



## White Paper

# Providing High Availability for IBM Director Server

Introducing LifeKeeper™ from SteelEye Technology®

### Abstract

Many organizations use IBM Director running on IBM **eServer**® systems to manage their IT infrastructure, especially business critical assets. The SteelEye LifeKeeper Protection Suite for IBM Director significantly improves the reliability and effectiveness of IT management teams by ensuring that IBM Director Server is highly available and that the IBM Director database is protected. This paper presents an overview of the LifeKeeper Protection Suite for IBM Director.

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## Introduction

Ensuring the availability of business critical applications and data sources is a primary function of every IT shop. Companies looking to expand their IT capabilities must also optimize and automate the management of their IT environments. To make that possible, IBM has developed Director, an integrated suite of tools that provide flexibility in system management capabilities to maximize system availability and lower hardware and software management costs. With IBM Director, detailed monitoring of local and remote system hardware, including critical components, such as processors, disks, and memory is automated and simple. IT administrators now have intuitive yet powerful systems management software that supports their complex environments.

Given IBM Director's role as a central platform to monitor and proactively manage IT-based business critical resources, its own availability is important. The LifeKeeper Protection Suite for IBM Director works to ensure this by providing high availability protection and eliminating the potential for IBM Director Server being a single point of failure within the system management chain. LifeKeeper constantly monitors Director Server processes and its database to ensure that IBM Director Server is accessible and properly working. If a failure is detected, LifeKeeper will take the necessary actions to return Director to operation. LifeKeeper also supports manual switchover of Director Server processes between primary and backup servers so that planned maintenance can be performed without unnecessary downtime exposure

This paper will cover key aspects of the LifeKeeper Protection Suite for IBM Director. Among these are a solution overview, system requirements, storage considerations, configuration options, limitations, support options, and a summary of solution benefits.

## Solution Overview

IBM Director is built using a classic two-tier architecture. The first tier consists of client agents (of various sizes and capabilities) that run on the managed systems. These agents report back to the second tier, which is the Director Server. Director Server is the central control point for the managed network. It collects and maintains inventories, responds to and communicates alerts from the agents, and executes Event Action Plans based on criteria set up by network administrators. The administrators communicate with Director via the Director Console, a Java-based application that is installed and run from a remote system.

Over time, IBM Director has become a major component of many network and IT operations; but there is a potential downside. In many of those sites, IBM Director Server has become a potential single point of failure. If the Director Server is down, the agents have no system to which they can communicate alerts and problems. Without this up-to-date information, network managers and users are not notified when critical system conditions are reached, and administrators are not able to access inventory data on corporate assets. In short, the data center can be in a vulnerable state until the Director Server is back online.

With the LifeKeeper Protection Suite for IBM Director, the Director Server, access to the Server, and the Director's database are all protected. The LifeKeeper Protection Suite includes:

- LifeKeeper for Windows (including core recovery kits)
- LifeKeeper IBM Director Server Application Recovery Kit
- LifeKeeper Data Replication

With these tools, IBM Director Server and its default database can be installed on a shared storage device or on a replicated volume managed by LifeKeeper Data Replication. Using either storage type, LifeKeeper manages the protected volume making it accessible and available to IBM Director Server on either the primary or backup server. The LifeKeeper IBM Director Recovery Kit monitors, starts, and stops the IBM Director Server processes on either server as well. Client agents and Director Administrators can contact the Director Server by means of a virtual IP address that can be asserted by LifeKeeper on either the primary server or the backup server. And most importantly, LifeKeeper for Windows ensures that all of these components work in concert to protect the Director Server

In the screen shot below, the LifeKeeper Console shows an active LifeKeeper Protection Suite for IBM Director cluster.



There are two active hosts in this cluster, POPEYE and TOM. There are three protected resources in this cluster: the IBM Director server (IBMDir.0), an IP address

(172.17.104.123), and a LifeKeeper Data Replication managed volume, G: (LKDR.Vol.G). The screen shot also shows that the IP address and the volume are dependencies of the Director server. This means that LifeKeeper will not try to start the Director server until the IP address and volume are ready. The interface also shows that the IBM Director Server hierarchy is active on the system called POPEYE, and the system called TOM is in standby mode, waiting to take over if anything bad were to happen on POPEYE.

In the above hierarchy, the IBM Director Server would have been installed to volume G:, and this volume G: would be replicated from POPEYE over to TOM. The IP resource would be used by the Director agents to communicate with the Director server. This IP resource would also be used to connect to the Director Console.

The LifeKeeper IBM Director Application Recovery Kit monitors the status of the IBM Director Server, and if it detects trouble, the kit will attempt to restart it on the local machine. If this attempt is unsuccessful, LifeKeeper will coordinate a restart of Director Server on the backup system and arrange for access to its database from the backup system as well.

## System Requirements

The LifeKeeper Protection Suite for IBM Director works with IBM Director 5.10. Minimum and recommended hardware requirements for the LifeKeeper Protection Suite for IBM Director are as follows:

Processor Speed	1.5 GHz Pentium
System Memory	512 MB (minimum), 1024 MB (recommended)
Disk Space	325 MB for Director, 95 MB for LifeKeeper
Network Adapters	1 for Client and Administrative Connections 1 for Cluster Communication (recommended) 1 Gbit NIC for LifeKeeper Data Replication (optional)

Keep in mind that the disk space that Director requires will grow based on the number of managed objects in the network. Also remember that all of this disk space will need to be replicated via LifeKeeper Data Replication, or shared on an external disk array that is supported by LifeKeeper (see Storage Considerations in the next section).

LifeKeeper for Windows requires two communication paths for cluster communication. Typically this is accomplished by dedicating a network interface for this purpose, often over a crossover cable connecting the primary and backup systems. The public network is used as the second path. It is also possible to use serial ports and a null modem cable as a communication path.

The initial release of the LifeKeeper Protection Suite for IBM Director is restricted to running on x86-based servers (AMD or Intel) running Windows 2000 or Windows Server 2003. Subsequent releases will support Linux and Power Architecture hardware.

The initial release of the LifeKeeper Protection Suite for IBM Director only provides support for the default Apache Derby database that is included with IBM Director. Subsequent releases will support other databases such as Microsoft SQL Server, Oracle, and IBM DB2.

## **Storage Considerations**

When clustering an application such as IBM Director Server with LifeKeeper, it is necessary to make the critical disk-based data on which Director depends available to both servers in the cluster. This can be accomplished in two general ways: by using shared storage or through data replication.

### ***Shared Storage***

Shared storage is the classic way of building a high availability cluster. In this method, the critical data lives on an external storage array that can be accessed by all of the members of the cluster. The cluster software, in this case LifeKeeper, will control which system has access to the data at any given time. This is called I/O Fencing.

LifeKeeper for Windows uses an I/O Fencing technique built on a "Filter Driver." Windows has the capability to add "Filter Drivers" into the I/O stack of the operating system. The filter driver that the LifeKeeper team has created provides for communication across the LifeKeeper cluster to determine if the volume in question is already being used by another node in the cluster. When the protected volume is in-service on another system the filter driver blocks all access to the volume locally.

Some examples of storage that can be implemented with the LifeKeeper Protection Suite for IBM Director include the TotalStorage DS4000 series storage units and the TotalStorage DS400 units, both of which use Fibre Channel connectivity. The iSCSI-based TotalStorage DS300 can also be used.

### ***Data Replication***

A main advantage of building high availability clusters with SteelEye's LifeKeeper is its very flexible architecture. LifeKeeper uses a Resource-Driven Architecture. In a resource-driven clustering system there is no central control of the cluster. The actions taken on a resource in the cluster are determined by the cluster member who currently "owns" the resource. Cluster members who own a resource and determine a need to take action on a resource do not need permission by other members of the cluster. This type of clustering system tends to scale much better due to multiple resources being common, and multiple owners in the cluster being able to take independent actions in the case of a failure.

The biggest advantage to the Resource-Driven architecture is the great flexibility that is achieved in the area of storage. Since there is no requirement for a "Quorum

Device”, new storage techniques like “Network Attached Storage” and “Data Replication” can be easily accommodated into the model.

The LifeKeeper Protection Suite for IBM Director can optionally use LifeKeeper Data Replication as its storage system. With LifeKeeper Data Replication, a volume on one computer can be replicated across a network connection to a volume on a second system. So the volume where IBM Director Server will be installed can be replicated to a second system, and this replicated volume will plug into LifeKeeper as just another type of “Volume” resource.

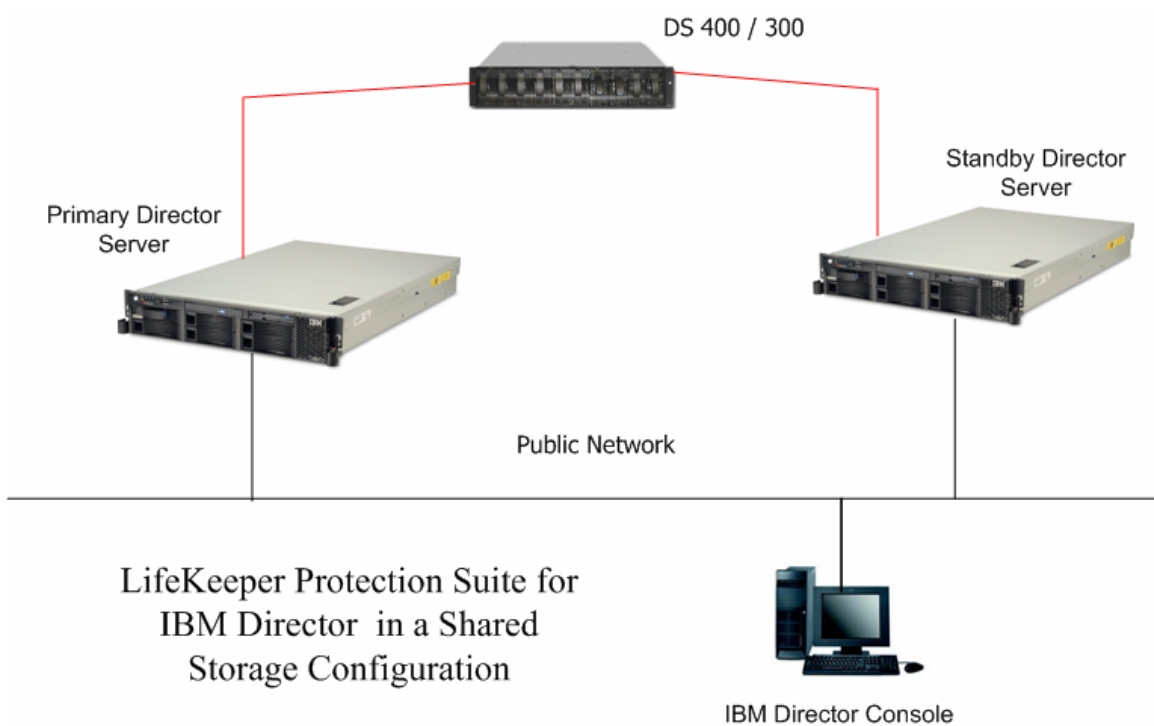
LifeKeeper Data Replication works in either synchronous or asynchronous modes. The synchronous mode is the more robust of the two models, as block writes to the local (source) disk are held until the write on the target system occurs and is acknowledged. This ensures that the target system is always in sync with the source system. This model breaks down, however, when the network connection is across a slow link, or on one that has very high latency. Most WAN connections fall into this category; to handle this, LifeKeeper Data Replication implements an asynchronous mode as well. In asynchronous replication, an intent log on the source is used to keep track of blocks that have been written locally but not yet acknowledged by the target. This allows the local (source) system to not wait for acknowledgements across a high latency link and the applications being protected to operate as though they are connected only to local disks.

LifeKeeper Data Replication can utilize any configured TCP connection for replication traffic. The most common of these are Ethernet devices, but other TCP configured devices (Fibre Channel, Infiniband, etc.) can be used as well.

## Configurations

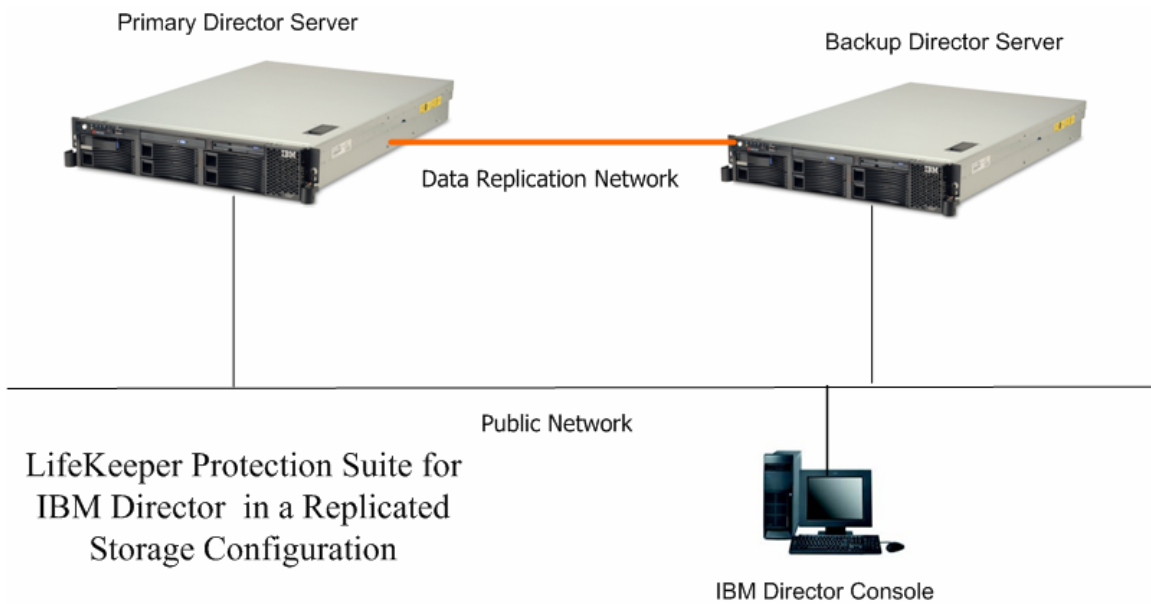
Both shared storage and data replication configurations are supported by the LifeKeeper Protection Suite for IBM Director. This section reviews in detail examples of each configuration.

### Shared Storage



In this configuration, a DS400 is being used as a shared storage device for the LifeKeeper cluster. A LUN on the DS400 is created for use by the cluster and is made accessible to both systems. A volume and file system is created on the LUN and its added as a volume resource in LifeKeeper. During installation, IBM Director is placed onto this shared Volume. A similar configuration can be created with a DS 300 using the iSCSI protocol.

## Replicated Storage



In this configuration, a local volume on the Primary server is replicated to the backup Director server using LifeKeeper Data Replication. The volume is managed as a resource in LifeKeeper. During installation, IBM Director is installed to this replicated volume.

## Limitations

The LifeKeeper Protection Suite for IBM Director is available for download at no charge from SteelEye's website. While this solution is fully functional in its ability to protect Director, there are a few limitations with this product that are not found in the standard LifeKeeper for Windows product.

1. Active-Passive Support only. The LifeKeeper Protection Suite for IBM Director will only allow for a two node cluster that protects the IBM Director server. The standard LifeKeeper product has no such limitations. The standard LifeKeeper product can support up to 32 nodes and work in active-passive, active-active, cascading, or N+1 configurations.
2. As was stated above, this initial version (v5.1) of the LifeKeeper Protection Suite for IBM Director works only with the Apache Derby database that is bundled with IBM Director 5.1. SteelEye plans to support other databases such as Microsoft SQL Server, Oracle, and IBM DB2 at a later date. Please contact your local SteelEye sales manager for more information about this feature.
3. The standard LifeKeeper product can protect many different types of applications that are part of most IT infrastructures. The LifeKeeper Protection Suite for IBM Director, however, is designed and licensed to only protect the IBM Director server.

To see the full line of SteelEye products to protect your applications, please see the SteelEye website at <http://www.steeleye.com>, or contact your local SteelEye reseller.

4. The LifeKeeper Protection Suite for IBM Director runs only on x86 based servers (AMD or Intel) running Windows 2000 or Windows Server 2003. Subsequent releases will support Linux and Power Architecture hardware.

## Support Options

Support for LifeKeeper Protection Suite for IBM Director is provided via email free of charge. A response to your inquiry or issue will be made within 24-48 hours after receipt of email. For companies who require 24x7 support and want the option of contacting SteelEye via phone, there is a support package available for purchase either from SteelEye or from IBM.

## Solution Benefits

The LifeKeeper Protection Suite for IBM Director provides a number of benefits to organizations that implement it.

1. Make your IBM Director infrastructure highly available.

The LifeKeeper Protection Suite for IBM Director monitors the processes that make up IBM Director. Also, systems in a LifeKeeper cluster are being constantly monitored for a number of hardware related failures. If a failure occurs on the primary server, LifeKeeper will have IBM Director Server back up and running in short order on the backup system.

2. Ease of Maintenance

The LifeKeeper Protection Suite for IBM Director helps make maintenance of the Director Server system quick and easy. Just move the Director hierarchy to the backup server at a convenient time and then take the primary down for what ever maintenance is needed. IBM Director Server will still be there, monitoring and managing your network. Do maintenance during normal hours, instead of off-hours.

3. Homogenous or Exotic Hardware not necessary

SteelEye's LifeKeeper does not require all systems in the clusters to be identical, and that goes for the LifeKeeper Protection Suite for IBM Director as well. Machines do not need to be identically configured to work well in a LifeKeeper cluster. And using LifeKeeper Data Replication makes the need for shared storage an option, not a necessity.

#### 4. Use Standard Versions of Operating Systems

Other clustering products require the use of Advanced or Enterprise versions of Microsoft Windows. Not so with LifeKeeper. The LifeKeeper Protection Suite for IBM Director will work just fine on standard versions of Windows 2000 or Windows Server 2003.

#### 5. Rest Assured

...that IBM Director will be watching and monitoring the network, and that LifeKeeper will be watching out for problems with Director. And the LifeKeeper Protection Suite for IBM Director will be ready to step in to make things right if anything should go wrong with Director or the system that it is running on.

## Conclusion

Given IBM Director's role as a central platform to monitor and proactively manage IT-based critical business resources, its own availability is of utmost importance. The LifeKeeper Protection Suite for IBM Director ensures this by providing high availability protection and eliminating the potential for IBM Director Server being a single point of failure within the system management chain. LifeKeeper constantly monitors Director Server processes and database to ensure that all components are properly working. If a failure is detected, LifeKeeper performs the necessary actions to return Director to operation. The LifeKeeper Protection Suite for IBM Director helps make IBM Director more resilient and available to protect those critical business resources.

## Acknowledgements

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## References

SteelEye Technology LifeKeeper Solution Brief for IBM Director

[www.steeleye.com/pdf/literature/lifekeeper\\_director\\_solution\\_brief.pdf](http://www.steeleye.com/pdf/literature/lifekeeper_director_solution_brief.pdf)

SteelEye Technology LifeKeeper Solution Brief for Windows 2000/2003

[www.steeleye.com/pdf/literature/lk4win2k.pdf](http://www.steeleye.com/pdf/literature/lk4win2k.pdf)

IBM Director Documentation and Resources

[www-03.ibm.com/servers/eserver/xseries/systems\\_management/ibm\\_director/resource](http://www-03.ibm.com/servers/eserver/xseries/systems_management/ibm_director/resource)