

The logo for VERITAS, featuring the word in a bold, blue, serif font. Above the letters 'I' and 'T' is a stylized graphic consisting of a downward-pointing triangle with three horizontal lines, and a red arrow pointing downwards from the top center of the logo area.

**VERITAS**

Business without interruption.

# **The Road to Centralized Management**

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## ***Realizing the Promise of SANs***

**Bill North**

**Director, Storage Network Programs**

**Strategic Initiatives Group**

**VERITAS Software**

**Education Committee Chairman**

**Storage Network Industry Association**



# Applications Drive Storage

Exponential growth

Always available

Protected and Recoverable

Shared across platforms

Universally accessible

S  
T  
O  
R  
A  
G  
E

Voice/data integration  
Wireless  
Online video

E-Commerce  
Customer Mgmt.

Data Analysis

Enterprise Applications

Client/Server

Basic Accounting

'70s

'80s

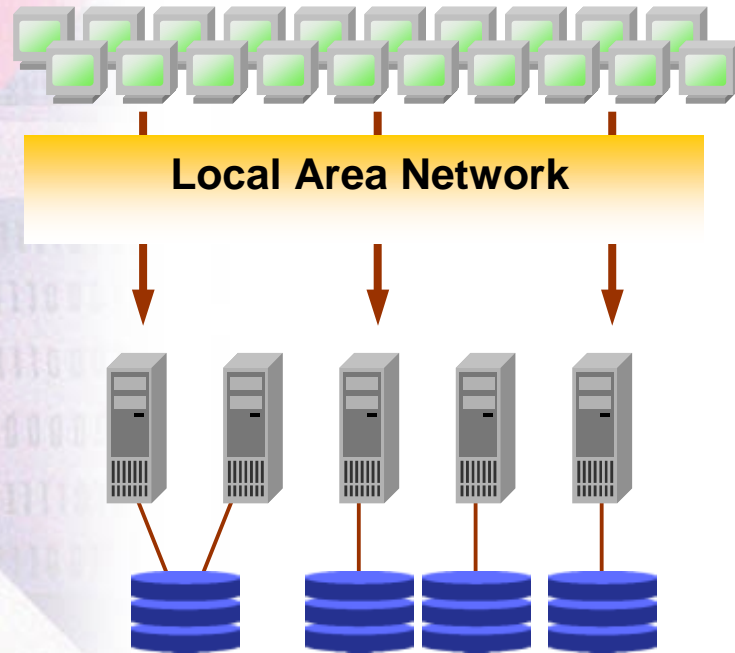
'90s

'00s

'10s

# Traditional LAN

## Client/Server Architecture



**“Any-to-any” LAN-based connectivity**

*but...*

**“Point-to-point” storage architecture**

- ▼ **Limited scalability**
- ▼ **High availability is prohibitively costly**
- ▼ **Difficult, costly management**
- ▼ **Fragmented and decentralized storage**



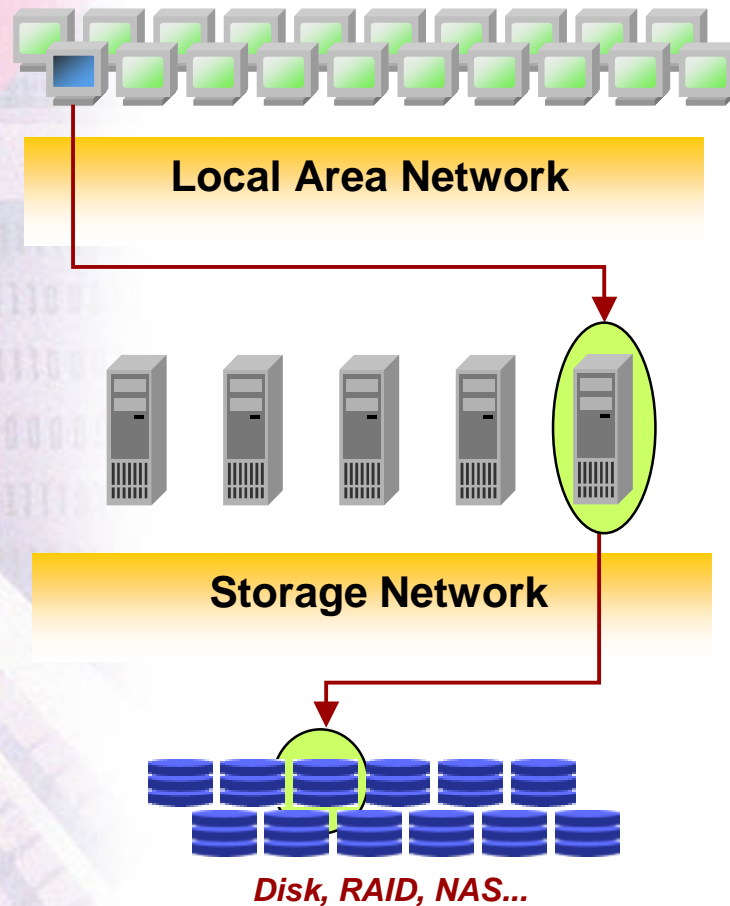
# ***New Capabilities are Needed***

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- ▼ **Managing costs through physical centralization**
  - Sharing of costly peripherals
  - Capacity management across pools of storage
  - Optimize highly trained staff with central administration
  
- ▼ **Increased availability without escalating costs**
  - Virtualization permits non-disruptive on-line changes
  - Policy agents automate storage management tasks
  - Multiple paths between application and data
  
- ▼ **Data centers that grow at internet speed**
  - Adapt to rapid and unpredictable change
  - Re-purposing of application servers
  - Dynamic, demand-based allocation of storage and devices

# A New Model

## “Storage Area Network” Architecture



### “Any-to-any” storage connectivity

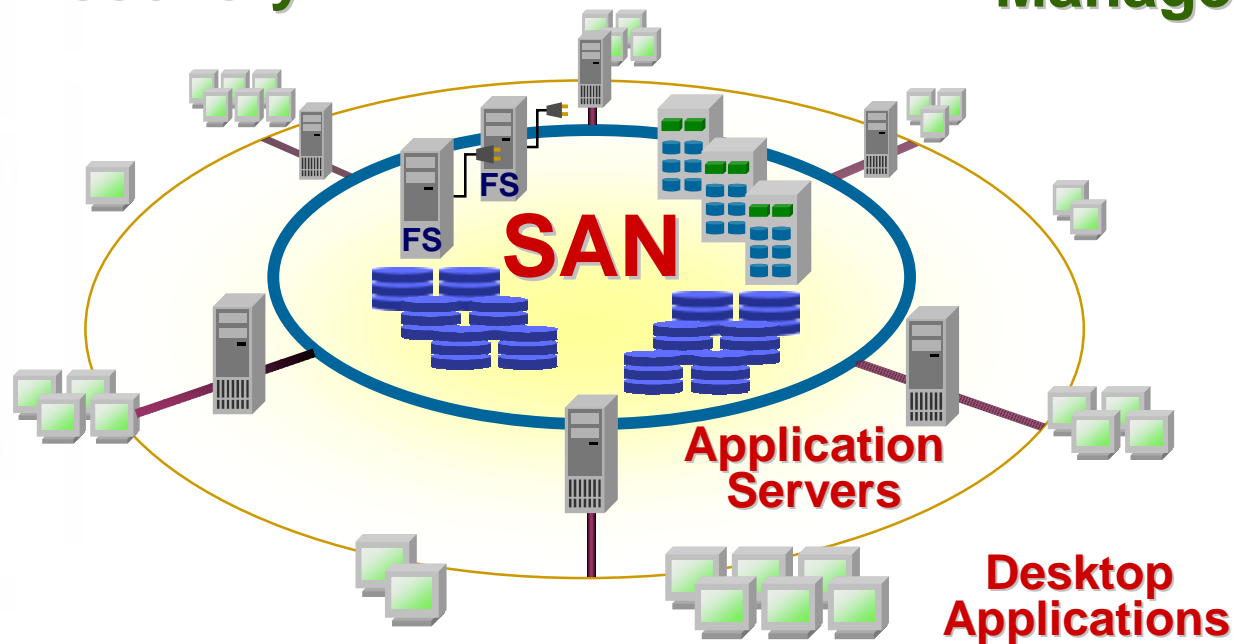
- ▼ Ubiquitous data access
- ▼ Higher availability — at significantly lower cost
- ▼ Easy and inexpensive scalability
- ▼ Reduced management costs

# SANs are at the Core of e-business Infrastructure

**Data Protection  
& Recovery**

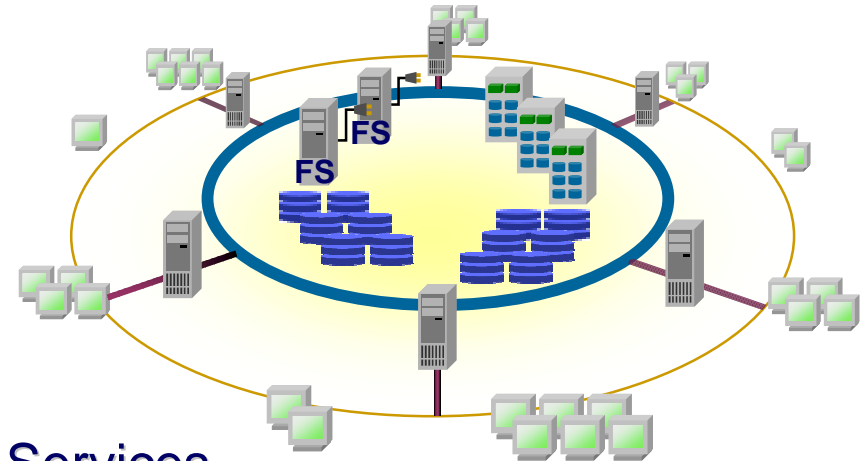
**On-Line Data  
Access**

**Automated  
Management**



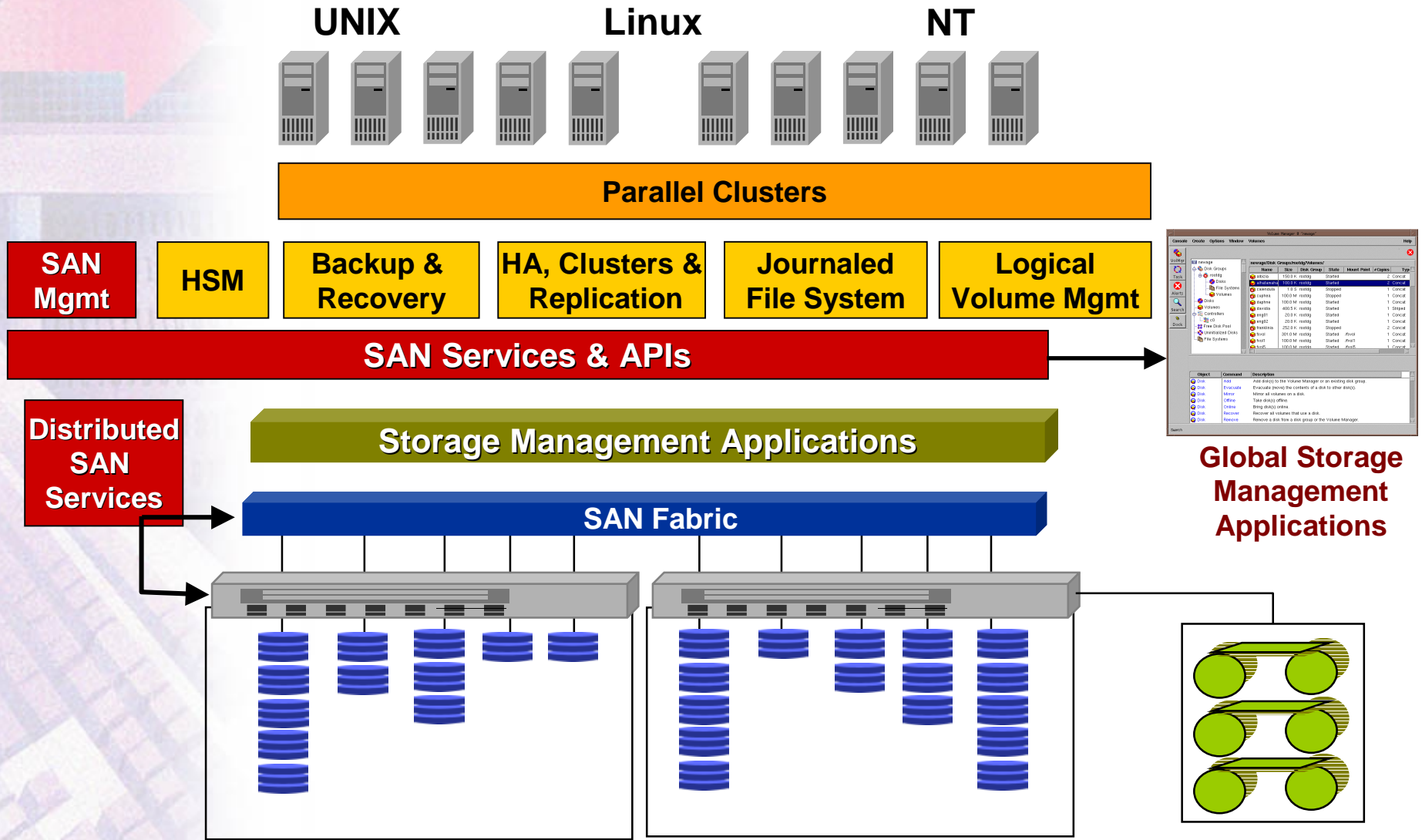
# Ideal SAN Characteristics

- Thousands of devices
- Arbitrary interconnection
- Scalable bandwidth
- Dedicated to and optimized for storage I/O
- High Availability of Applications & Services
- Dynamic Device Management and Detection
- Long Distance Interconnects
- Fault tolerance
- Disaster Recovery
- Enterprise Class Access Control and Security
- Shared storage access between heterogeneous systems
- Current applications and OS's run without modification



***But...  
SANs are inherently  
more complex  
environments***

# SAN Management Architecture





# Virtualization in a SAN Environment

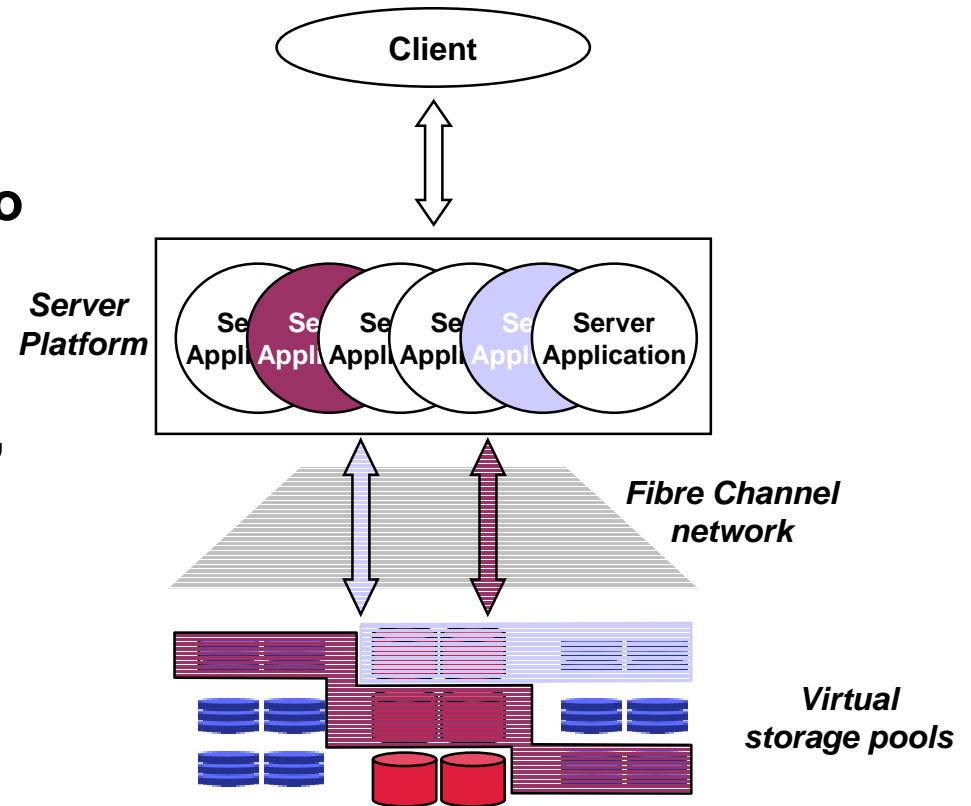
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- ▼ Delivering virtualization *technology* for the SAN environment
- ▼ Standards-based “glue” for SANs
  - V<sup>3</sup> SAN Access Layer
  - V<sup>3</sup> Storage Appliance Software Suite
  - V<sup>3</sup> SAN Management Tools



# What *is* SAN Virtualization?

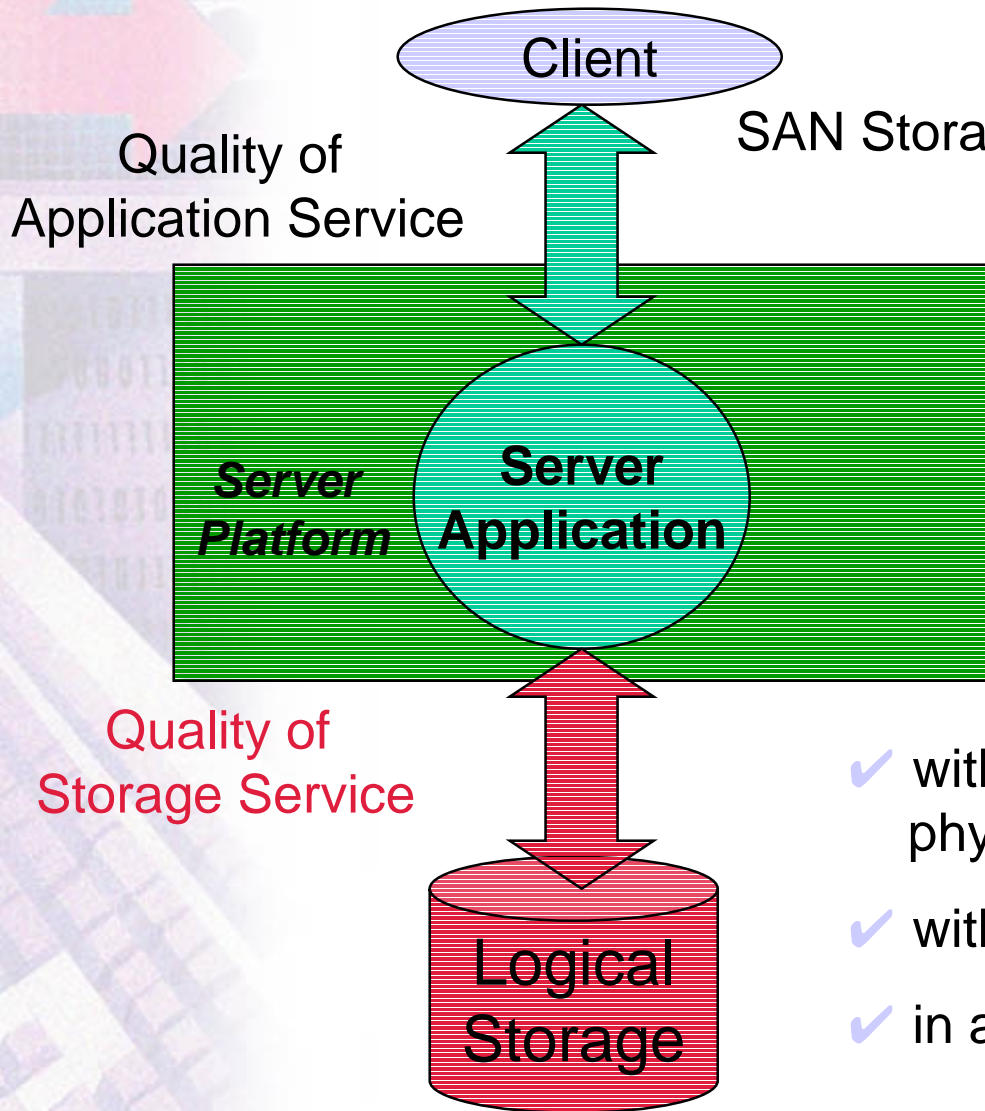
- ▼ The process of organizing multiple **storage resources** into logical - or virtual - entities to better manage capacity, automate procedures, and increase performance



- ▼ ***SAN virtualization enables management of more complex installations while controlling and reducing cost of ownership***

# The Goal of "SAN Virtualization"

## Dramatically Simplify Storage Management

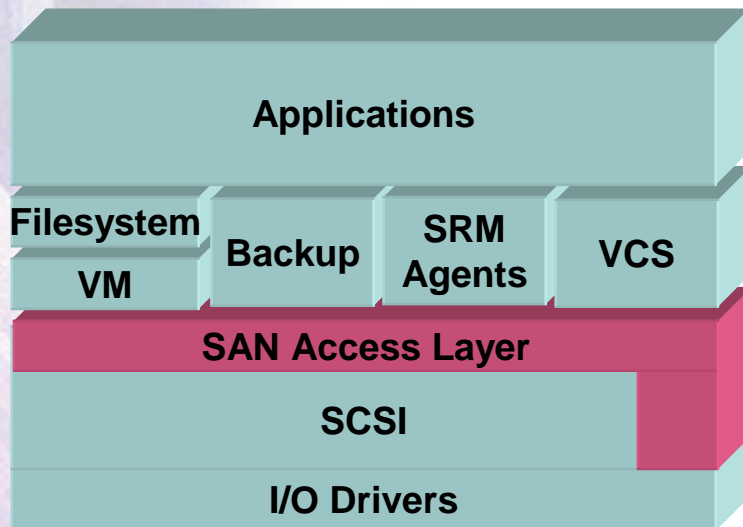


SAN Storage Management must be capable of these services....

- ✓ *Capacity Allocation*
  - ✓ *Failure Recovery*
  - ✓ *Data Protection*
  - ✓ *Performance Management*
  - ✓ *Asset Optimization*
- ✓ without manual management of physical devices
  - ✓ with minimal disruption to application
  - ✓ in a heterogeneous environment

# The VERITAS V<sup>3</sup> SAN Access Layer Creates SAN-Aware Storage Management

*V<sup>3</sup> SAN Access Layer is a new host-based technology that provides a virtual interface into the more complex SAN environment*

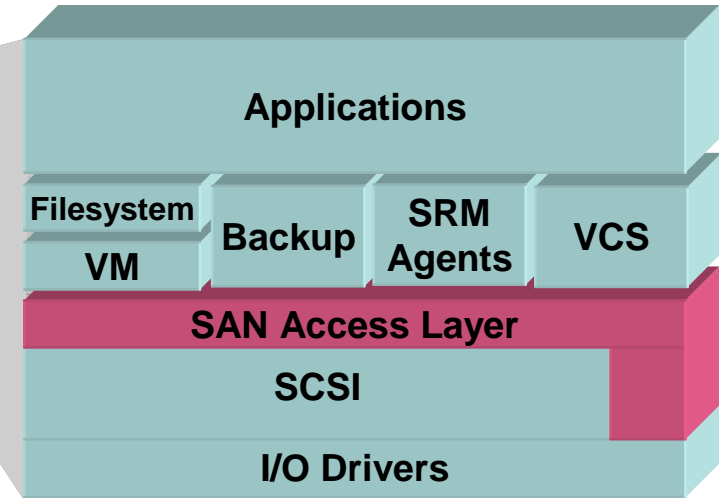
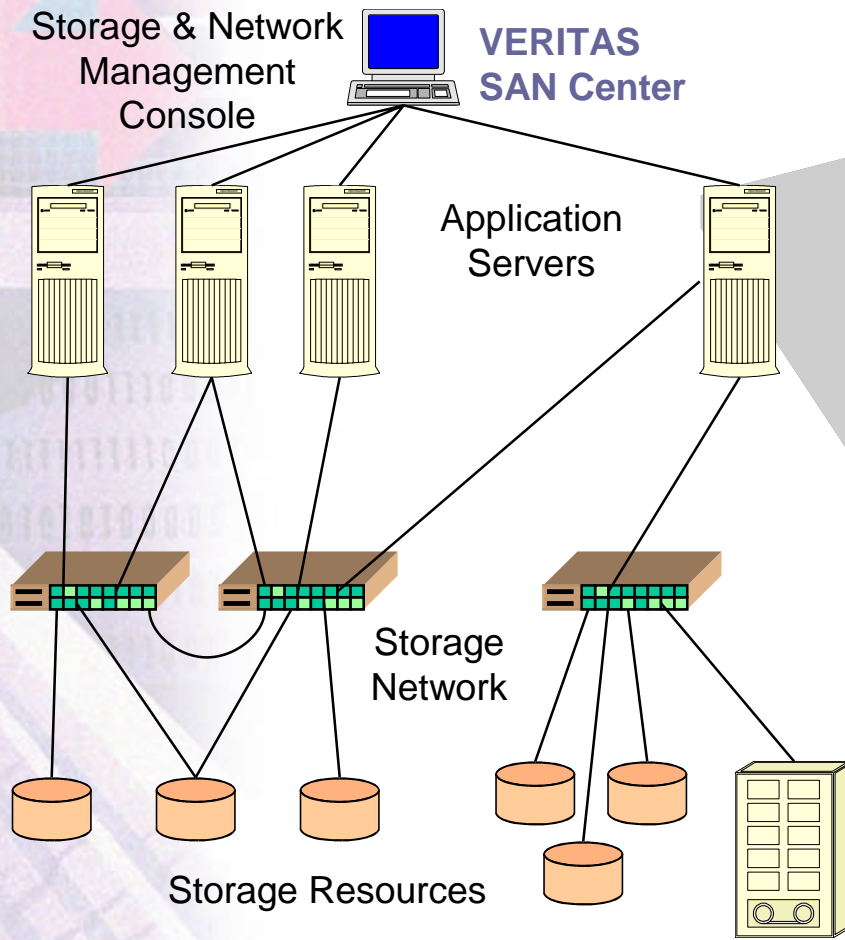


- ✓ “Client API” for host applications are common across NT/UNIX
- ✓ “SAN API” for communication with SAN Fabric, Devices, Services
- ✓ Complements more limited legacy SCSI I/O services

***Enables SAN Discovery Services***  
***SAN APIs based on de-facto and formal standards...  
with vendor specific extensions added as needed***



# The VERITAS SAN Access Layer Creates SAN-Aware Applications



**Discovery Services**  
Topology & Distance

Zoning

Storage Attributes and Agents

**Common APIs for NT and UNIX**  
SAN APIs

Client APIs for SAN Management  
or storage management applications

**Foundation for SNIA Discovery Working Group**

# SAN Discovery Services

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*SAN Discovery Services capture, correlate, and maintain capabilities & attributes of a SAN configuration and presents a common service API*

- ▼ **Properties that are discovered and used....**
  - ✓ **Device and host names**
  - ✓ **Topology/distance & SAN configuration state changes**
  - ✓ **Zoning Configuration & Control**
  - ✓ **Off-host Agents and Services (ie 3rd Party Copy)**
  - ✓ **Storage Attributes (cost, RAID level, performance)**

# Using the V<sup>3</sup> SAN Access Layer to Enable SAN Capabilities

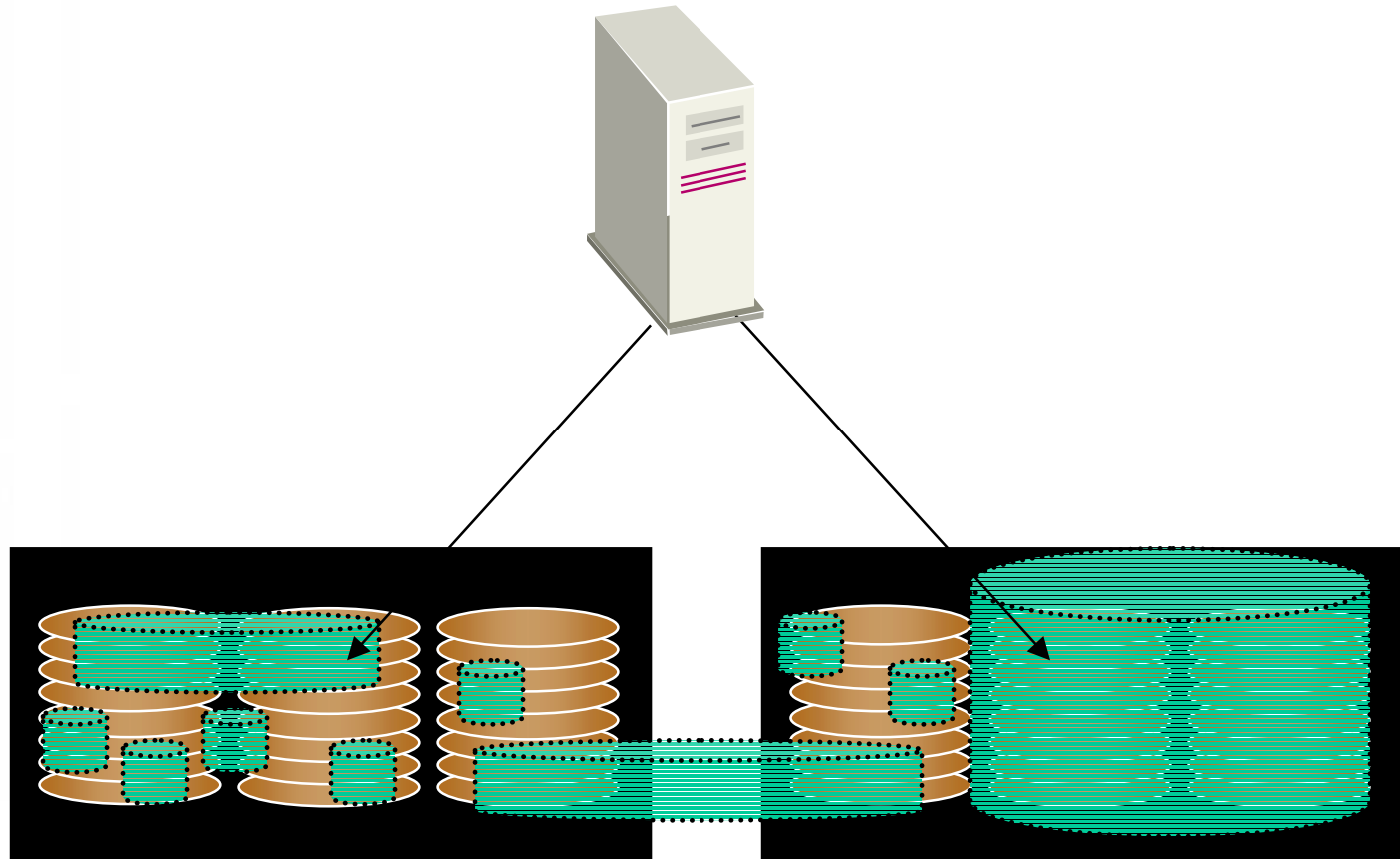
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- ▼ **V<sup>3</sup> SAN Management Tools**
  - ✓ **Single centralized application for zone administration**
  
- ▼ **High Availability Cluster Server**
  - ✓ **Automatically re-configures zone to provision a new path to failed application's storage**
  
- ▼ **Logical Disk / Volume Manager**
  - ✓ **Finds free disks to allocate to a growing application based on cost/performance needs**
  
- ▼ **Backup and Storage Migration**
  - ✓ **Finds the best 3rd Party Copy agent for LAN-free data movement**

# Logical Volume Manager

## An Example of Storage Virtualization

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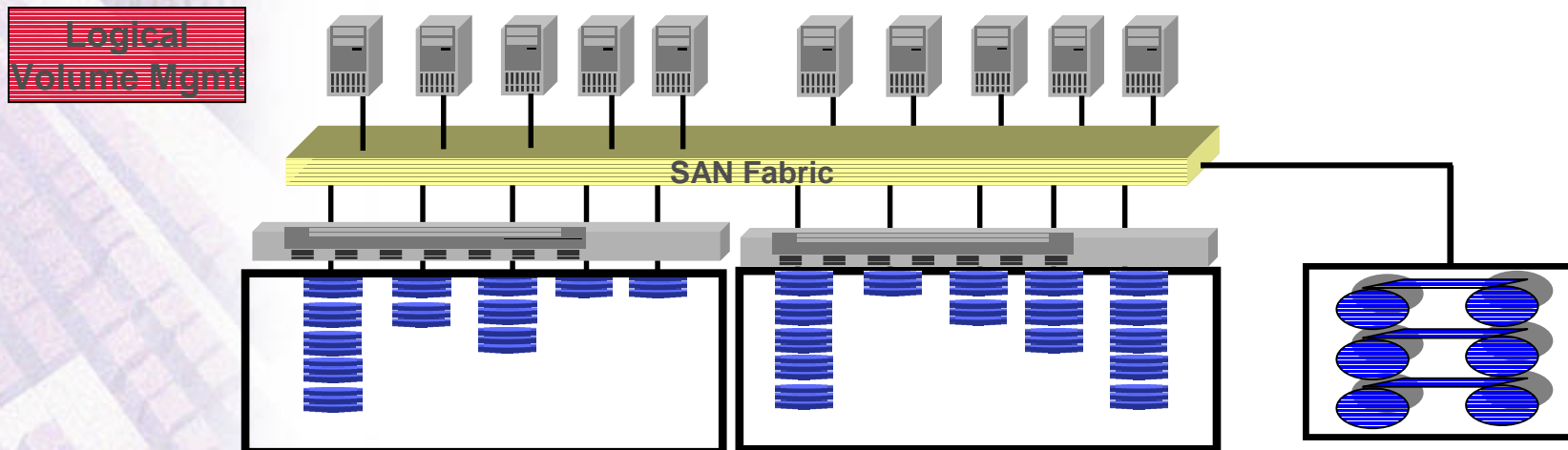
**Virtualizes** disk storage to allow creation and online modification of logical storage free of hardware and OS restrictions



# VERITAS Logical Volume Manager (VxVM) in SAN Environments

## Non-Disruptive On-Line Storage Management

- Remote Mirror to peripheral 10km away
- “LUN ownership” in multi-host environment
- Add-storage on-line to FC hubs/switches
- DMP provides path fail-over and load balancing
- Performance Optimization across a SAN

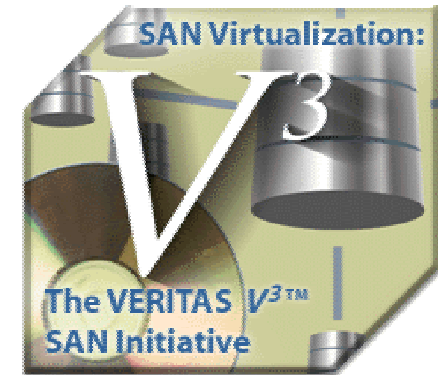


# Intelligent Storage Appliances

## Virtual Consolidation of SAN Resources

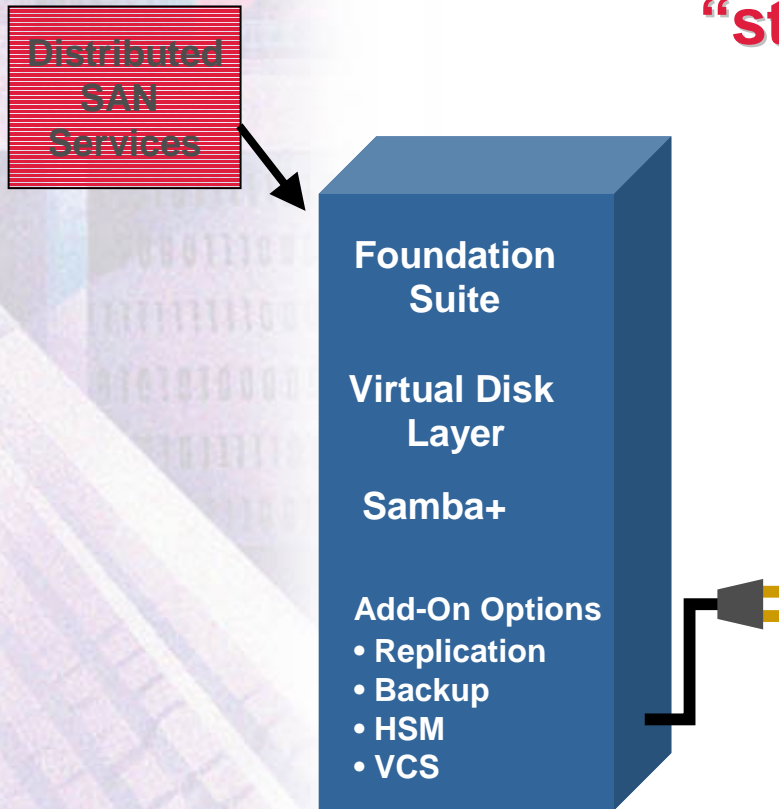
### ▼ V<sup>3</sup> Storage Appliance Software Suite

- The power of VERITAS products together in one software suite and integrated into 3rd party intelligent storage servers (or *appliances*)
- All centrally managed via V<sup>3</sup> Storage Appliance's *Virtual Disk Manager*
- Based on FS, allows multiple virtual disks to be more efficiently managed
  - Other VERITAS products such as Backup and VCS to be provided as options -- all managed via one central console
- *Virtual consolidation point improves manageability*
- *Maximizes uptime by minimizing impact of physical SAN configuration changes*
- *Provides the basis for "host free" data movement between intelligent storage devices*



# VERITAS StorageCentre Intelligent Storage Appliance

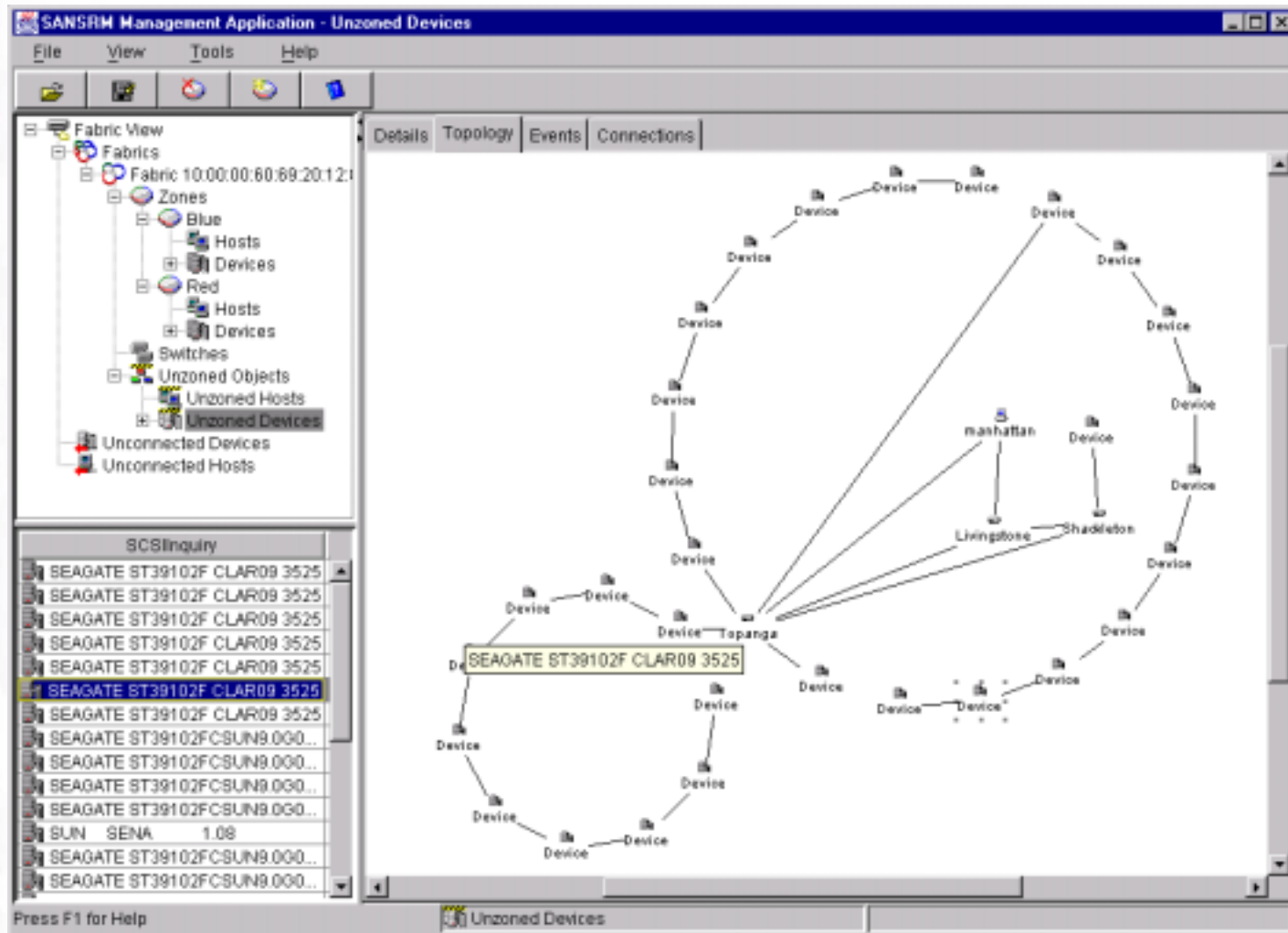
## Embedding VERITAS software on the “storage” side of the SAN



- ▼ SAN Attached Storage Server based on VERITAS Foundation Suite
- ▼ Commodity HW & Commercial OS for variety price/performance points
- ▼ VDISK layer represents “server” as a virtual disk over a SAN
- ▼ Optional Samba+ layer allows file access to storage over a LAN port
- ▼ Add-on storage management functions as needed for availability or scalability

# SAN Center

## SAN Visualization and Zone Administration



The screenshot displays the SANSRM Management Application interface, titled "Unzoned Devices". The interface is divided into several sections:

- Left Panel (Fabric View):** A tree view showing the hierarchy of the SAN. It includes "Fabrics", "Zones" (Blue, Red), "Hosts", "Devices", "Switches", "Unzoned Objects", "Unzoned Hosts", and "Unzoned Devices". The "Unzoned Devices" folder is currently selected.
- Bottom Left Panel (SCSI Inquiry):** A list of SCSI devices. The selected device is highlighted in blue:
 

Device ID	Vendor	Model	Revision	Serial Number
SEAGATE ST39102F CLAR09 3525	SEAGATE	ST39102F	CLAR09	3525
SEAGATE ST39102F CLAR09 3525	SEAGATE	ST39102F	CLAR09	3525
SEAGATE ST39102F CLAR09 3525	SEAGATE	ST39102F	CLAR09	3525
SEAGATE ST39102F CLAR09 3525	SEAGATE	ST39102F	CLAR09	3525
SEAGATE ST39102F CLAR09 3525	SEAGATE	ST39102F	CLAR09	3525
SEAGATE ST39102F CLAR09 3525	SEAGATE	ST39102F	CLAR09	3525
SEAGATE ST39102F CLAR09 3525	SEAGATE	ST39102F	CLAR09	3525
SEAGATE ST39102FC SUN9 000...	SEAGATE	ST39102FC	SUN9	000...
SEAGATE ST39102FC SUN9 000...	SEAGATE	ST39102FC	SUN9	000...
SEAGATE ST39102FC SUN9 000...	SEAGATE	ST39102FC	SUN9	000...
SEAGATE ST39102FC SUN9 000...	SEAGATE	ST39102FC	SUN9	000...
SUN SENA 1.09	SUN	SENA	1.09	
SEAGATE ST39102FC SUN9 000...	SEAGATE	ST39102FC	SUN9	000...
SEAGATE ST39102FC SUN9 000...	SEAGATE	ST39102FC	SUN9	000...
- Main Panel (Topology):** A graphical representation of the SAN topology. It shows a central device labeled "SEAGATE ST39102F CLAR09 3525" connected to a "Device Tapanga". This central device is also connected to "manhattan" and "Livingstone". The "manhattan" and "Livingstone" devices are further connected to "Shadleton". The topology is represented as a network of interconnected devices.



# SAN Management Strategy

## *Enabling New Global Storage Applications*

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- ▼ **Goal : Reduce Complexity of SAN Administration**
  - ✓ **Manage *logical* SAN storage resources**  
**(use device views as the exception)**
  - ✓ **Deploy functional applications for zone management and capacity allocation**
  - ✓ **Make policy management pervasive to reduce reactive and manual management**
  
- ▼ **Modular Agent/Application architecture**
  - ✓ **Scales from point application management to large SANs using optional central repositories**
  - ✓ **Built on standards (JIRO, CIM, WMI, DMTF, SNIA) & installed base of frameworks (Tivoli,CA, HP, BMC)**

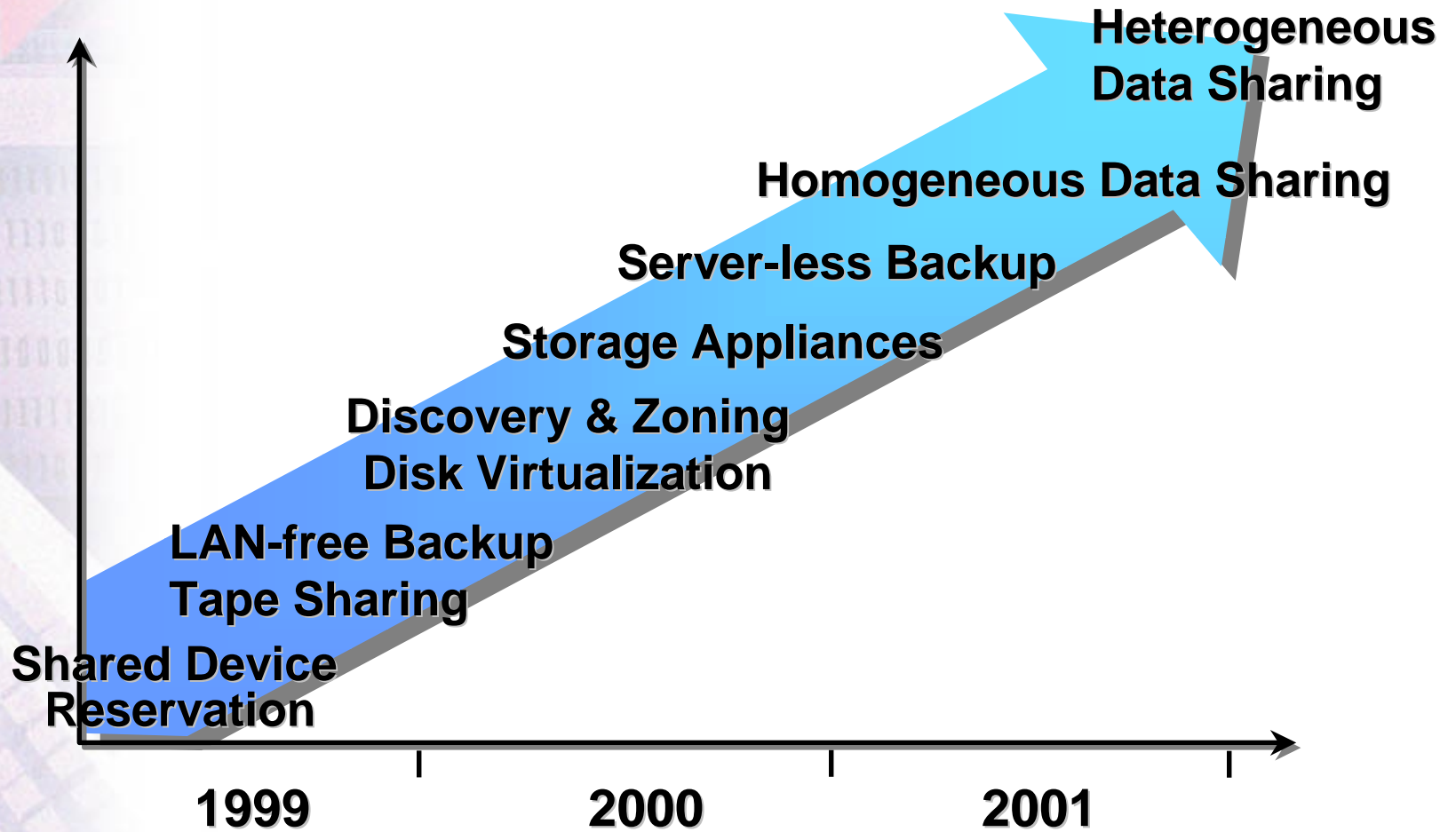
# V<sup>3</sup> SAN Management Tools

## Components used in VERITAS and OEM products

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- ▼ **Administration built on V<sup>3</sup> SAN Access Layer**
  - SAN Visualization with multiple views
  - Zone management from a single application
  
- ▼ **VERITAS Application Management**
  - “SRM” agents and JAVA applications for VM, VxFS, NetBackup
  - Reporting, monitoring, policy automation
  
- ▼ **Common Services**
  - Event notification : e-mail, pager, SNMP
  - Policy administration and enforcement
  - Platform adapters: Systems Mgmt or OEM

# SAN Evolution





The background is a collage of digital and technological elements. At the top, there's a grid with a small black triangle pointing down. Below it, the word "VERITAS" is written in a bold, blue, serif font. The background features a computer keyboard in the lower right, binary code (0s and 1s) scattered throughout, and several large, semi-transparent arrows in shades of red and orange pointing in various directions. The overall color palette is dominated by purples, blues, and greys, with the red/orange arrows providing a strong contrast.

**VERITAS**

**Business without Interruption**

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