



## *White Paper for Kayo 2.0 Volume Sharing software*

### Executive Summary

This white paper is directed towards a business audience more than a technical audience (technical details are covered at a high level). It describes Sanbolic's Kayo software, how it works and the business and technical value that companies using Kayo can receive. Kayo runs on computers connected to a SAN (Storage Area Network) and enhances interSAN communication. SANs provide an infrastructure for rapid storage growth, and fast data access solutions allowing companies to exploit the value of their business information. SANs have emerged to move storage architectures into scalable, high-availability and high bandwidth sharing of data among multiple computers.

### Introduction

Kayo transparently enables multiple computers to share single disk volumes on the SAN-storage. Kayo is a productivity tool, ideally suited for special purpose work-group applications, example:

- Video and Audio editing
- Pre-press
- CAD/CAM
- Web farms
- Clustered servers

All of the above applications can realize work-group productivity increases of typically 30% or more. With Kayo a user merely has to focus on their specific application and content and not worry about the underlying storage architecture.

Kayo provides a storage environment that gives users on a SAN the flexibility and reliability of sharing volumes. Kayo saves precious hours of work-group labor cost that

can be redirected to more important, revenue-generating, production jobs.

IT managers are asked to manage the ever-increasing volumes of critical business data. They are asked to improve the performance of information hungry applications and streamline work-group applications. And of course there is the requirement to reduce storage cost overall. Kayo will help do just that.

### **The Problem**

The primary duties of an operating system are to manage the execution of computer processes, control the flow of data between the computer and its peripherals, and manage the data that is stored on the computer's hard drives. Standard Operating Systems (OS), such as Windows NT and Windows 2000 require additional software to handle SAN volume sharing or file sharing. Kayo provides this functionality. Lack of this functionality translates to a productivity problem for businesses.

An example is the video market, where within the workgroup, one person may be editing the video while another is editing the audio; yet another may be doing rendering, etc. These workgroups work both independently and cooperatively on the same information. Without the functionality of Kayo data sharing within the SAN work groups would lead to data corruption and reduced workflow.

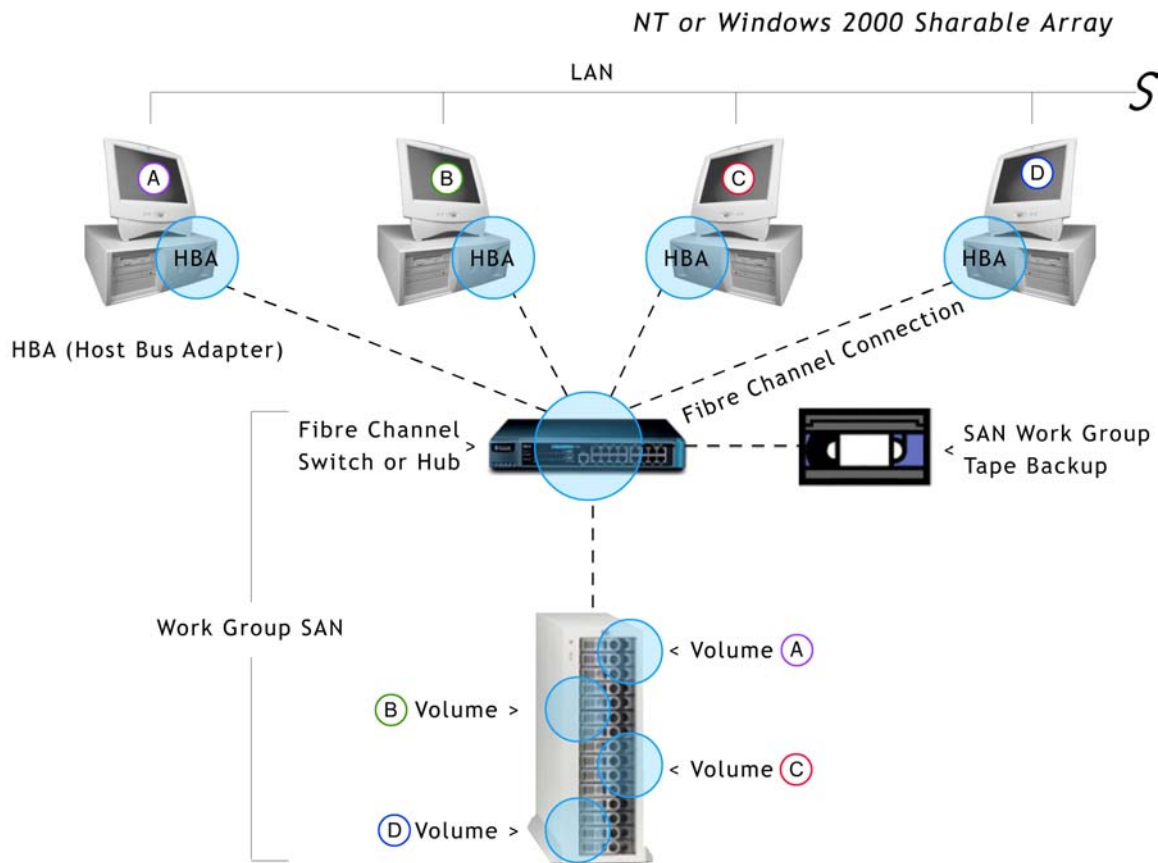
The process for the video market has been to have storage connected to each station within the workgroup. Each user would have their own storage that was connected to the other stations via a standard Ethernet network. The only way to share data is to send the files across the Ethernet network or move the hard drives to the next station. When large amounts of data are transferred across an Ethernet network, even with Gigabit Ethernet, users still can't achieve the performance of a Fibre Channel SAN. The problem with both of these methods is that the original user is not able to work with their data during this process.

### **What Kayo Does**

SANs keep the data flowing and Kayo provides the mechanism of sharing the information between workstations. Data storage capacity can grow as much as 50 to 100 percent annually in most companies. The inability to quickly and easily share information among platforms can impede an organization's ability to exploit information to its fullest value. Overtaxed LANs struggle to keep up with the end-user application data flow, resulting in the creation of SANs.

For SANs to effectively share the storage pools specialized software is required. Kayo allows multiple SAN users to access and share the volumes on the centralized storage.

SANs provide cost-effective storage consolidation, enabling the creation of common shared storage pools attached to multiple servers. Kayo provides the ability to share information amongst Windows NT and Windows 2000 systems and to exploit information to its fullest value.



**Fig 1.**

### Technical specifications

*A more technical understanding of Kayo*

#### **Workgroup SAN -**

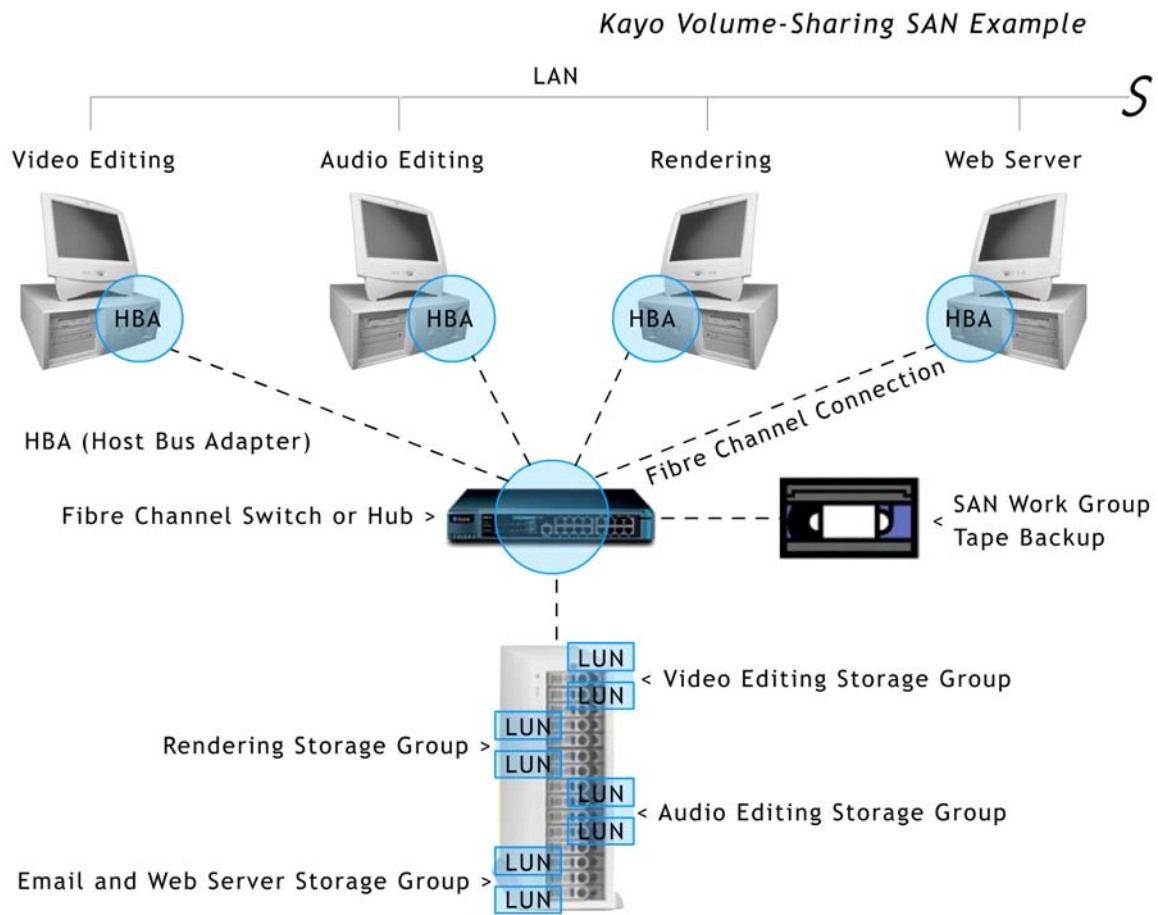
A SAN consists of shared storage, with hubs or switches and multiple workstations. Each workstation has a Fibre Channel host bus adapter (one or more depending on the high-availability requirements). See figure 1. One of the systems also has management software for the storage array to bind/unbind LUNs (Logical Unit Numbers), and to monitor the performance and functions of the array.

#### **Booting up a SAN**

Each workstation requires an operating system. When the operating system boots up on each of the workstation, it scans for all the SCSI devices on the system and thinks that all the storage devices belong to it. To avoid overwriting of data when multiple workstations believe that the storage belongs to them, a LUN masking utility might be used.

### Standard LUN Masking Environment

To prevent possible data corruption that would result from multiple workstations accessing the same files on a volume, the storage management software is used to achieve LUN masking. The benefit of LUN masking is that IT managements gain the ability of doing storage consolidation, whereby each workstation “owns” its assigned disc space (LUNs).



The volumes on the storage are divided into LUNs and each workstation believes it “owns” a specific part of the storage (one or more LUNs). The disadvantages are that files cannot be safely shared amongst the workstations since they do not share the volumes.

### Kayo 2.0 inner workings

To overcome the limitations of LUN masking, the SAN user can install Kayo 2.0 on each of the workstations. Due to the point-to-point physical connection of the SAN and with Kayo volume-sharing software, all users are able to see the volumes on the shared storage as local storage.

Each volume can have one writer at a time, while the other users on the SAN have reader access to that volume. Even if the writer goes offline readers still have access to the volumes. Any reader at any time can request writer access from the current owner of a volume, via commands and control messages over the Ethernet. The owner of the volume can accept or reject the request.

Once the owner of the volume relinquishes write-access privilege to another user (writer), if the writer creates or deletes any file, an automatic refresh function takes place notifying that a change has occurred on the volume.

If the writer does not write to a volume within a designated time, the volume is automatically released and write access of this volume becomes available for any other user on the SAN.

### **How Kayo appears to the user**

A user will easily adapt to using Kayo since Kayo is incorporated into Windows Explorer interface.

Kayo user can perform most functions without using the Kayo interface. They can however perform additional functions through the “Right Click Menu” or the Kayo Control Panel.

### **Kayo in the marketplace**

Kayo’s design overcomes many of the weaknesses of other volume sharing solution that are currently available.

Kayo has been designed to maximize reliability and stability of the SAN by eliminating the need for a Meta Data Controller (MDC). A MDC is used in some other software systems to manage users access to the SAN. The fundamental problem with a MDC is that it is a single point that all system data must go through. This creates two potential problems; the first is as the SAN grows the MDC becomes a bottleneck slowing traffic on the SAN. The second is that the MDC is a single point of failure. If the MDC fails the entire SAN fails.

Kayo does not experience either of these problems, as there is no MDC. Any (or all) station within a Kayo SAN can fail without affecting the others ability to access their data. The Kayo users communicate with each other to manage the access of data and will not experience the performance problems that exist with a MDC.

Kayo is a hardware independent solution. Which means that you can use virtually any storage, switch or hub, and host bus adapter that you choose.

Kayo is a volume sharing software solution that allows workgroups of SAN users to share data with other users in the group that are connected to the SAN. Kayo manages

users read and write to volumes on the SAN. To maintain data coherency Kayo allows only one user to write to a volume at a time. While there can be only one writer, there can be many readers accessing the same volume at the same time.

Kayo also has advantages in doing centralized SAN tape backup, facilitating the backup of the respective volumes.

### **Business justification for Kayo**

Business managers and IT administrators require operational and financial justifications prior to approving any new software package. The operational aspect deals with the streamlining of the day-to-day workload, while the financial aspect deals with the return on investment. IT solutions are based upon their ability to increase revenue, reduce expense, and decrease risk. This is how corporations view the business value of IT investments.

#### Positioning of Kayo:

- Kayo software is targeted for workgroup SAN environments to assist customers, who tend to have from 2 to 50 Windows NT &/or Windows2000 workstations, all sharing a centralized storage resource, and require the flexibility of high performance, reliable, data sharing. A standard workgroup is typically between 2 to 10 workstations, Kayo however is scalable to 50+ stations.
- Kayo software is easy to use with minimal to no added training or systems administration overhead.
- Kayo software is designed so that it does not require a metadata server, thus providing higher system availability, and lower system cost.
- Kayo eliminates a single point of failure, found in other volume sharing software, since it does not have all the metadata residing on one server.
- Kayo software works with all Microsoft NT/Windows 2000 supported applications.

#### Example of Kayo (ROI):

This example demonstrates how one can estimate an ROI (Return On Investment) for their specific business environment. The example is based on the impact of implementing a SAN and using Kayo in the digital media technology.

Please request our ROI worksheet to apply the model to your specific business requirements.

ROI Example:

A company with five SAN users that are paid an annual salary of \$50K, billing 25 hours a week at \$200 per hour will see almost **\$120K** in **additional revenue**. That

means that Kayo will provide *over a 12 times return* on the initial (first year) investment in Kayo. The example is based on a productivity increase of 10%. A more realistic productivity increase of 30% would lead to \$380K in additional revenue or 38 times ROI.

<b>Worksheet</b>	
Number of Employees	5
<b>Productivity Increase</b>	<b>10%</b>
Annual Salary	\$50,000
Loaded Cost (per FTE*)	\$70,000
Billable Rate (per hour)	\$200
Hours Billed per Week	25
<i>Based on the Worksheet this section outlines the current revenue and the expected increase from installing Kayo.</i>	
<b>Current Revenue (per FTE)</b>	
Monthly	Annually
\$21,650	\$259,800
<b>Additional Revenue from Kayo (per FTE)</b>	
\$2,165	\$25,980

<b>Kayo Solutions Costs</b>	
Kayo License (per user)	\$1,990
<b>Cost of Kayo Solution</b>	\$1,990

<b>Add SAN Solutions Costs</b>	<b>Cost</b>	<b>Extended</b>
Fibre Channel HBA*	\$1,800	\$9,000
Fibre Channel Switch***	\$1,000	\$5,000
<b>Storage</b>		
Enclosure	\$10,000	
Enter Amount Storage (GB)	200	
Total Storage Cost	20,000	
<b>Total SAN Cost</b>		\$34,000

\*FTE - Full Time Employee  
 \*\*HBA cost includes all required cables  
 \*\*\*Assumed cost of 1,000 per switch port

<b>ROI -Kayo</b>		
<b>1 Year</b>	<b>2 Year</b>	
\$119,950	\$249,850	<b>Additional Revenue</b>
\$9,950	\$9,950	<b>Solution Cost</b>
12.06	25.11	<b>X Return</b>

<b>ROI -Kayo and SAN</b>		
<b>1 Year</b>	<b>2 Year</b>	
\$85,950	\$215,850	<b>Additional Revenue</b>
\$43,950	\$43,950	<b>Solution Cost</b>
1.96	4.91	<b>X Return</b>

<b>Revenue/Profit Estimates ****</b>	
Annual Payroll	\$525,000
Equipment Costs	\$350,000
Total Revenue	\$1,299,000
Estimated Profit	\$424,000
Additional Kayo Revenue	\$119,000
<b>Total Profit (estimate)</b>	<b>\$543,950</b>

\*\*\*\*This is a rough estimate of overall business costs and how Kayo can increase profits by increasing employee productivity

### Conclusion

Most workgroup environments will gain more savings through consolidating storage and making more effective usage of a SAN through volume sharing software. Kayo volume sharing software for Microsoft NT/Window 2000 offers sufficient value to justify the investment.

**About Sanbolic**

Sanbolic, Inc. located in Watertown, Massachusetts, is a developer of software and solutions for storage networking. The company was established in 2000, and released its first product, Kayo, volume-sharing software, in Q4 2000. Kayo is available through SAN integrators and OEMs.

Sanbolic also has developed Melio FS a distributed, heterogeneous file system that allows multiple users to access files on the storage as if they were their own.

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