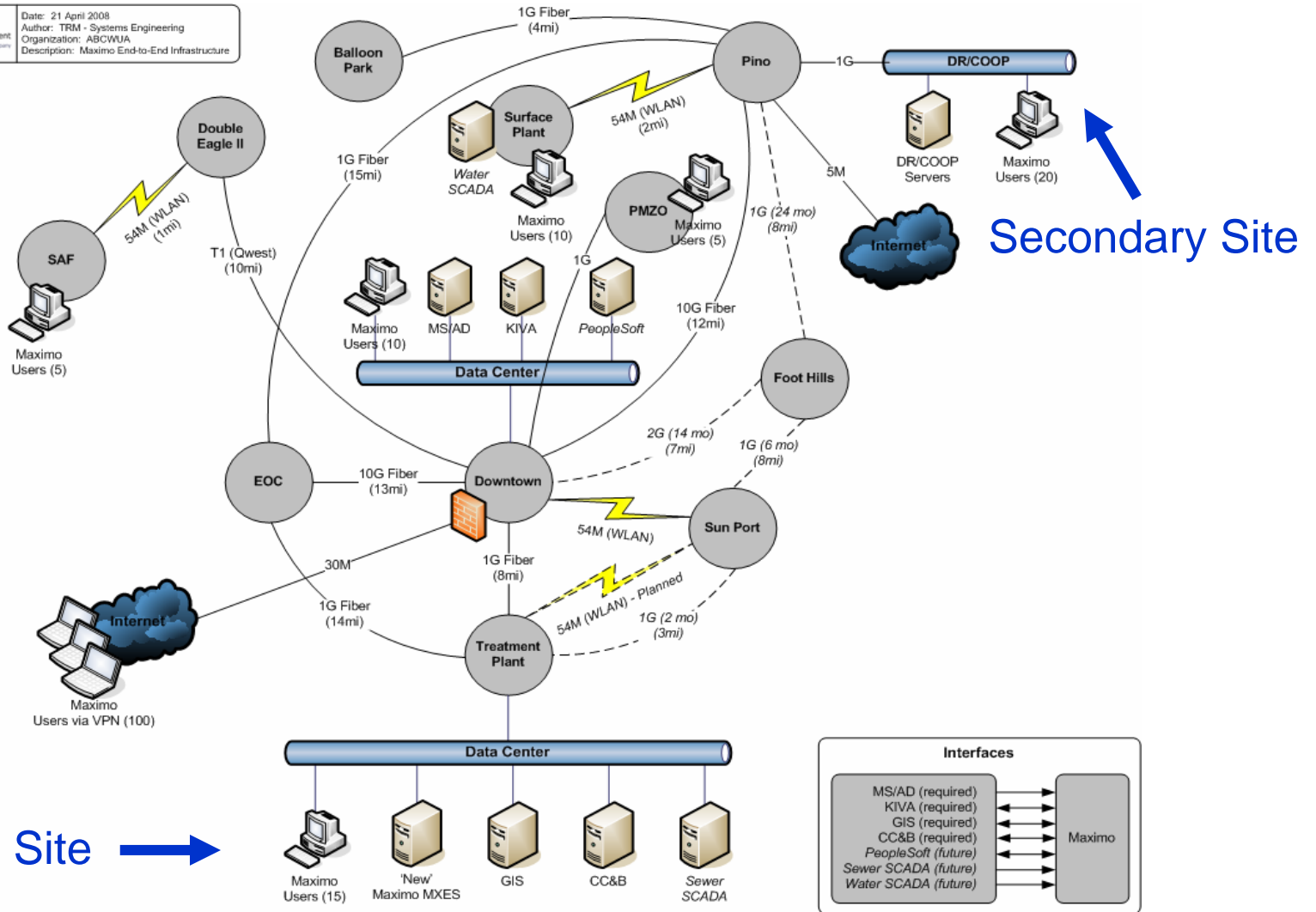
Maximo: PROD-FO, ACCP, QA,
TRAIN, DEMO, DEV

CC&B: PROD-FO, ACCP, QA,
TRAIN, DEMO, DEV



ABCWUA – E2E Infrastructure


TRM total resource management
 A Consulting and Technology Company
 Date: 21 April 2008
 Author: TRM - Systems Engineering
 Organization: ABCWUA
 Description: Maximo End-to-End Infrastructure



Primary Site →

QUESTIONS?

Contact Information

- Charles Rarick
- Director, Storage Practice
- Phone: 505-220-4858
- Email: rarick@cdsinc.com



Commercial Data Systems

Thank you!

Charles Rarick
Director, Storage Practice
rarick@cdsinc.com

Virtualizing the Desktop

Desktop PCs--Operation's Top Five Headaches

Management

Day-to-day support of corporate systems

Assuring data and machine security independent of location

Security

Compliance

Ensuring that machines are compliant to Corporate and regulatory requirements

Providing users "anytime, anywhere" access to data and applications

Access

Business Continuity

Ensuring continuity in the event of machine loss, disaster, or workforce interruption

The Benefits of Hosted Desktop Virtualization

Benefit

Why it improves upon the traditional PC

Data security

Data is centralized and thus not out on individual client devices

Endpoint security

“Desktops” are protected by client security *and* network security

Manageability

Machines are always on and always available for IT to administer

Flexible remote access

Access made easy: “desktops” are available to workers

The Benefits of Hosted Desktop Virtualization

Benefit

Why it improves upon the traditional PC

Desktop Cost Savings

Inexpensive to purchase, rapid swap of failed systems

Green Solution

Thin clients require little power, produce little heat, have small footprint

Centralized Data Support

Efficient backup/recovery of user data

Lower Cost of Management

Centralized management drives down support costs

Hosted Desktop Virtualization Considerations

Limitation

Considerations for the organization

Cost

Capital costs can start at \$1760 per user

Licensing

- Microsoft doesn't make it easy
- \$110 per thin client or \$23 + SA for a PC

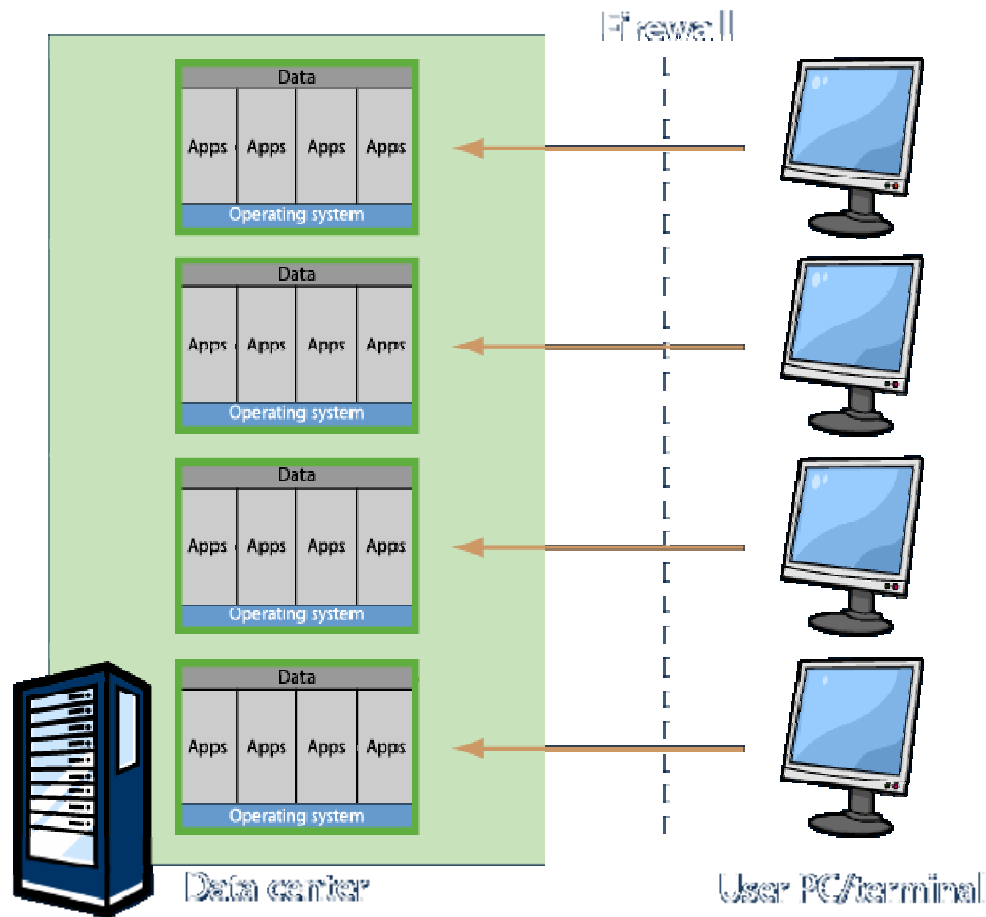
Storage

Most plans don't account for NAS being more expensive than PC storage

Solution complexity

Most organizations don't have internal experience to get the right pieces together

Hosted Desktop Virtualization — What is needed?



- User device
- Virtualization licenses
- VECD licenses
 - Windows Software Assurance, if applicable
- Data center servers
- Sufficient bandwidth
- Network storage

Source: Forrester Report, April 9, 2008, "Demystifying Client Virtualization"

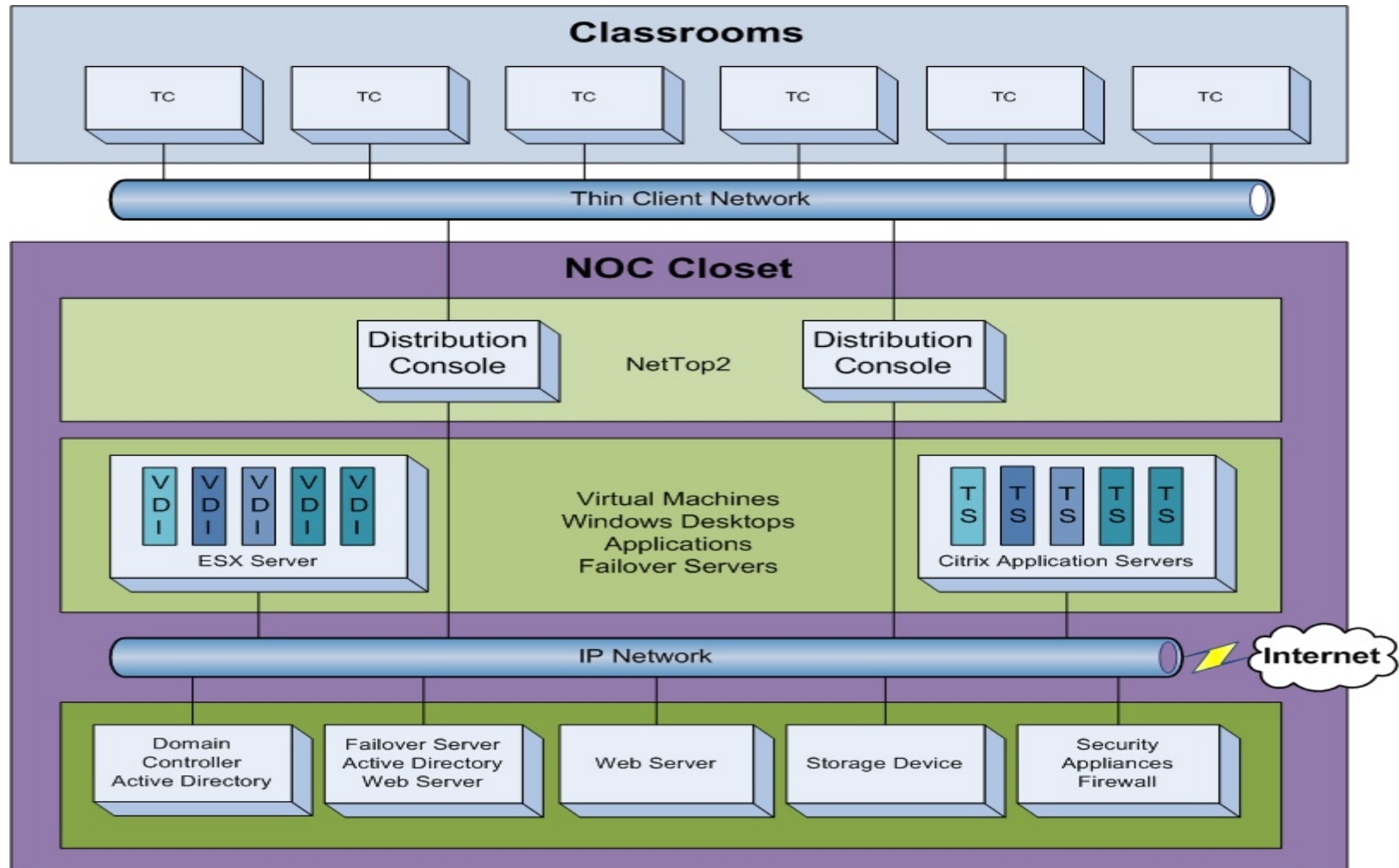
Penn. Army National Guard Background

- Army NCO Academy for Military Occupational Specialties
- Courseware needed to include software actually used in combat
- Academy is perpetually full
- Need to rapidly re-purpose classrooms
- Existing classrooms had little IT infrastructure
- Limited available IT staff
- Sizeable Annual Costs
 - \$500K/year in basic reproduction costs
 - \$250K/year in additional costs due to frequent course changes
- Five other academies with the same issues
 - LA, SC, MS, UT, NE
 - No collaboration between academies
 - No student access to internet

PANG--Thin Client Requirements

- Reduce Capital & Operating Cost
 - Hardware (consolidation)
 - Power
 - Cooling
- Reduce Administration
 - Desktop image
 - Infrastructure Systems
 - Security
- Support growing application requirements
- Provide future proof architecture that can support multiple classification requirements (NIPRnet, SIPRnet, etc,)

PANG--Reference Architecture



PANG--Trusted Thin Client Component

Warrior Leadership Course
Basic NCO Course
Advanced NCO Course
1st Sergeants Course



XenDesktop



Virtual Desktop Infrastructure



Army Battle
Command Applications

Trusted Linux™
Primary Distribution Console



Trusted Linux™
Secondary Distribution Console



Trusted Linux™
Thin Client



Trusted Linux™
Thin Client



Trusted Linux™
Thin Client



Trusted Linux™
Thin Client

PANG--Citrix XenDesktop

- **Optimal Computing Experience**

- ICA protocol performs well over low-bandwidth connections
- Provides mobility and flexibility--users can work from different locations using any device

- **Centralized Management**

- A comprehensive console enables complete, centralized management
- Entire XenDesktop Server farm
- Servers, applications, licenses, printers and users

- **Compatibility**

- XenDesktop Server supports a wide range of platforms, devices and connections
- Ensures critical applications are widely accessible
- Windows, UNIX, Java and Web applications, "home-grown" and non-multi-user applications

- **Security and Control**

- Policy-driven, centralized security control
- Application use, data access, file transfers and other actions
- Based upon job function, location and other factors
- Encrypted access over the Internet is provided via a built-in, secure gateway

- **Scalability**

- XenDesktop offers the ability to effectively scale deployments both "out" and "up"
- Supports more than 1,000 servers per farm

PANG--Storage Component

- **NetApp FAS2020**
 - Entry-level offering
 - Dual controller active-active (HA) throughout
 - High-performance SAS, 4Gb FC from end to end
 - IO connectivity options
 - Onboard remote platform management

- **Benefits**
 - Thin provisioning
 - RAID-DP
 - Deduplication
 - Snapshots for rapid, reliable backup and restore
 - Unified architecture