



Eisoo AnyBackup 3.0

White Paper

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Overview

Nowadays, how to protect business-critical data has been a serious problem that every enterprise and organization would confront. Analysis of ESG shows that the volume of data that needs to be protected increases by 60% per year. Thus it is a challenge to select a backup solution which totally suits organization's IT architecture to deal with the explosive expansion of data volume and heterogeneous IT architecture. Therefore, a secure, flexible and easy-to-use data protection has become an urgent solution to prevent data loss in case of disaster.

Over the last decade, Disk has gradually become the main media in the realm of data backup and disaster recovery as the cost of disk has reduced greatly as well as its I/O speed and reliability has increased greatly. Since the beginning of 21st Century, disk has become the main stream for data backup. According to statistics, innovation patents of disk-based backup technology have far exceeded the tape backup technology. Eisoos AnyBackup 3.0 is the representative of disk-based backup software, the following are the main features of Eisoos AnyBackup 3.0.

Full Features

Eisoos AnyBackup 3.0 support data protection for both Windows and Linux platforms, ranging from file, email, database, OS. Besides, it provides four backup modes which are scheduled backup, centralized backup, mandatory backup and secure backup. Besides, event-triggered backup, continuous data protection and auto-failover backup for sever in cluster environment provide all-around protection for enterprise's data security.

Secure Backup

Security is the core for data backup, which runs through every aspect of Eisoos AnyBackup 3.0 for it provides secure client to ensure legal authorization of operation and protect confidential data by preventing unauthorized access.

Self-developed EDTP Protocol encrypts data with SSL algorithm doubles data security and prevents leakage of data in the process of transmission and storage. USB-Key strong identity authentication makes sure the safe access of users.

Easy-to-Use

All-in-One-Web Management Console enables easy access and convenient management with *Rich UI*. Local installation, web installation and remote installation for client agents make deployment fast and easy. Virtual Media Pool (VMP) gives dynamic expansion of disk media, and let administrator far away from tedious media management work.

Chapter 1 Product Overview

1.1 Brief Introduction

Eisoo AnyBackup 3.0 is the flagship product of Eisoo Software Inc., providing protection for operating systems, applications and documents on both Microsoft Windows and Linux platforms. It supports full protection for file server, WEB server and other application servers on Windows or Linux platform; meanwhile, it is the best choice for staff's desktop and laptop. All the above makes Eisoo AnyBackup 3.0 the most integrated backup solution for datacenter and desktop environment protection.

1.2 Functions

Eisoo AnyBackup 3.0 adopts AnyCore Kernel and AnyView Framework of daemon service and UI structure to make solid foundation to its superior performance.

1.2.1 Protection for Operating System

Eisoo AnyBackup 3.0 supports a series of operating systems of Windows and Linux platforms to provide reassuring system protection for desktop, laptop and server.

- Based on AnyRestore system recovery technology, even when the hard disk or other hardware is damaged, backup set of original system can be restored to new hardware environment.
- Support system backup and recovery of Windows 2000, XP, 2003, Vista, 2008 and Window7 server series.
- Support system backup and recovery of Red Hat, Ubuntu, SUSE, Fedora and Red Flag on Linux platform.
- Support system disaster recovery of server such as IBM, HP and Dell in RAID environment.
- With AnyHidden technology, client can create a hidden partition in local file system for the operating system to be directly backed up to this specific partition.
- Supporting disaster recovery in IBM, HP, Dell and all other server environments, including RAID0, RAID1, RAID5 and other RAID types.

1.2.2 Protection for 32/64-bit Applications

Eisoo AnyBackup 3.0 offers comprehensive protection to a series of applications in cluster environment.

- Support full, incremental and transaction log backup for SQL Server database.
- Support full and incremental backup for Oracle database, table space and transaction log.
- Support roll-out time point recovery for Oracle.
- Support hot backup of full and transaction log backup for Lotus Domino.
- Support hot backup for Exchange Server, including full and incremental backup of the whole database or single storage group and backup and recovery of public folder and mail.

- Support online full and incremental backup of Sybase and remote disaster recovery to original location or different servers.
- Support hot backup and disaster recovery of Active Directory on Window Server 2003 or above.
- Support backup of SQL Server, Oracle, Domino, Exchange Server and Sybase Server in cluster environment to achieve seamless auto failover.
- Support hot backup for OA system, financial operating system, CRM, ERP, CAD and Web system.

1.2.3 Protection for File

- Supporting automatic incremental file backup in heterogeneous platform of Windows and Linux.
- Supporting full backup, Incremental Backup, Rotation Backup and Synthetic Backup for office files, videos, design drawings, pictures and other various kinds of files.
- Synthetic backup technology can be automatically triggered according to rotation period, and the synthetic data will consume only the server resource but not CPU time or I/O load at the client side.

1.2.4 Protection for E-mail

Eisoo AnyBackup 3.0 adopts the latest block mirroring technology to execute E-mail block-level incremental backup which only backup the varied part to keep to the latest status by minimum backup volume. Support block-level incremental and synthetic backup for Outlook, Outlook Express, Foxmail, Thunderbird and Windows live mail. Mail Assistant Tool realizes the automatic search of the installation and storage path of mail of multiple users.

1.2.5 Remote Synchronization for Media Server

- Supporting Media Server to run in heterogeneous platforms of Windows and Linux.
- Supporting multi-Media Servers.
- Supporting continuous data synchronization of two different media servers.
- Providing self-healing for server. When stoppage or deadlock happens to Media Server, systems can automatically self-heal to working state, reducing the interference to backup system by administrator.

1.2.6 Management Console based on Web

- Management Console based on web can provide unified and centralized management on all backup clients. Backup and restoration operation can be initiated on Management Console to the data of certain client, and remote installation and centralized updating can also be implemented on Management Console.
- Supporting deployment of Management Console both on Windows and Linux platforms.
- Supporting online updating for Management Console and Media Server. Online updating of Management Console and Media Server can be realized by using EUP updating package, through updating wizard provided by Management Console; moreover, Management Console and Media Server can be smoothly updated without affecting current backup schedule.
- Supporting access to Management Console based on DNS domain name. Management Console can be deployed in the server computer with multiple Network interface cards and dynamic IP address.
- Centralized user space and privilege management.
- Centralized backup task management, unified backup task creation and management interface, and centralized platform of distributing the backup strategy.

- Comprehensive media management, including media and deletion of data in the media, modification of media information and space size, etc.
- Providing self-healing function for server, when accidental stoppage or deadlock happens in Media Server. The systems can automatically self-heal to working state, which reduce the interference to backup system by administrator.
- Available to directly select mapped Network directory on the client and backup to Media Server.
- Updating to ACE 5.6, message transport layer adopt agent mechanism to achieve asynchronous transmission which can promote credibility.
- The improved heart beating message detection algorithm can conduct more precise detection of off-line client.
- Supporting synchronizing data in lower level Management Console to upper level Management Console.

1.2.7 Various Client Types

- ✧ Normal client: available to manage backup and restore tasks with corresponding privilege after authorization by administrator. In the meanwhile administrator can also make active backup management for the client.
- ✧ Daemon client: administrator make active backup for client-side data without acknowledging the client; backup is forcefully executed without necessities to tell the client.
- ✧ Secure client: this client is bound with appointed user and only the user himself can make backup and recovery for data in his computer. Without authorization of the client, administrator cannot execute backup and restore tasks for this type of client, and cannot check the content of secure client's data.

1.2.8 Active backup solution based on task strategy

- Backup strategy can make centralized management for backup media, file filtering type, backup time and other elements.
- Normal user can be authorized by administrator to access a certain backup strategy; so that centralized control can be realized when backup solutions are distributed to different groups.
- Normal user only needs to apply the authorized backup strategy, and then make batch appointment for the source data to be backed up.
- Administrator can authorize normal user to customize the backup task meet normal user's personalized backup request.
- This function is applied for active backup solution, that is, administrator manages the whole backup plan and every user manage data backup and recovery himself..
- This function can be combined with secure client, to greatly simplify configuration of normal users for IDC backup service platform, secure cabinet, secure backup and other applications. And since the whole backup plan is completely controlled by administrator, the requirements for data security and centralized management can both be fulfilled.

1.2.9 Diversified Backup and Recovery Mechanism

- Supporting Full Backup, Incremental Backup and differential backup (for database).
- Supporting rotation backup and synthetic backup.
- Supporting backup encrypting, compressing, automatic dividing etc.
- Supporting recovery through browsing based on point-in-time.
- Supporting recovery by downloading from Web.
- Supporting searching recovery.

1.2.10 Continuous Data Protection (CDP)

Eisoo AnyBackup 3.0 captures and records every change of data and executes incremental backup of the changed data simultaneously. Recovery time-point will be generated according to strategy that is set in Continuous Parameter, thus data recovery will be performed according to these time-points.

Backup principle:

File change is captured by File Filter Driver which records file change into file -mapped memory pool, thus even when the computer powers off, these changes will be kept. Meanwhile, Eisoo AnyBackup 3.0 executes block-level incremental backup to the changed file that is stored in file -mapped memory pool. First, full backup is executed and at the same time Real-time monitor of this backup job is launched .Once the full backup is finished, client initiates continuous backup to changed file that has been monitored during the execution of full backup.

Browse and recovery principle:

Firstly, download the backup set and index file of continuous backup from restore server and analyze backup set to generate recovery time-point list to get the latest recovery time-point which includes historical time-points of catalog set and time-points of index file of continuous backup in continuous storage area. Thus users are able to select any time-point in the list to restore data.

Recovery of continuous backed up data is the same way that of traditional full backup data for recovery time-point is generated by time-point generation algorithm which is the same as the routine data recovery.

1.2.11 Backup Audit

Eisoo AnyBackup 3.0 launches Backup Audit function based on enterprise's audit manager which includes three aspects, Security Audit monitors data security status by Anyreport Service; Action Audit monitors administrator and common users action by logs which includes user log, system log and client log ;and

Backup Audit monitors administrator or user's backup operation backed up data by Browse to Restore.

1.2.12 Advanced Reporting Service

Based on latest AnyReport reporting service framework, Eisoo AnyBackup 3.0 provides backup system status and analyzes log, execution history and media space to give reference for users. Security Status of client report records current backup operation condition; Media Server usage report analyzes space consumption of media server to provide a basis for administrator; vivid demonstration of pie chart, line graph and histogram give administrator intuitive understanding and report export by PDF and HTML format is also available.

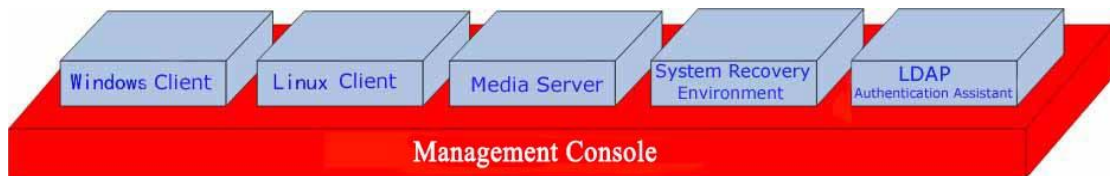
1.2.13 Virtual Media Pool: Free-to-Manage Media

Eisoo AnyBackup 3.0 adopts the VMP technology to initiate the era free-to-manage of media which realizes the centralized management of multi-media and space expansion. All available media servers and media fused into Virtual Media Pool to their maximum. New media servers are added to VMP in cluster or group way to connect Management Console to realize the easy and quick space and throughput extension.

Chapter 2 Deployment

2.1 Components of Eisoo AnyBackup 3.0

Six components are available for deployment, which are Management Console, Windows Client, Linux Client, Media Server, System Recovery Environment and LDAP Assistant.



2.1.1 Management Console

Management Console is the core component of Eisoo AnyBackup 3.0. Deployed on backup server, Management Console is used to manage the network backup schedules, perform data backup, and respond to data recovery requests. It includes the following parts:

1. Apache Sever, which is used to present web page;
2. Management Interface, which can be accessed via web;
3. MySQL database server, which is used to save configuration information;
4. AnyBackupEngine, which is used to receive operation and schedule instructions;
5. Main Media Server, which is used to store the backed up data;
6. Restore Server Engine, which is used for data restore and Download via Web.

2.1.2 Functions of Management Console are as follows:

- Backup: Administrator and authorized users perform backup and recovery jobs.
- Recovery: Administrator and authorized users can restore data or download compressed data packets (used for files and operating system) via Web.
- Execution: View and check the present and historical execution of backup jobs.
- Logs, Logs provides administrator, audit and authorized users with detailed operation executions.
- User Management: Administrator can perform creation or deletion of users, domain user importation, and user authorization via Management Console.
- License Management: Administrator can activate or delete license key, as well as license key authorization to users via License Management.
- Media Server: Administrator can learn detailed information about and make

centralized management to Media Server and media on Management Console.

- **Client Management:** Administrator can manage client or client group by client authorization, remote client installation and client group binding.
- **Cluster-Client Management:** Administrator performs this management by creating, modifying or eliminating cluster client binding for two servers or more than two servers.
- **System Settings:** Administrator can make system settings such as setting for Web address of Management Console, Mail Notification, Network Re-connection and Speed limit, Number of concurrent Tasks, Log Auto vacuum, Data Download and Recovery, etc as to optimize system backup and recovery.
- **Upgrade:** Support online upgrade for Management Console, Media Server, client and LDAP Assistant, which are realized by using EUP upgrade package. Thus, unified and centralized upgrade can be easily achieved.

2.1.3 Windows Client

Windows Client is used for operating system, files and databases backup and recovery in Client machine. Client Engine service enable Management Console to access at any time. It connects to Engine Server and responds to the network operating command such as backup and recovery from Management Console. Three Windows client are applied in different aspects.

Normal client: Normal client is deployed in client machine which has the authority to change the client's connection to certain Management Console and stop its service or process or even uninstall it without the permission of administrator. The deployment usually has to be acceded by user of client machine.

Daemon client: Daemon client is usually deployed compulsorily which cannot be deleted or changed by users of client machines while administrator has the authority of Daemon client installation by password authentication. Daemon

client is usually deployed in client machine of which user is not expected to acknowledge.

Secure client: Secure client is deployed to protect sensitive and critical data which cannot afford to leak. Secure client is assigned to certain user for exclusive operation which even administrator has no right to access. Client identity authentication should be taken before executing operation to secure client, and after binding secure client to the user, this binding will not change unless the secure client is authorized to other users.

2.1.4 Linux Client

Linux Client is which is of Daemon client type is used for operating system, files and databases backup and recovery in Client machine on Linux platform. Client Engine service enable Management Console to access at any time. It connects to Engine Server and responds to the network operating command such as backup and recovery from Management Console.

2.1.5 Media Server

Media Server is consisted by two parts: Master Media Server and Subordinate Media Server. When Master Media Server is insufficient for data storage, a subordinate media server is needed to take over Master Media Server to store backed up data. Subordinate Media Server is usually deployed in client machine thus relieves the burden of Management Console. In addition, subordinate media servers are capable to perform synchronized data read and write. In general, the roles that media server is played in the following:

- Receive and store backed up data from Client machine.
- Restore backed up data or download data packet via HTTP Protocol.
- Synchronize between media servers in offsite data backup.

2.1.6 System Recovery Environment

System Recovery Environment is an indispensable module of system backup, which is used to initiate System Recovery Wizard. It features as follow:

- Support system recovery for desktop and server environment.
- Support local system recovery (backup set in client machine), remote system recovery (backup set in media server) and network sharing system recovery (backup set in shared folder).
- Support Bare Metal Recovery. By setting Standard System to machines, maintenance effort will be reduced significantly for administrator.

2.1.7 LDAP Assistant

In order to fit complicated and heterogeneous network environment and satisfy user's need to deploy Management Console to different platforms and operating systems especially domain controller system, Eisoo AnyBackup 3.0 provides domain system support as an independent module with special identity authentication service. LDAP Assistant is the bridge that connects users of different domain together to the Management Console for unified management.

A LDAP Assistant can connect to several Management Consoles, while a Management Console can be only connected to a LDAP Assistant. When new connection has been made between Management Console and LDAP Assistant, existing one will be deleted automatically.

2.2 Basic Packet for Eisoo AnyBackup 3.0

Basic packet is the basic authorization packet for Eisoo AnyBackup 3.0. Authorized user has right to access advanced functions. The agents and options will be elaborated in the following.

2.2.1 Non-server Windows File Backup Agent

This Agent is used for Windows Client's data backup and recovery authorization in non-server Windows platform, which is authorized to backup document.

Non-server Windows platform includes: Windows XP (32/64bit), Windows 2000 Professional, Windows Vista (32/64bit).

2.2.2 Windows Non-server System Disaster Recovery Agent

This Agent is used for Windows Client's system backup and disaster recovery authorization in non-server Windows platform including Windows XP (32/64bit), Windows 2000 Professional, Windows Vista (32/64bit).

2.2.3 Windows Non-server Mail Backup Agent

This Agent is used for Windows Client's mail backup and recovery authorization in non-server Windows platform which includes Windows XP (32/64bit), Windows 2000 Professional, Windows Vista (32/64bit). This agent supports block-level incremental backup and recovery of E-mail such as Outlook, Foxmail, Outlook Express, Thunderbird and Windows live mail.

2.2.4 Linux Backup Agent

This Agent is used for Linux file, database and operating system backup and recovery authentication in Linux platforms including RedHat, RedFlag, Debian, Ubuntu, SUSE, Slackware and CentOS.

2.2.5 Windows Server Backup Agent

This Agent is used for Windows Client's document, E-mail and operating system backup and recovery authorization in server Windows platform which includes Windows 2000 Server, Windows 2000 Advanced Server, Windows Server 2003, Windows Server 2008 and Windows 7 series.

2.2.6 SQL Server Backup Agent

This Agent is used for SQL backup and recovery authorization in Windows platform. This Agent supports the full, differential and incremental backup for

SQL server.

2.2.7 Windows Server System Disaster Recovery Agent

This Agent is used for Windows system disaster backup and recovery authorization in server windows platform which includes Windows 2000 Server, Windows 2000 Advanced Server, Windows Server 2003, Windows Server 2008 and Windows 7. This agent is used to guarantee the normal function of the whole servers for organization, to take a few for example, file server, domain controller, CRM/ERP server, these servers are of critical importance to daily operation and performance for organization to which a weenie error would cause the total paralysis. After activating the Agent, Management Console is capable to execute online backup for these servers. In case of server breakdown or deadlock, server system is able to restore to its original status by disaster recovery.

2.2.8 Advanced Open File Option

This option is to authorize Windows client to backup opening files which is exclusively opened by others and denies access by the third party, such as Personal Storage Table of Outlook file. With Advanced Open File Option, all the open files will be accessible thus backup of open file can be easily realized.

2.2.9 Oracle Backup Agent

This Agent is used for Oracle database system backup and recovery in server windows platform. It supports full and incremental backup for Oracle database and table space with automatic backup and recovery for Archive log.

2.2.10 Oracle for Linux Backup Agent

This Agent is used for Oracle database system backup and recovery in server Linux platform, which supports full and incremental backup for Oracle database

and table space, and automatic backup and recovery for Archive log. It is usually installed in Oracle database server to protect Oracle database.

2.2.11 Lotus Domino Backup Agent

This Agent is used for Lotus Domino database backup and recovery in server windows platform, which supports full, incremental and transaction log backup for Lotus Domino server.

2.2.12 Sybase Backup Agent

This Agent is used for Sybase database backup and recovery in windows server systems, which supports full and incremental backup for Sybase server. It is deployed in Sybase server to protect Sybase database.

2.2.13 Exchange Server Backup Agent

This Agent is used for Exchange Server database backup and recovery in Exchange Server windows platform, which supports full and incremental backup for Exchange server.

2.2.14 Active Directory Backup Agent

This Agent is used for Active Directory database system backup and recovery in domain windows platform, which supports full backup and disaster recovery for Active Directory server. It is usually deployed in Active Directory server to protect Active Directory.

2.2.15 Media Server for Windows Agent

This Agent is used to authorize availability of subordinate media server in Windows platform which is deployed and authorized in Windows client when user needs additional media server for space extension.

2.2.16 Media Server for Linux Agent

This Agent is used to authorize availability of subordinate media server in Linux platform. Principle Media Server is installed on where Management Console locates. Thus subordinate media server is deployed and authorized in Linux client when user need additional media server.

2.2.17 Advanced Reporting Service Option

This option is used to authorize Advanced Reporting Service for Administrator. Advanced Reporting Service includes Media Space report, Media Growth Report and Client Security Status Report. Advanced Reporting Service provides clear and intuitive picture of the whole backup system.

2.2.17 USB-KEY Option

USB-KEY option is used in secure backup to ensure safe access. USB-KEY is recognized as the mainstream strong identity authentication technology, each of which is an independent and singular identity authentication voucher.

2.3 System Requirements

2.3.1 32-bit Management Console & Media Server

Item	Minimum	Recommended
Processor	Intel Pentium 4 or	Intel Pentium Dual or above
Memory	1GB	2GB
Installation disk space	10GB	100GB or more
Operating System	Windows 2000 SP1 or above, Ubuntu6.04, SUSE	Windows 2003 or above, RedHat Enterprise Linux

	Linux10,RedHat Enterprise Linux 4, RedFlag 4, Fedara 4,	4, SUSE Enterprise 10
Browser	IE 6.0, IE 7.0 or Firefox 2.0	Firefox2.0

2.3.2 64-bit Management Console & Media Server

Item	Minimum	Recommended
Processor	Intel Pentium 4 or	Intel Pentium D or higher
Memory	1GB	2GB
Installation disk space	10GB	100GB or more
Operating System	Windows XP(64-bit) or above	Windows 2003 (64-bit)
Browser	IE 6.0, IE 7 or Firefox 2.0	Firefox 2.0

2.3.3 32-bit Windows Client Agent

Item	Minimum	Recommended
Processor	900MHz	1.2GHz or higher
Memory	512MB	1GB or more
Installation disk space	5GB	20GB
Operating System	Windows 2000 SP1 or above	Windows XP, 2003
SQL Server	SQL Server 2000, 2005	SQL Server 2000, 2005

Exchange Server	Exchange Server 2003, 2007	Exchange Server 2003, 2007
Sybase	Sybase 12.0 or above	Sybase 12.0 or above
Oracle	Oracle 8i, 9i, 10g	Oracle 8i, 9i, 10g
Domino	Lotus Domino R5, R6, R7, R8 or later	Lotus Domino R5, R6, R7, R8 or above
Active Directory	Windows 2003 or above	Windows 2003 or above

2.3.4 64-bit Windows Client Agent

Item	Minimum	Recommended
Processor	900MHz	1.2GHz or higher
Memory	512MB	1GB or more
Installation disk space	5GB	20GB
Operating System	Windows XP(64-bit) or above	Windows 2003 (64-bit)
SQL Server	SQL Server 2000, 2005	SQL Server 2000, 2005
Exchange Server	Exchange Server 2003, 2007	Exchange Server 2003, 2007
Sybase	Sybase 12.0 or above	Sybase 12.0 or above
Oracle	Oracle 8i, 9i, 10g	Oracle 8i, 9i, 10g
Domino	Lotus Domino R5, R6, R7, R8 or above	Lotus Domino R5, R6, R7, R8 or above
Active Directory	Windows 2003(64-bit)or above	Windows 2008(64-bit)

2.3.5 32-bit Linux Client Agent

Item	Minimum	Recommended
Processor	900MHz	1.2GHz or higher
Memory	512MB	1GB or more
Installation disk space	5GB	20GB
Operating System	RedHat Linux Enterprise 4.0 Fedora Linux 4.0 SUSE Linux 10.0 RedFlag Linux 4.0 Ubuntu Linux 6.04	RedHat Linux Enterprise 4.0 Fedora Linux 5.0 SUSE Linux 10.0 RedFlag Linux 4.0 Ubuntu Linux 6.04
Oracle	Oracle 9i, 10g	Oracle 9i, 10g

2.3.6 64-bit Linux Client Agent

Item	Minimum	Recommended
Processor	900MHz	1.2GHz or higher
Memory	512MB	1GB or more
Installation disk space	5GB	20GB
Operating System	RedHat Linux Enterprise 4.0(64-bit) Fedora Linux 4.0(64-bit) SUSE Linux 10.0(64-bit) RedFlag Linux 4.0(64-bit)	RedHat Linux Enterprise 4.0(64-bit) Fedora Linux 5.0(64-bit) SUSE Linux 10.0(64-bit) RedFlag Linux 4.0(64-bit) Ubuntu Linux 6.04(64-bit)

	Ubuntu Linux 6.04(64-bit)	
Oracle	Oracle 9i, 10g(64-bit)	Oracle 9i, 10g(64-bit)

2.3.7 LDAP Assistant

Item	Minimum	Recommended
Processor	900MHz	1.2GHz or higher
Memory	512MB	1GB or more
Installation disk space	5GB	20GB
Operating System	Windows XP or above	Windows 2003

Chapter 3 Technology

3.1 Cluster Snapshot technology

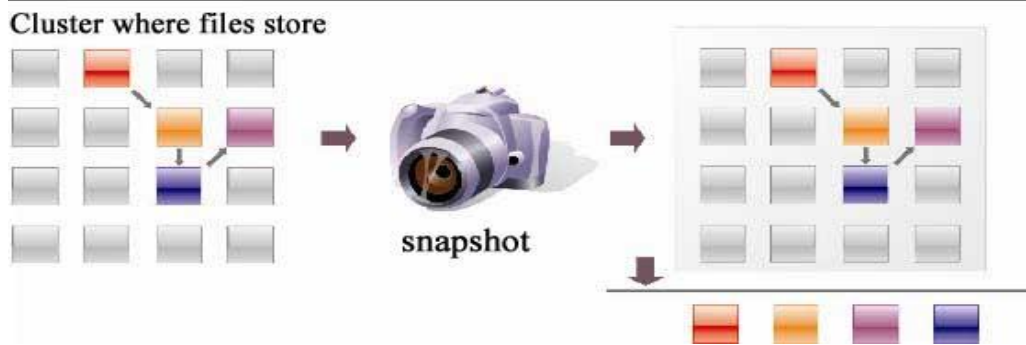
Cluster Snapshot technology is a special technology independently developed by Eisoo Software Inc., which is used for backup of operation system and opening files. It is successfully developed and utilized. A hidden system storage space is located on the disk, which is used to store boot recording area, file directory area (FCT) and file allocation table (FAT). These areas are used for storing and recording system information. Boot recording area is in the first sector of zero head in track 0, mainly providing disk parameter to operating system, such as the byte number per sector, sector number per cluster, number of document

allocation table, the allowed directory number and the actual number of sectors on the disk. FCT on document directory area is used to store document system directory while document FAT shows the distribution of documents to re-allocate documents and release disk space.

Disk file is stored as the unit of cluster, for example: 360KB floppy disk considers 1 sector as 1 cluster (512 bytes). Document on the disk is stored in disconnected way, that is to say, document is stored in available cluster. Before document storage, FAT is scanned firstly to find out the first available cluster as the initial storage cluster and then find the available clusters enough for the storage of the whole document. Thus the content of the documents can be respectively stored on the found available cluster until meeting the content of the document length. Each cluster of document is connected and combined by certain pointer and is labeled by respective number according to the sequence, which along with pointer constitutes the file allocation table (FAT). Otherwise, the reading of this document firstly starts from the initial cluster in the directory item until the last cluster.

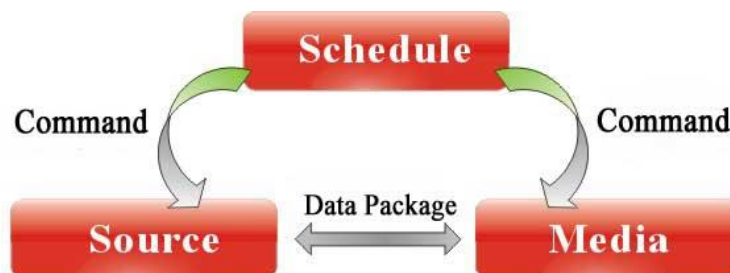
Data change of operating system is basically in an atomic way, which cannot be separated again. Cluster Snapshot Technology enables Eiso AnyBackup 3.0 to scan documents one by one and make snapshot of each cluster structure when analyzing to-be-backed-up document to precise the location of relevant clusters. When system backup begins, quick and precise backup of the clusters data will be executed.

Cluster Snapshot Technology prevents the inconsistency of the backed up data and original data caused by the mass data change, thus ensures the completion and correctness of backed up operating system and the opened files.



3.2 AnyLink Execution Engine

Eisoo AnyBackup3.0 adopts AnyLink Execution Engine to integrate backup, synchronization, and replication by a set of source code, which sets the acquisition and write of documents, database, and e-mail as basic modules. AnyLink Execution Engine is composed by three parts: Schedule, Source and Media.



Schedule integrates various scheduling algorithm, including backup and recovery, synchronization and replication, migration and system backup.

Schedule sends control instruction to the source end according to the execution command and strategy. When the execution strategy is Push, such as data backup and migration, Source end starts the specific Data Reader to extract data on local position and sends relevant data to Media end by EDTP transmission protocol; Media end accepts and stores the data from the Source end and then sends process instruction to schedule periodically. When execution strategy is Pull, such as search or recovery of backed up data, Source end starts the specific Data Writer and send the corresponding data to the local position from the

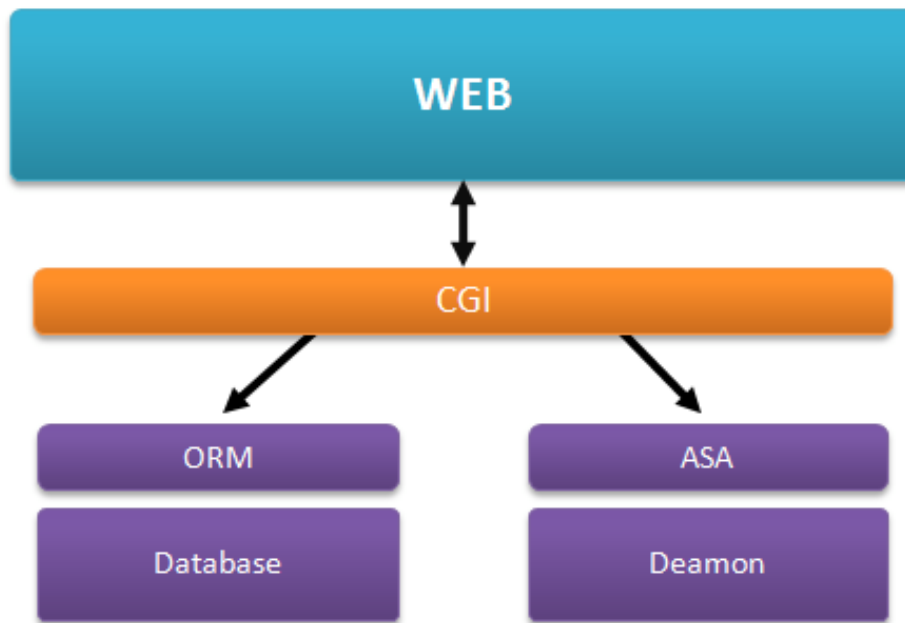
Media end by EDTP transmission protocol.

Source end supports reading and writing-back various types of data such as documents, e-mail, database, and the system status information. Media end includes such storage media as local and mobile hard disk, Network disk, disk series of various specifications, NAS equipment, IP SAN and FC SAN Network storage and off-line optical disk media.

3.3 AnyView Framework

AnyView Framework is the new technology that is adopted in Eiso AnyBackup 3.0. It is based on AnyLink Execution Engine and develops specific framework by absorbing MVC Classic Mode along with WEB-GLUE-SERVICE to achieve successfully the seamless integration of UI and daemon service by a glue layer thus satisfies a variety of performance and realizes total independence of execution modules. It provides such functions as the follows:

- Abstraction of data access and generalization of dealing with data access;
- Presentation layer based on component to provide common interface and activex controls, thus enhance the development efficiency.
- Support control file of software and its version to realize the presentation modality flexibly.
- Customized expansion of service which is generated by semi-automatic framework guarantees the stability and usability.
- Process-oriented execution engine and multi-process mode based on execution body and queue enhance the concurrent capacity and robustness of application.



3.4 EDTP Transmission Protocol

Eisoo AnyBackup 3.0 adopts EDTP as the data transmission protocol which is an enhanced and self-developed transmission protocol to ensure the transmission security of mass data. It realizes the stable data transmission under the circumstance of highly-delayed and low reliable network; meanwhile, it supports data encryption, data compression, self-checking, Network automatic reconnection, and automatic rearrangement and retransmission of data in case of data loss. Therefore, EDTP Transmission Protocol reveals its robustness and high performance in dealing with mass and remote data transmission.

FTP, as the traditional data transmission protocol has many demerits in the process of Network backup. To take a few for example, data transmission capability, data security and accuracy are largely below the expectation and requirements of enterprise. EDTP predominates over the FTP transmission protocol in terms of data security, reliability, capacity and scalability.

EDTP protocol encodes data into certain data packet by certain means. The packet has two parts: message header and message body. Message header is used to store data description information and checkout code for data packet, while message body stores data that is to be transferred. EDTP protocol guarantees the data confidentiality. To prevent data leakage during transmission and storage, different encryption algorithm are deployed from the upper command to encrypt the data packet. Meanwhile, EDTP protocol also compresses the data packet with different compress ratio during coding to minimize the transmission volume. The accuracy of data is one of the most important things during transmission, so the constant check of data packet is vital. EDTP protocol realizes data self-check by the verify code which is generated by specialized algorithms according to the transmission data in the message header. When the data packet reaches media, verification code will be decrypted and verified with message body by algorithm deduction. If deduced data are complied with each other, data transmission is successful; otherwise, Media end will send request again to Schedule for data transmission. Thus it can easily check out whether the data is accurate or not without checking the data source by the second transmission and fully satisfy the requirement of enterprise.

3.5 XPCOM Cross Platform Component Model

XPCOM is a cross-platform component model based on Open source, which can be operated both in Windows and Linux platforms and provides a set of Interface Definition Approaches, Component Implementation Loading and Register mechanism, thus XPCOM Cross Platform Component Model plays as the foundation for Eisoo software to realize the complete function modularization.

Thank to XPCOM-based technology, Eisoo AnyBackup 3.0 furthers modularization into plug-in such as task management, log management, client management, report services and data source based on Management Console,

agent and options to fully realize the flexibility and scalability of Eiso AnyBackup 3.0.

3.6 USB-Key Strong Identity Authentication

In order to further improve data security, two USB-Key authentication approaches are adopted. One is “Based on USB-Key” and another is “Based on Password and USB-Key”. USB-Key is hardware equipment designed by PKCS#11 standard of RSA Lab which is widely used to save CA certificate in PKI System for identity authentication and decryption of data. It embodies many outstanding features as follows:

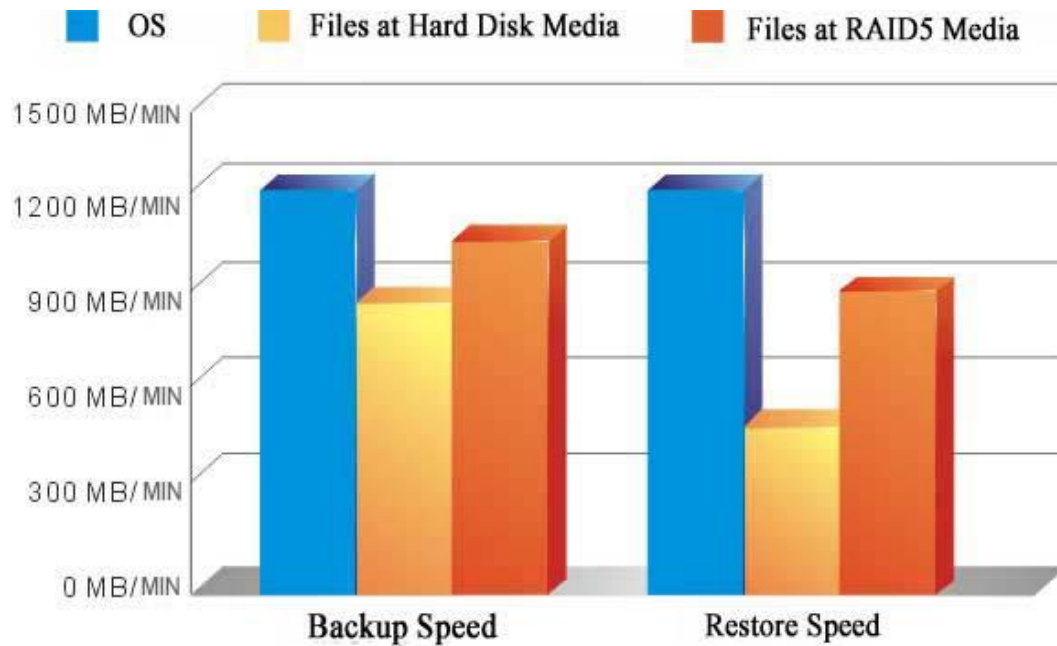
- When one user authentication is based USB-Key, the recovery of its backed up data is also authenticated by USB-Key.
- Support redistribution of USB-Key when the original one is unavailable.
- Combine with backup strategy to realize the secure and active data backup.
- Combine with System Recovery Environment to ensure the security of system recovery.

3.7 Disk-to-Disk Backup

Eisoo AnyBackup 3.0 is backup software specialized for enterprise, it takes disk as the backup media and makes full use of the characteristics of the disk to improve the reliability of data backup and recovery. To meet the desire of users, backup windows have been reduced to one minute (quasi-real-time measurement) to meet the RPO and RTO standard for the users.

Disk as storage media for random reading and writing owns high I/O speed; its structure advantage ensures the high reliability of data reading and writing. Nowadays, disk as an online storage media is widely adopted in the realm of data protection. Its can shorten the backup windows to the minimum and restore the data in short while so as to make the deployment of backup project more adaptable and efficient.

Eisoo AnyBackup 3.0 is disk to-disk backup software which provides so many functions as backup cycle with the minimum granular of one minute interval, recovery time-point, single file recovery and file download through Management Console. The following table is one testing report of system backup & recovery, file backup & recovery and disk array on the single hard disk and RAID5:



3.8 Open File Backup

Open File Backup is a technology developed by Eisoo Software Inc. When data is opened and read by certain application, it's opened in an exclusive way. For instance, Outlook is running personal storage table, which cannot be backed up by the traditional backup software, however, Open File Backup technology aims to achieve this kind of data backup. By activating Advanced Open File Backup option on Management Console, Eisoo AnyBackup 3.0 is capable to get data information when confronting the deadlock of file. Open File Backup is realized by direct reading and writing the logical disk sector to ensure the consistency of the data.

3.9 Backup Set Storage Technology

Eisoo AnyBackup 3.0 adopts backup set storage technology with specialized data storage format which includes two kinds of formats: ECS file and EBS file.

ECS file: Eisoo Catalog Set, it is used to store a series of catalog information generated by backup executions, one catalog is index information of metadata information of backed up file, which includes file name, basic property, extended property, etc. It uses optimal three-level index table to save backup catalog information to reach the goal of performing backup and recovery of files up to million level. The first level is static index table which is used for catalog index block, the second level index table is used for basic property index of every backed up file, the third level index table is used for full properties index of the first backed up file. In the process of analyzing backup and recovery performance, AnyLink Execution Engine only store the first and second level index tables into heap memory system, which consumes little memory; while the third level index table only be used in data recovery and consumes only stack memory, in this way, it achieves the goal of backup and recovery of file to million level.

EBS file: Eisoo Backup Set is the file that stores the content of backed up data by format of data block. It combines dynamic data block index technology and open file backup technology to accurately backup t data even when the data is experiencing constant change.

In the following, the features of Backup set storage technology will be elaborated:

Seamless integration of Backup set storage technology and scheduling algorism of AnyLink Execution Engine minimizes the I/O amount of backup and reduces wastage of system performance.

Backup set storage technology supports dynamic segmentation and storage distribution, when main media server is insufficient, backed up data can be

stored into secondary backup media.

Backup set support dynamic data compression, as to some compressed file in ZIP, JPEG format, backup system no longer executes compression, thus CPU consumption and storage time can be greatly decreased.

Backup set support password protection of un-encrypted content and multiple encryption algorithms for content, as well digital signature authentication technology to prevent illegal, illegal access to backup data.

When computer is virus-infected, backup set can avoid infection of documents, E-mail and applications which are stored in the backup set with its specific format.

3.10 SmartMove Synthetic Backup

SmartMove Synthetic Backup is one of the most outstanding functions in backup industry. It is superior over other backup software in the following features:

- SmartMove algorithm enables Synthetic Backup performance to achieve 8~14 faster compared with the performance of present Synthetic Backup.
- Outstanding performance of SmartMove Synthetic Backup depends on the amelioration of the patented Synthetic Backup algorithm, which makes available space, expired and invalid data in media as the foundation to execute the optimal backup assembly thus realizes the remarkable improvement.
- It supports the backup set synthesis according to once, day, week and month as time unit.
- Support synthesis of incremental backup to reduce the storage space when executing frequent backup.
- Support optimal synthesis of full backup sets and when full backup sets beyond the limit of full backup set, the earliest version will be deleted to keep standard backup set copies for rotation backup.

Chapter 4 Backup & Restore

4.1 Backup strategies

Eisoo AnyBackup 3.0 owns rich Backup strategies which include two parts, the first part is backup job option, the second part is backup rotation strategy. The former one involves data compression, data encryption, file filter and advanced option. Data compression option includes no compression to data, quick compression, standard compression and high intense compression, which compress data to 30~70 percent of the original size according to the property of data, which has greatly reduce the storage volume for media server. Data encryption option includes no execution of security measure, use password to protect backup set and encrypt backup set with automatic AES256 algorithm, among which encrypt backup set with automatic AES256 algorithm is the most secure protection which cannot be decrypted by any other software except Eisoo AnyBackup3.0 thus data safety can be well guaranteed. File Filter includes directory filter, time filter, file property filter, which combines forms powerful filter function thus greatly save user's effort to filter useless files such as cookies to save backup time and efficiency. Advanced Option provides configuration of backup job number that can be simultaneously executed.

Backup rotation strategy mainly a series of rotation strategies that realizes the data security to its maximum. It includes backup rotation with once, daily, weekly and monthly unit as well as event-triggered backup. Backup rotation with once, daily, weekly and monthly unit means backup job is triggered in once, daily, weekly or monthly while event-triggered backup is the backup that is triggered by critical event like machine powers on, powers off and network reconnect .

4.2 Event-Triggered Backup

Eisoo AnyBackup3.0 provide event-triggered backup to realize the unity of data even in critical events.

- Power-on-triggered backup: Automatically start backup when the machine powers on.

- Power-off-triggered backup: Automatically take over the jobs when getting the power off command and shutdown the computer after complete backup.
- Network-reconnection-triggered backup: Automatically execute backup job when network reconnection.

4.3 Hot backup and recovery for OS

Hot backup for OS refers to online full and incremental backup for running operating system. Hot backup for OS of Eisoo AnyBackup 3.0 is featured as follow:

- Full support a series of Microsoft operating systems including Windows 2000 series, Windows XP, Windows 2003, Windows 2008, Windows Vista and windows 7.
- Support full backup of the whole operating system without interrupting its normal work and consumes little system resources such as memory, disk space. What's more important is that it is compatible with advanced features of NTFS file system including Named Stream, Hard Link, Reparse Point, Sparse File, Space Quota, File encryption and compression.
- Scheduled Incremental backup realizes the unlimited preservation of timepoint and keep system to the latest status periodically. In case the system is virus-infected or encounters unexpected breakdown, Eisoo AnyBackup 3.0 will get it to its normal status within 10 minutes.
- Support system Rotation backup to preserve latest backup set copies. When backup set copies exceed the limited numbers, the obsolete copies will be deleted automatically.
- Support Bare metal recovery thus original system can be transferred to new machines. Besides, it supports remote system recovery thus administrator is beneficial to deploy all system packets to new purchased machines.
- With the help of standard compression technology, the backed up data can be compressed to 30%of the original size.

Eisoo System Recovery Environment is an independent running system based on GUI Linux platforms. It has the features below:

- Support booting drive from Hard Disk, portable disk, flash disk and CD/DVD.
- Adopts NTFS-Write in User Mode rather than Captive or Linux NTFS Driver to ensure the preciseness and reliability of system recovery.
- Support Samba, restore OS from network sharing folder where backup set and catalog set files store, and EDTP protocol enables system recovery from remote backup server.

4.4 Backup and Recovery for SQL

SQL backup and recovery is based on AnyLink Execution Engine which adopts is Microsoft VDI technology to realize the hot backup and recovery. Its features are as follows.

- Seamlessly integration with AnyLink Execution Engine to realize easy centralized management and reliable network backup.
- SQL recovery adopts Eisoo Backup Set Storage Technology to realize dynamic segment and distributable storage. Dynamic compression and database-level encryption are also available.

4.5 Backup and Recovery for Oracle

Having cooperated with Oracle Cooperation by assigning Oracle Partner, Oracle database backup and recovery have been successfully integrated into AnyLink Execution Engine, which adopts RMAN Technology and Media Management Library (MML) to realize hot backup and recovery for Oracle. It's features as follows:

- Seamlessly integration with AnyLink Execution Engine realizes centralized backup and network management.
- Support backup and recovery for databases, table space, tables, archive logs, control files.
- Support accurate point-in-time recovery for database tables, thus deleted-by-mistake database tables can be recovered in seconds.
- Combination of system recovery and off-line backup realizes disaster backup and recovery for Oracle Database.

4.6 Backup and Recovery for Lotus Domino

Domino backup port provided by IBM Cooperation along with AnyLink Execution Engine realizes the hot backup and recovery for Lotus Domino.

Features are as follows:

- Seamlessly integration with AnyLink Execution Engine realizes centralized backup and network management.
- Support backup and recovery for databases and logs.
- Support accurate point-in-time recovery for database tables, thus deleted-by-mistake database tables can be recovered in seconds.
- Combination of system recovery and off-line backup realizes disaster backup and recovery for Oracle Database.

4.7 Backup and Recovery on Linux Client Agent

Eisoo AnyBackup 3.0 supports backup and recovery for files and database on Linux platform with Anylink Execution Engine.

4.8 Backup and Recovery for Sybase

Backup and recovery for Sybase is integrated into AnyLink Execution Engine. With communication between Sybase Backup Server Archive API and Sybase Backup Server, data transmission is carried out in the way of ACE shared memory which is compatible with other applications. With Open Client API-the open programmatic interface of Sybase, instances linkage and databases access can be achieved. Features are as follows:

- Support online full and incremental backup for Sybase.
- Support backup for single or multi -instance and database.
- Support point-in-time recovery for databases and disaster recovery.
- Eisoo Backup Set Storage Technology provides dynamic compression and database-level encryption.

4.9 Backup and Recovery for Exchange Server

Exchange Server backup includes backup for mailbox, public folder, transaction log files and server domain. EDK (Exchange Development Kit) provides access port to realize hot backup and optimized backup combination for Exchange Server. Features are as follows:

- Support full and incremental backup for the whole database and single storage group, public folder and mailbox.
- Support full, incremental backup and transaction log backup which inserts transaction logs generated in the process of previous backup execution, thus completeness of database can be guaranteed.
- Support disaster recovery and instant recovery for Exchange Server system.
- Abundant rotation backup strategies help to achieve real-time backups, save restore time and minimize data loss.

4.10 Backup and Recovery for Active Directory

Active Directory backup includes AD database, transaction log files and checkpoint file. By Microsoft Visual SourceSafe (VSS), hot backup for Active Directory. Features are as follows:

- Support full backup for AD database, transaction log files and checkpoint files.
- Support browse to restore and browse by category.
- Support restoration to original location or other location where Active Directory has been installed
- Support authorized recovery and non-authorized recovery.