SAN for ERP Data Storage
How Cisco IT Deployed a SAN for ERP Data Storage

A Cisco on Cisco Case Study: Inside Cisco IT

Overview

- **Challenge**

  Storage growth within Cisco® far outpaced the capabilities of the direct access storage (DAS) or early storage area network (SAN) solutions available on the market

- **Solution**

  Offering storage as a utility service and moving away from the "server-centric" model (DAS) to a "network-centric" model, in which storage is pooled within the network, increases utilization, improves manageability, and saves money

- **Results**

  Migration and consolidation of specific ERP SAN islands to the Cisco MDS 9509 Multilayer Director Switch

Overview (Contd.)

- Next Steps

  Migration of all business functions in the Research Triangle Park data center to a single Cisco MDS 9509 SAN-based infrastructure

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Background - Summary

- Cisco® IT enterprise resource planning (ERP) storage evolved over the past five years, before migrating to Cisco MDS 9509 multilayer director switches

    1997—Mostly DAS over Small Computer System Interface (SCSI)

    1998—Fibre Channel switches extend storage

    2001—SAN switches consolidate storage, improve utilization
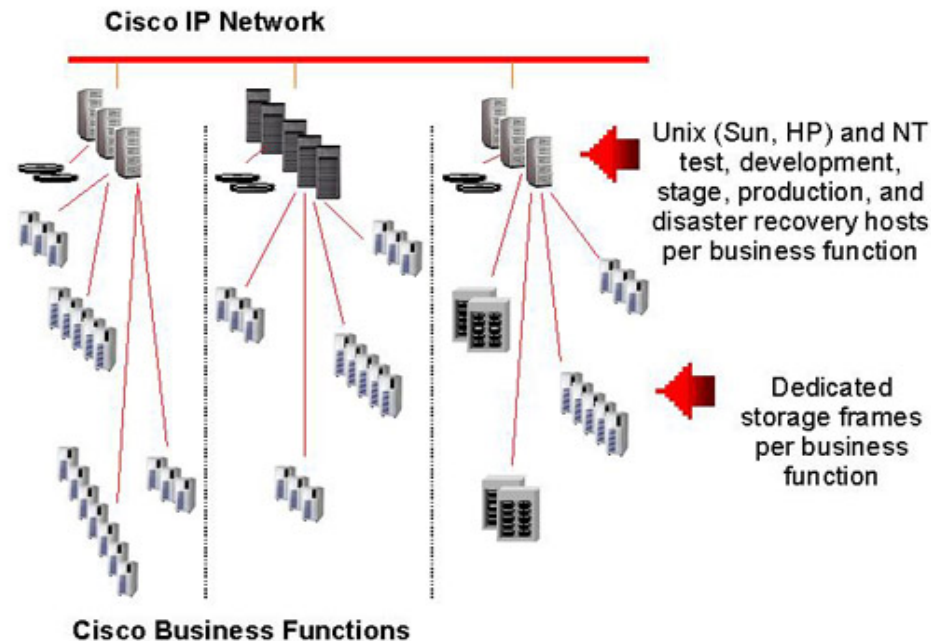
Challenge - Storage Growth

- Storage growth within Cisco® far outpaced the capabilities of the storage management tools available on the market and was very costly. Pushing storage utilization higher was critical to Cisco cost savings.
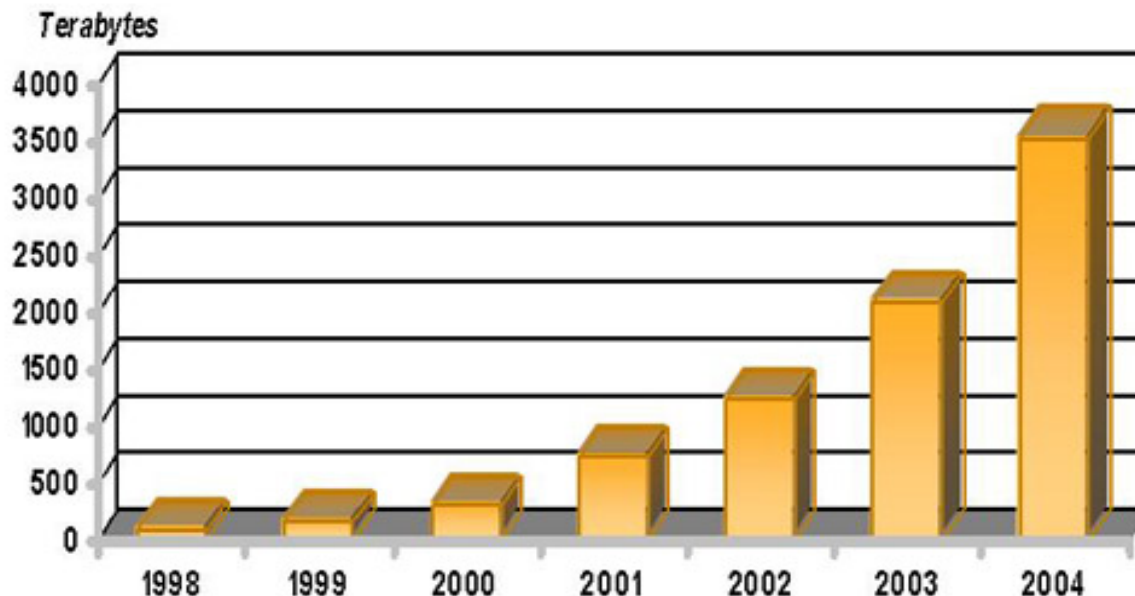
Cisco storage growth with 2003 and 2004 projections

Challenge - DAS Architecture Issues

- In late 2000, Cisco® realized that storage management within the DAS architecture would not scale because each storage subsystem, regardless of its size, was a "point of management"

- In early 2001, demand for storage continued, creating another important concern with the DAS architecture—how could Cisco continue to support the growing storage environment without adding costly resources?

Cisco IP Network

Unix (Sun, HP) and NT test, development, stage, production, and disaster recovery hosts per business function

Dedicated storage frames per business function

Cisco Business Functions

Cisco Storage Architecture in the Mid-to-Late 1990s

Solution - Network-Centric Storage Model

- Invest in a storage solution that includes offering storage as a utility-like service to be shared across multiple hosts and applications

- Move away from the "server-centric" model (DAS) to the "network-centric" (SAN) model, in which storage is pooled within the network

# Solution - Three Phase Plan

- The vision of a network–centric storage service capable of offering storage capabilities to any corporate application would be achieved in three phases:

    Phase 1 – 2001: Migrate DAS to SAN islands where appropriate within current business function groups

    Phase II – 2003: Consolidate SAN islands and any remaining DAS to a single SAN within each business function per data center

    Phase III – 2005: Consolidate all business function SANs to a single SAN per data center

Solution - Ideal Hardware Solution

- Early in the migration in 2001, Cisco® decided that the ideal hardware solution would:

  Physically connect all servers to a single pool of storage

  Minimize overhead associated with SAN inter-switch links (ISLs)

  Provide additional expansion capabilities for future growth

  Support the business unit philosophy

  Provide a migration path to emerging technologies such as Fibre Channel Interface Protocol (FCIP) and SCSI over IP (iSCSI).

Results - Storage Architecture (Phase I)

- The storage teams migrated 35 percent of business storage to a SAN environment
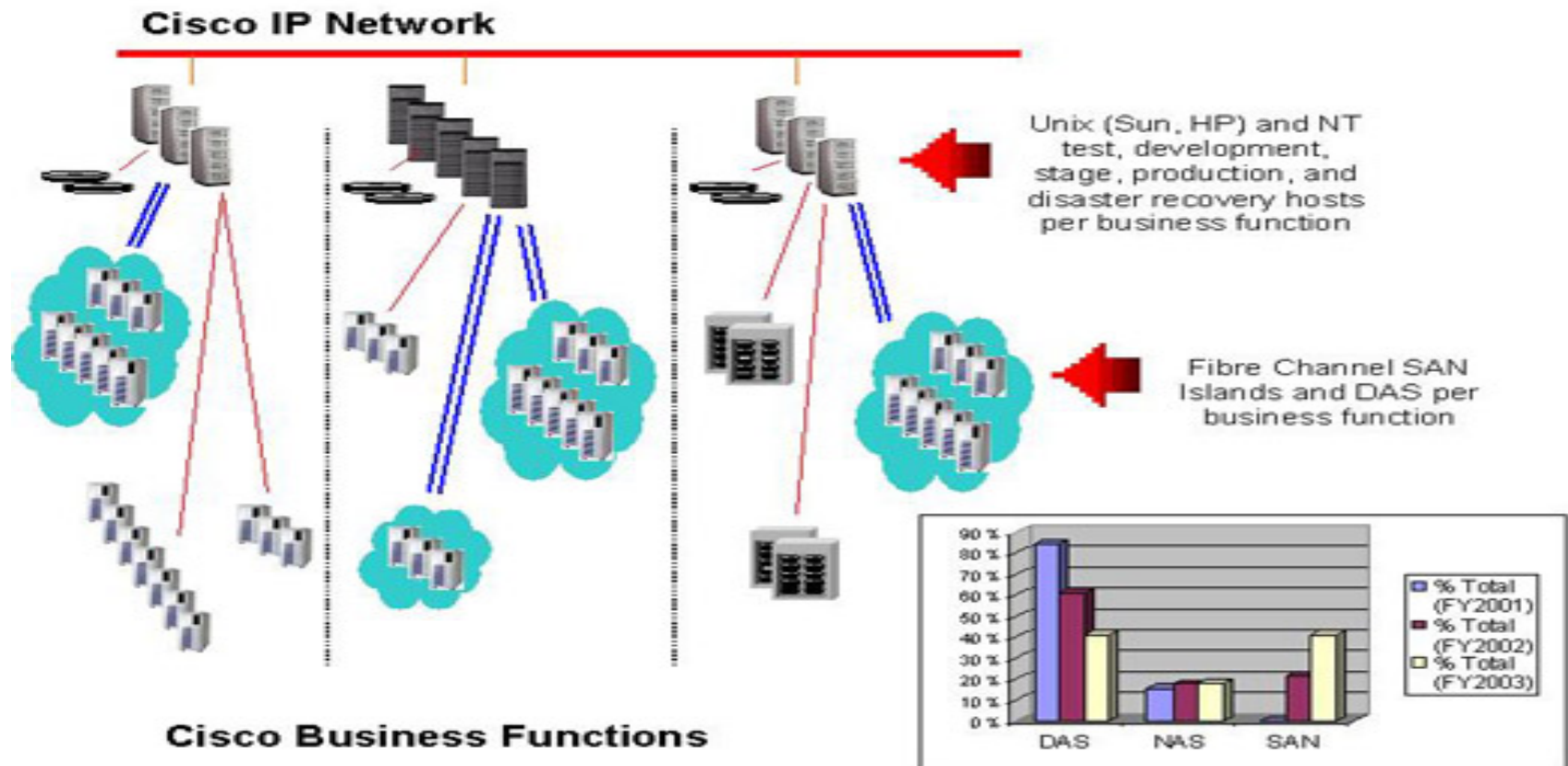
High-Level Cisco® Storage Architecture After Phase I of Migration to Storage Vision (Late 2002)
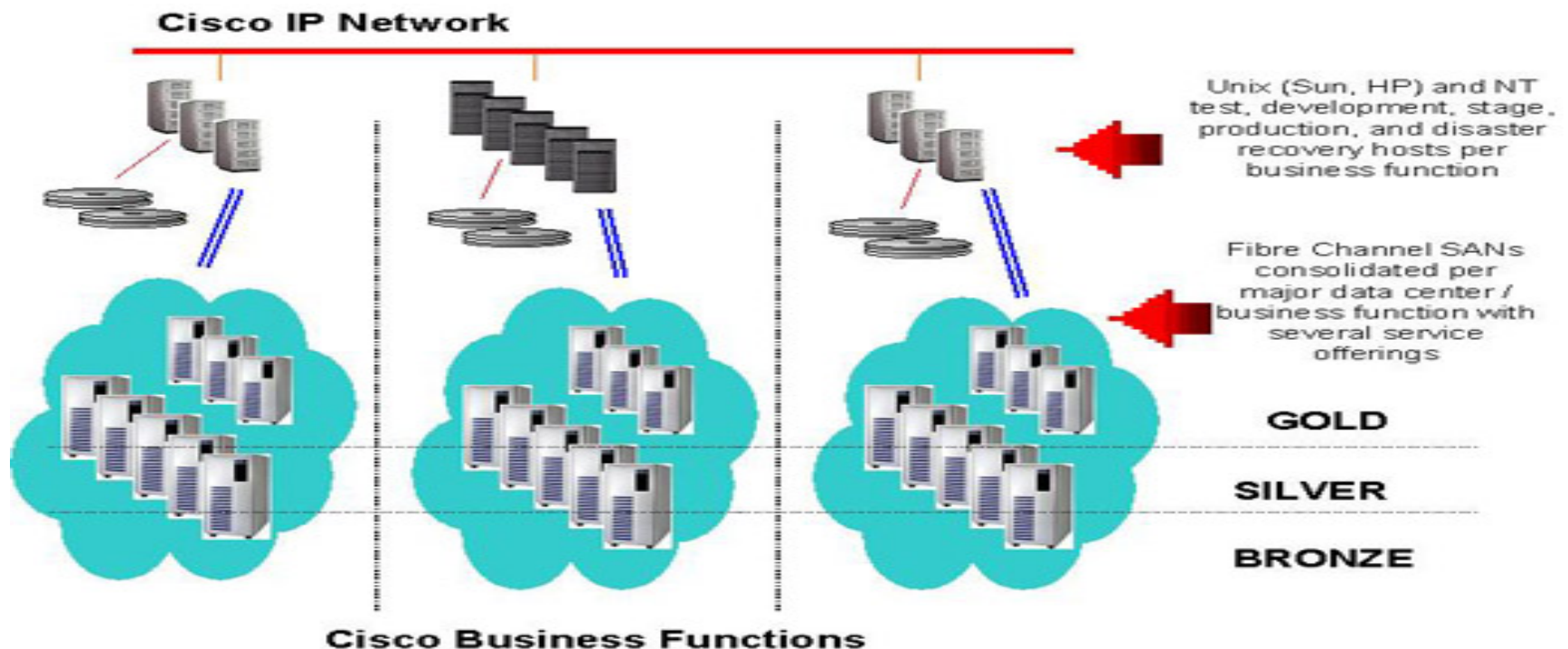
Challenge - Migration Challenge (Phase II)

- The ERP/data warehousing business functions were combined into a single business function in 2002, exacerbating the scalability constraints of the available Fibre Channel switches

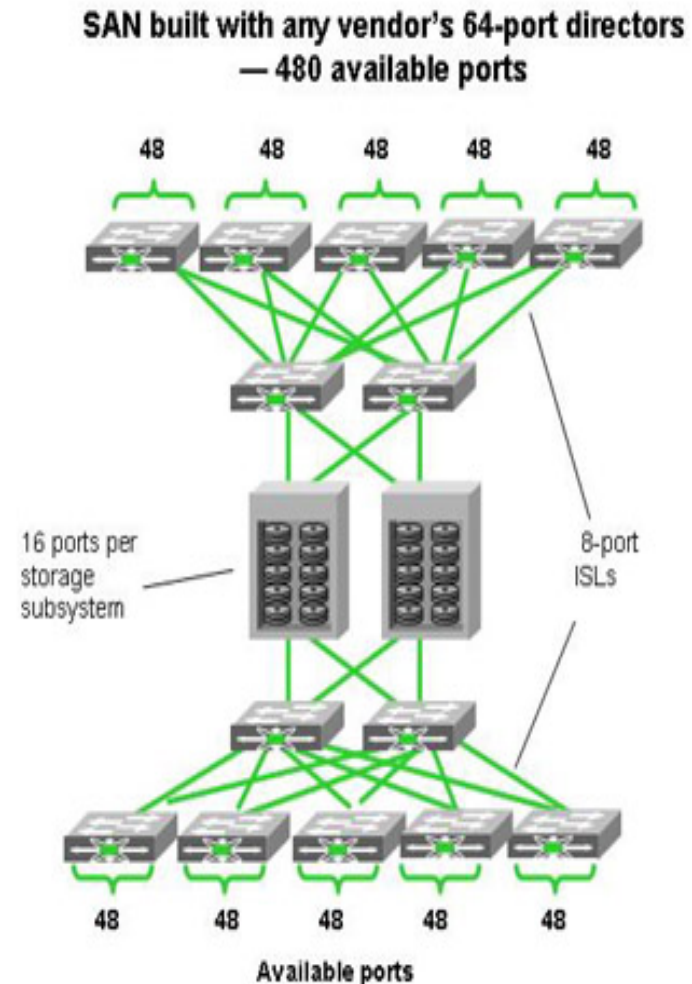Cisco ERP/Data Warehousing Business Function
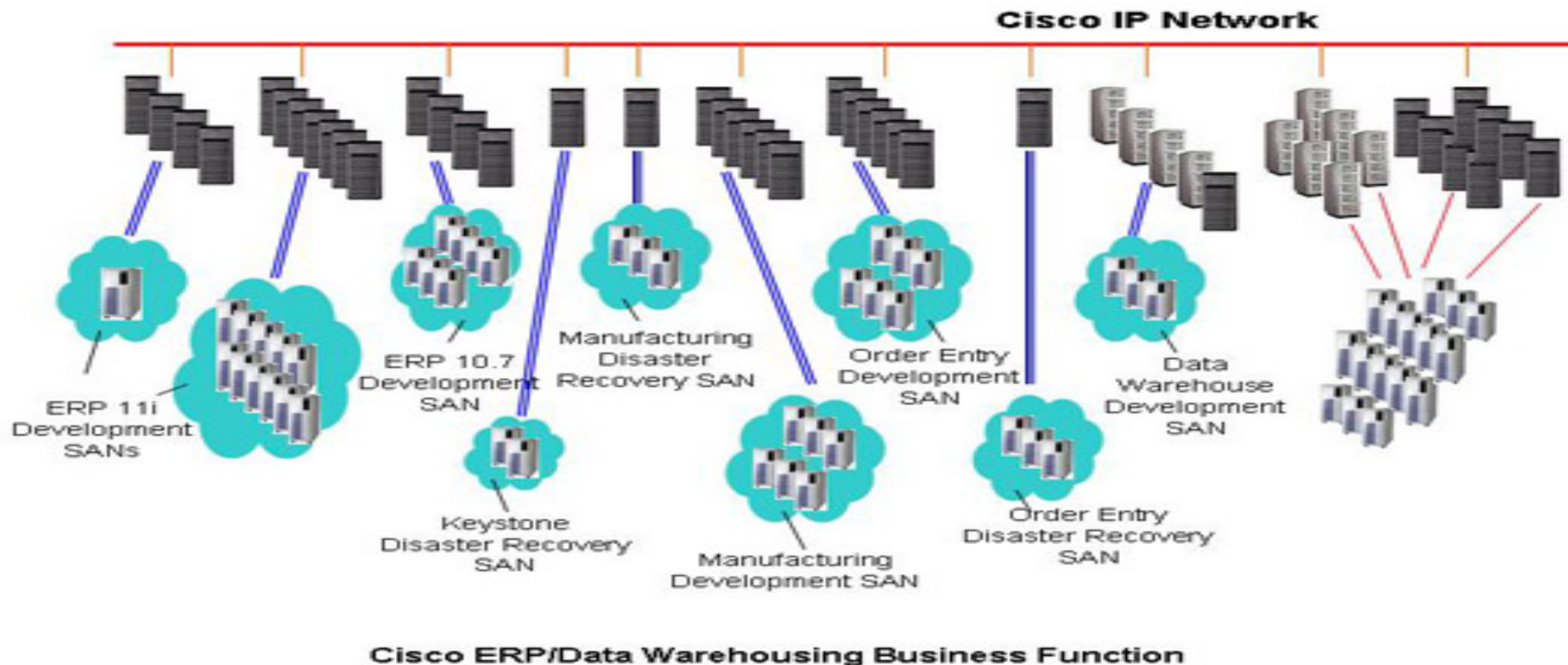
Solution - Migration (Phase II)

- Phase II of the migration was to consolidate the remaining DAS and any SAN islands within each business function into a single large SAN per business function per data center


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Challenge - Migration Challenge (Phase II)

- Building a SAN large enough to support an entire business function environment (even within a single data center) proved challenging

- For example, providing storage for the ERP business function within Cisco would require more than 400 ports

- Multiple fabrics require multiple management interfaces – increasing management costs

- Multiple islands require separate storage – utilization was better, but still low

SAN built with any vendor's 64-port directors — 480 available ports

48   48   48   48   48

16 ports per storage subsystem

8-port ISLs

48   48   48   48   48

Available ports

Solution - MDS 9509 Multilayer Director Switch

SAN built with Cisco MDS 9509 multilayer director switches—416 available ports

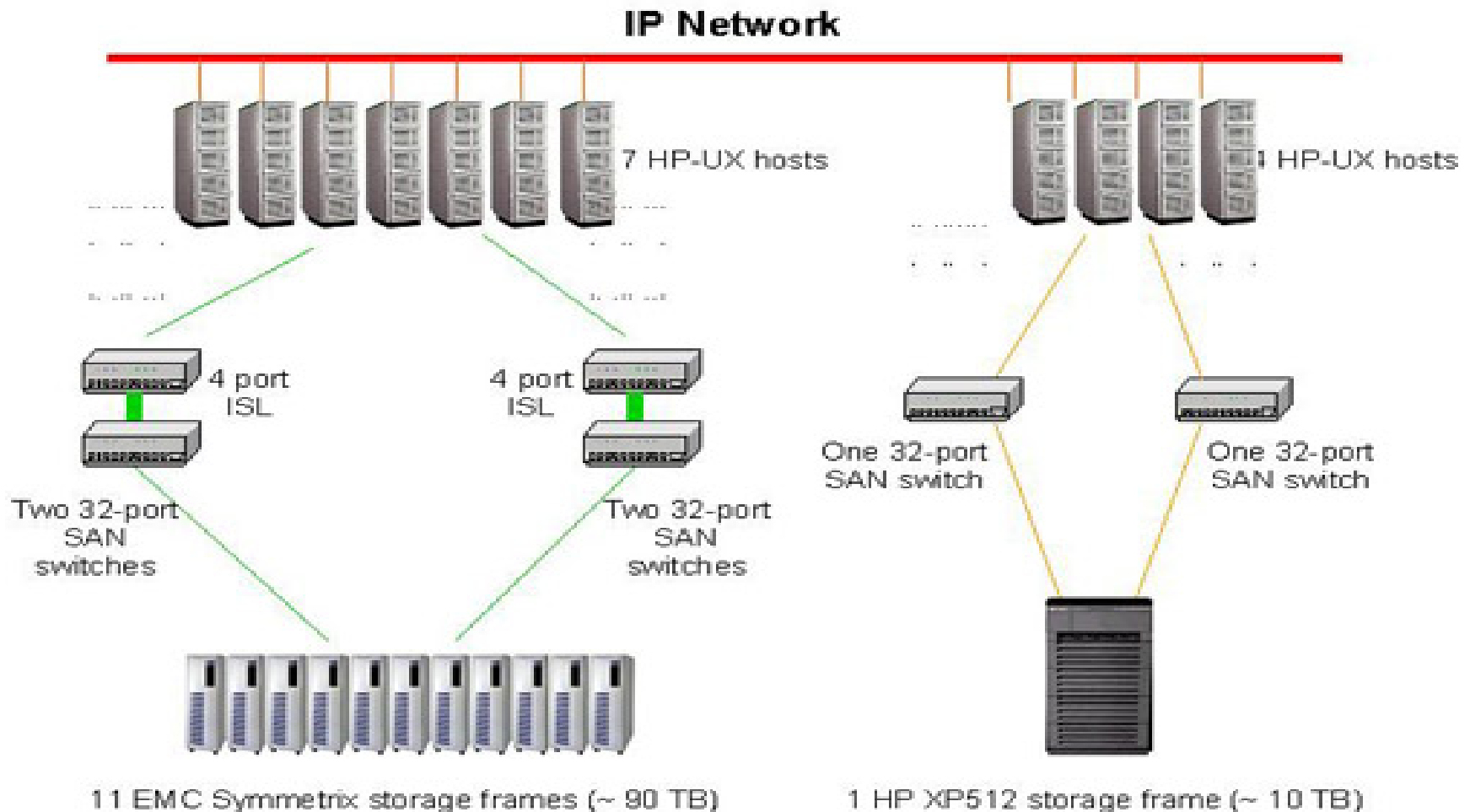Available ports

208   208

16 ports per storage subsystem
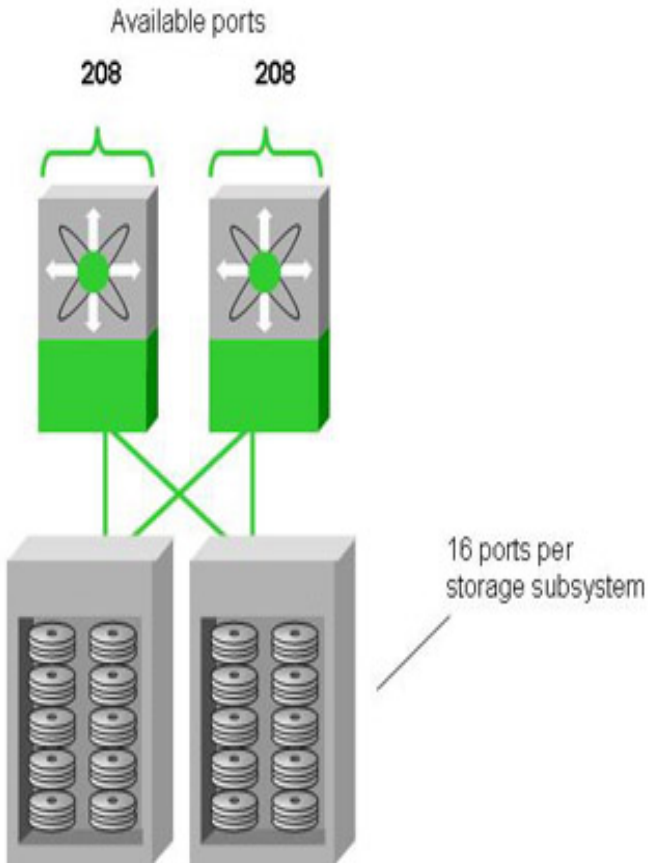
- The Cisco® MDS 9509 supports all the high-availability features that define director–class operation

- By bundling up to 16 Fibre Channel ports into a logical port channel, the Cisco MDS 9509 achieves higher inters witch bandwidth while preserving a single interface instance within the fabric shortest path first (FSPF) routing process

- Migrating to 2 fabrics from 22 in the ERP improved storage utilization while reducing management overhead

- VSANs allowed separate storage networks on a single shared fabric, keeping business functions separate

Results - Oracle 11i Migration

- The Oracle 11i portion of the ERP development environment was chosen as the first to be migrated to the new Cisco® MDS 9509 switches

- The storage team planned a two–stage migration:

  Stage 1—Migrate one half of the current two SAN fabrics from their current 32-port SAN switch architecture to a single Cisco MDS 9509

  Stage 2—After testing, migrate the second half of the two SAN fabrics to an added pair of Cisco MDS 9509s

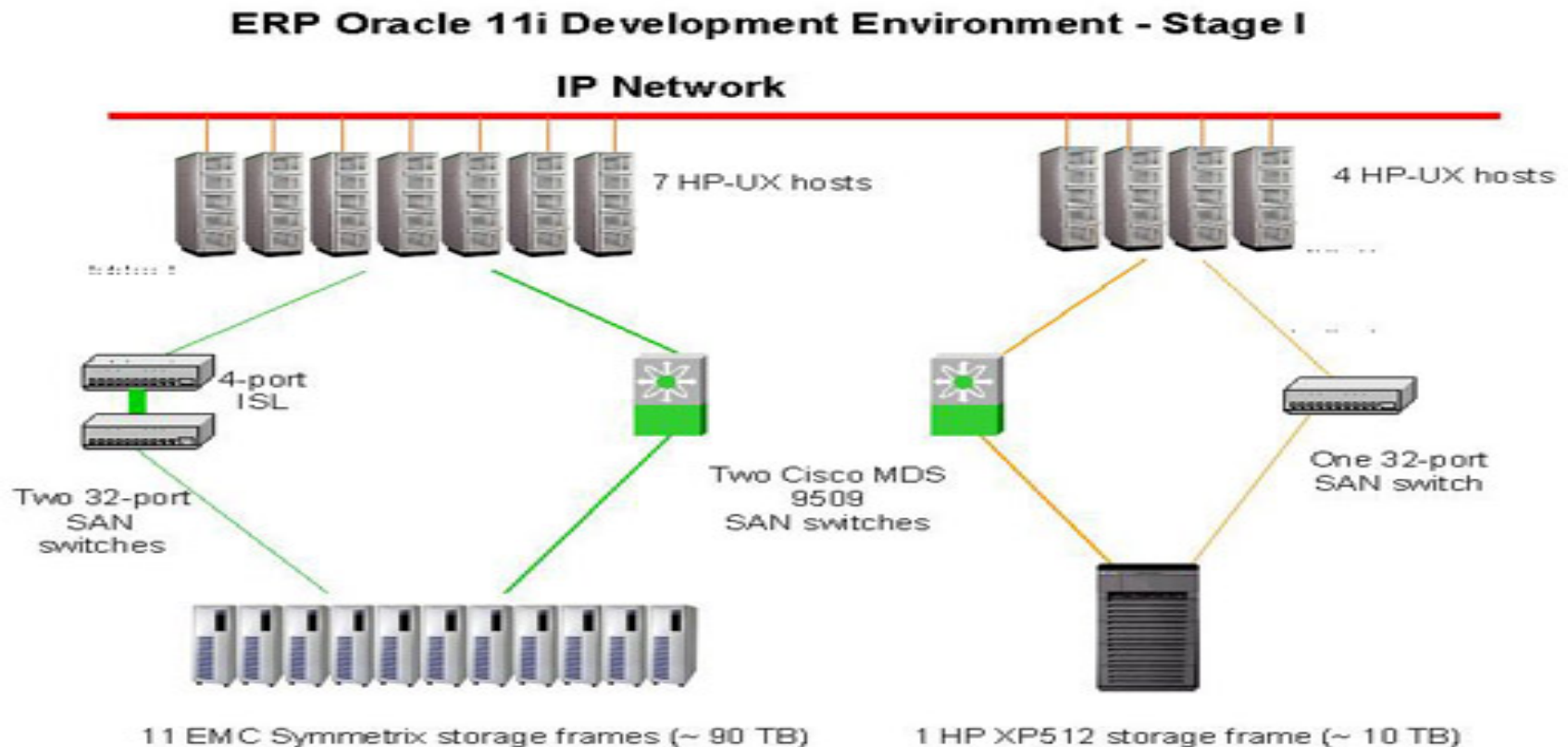# Results – Oracle 11i Before Migration

ERP Oracle 11i Development Environment Before Cisco MDS 9509

IP Network

7 HP-UX hosts

4 HP-UX hosts

4 port ISL

4 port ISL

Two 32-port SAN switches

Two 32-port SAN switches

One 32-port SAN switch

One 32-port SAN switch

11 EMC Symmetrix storage frames (~ 90 TB)

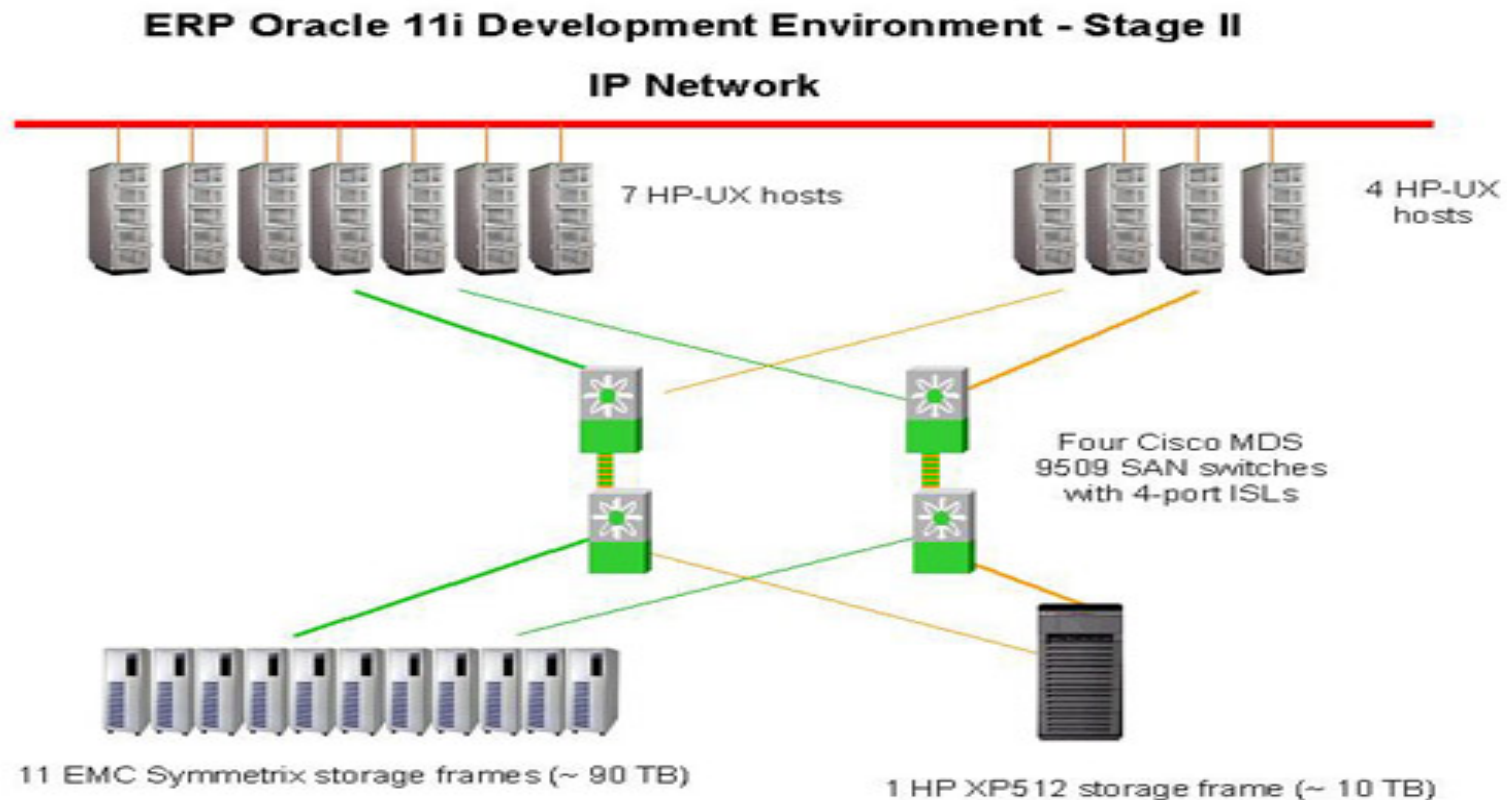1 HP XP512 storage frame (~ 10 TB)

Results - Oracle 11i Stage 1 Migration

- Each Cisco® MDS 9509 is configured with redundant supervisor engines, four 16–port line cards, and three 32–port line cards.

ERP Oracle 11i Development Environment – Stage I

IP Network

7 HP-UX hosts

4 HP-UX hosts

4-port ISL

Two 32-port SAN switches

Two Cisco MDS 9509 SAN switches

One 32-port SAN switch

11 EMC Symmetrix storage frames (~ 90 TB)

1 HP XP512 storage frame (~ 10 TB)
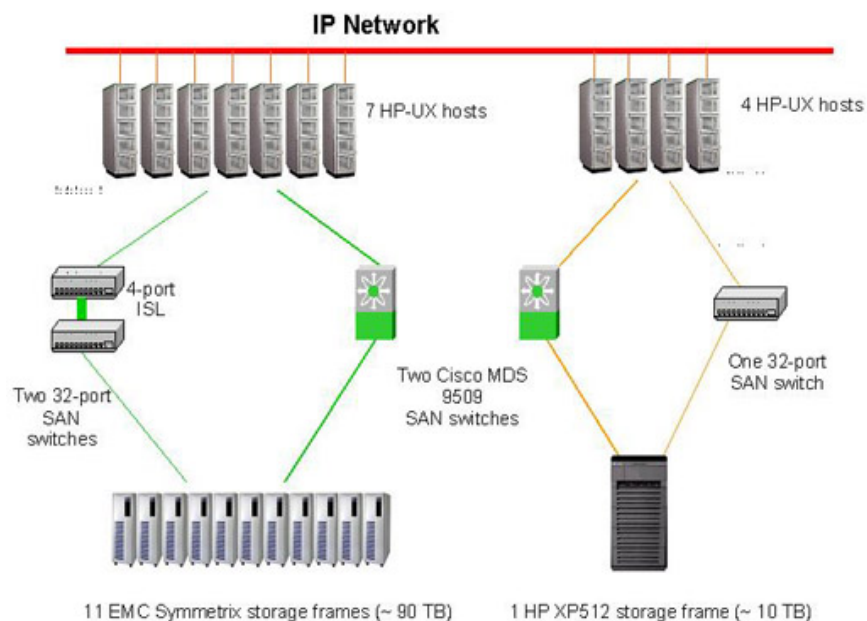
Results - Oracle 11i Stage 2 Migration

- The Cisco® MDS 9509 switches were connected by a single port channel composed of four ports, which is treated as a single ISL by the FSPF protocol
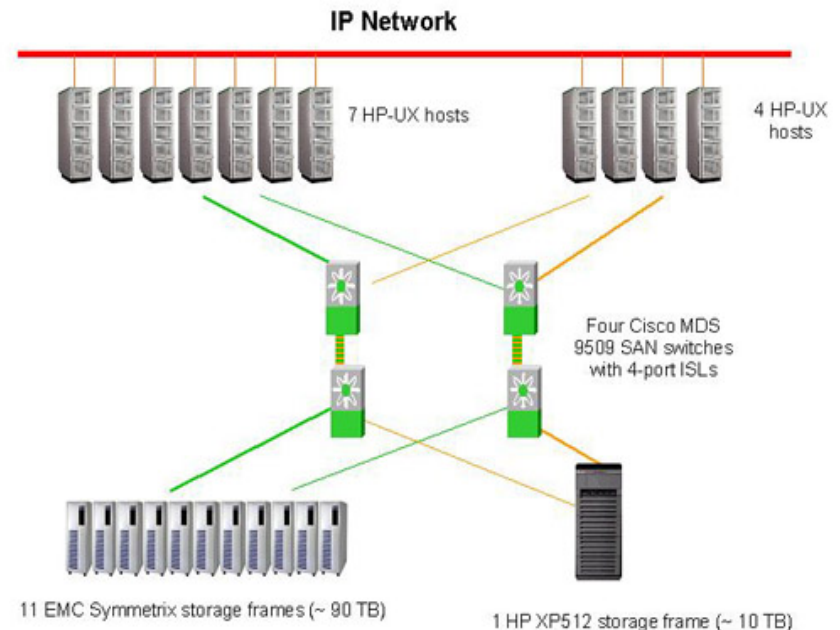

ERP Oracle 11i Development Environment - Stage II

IP Network

7 HP-UX hosts

4 HP-UX hosts

Four Cisco MDS 9509 SAN switches with 4-port ISLs

11 EMC Symmetrix storage frames (~ 90 TB)

1 HP XP512 storage frame (~ 10 TB)

Results - Oracle 11i Stage 1 and 2 Migration

- The Cisco® IT storage group extensively tested the Cisco MDS 9509, the group was confident that the MDS 9509 would work in the Oracle 11i development environment and that the migration could be done with no effect on the hosted applications

ERP Oracle 11i Development Environment - Stage I

IP Network

7 HP-UX hosts

4 HP-UX hosts

4-port ISL

Two 32-port SAN switches

Two Cisco MDS 9509 SAN switches

One 32-port SAN switch

11 EMC Symmetrix storage frames (~ 90 TB)

1 HP XP512 storage frame (~ 10 TB)

ERP Oracle 11i Development Environment - Stage II

IP Network

7 HP-UX hosts

4 HP-UX hosts

Four Cisco MDS 9509 SAN switches with 4-port ISLs

11 EMC Symmetrix storage frames (~ 90 TB)

1 HP XP512 storage frame (~ 10 TB)

Results - Summary

- The ERP Oracle 11i environment at Cisco is now better positioned for growth than ever before

- VSANs, which add to the security and availability within the SAN as a whole, are being used to completely isolate the former SAN islands from one another

- Servers can access storage on any frame independent of physical cabling and switch interconnects, leading to greater storage usage potential

- The new Cisco ERP/data warehousing SAN virtually eliminates the need for scheduled downtime associated with storage, and further savings are derived through operational efficiencies

Next Steps - Summary

- Consolidation of the entire Research Triangle Park data center onto a single SAN

- Migration of all business functions in the data center will further extend the ROI of the Cisco® MDS 9509 switches

- Migrations will take place without disruption to the hosted applications, and VSANs will be used to maintain strict traffic separation and to insulate applications from one another where applicable

Next Steps – Summary (Contd.)

- Storage products such as SRM and SAN management tools are maturing, and future technologies such as Cisco MDS 9000 Series-based storage virtualization will play a critical role in the large-scale consolidation defined and required to meet the Cisco IT storage vision

Solution - Storage Pool Concept

- The storage pool concept would also allow Cisco® to separate the pool into various service levels.
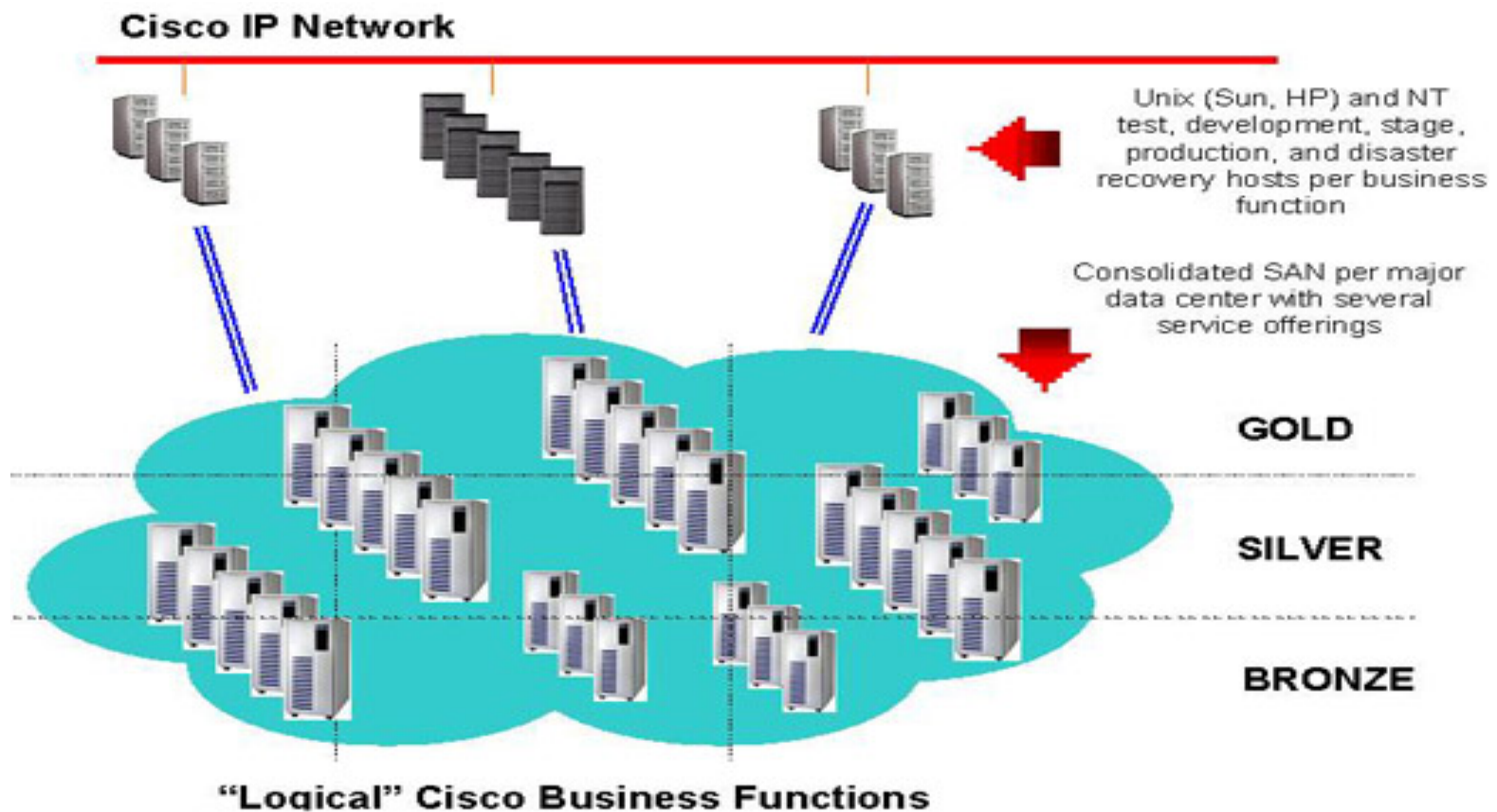
Cisco End-to-End Network Solutions

- Firms that require high availability and maximum ROI choose Cisco® enterprise network solutions to:

   Lower costs, provide storage networks that integrate well with their data center networks, control network resources more effectively, speed project implementation, improve security, and minimize risk and complexity

To read the entire case study, or for additional Cisco IT case studies on a variety of business solutions, visit Cisco on Cisco: Inside Cisco IT
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