RingStor User Manual

Version 2.1

Last Update on October 17th, 2014

RingStor, Inc.

197 Route 18 South, Ste 3000

East Brunswick, NJ 08816

Table of Contents

1 Overview

This user manual provides step by step instructions on how to install and manage RingStor enterprise data protection and recovery software suite, version 2.1. This document is also available on the web at http://www.ringstor.com.

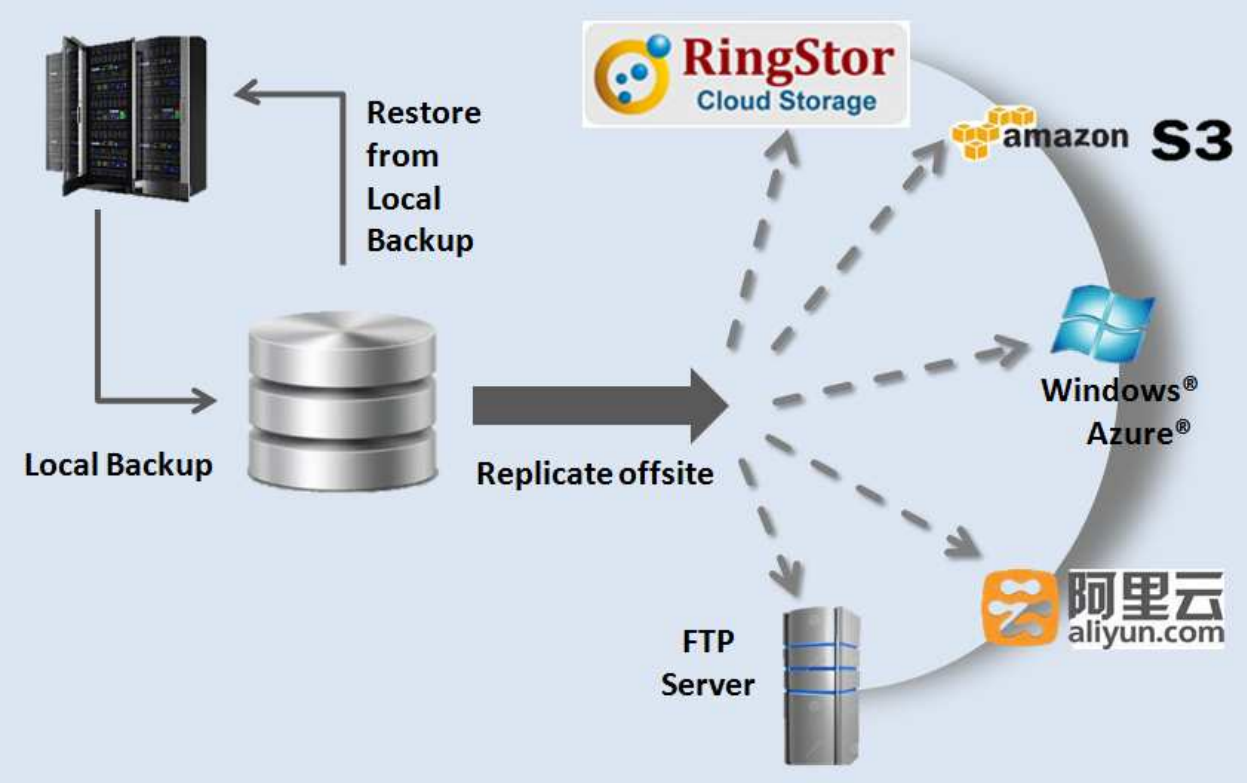
1.1 RingStor Data Protection

RingStor cloud backup software provides three different ways to backup the data: Online Backup Only, Local Backup Only and Local Backup with Replication.

Online Backup Only: data is transmitted and saved to RingStor cloud storage.

Local Backup Only: data is backed up to local storage only

Local Backup + Replication: data is backed to local storage first, then replicated offsite to the remove storage, as shown in picture below.



1.2 RingStor Cloud Backup Editions

RingStor suite comes with three editions designed for Professional Office, SMB and Enterprise. Following table

shows the difference among these three editions.

		Lite Edition	Standard Edition	Enterprise Edition
File Backup	Windows XP, Vista, 7, 8	✓	✓	✓
	Windows 2000 Server	✓	✓	✓
	Windows 2003 Server	✓	✓	✓
	Windows 2008 Server	✓	✓	✓
	Windows 2008 R2 Server	✓	✓	✓
	Windows 2012 Server	✓	✓	✓
	Linux (Redhat, SUSE, Debian, OpenSUSE, etc)		✓	✓
	Mac OS		✓	✓
Bare Metal Backup	Windows XP, Vista, 7, 8		✓	✓
	Windows Server 2003, 2008, 2008 R2, 2012		✓	✓
Database Backup	SQL Server 2000		✓	✓
	SQL Server 2005		✓	✓
	SQL Server 2008		✓	✓
	SQL Server 2012		✓	✓
	MySQL		✓	✓
Applications Backup	Exchange 2003			✓
	Exchange 2007			✓
	Exchange 2010			✓

1.3 Cloud Backup

RingStor suite comes with a cloud storage to provide data protection and recovery. A RingStor system consists of a cloud system, DataAgents and RingStor Explorer.

The cloud consists of a Cloud End Point, Cloud Indexer, one or more DataServers and physical storage.

The Cloud End Point is a set of lightweight software that serves as an access point for communication to cloud.

The Cloud Indexer is a software service that provides indexing service to cloud.

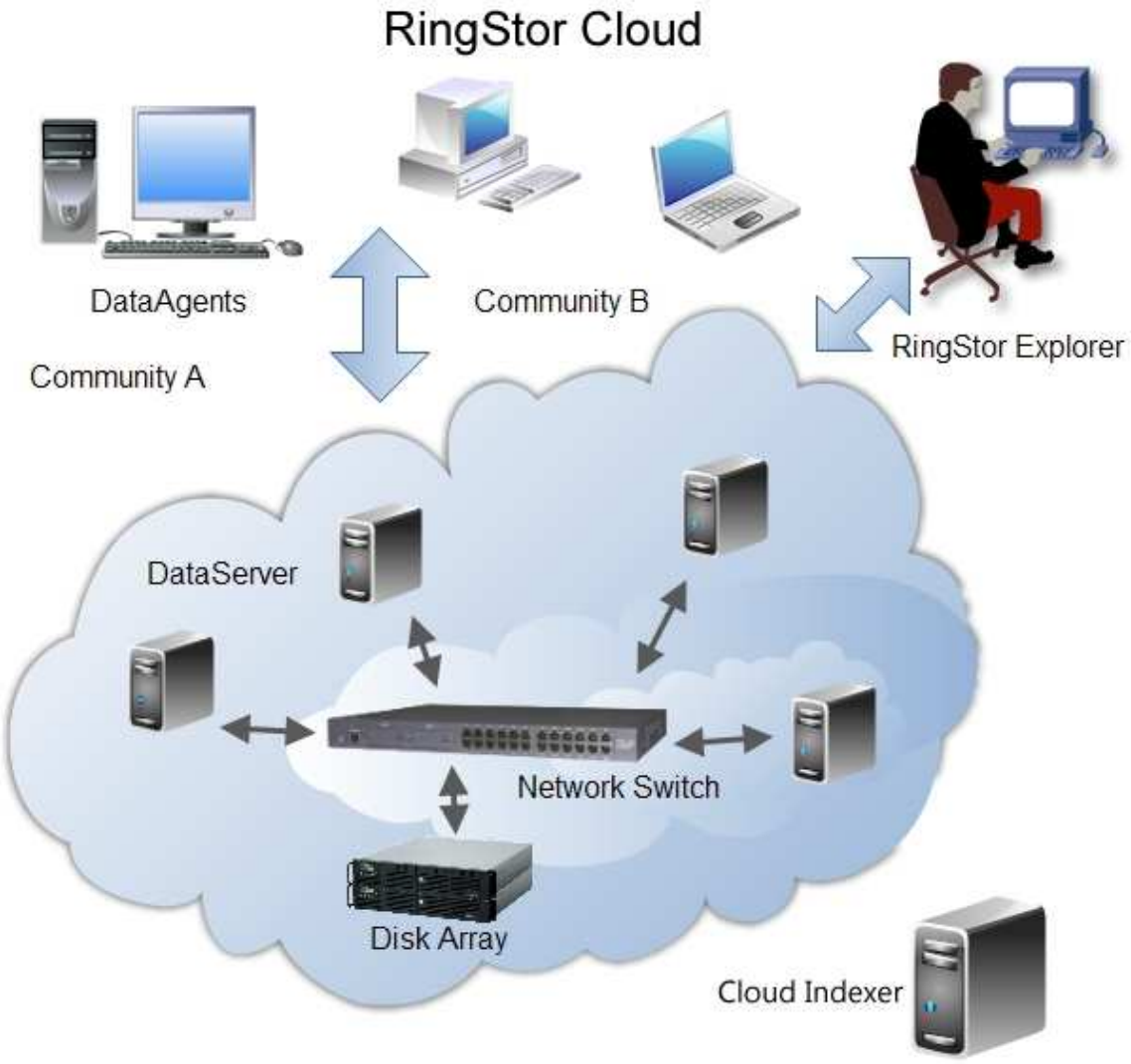
The DataServers and physical storage inside cloud system provide virtually unlimited capacity, highly scalable and on-demand available storage for applications.

DataAgent is a software service running on computers where application data requires protection. In 2.1, DataAgent can backup file on Windows, Linux and Macintosh, Microsoft SQL, MySQL, Microsoft Exchange.

RingStor Explorer is a graphic user interface for administrators to manage all components in RingStor.

For more information about RingStor and its components, please visit on the web at http://www.ringstor.com.

An example of RingStor configuration is illustrated below:



1.4 DataAgent

A DataAgent is a suite of software installed on a computer whose application data requires protection. Each application data is supported by an Agent that provides backup service. Agents supported in release 2.1 are File Backup, SQL Database Backup, MySQL Database Backup and Microsoft Exchange File Level Backup.

Each DataAgent and its agents must be licensed to run in RingStor system. For additional DataAgent or agent license, please go to http://www.ringstor.com for details.

1.4.1 File Backup

A File Backup agent can maintain multiple copies at different point of time for same file. File Backup can run in form of one or more full backup, with a number of incremental backups. Files protected under File Backup can be restored to a point of time selected by user.

1.4.2 Bare Metal Backup

A Bare Metal Backup agent takes a snapshot of selected volumes and backup data to image files locally for quick disaster recovery. The image files can also be replicated to RingStor cloud for offsite storage and protection.

1.4.3 SQL Database Backup

A SQL Database Backup agent can maintain multiple copies at different point of time for same database. SQL Database Backup can run in form of full backup, differential backup, transaction log backup and File Level backup. Full database backup must be performed first before any differential or transaction log backup. User can restore either a full backup or select a point of time for restore. File Level backup is used to provide file level copies of database data files and log files.

1.4.4 MySQL Database Backup

A MySQL Database Backup agent can maintain multiple copies at different point of time for same database. MySQL Database Backup can run in form of File Level backup which backs up the exported file from MySQL database.

1.4.5 Microsoft Exchange Backup

An Exchange Backup agent can maintain multiple copies at different point of time for same Exchange. Exchange Backup runs in form of File Level backup which backs data files, log files for the Exchange.

1.4.6 Microsoft Exchange Mailbox Backup

An Exchange Mailbox Backup agent will backup individual messages in specified Exchange. Customer can browse and select message for restore.

For Microsoft Exchange 2007 or newer version, Microsoft Exchange Server MAPI Client and Collaboration Data Objects client library must be installed prior to use RingStor Exchange Mailbox backup. The library can be downloaded from Microsoft web site at: http://www.microsoft.com/en-us/download/details.aspx?id=1004.

1.5 Cloud End Point

A Cloud End Point is a lightweight software service to provide access point to DataAgents. The Cloud End Point can be deployed inside an enterprise network to provide LAN backup, this deployment is a private clou. The Cloud End Point can be also deployed with appropriate firewall settings to become a public cloud to DataAgents that use public internet for backup and restore.

Each Cloud End Point must be licensed to run in RingStor system. For license info, please go to http://www.ringstor.com for details.

1.6 Cloud Indexer

A Cloud Indexer is a software service to provide indexing service to cloud. The index for objects backed up inside cloud are maintained by Cloud Indexer.

1.7 DataServer

A DataServer is a “cell brain” in RingStor cloud system to provide services in data protection, data recovery, etc. DataServer consists of a suite of software installed on a computer. In addition, DataServer provides a rich set of functionality on server side to browse and restore data etc.

In Lite Edition, only one DataServer can be installed. In Standard and Enterprise Edition, multiple DataServers can be installed in RingStor system for load balancing.

Each DataServer must be licensed to run in RingStor system. For additional DataServer license, please go to http://www.ringstor.com for details.

1.8 RingStor Explorer

RingStor Explorer is a Windows based user interface that provides user the ability to manage every aspects of RingStor system.

2 Installation

The installation of a complete RingStor system shall follow these steps:

1. The Cloud End Point must be installed first
2. Install Cloud Indexer
3. Install DataServer to the cloud
4. Install RingStor Explorer
5. Install DataAgent on computers where data need backup

RingStor Explorer can be installed on every user's computer to manage RingStor system.

2.1 Installation Preparation

To install Standard and Enterprise Edition, following must be prepared before starting the installation:

1. A domain user account that will be used to run Cloud End Point, Cloud Indexer and DataServer services inside cloud. This domain user account must have full access to the paths specified in 2 and 3 below.
2. A network shared path where the domain user has full access. This network shared path will be used to store index.
3. One or more network shared path where data will be stored. Additional such path can be added after cloud installation is completed.

For Lite Edition, Local System account can be used to install services. Locally connected hard drive can be used to store backed up data.

2.2 Cloud End Point

Cloud End Point can be installed on following platforms:

- Microsoft Windows XP/Vista/7/2003/2003 R2/2008/2008 R2/8/2012
- Recommended Memory: 3GB or more

2.2.1 System Requirement

The following third party software must be installed prior to Cloud End Point installation:

- Microsoft .NET Framework 3.5 is required.

  You may download .NET framework from microsoft.com at http://www.microsoft.com/en-us/download/details.aspx?id=21

- For Cloud End Point installation, a local or remote SQL server must be available to create database repository.

  Supported database systems are:

  - Microsoft SQL server 2005, 2005 Express, SQL server 2008, 2008 Express, SQL server 2012, 2012 Express

TIP: For Microsoft SQL server system, TCP/IP must be enabled in Client Protocols as shown below:

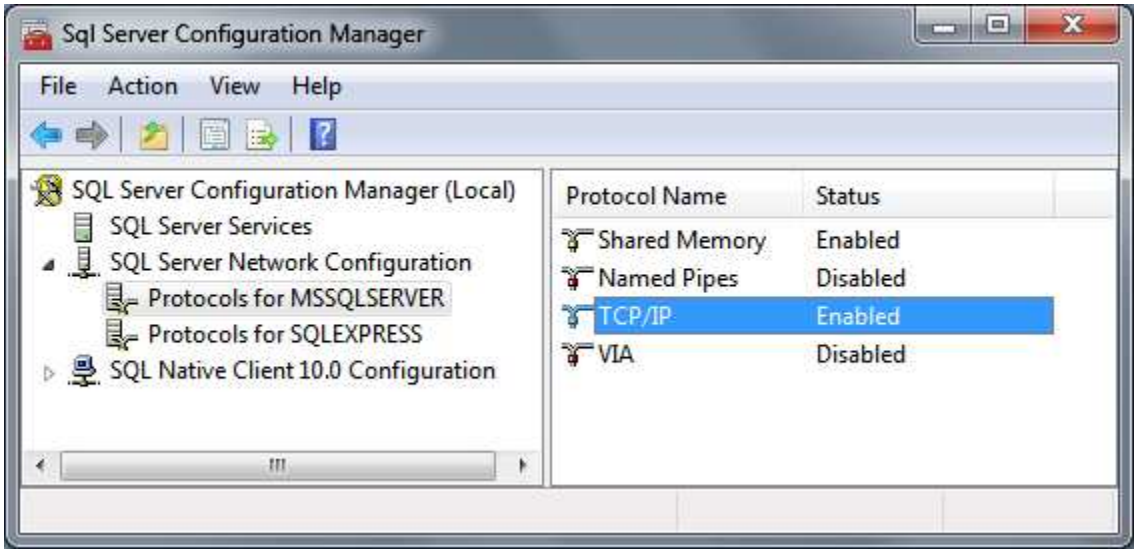


Figure 2.2.1 SQL Server Configuration Manager

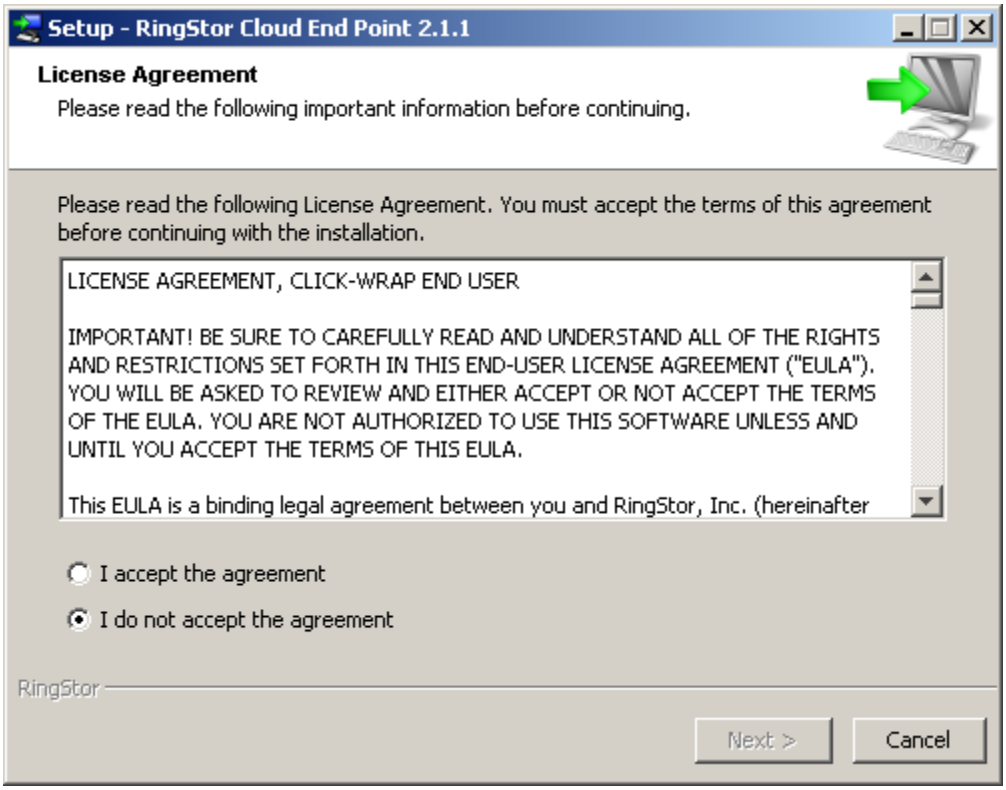
2.2.2 Install Cloud End Point

Run Installer

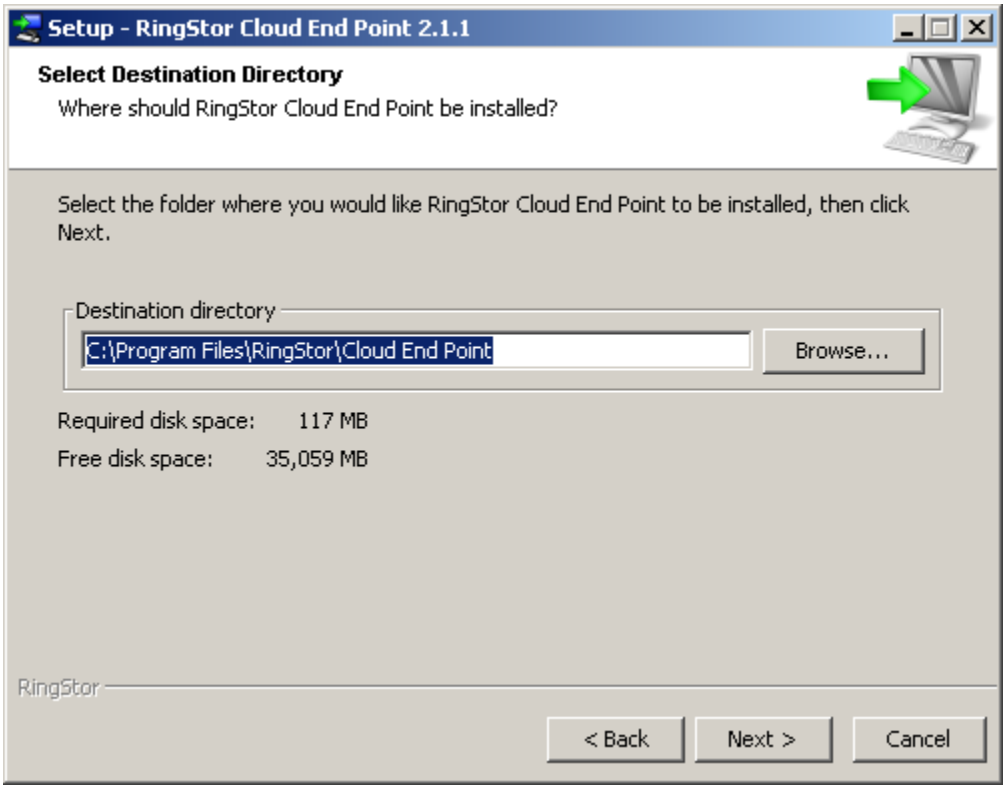
Download proper version of the installation executable from http://www.ringstor.com. Run the downloaded executable on the computer to start Cloud End Point installation.

Step 1 - Start Installation

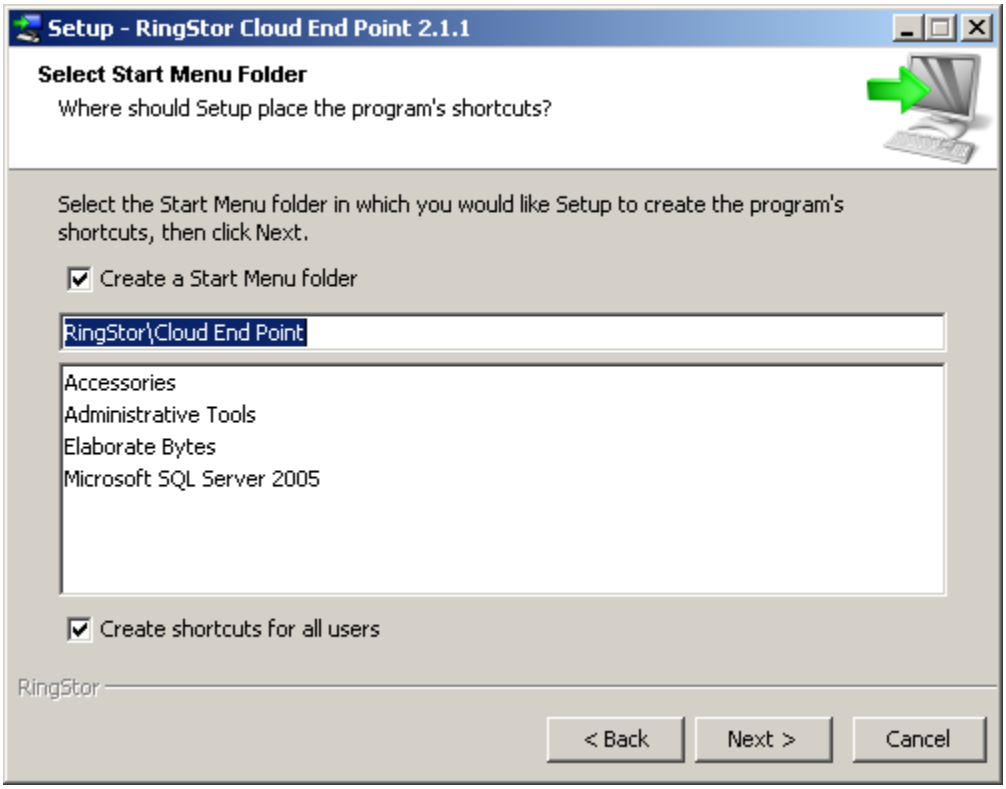
Step 2 - License Agreement



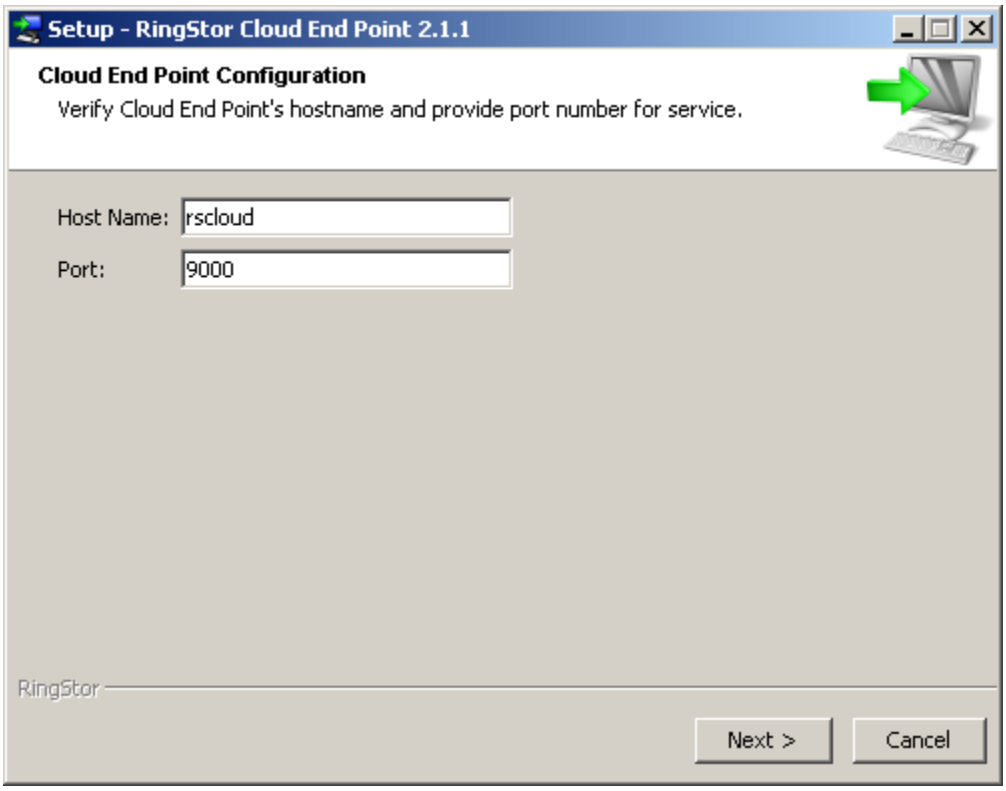
Step 3 – Specify Installation Root Folder



Step 4 – Menu and Shortcut



Step 5 - Cloud End Point hostname and port



The host name will be pre-filled with current computer's hostname or IP. If an IP is provided, the computer must be configured with static IP.

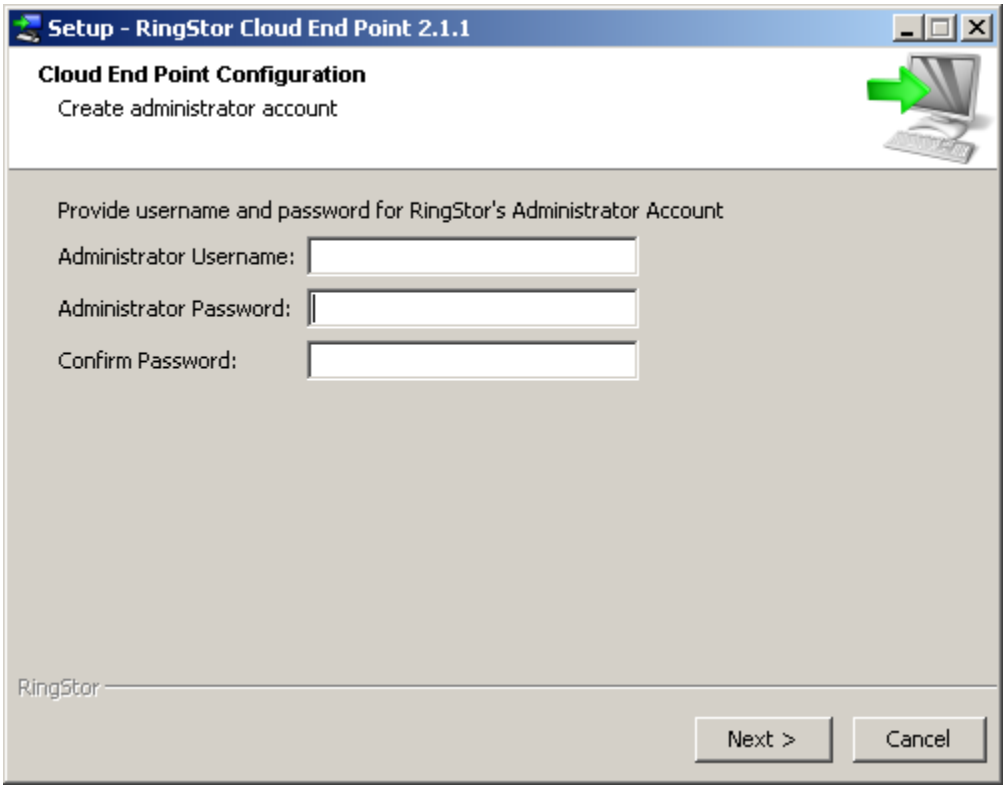
The port is default to 9000, you may change the port.

Cloud End Point service will listen on this port to provide services.

IMPORTANT: Cloud End Point service must be added into firewall to allow both inbound and outbound connections.

Click Next to continue.

Step 6 – Set up Cloud Administrator



RingStor administrator's username/password must be setup.

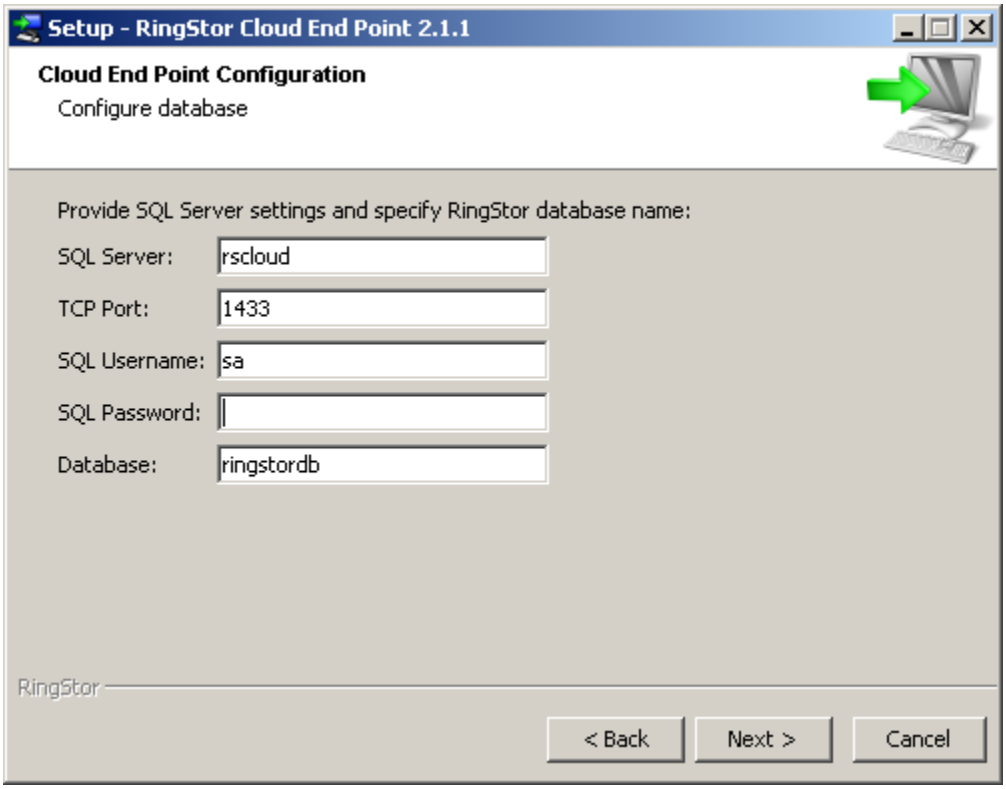
RingStor Login Credentials

Administrator Username – provide RingStor administrator's username

Administrator Password: - password for RingStor administrator

Click Next to continue.

Step 7 – Specify Database Repository



A database repository must be provided. RingStor cloud will stored system data in this repository.

SQL Server – host name of the computer where SQL server is running

TCP Port – TCP port for the SQL service (see tip on how to find TCP port)

SQL Username – SQL server user account, this account must have permission to create database

SQL Password – password for the user account above

Database – name of the database

TIP: How to find TCP port for Microsoft SQL service

From SQL Server Configuration Manager (show in Figure 2.2.1), select SQL instance on the left, make sure TCP/IP is Enabled on the right, then double click to TCP/IP to bring up TCP/IP Proper window (Figure 2.2.2).

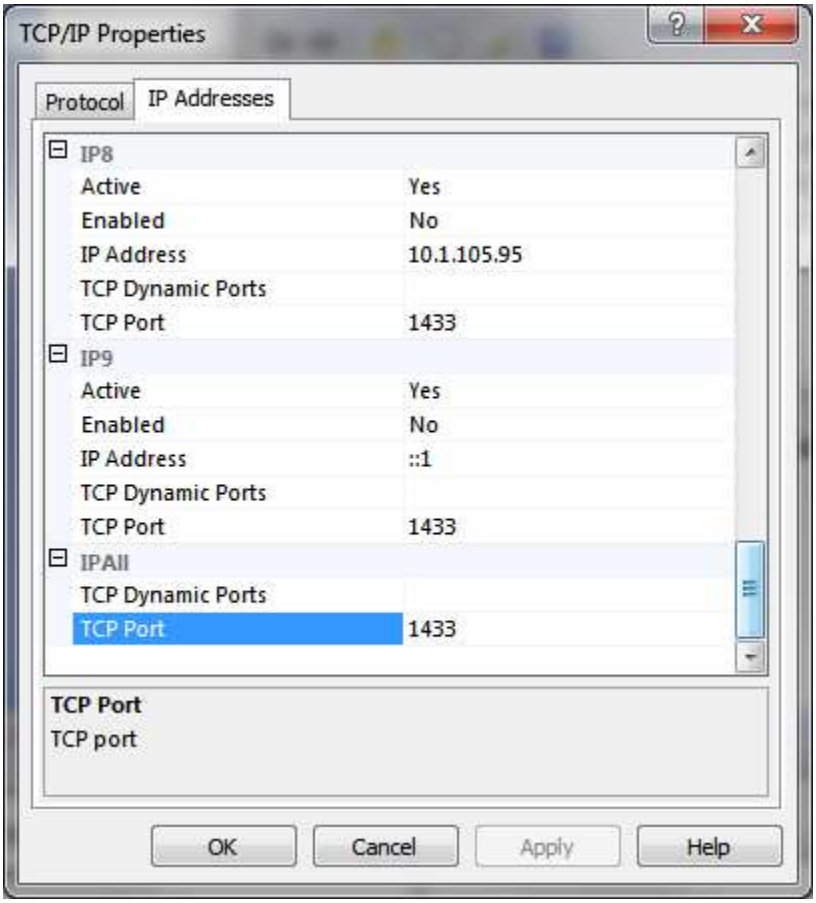


Figure 2.2.2: TCP/IP Property

The IPAll section has TCP Dynamic Ports and TCP Port. Depending on the SQL server settings, only one should have a numeric value. Put this numeric value in TCP Port on this configuration step.

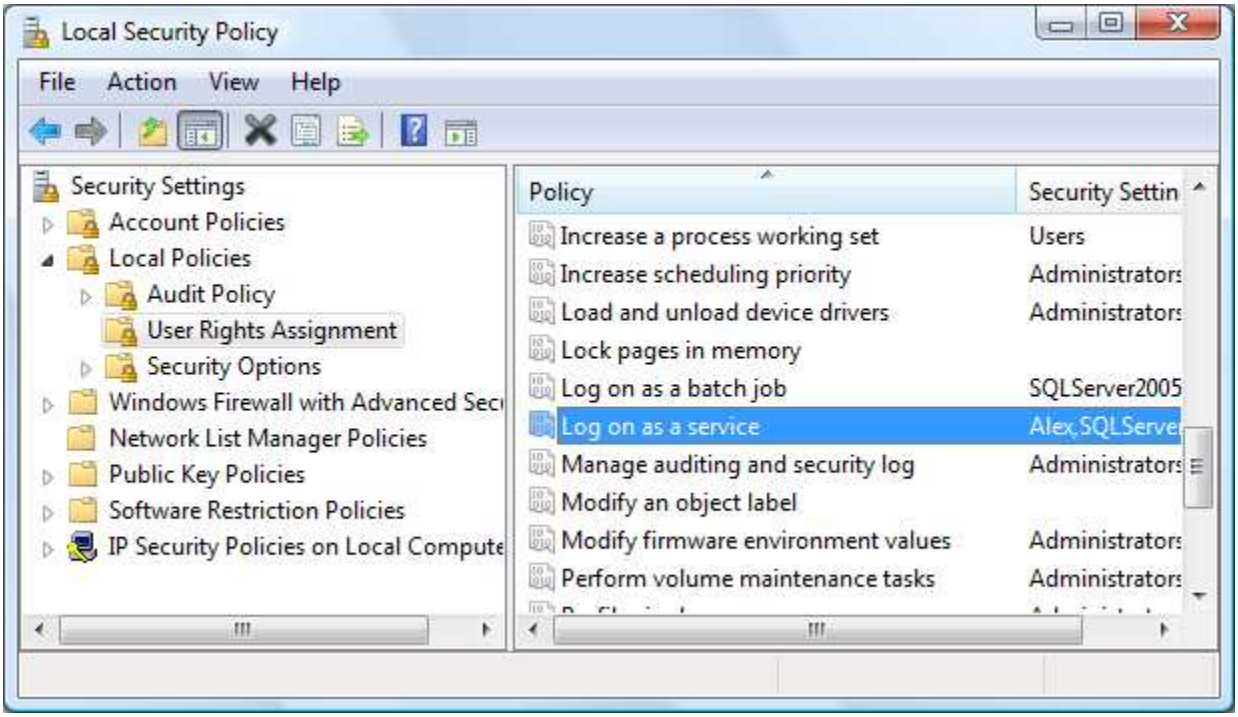
Click Next to continue.

Step 8 – Setup Cloud End Point Service

For Enterprise and Standard Edition, Cloud End Point service must run under a domain user which has full access to index repository. (Index repository is configured during CloudIndexer installation)

Click Next to continue.

For more information on how to grant Log On As Service permission for the user, open Local Security Policies window. You can access this window from Administrative Tools -> Local Security Policies. On this window, expand Local Policies -> Rights Assignment, find policy “Log On As Service” in right pane, open and verify or add user to this policy group. Following picture shows the Local Security Policy window:



Click Next to start and complete the installation process.

2.3 Cloud Indexer

Cloud Indexer is a required component in Enterprise Edition. It can be installed on following platforms:

- Microsoft Windows XP/Vista/7/2003/2003 R2/2008/2008 R2/8/2012
- Recommended Memory: 2GB or more

2.3.1 System Requirement

The following third party software must be installed prior to Cloud End Point installation:

- Microsoft .NET Framework 3.5 is required.

You may download .NET framework from microsoft.com at http://www.microsoft.com/en-us/download/details.aspx?id=21

2.3.2 Install Cloud Indexer

Run Installer

Download proper version of the installation executable from http://www.ringstor.com. Run the downloaded executable on the computer to start Cloud Indexer installation.

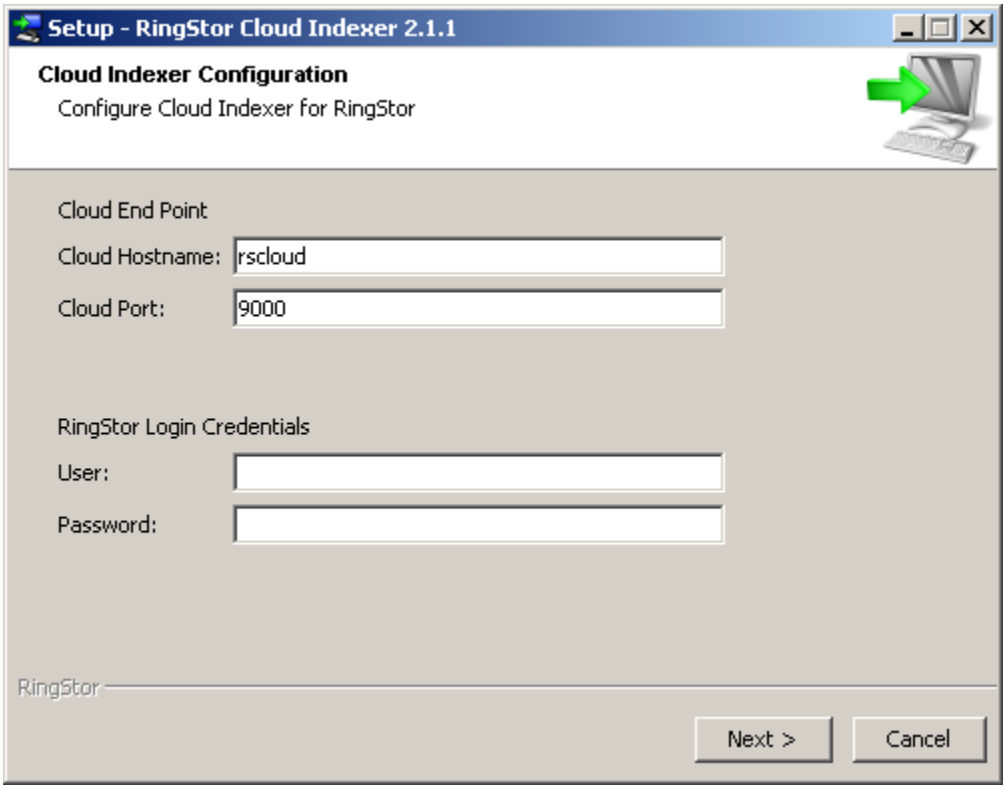
Step 1 - Start Installation

Step 2 - License Agreement

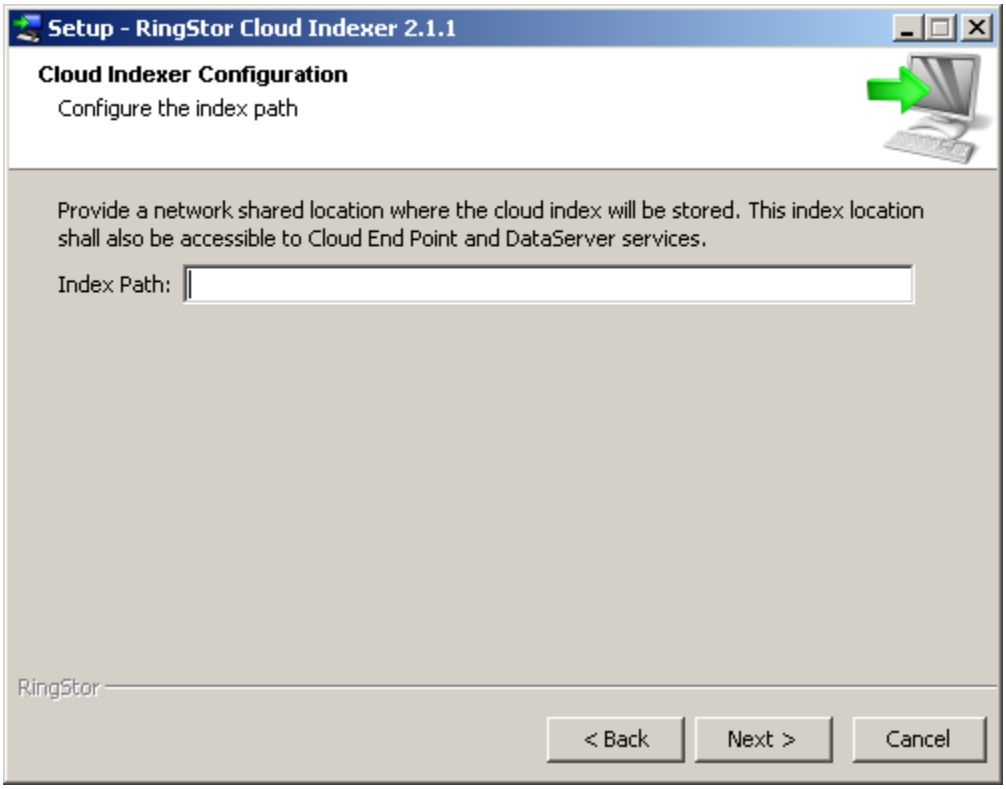
Step 3 – Specify Installation Root Folder

Step 4 – Menu and Shortcut

Step 5 – Provide Cloud info and credentials



Step 6 - Set up index path for cloud.



For Standard and Enterprise Edition, the cloud index path must be a networked shared path so all components in cloud have access to.

Click Next to continue.

Step 7 – Setup Cloud Indexer Service

For Standard and Enterprise Edition, Cloud Indexer service must run under a domain user which has full access to index repository.

Click Next to start and complete the installation process.

2.4 DataServer

DataServer is the server that resides inside the cloud, registers itself to Cloud End Point upon start, and provides services to DataAgents for data protection, recovery and more. The DataServer can be installed on following platforms:

- Microsoft Windows XP/Vista/7/2003/2003 R2/2008/2008 R2/8/2012
- Recommended Memory: 3GB or more

2.4.1 System Requirement

The following third party software must be installed prior to DataServer installation:

- Microsoft .NET Framework 3.5 is required.

  You may download .NET framework from microsoft.com at http://www.microsoft.com/en-us/download/details.aspx?id=21

2.4.2 Install DataServer

Run Installer

Download proper version of the installation executable from http://www.ringstor.com. Run the downloaded executable on the computer to start DataServer installation.

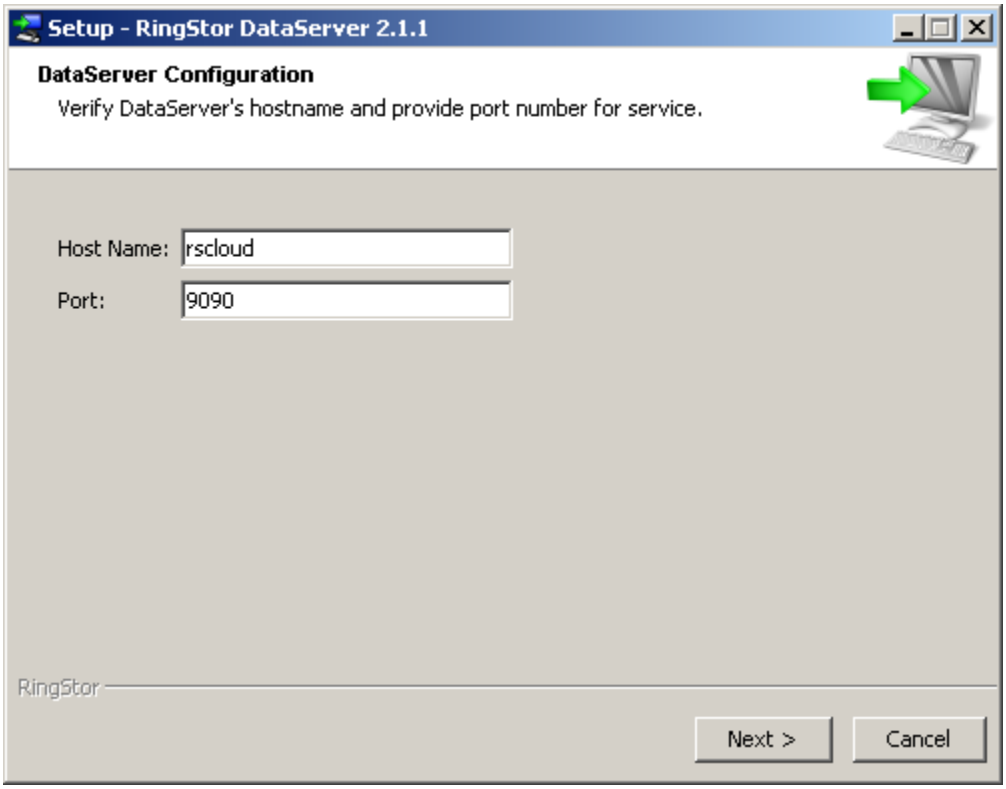
Step 1 - Start Installation

Step 2 - License Agreement

Step 3 – Specify Installation Root Folder

Step 4 – Menu and Shortcut

Step 5 – DataServer hostname and port



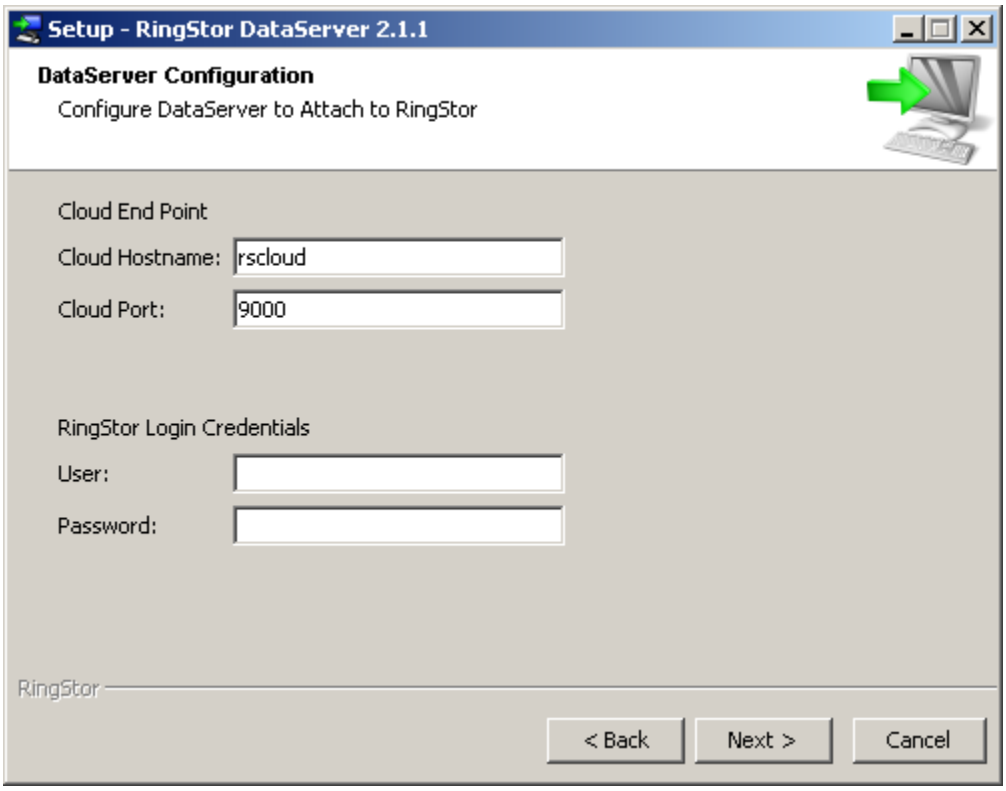
The host name will be pre-filled with current computer's hostname or IP. If an IP is provided, the computer must be configured with static IP.

The port is default to 9090, you may change the port.

DataServer service will listen on this port to provide services.

Click Next to continue.

Step 6 – Provide Cloud End Point info



DataServer must connect to the existing Cloud End Point and register itself to become part of RingStor cloud, make sure Cloud End Point is online and provide Cloud End Point settings in this step.

Cloud Hostname: the hostname or IP used when installing Cloud End Point

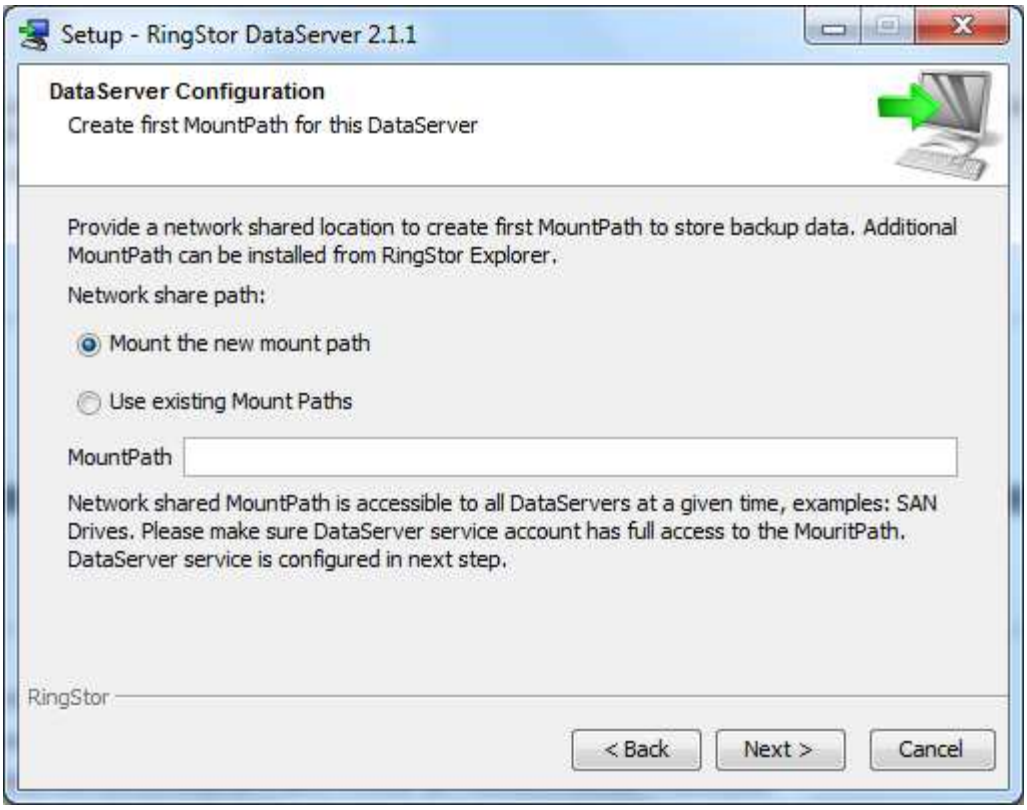
Cloud Port: the port number that existing Cloud End Point service is listening on.

Administrator Username: RingStor cloud administrator

Administrator Password: RingStor cloud administrator's password

Click Next to continue.

Step 7 – Create First MountPath



MountPath is a folder on hard drive with its full path provided above. In order for this DataServer to provide data protection, at least one MountPath must be accessible (read and write) by the DataServer.

The MountPath may be of these two types based on the connection to DataServer:

Directly Attached – the MountPath is hard wired to DataServer and only accessible by it.

Network Shared – the MountPath is a shared path that is accessible via network

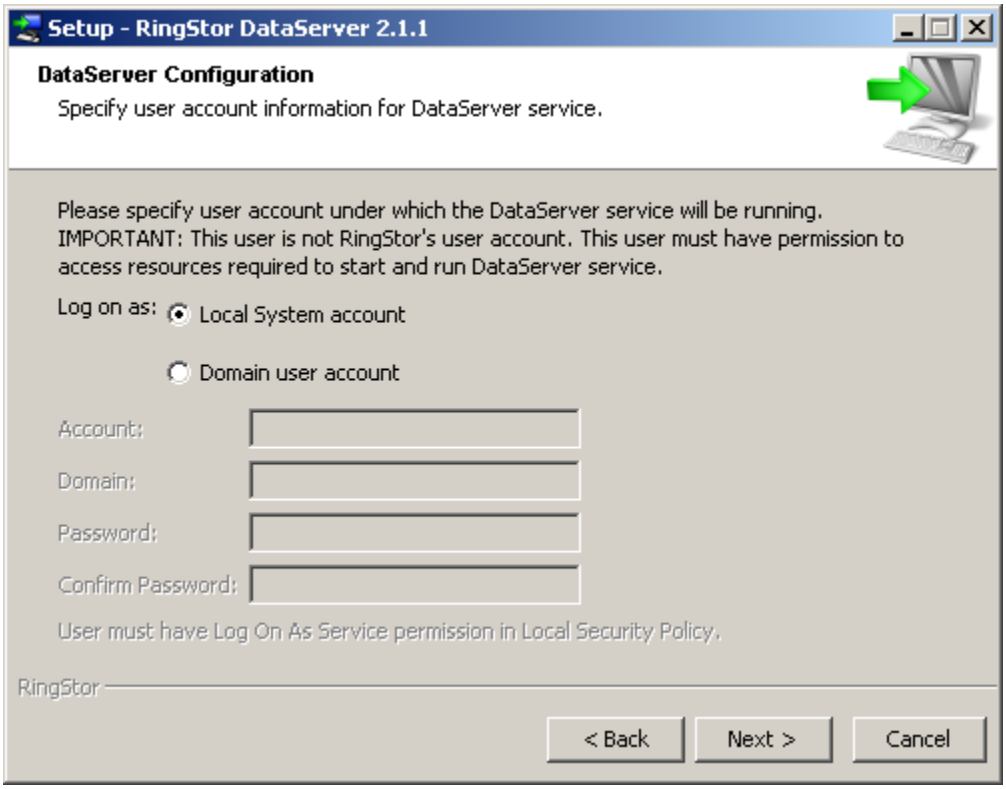
The examples of Directly Attached MountPath may be c:\mydatarepository, e:\mydatarepository.

The example of Network Shared MountPath may be \\mydataserver\mydatarepository

For Standard and Enterprise Edition, MountPath must be a network shared path.

Click Next to continue.

Step 8 –Setup DataServer Service



For Enterprise and Standard Edition, DataServer service must run under a domain user which has full access to MountPath and Index.

IMPORTANT NOTE:

1. The domain user account, or Local System, must have read and write permission to all MountPaths configured for this DataServer. If you use Network Shared MountPath, you must provide a valid domain user account here and grant this user full access to the Network Shared MountPath.
2. The domain user, if selected, must have Log on as service permission specified in Local Security Policy, please refer to Installation of Cloud End Point service for more information.

Click Next to start and complete the installation process.

2.5 DataAgent

DataAgent can be installed on following platforms:

- Microsoft Windows XP/Vista/7/2003/2003 R2/2008/2008 R2/8/2012
- Linux, (Redhat, SUSE, Debian, OpenSUSE, etc)
- Mac OS

2.5.1 System Requirement

The following third party software must be installed prior to DataAgent installation:

- Linux: JRE 1.6 or higher.
- Windows: Microsoft .NET Framework 3.5 is required. You may download .NET framework from microsoft.com at http://www.microsoft.com/en-us/download/details.aspx?id=21

2.5.2 Install DataAgent to RingStor Cloud

Run Installer

Download proper version of the installation executable from http://www.ringstor.com. Run the downloaded executable on the computer to start DataAgent installation.

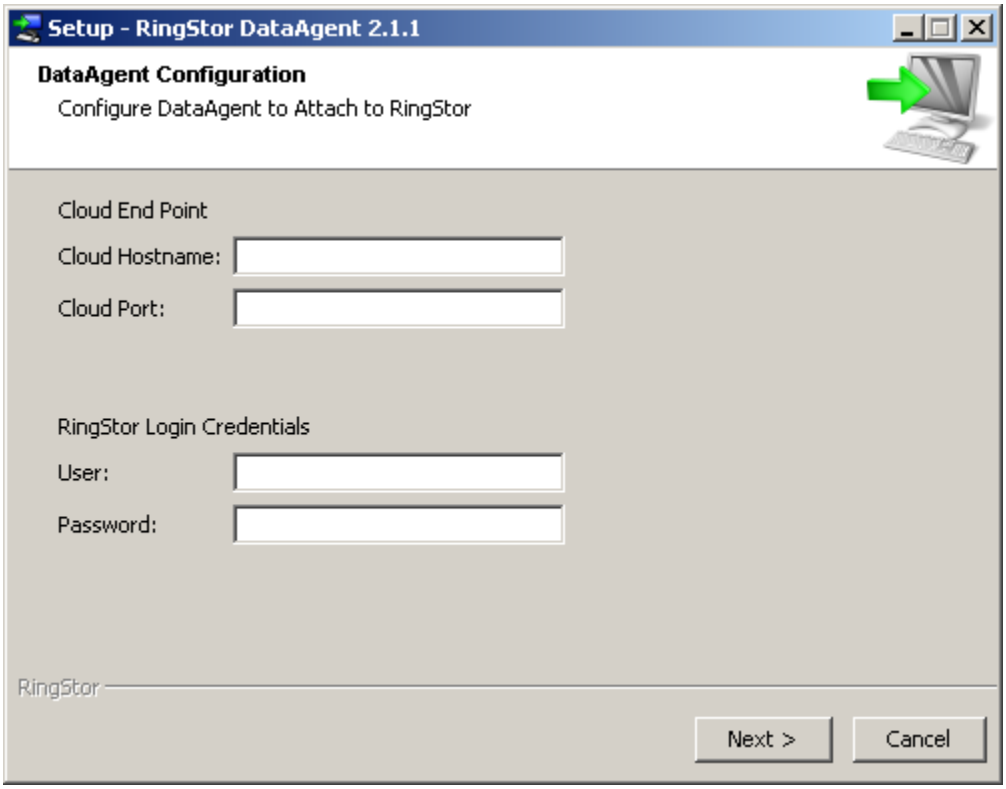
Step 1 – Start Installation

Step 2 – License Agreement

Step 3 – Specify Installation Root Folder

Step 4 – Menu and Shortcut

Step 5 – Register DataAgent to Existing RingStor cloud



RingStor Cloud End Point must be accessible by this DataAgent. RingStor user's username/password must be provided to connect to RingStor cloud.

Cloud End Point:

Cloud Hostname – provide hostname or IP of an online Cloud End Point in existing RingStor cloud

Cloud Port: - the port for the online Cloud End Point above

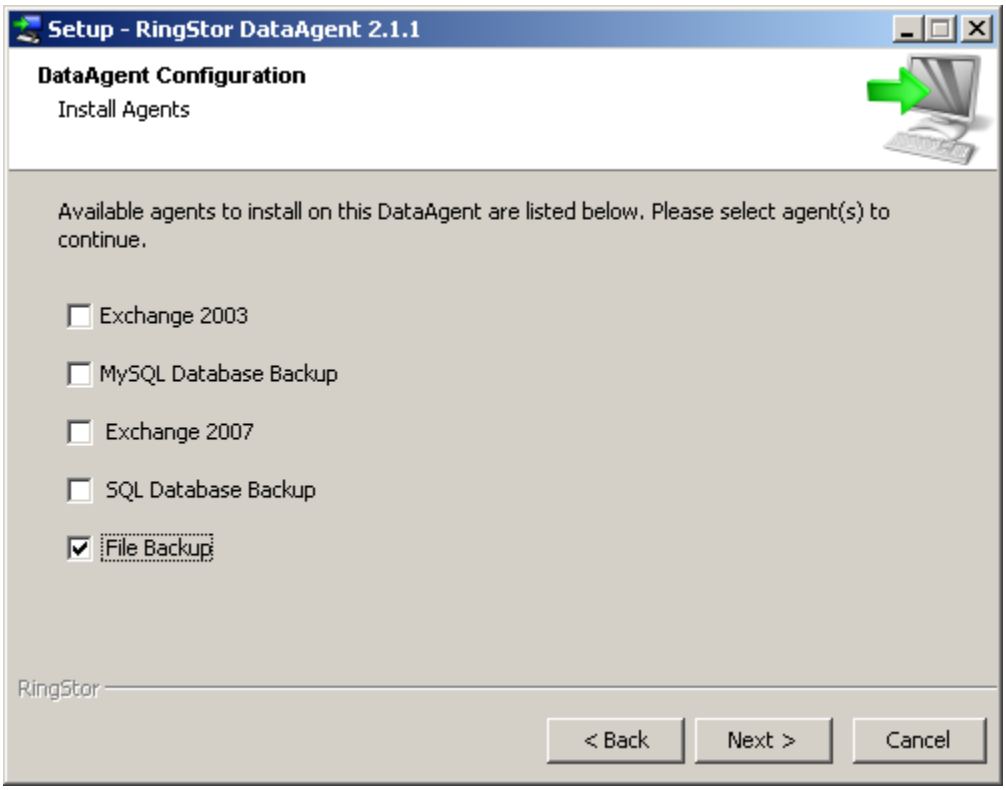
RingStor Login Credentials:

User – provide RingStor user's username that has rights to install the DataAgent

Password: - password for RingStor user

Click Next to continue.

Step 6 – Select Application Agents



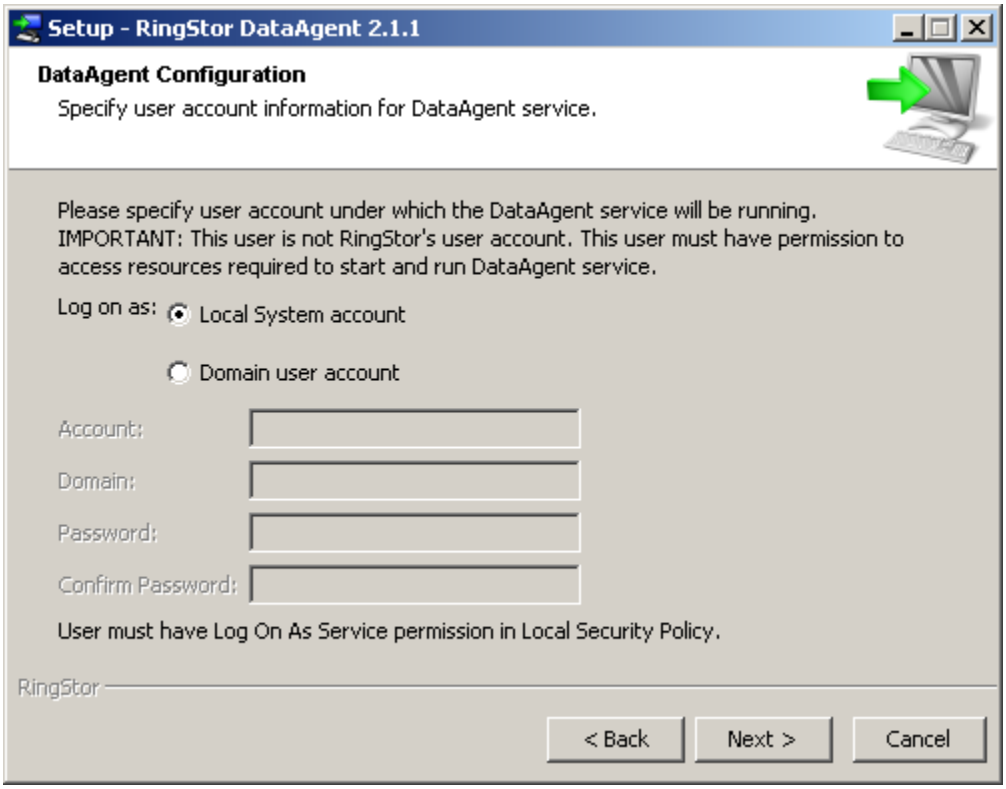
Available agents for this DataAgent are displayed and can be selected.

The available agents are based on DataAgent's platform and agents licensed to use on this platform.

Please read **Introduction** section for description of each agent.

Click Next to continue.

Step 7 – Setup DataAgent Service



The domain user account above is NOT RingStor administrator account used in Step 4. Specify if DataAgent service will run under Local System account or a domain user account. For domain user account, please provide account, domain and password.

IMPORTANT NOTE:

1. The domain user account, or Local System, must have read and write permission to all application data configured for protection on this DataAgent.
2. The domain user, if selected, must have Log on as service permission specified in Local Security Policy, please refer to Installation of Cloud End Point service for more information.

Click Next to start and complete the installation process.

2.6 RingStor Explorer

RingStor Explorer can be installed on following platform:

- Microsoft Windows XP/Vista/7/2003/2003 R2/2008/2008 R2/8/2012

2.6.1 System Requirement

The following third party software must be installed prior to RingStor Explorer installation:

- Microsoft .NET Framework 3.5 is required.

You may download .NET framework from microsoft.com at http://www.microsoft.com/en-us/download/details.aspx?id=21

2.6.2 Install RingStor Explorer

Run Installer

Run the downloaded executable on the computer to start RingStor Explorer installation.

Step 1 – Start Installation

Step 2 – License Agreement

Step 3 – Specify Installation Root Folder

Step 4 – Menu and Shortcut

Step 5 – Finish Installation

Click Next to start and complete the installation process.

3 RingStor Explorer

RingStor Explorer is a graphic user interface (GUI) to access and manage RingStor system. In this interface, authenticated user can perform following functions:

- View/Manage Communities
- View/Manage DataServers, DataAgents and components installed on them
- View/Manage Schedules
- View/Manage Tasks
- View/Manage Storage
- View/Manage Users
- View/Manage Reports
- View/Manage License
- View/Manage Updates

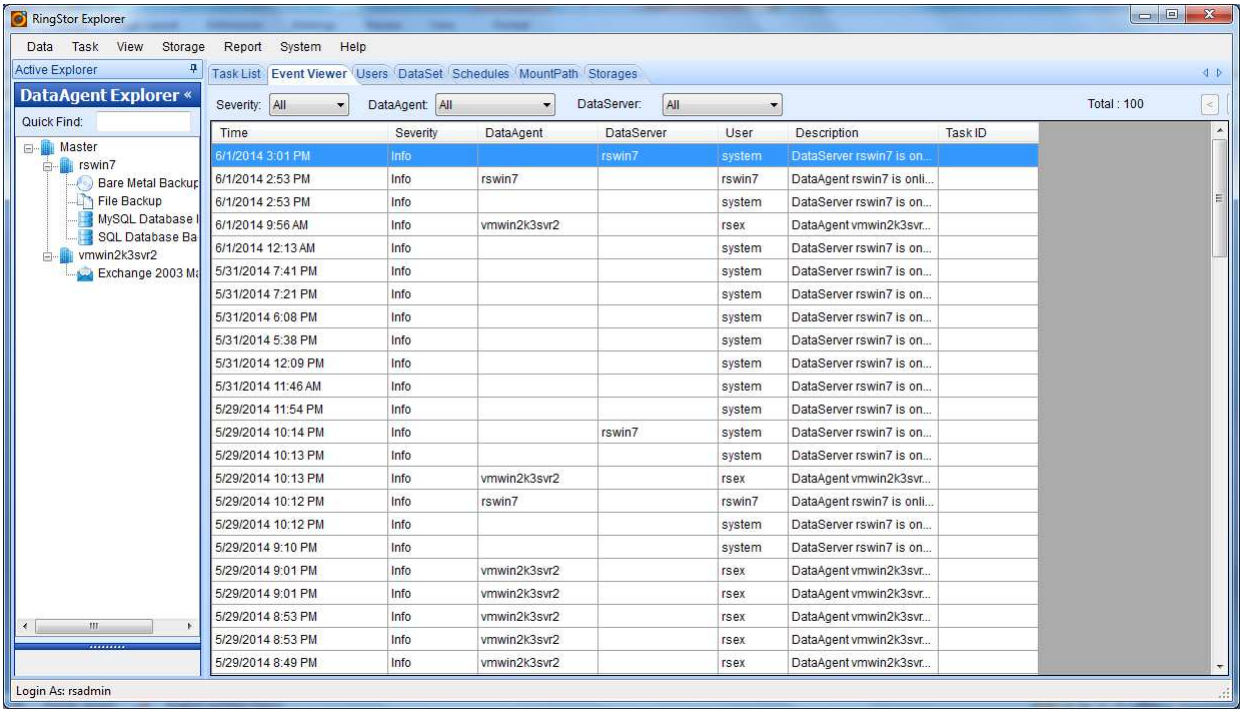


Figure 3.1 RingStor Explorer

The chapter will provide an overview of this GUI, the detailed functions are scattered in subsequent chapters.

Figure 3.1 is an example screen shot. The GUI has three major areas, Top Menu, Explorers and Content Tabs.

3.1 Top Menu

Data Menu:

Create New DataSet – create a new DataSet to start data protection

Import Data from Local Disk – import backup data from local disk for a DataSet into cloud

Task Menu:

Schedule New Task – use to create a new schedule

View Menu:

DataAgent Explorer – open DataAgent Explorer on left side

DataServer Explorer – open DataServer Explorer on left side

Schedule Explorer – open Schedule Explorer on left side

Storage Explorer – open Storage Explorer on left side

User Explorer – open User Explorer on left side

Storage Menu:

Add New MountPath – add a new mount path to the cloud

Add New MountPath Pool – add a new mount path pool to the cloud

Storage Usage – check spaces for all MountPath and Backup Data

Report Menu:

Create New Report – create various reports

Open Report – open an existing report

System:

Community – view and manage communities

Cloud End Point – view system info on Cloud End Point

License Info – show license installed, upgrade license

Configuration – view and manage system wide configurations

Help Menu:

Documentation – links to online documents

About RingStor – version info

3.2 Explorer

DataAgent Explorer – view/manage DataAgents and agents

DataServer Explorer – view/manage DataServers and storages

Schedule Explorer – view/manage Schedules

Storage Explorer – view/manage MountPath Pools and MountPaths

User Explorer – view/manage users

3.3 Content Tabs

3.3.1 Event Viewer – view system events

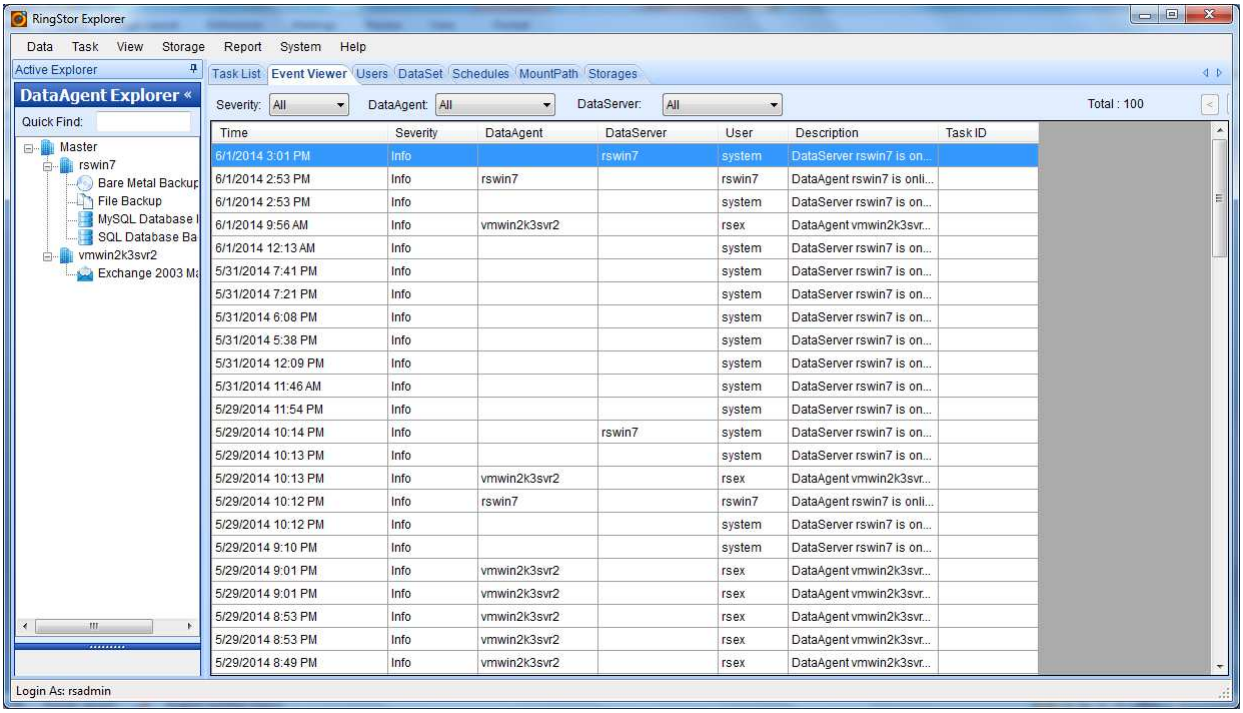


Figure 3.2 Event Viewer Tab

All events are listed with time, severity, description and DataAgent/DataServer/Task if applicable. Double click one event to bring up the event detail window shown below:

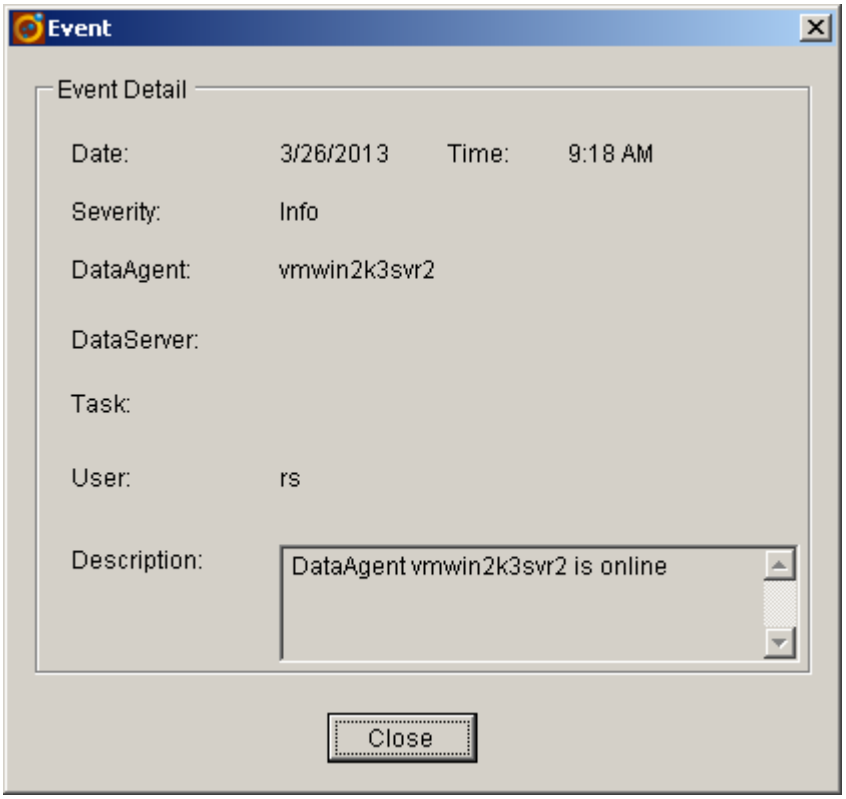


Figure 3.3 Event Detail Window

3.3.2 Task List – view/manage running tasks

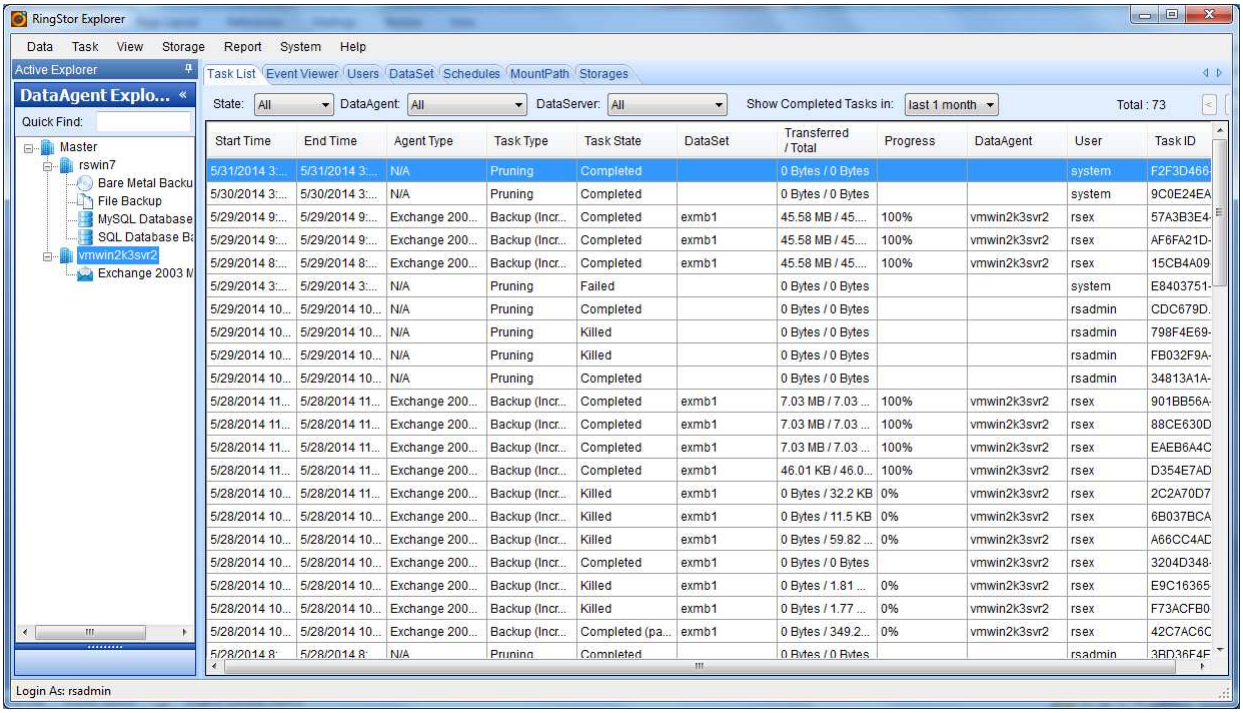


Figure 3.4 Task List Tab

All running tasks and recently completed tasks are displayed in this tab. Right click each task to bring up the context menu for the task, Detail menu will provide more information about this task as show in the following:

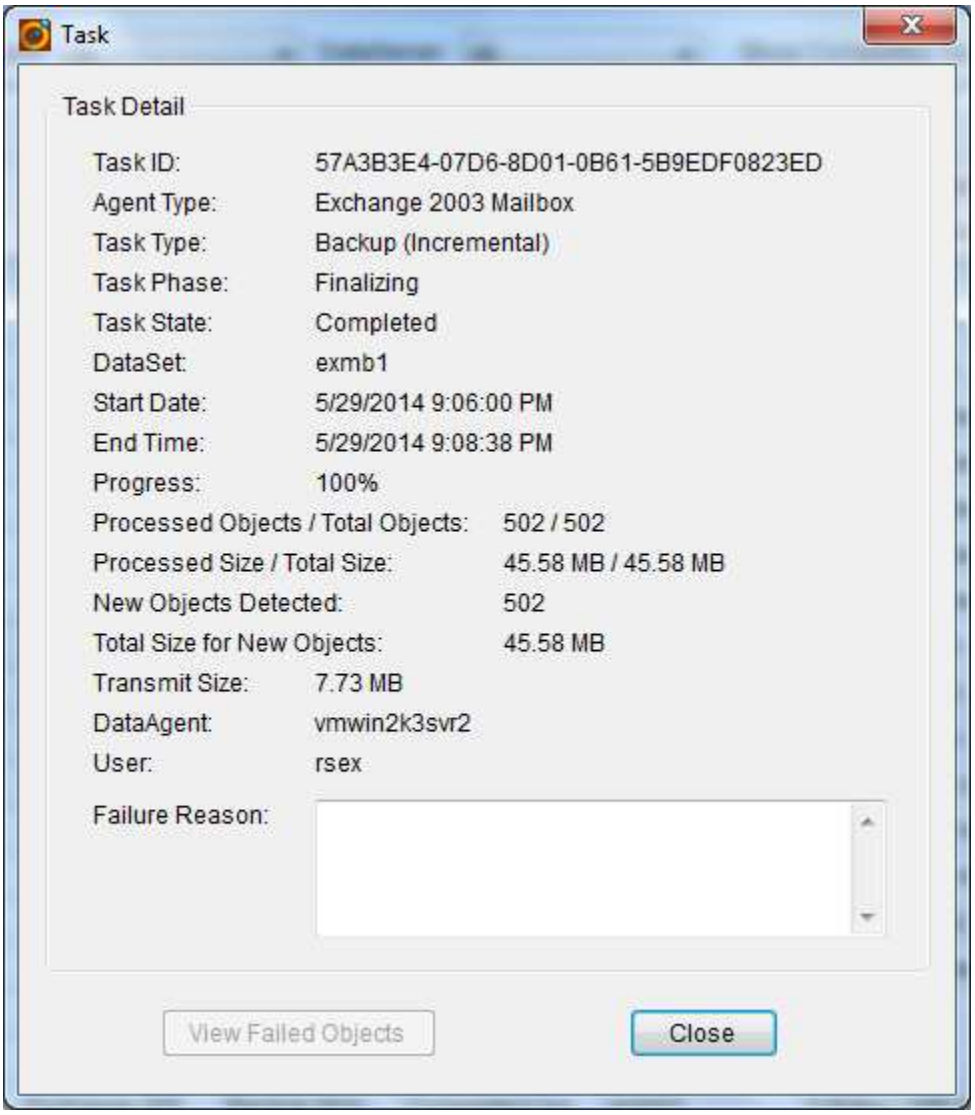
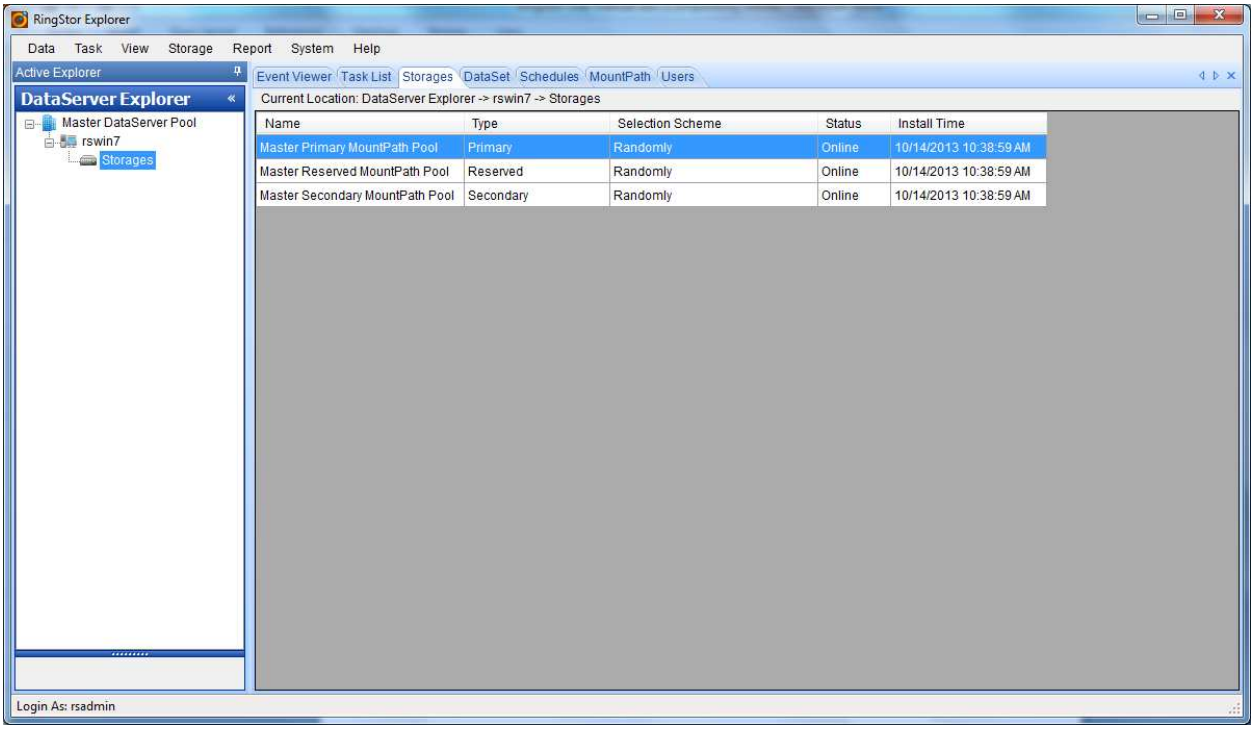


Figure 3.5 Task Detail Window

3.3.3 Storage tab – shown when Storage node is selected in DataServer Explorer



This tab lists all MountPath Pools that the DataServer is associated with. The DataServer has read and write access to all MountPaths in these MountPath Pools.

3.3.4 DataSet tab – shown when an agent is selected in DataServer Explorer

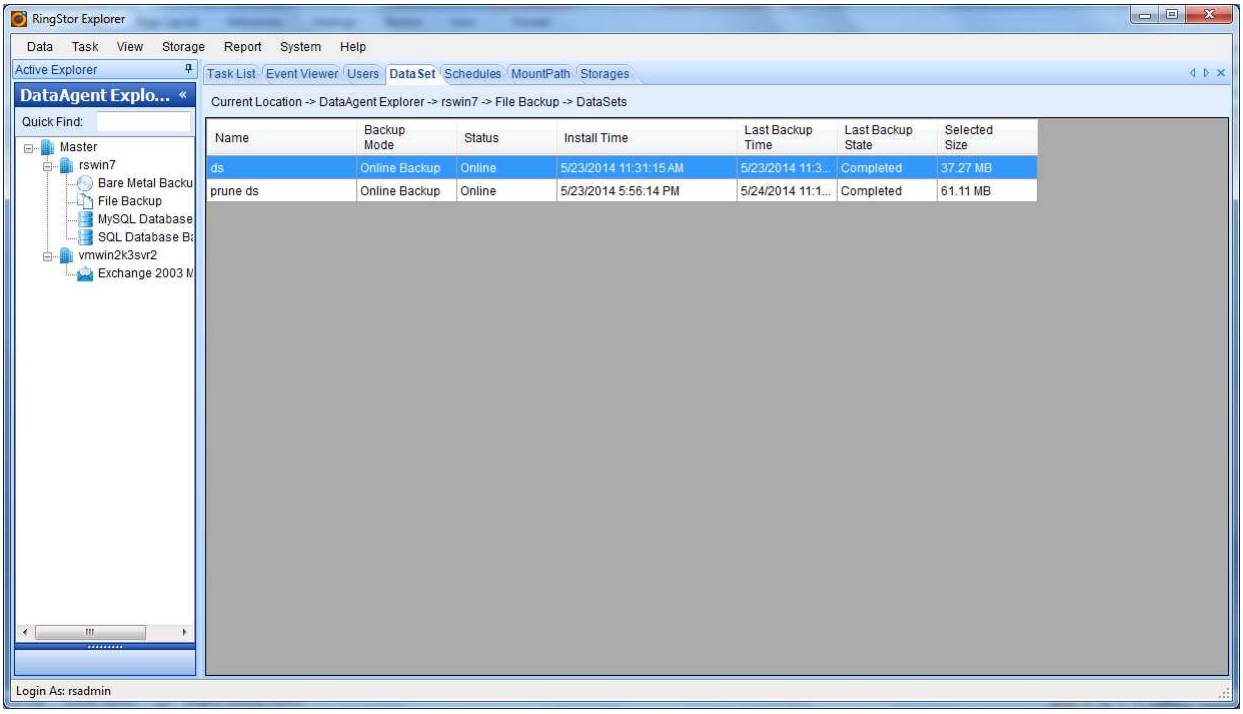


Figure 3.6 DataSet Tab

After selecting an agent in DataAgent Explorer on left, DataSet tab is activated to display all DataSets under this

agent for the DataAgent.

3.3.5 Schedules tab – view/manager schedules

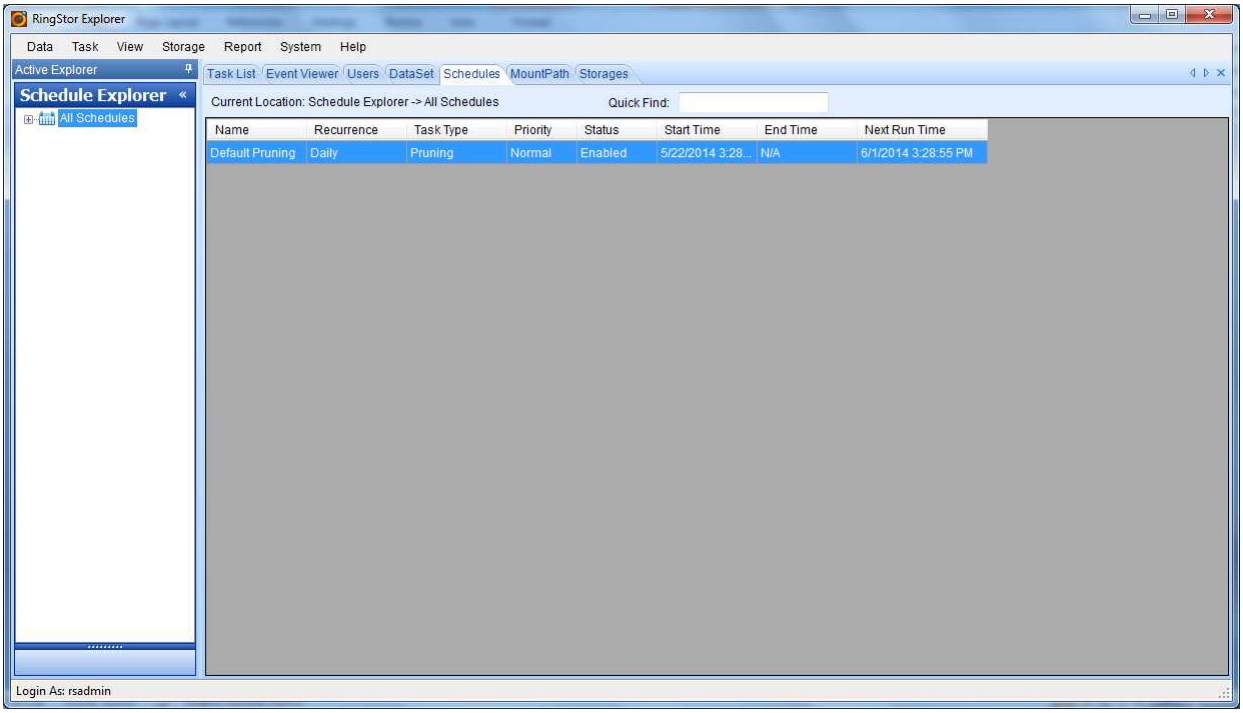


Figure 3.7 Schedules tab

Schedules tab lists all schedules configured in RingStor.

3.3.6 MountPath tab – view/manage MountPath

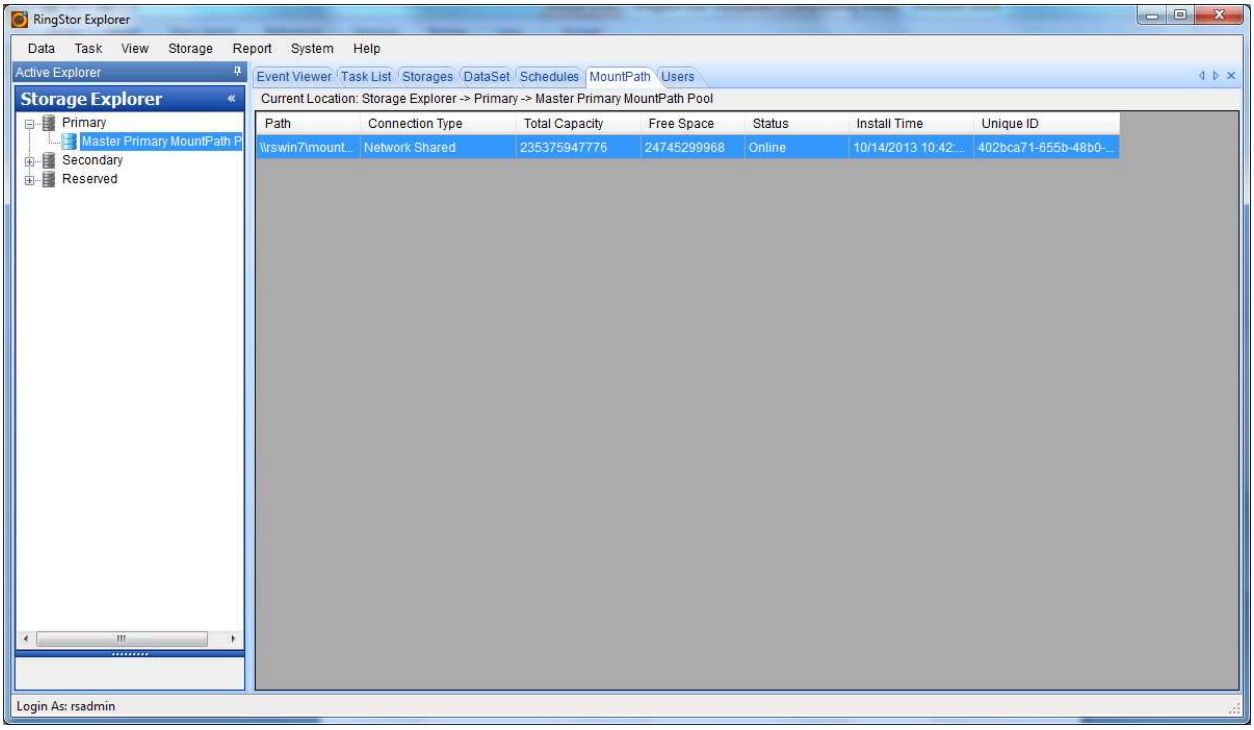


Figure 3.8 MountPath tab

Storage Explorer displays all configured MountPath Pools by the type, click each MountPath pool will activate this MountPath tab where all MountPaths under this pool are displayed.

3.3.7 Users tab – view/manager users

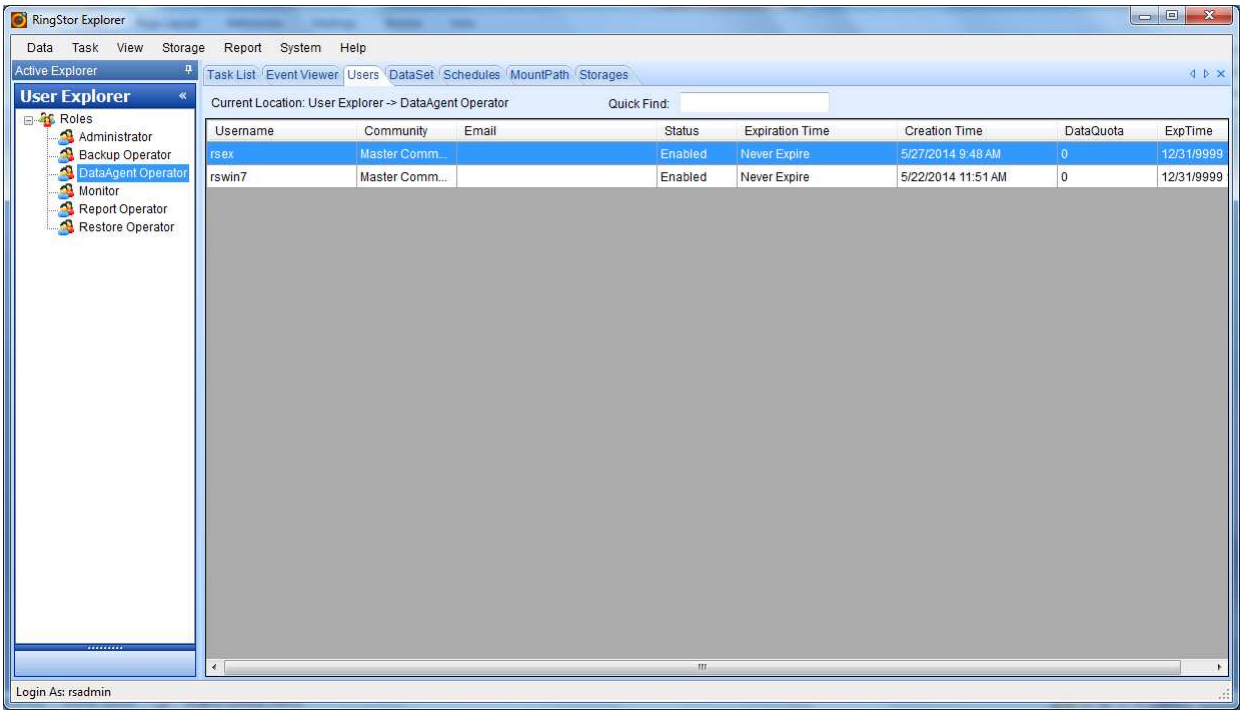


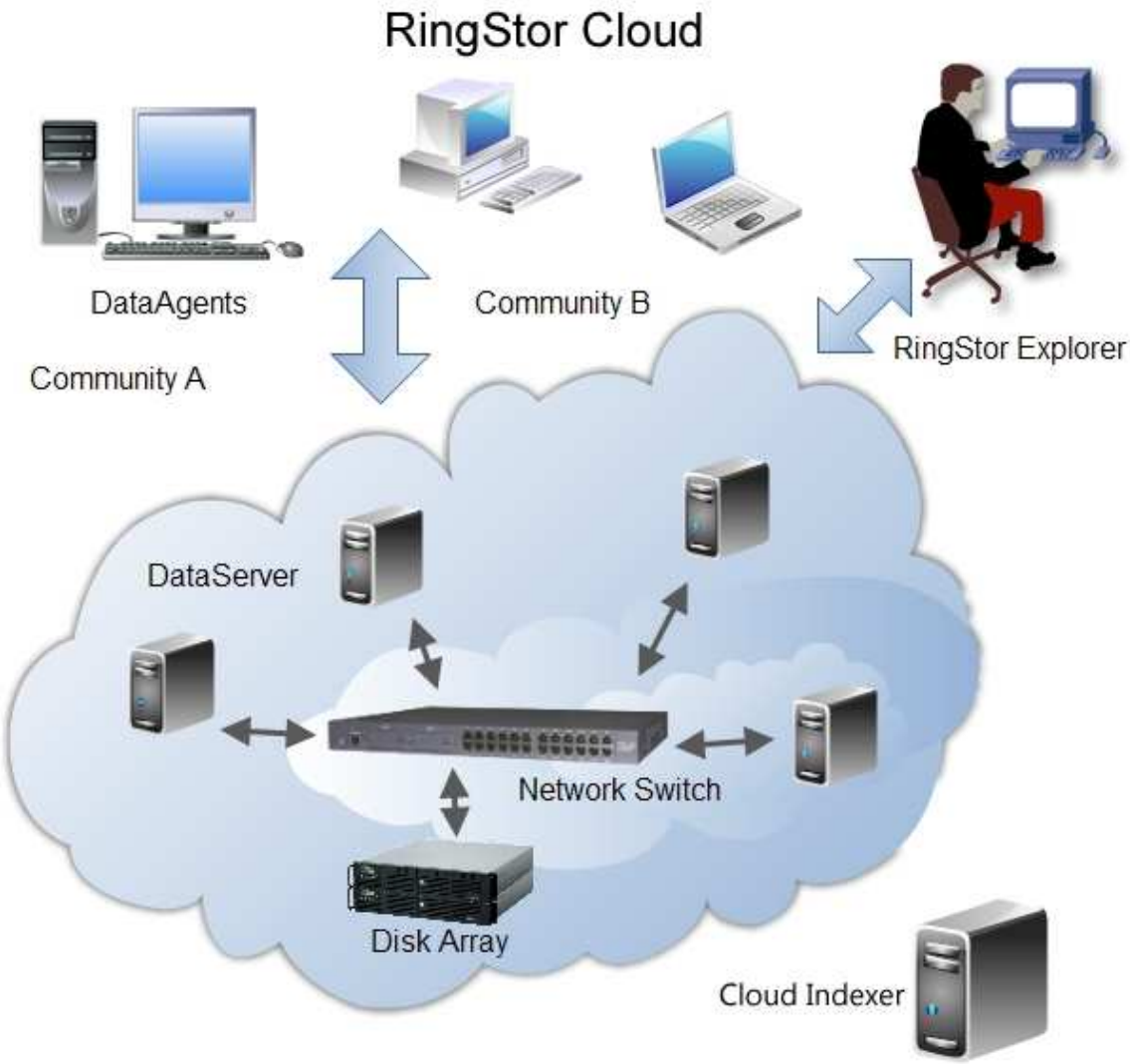
Figure 3.9 Users tab

Users tab is activated to display all users under selected role in User Explorer.

4 Community

4.1 Introduction

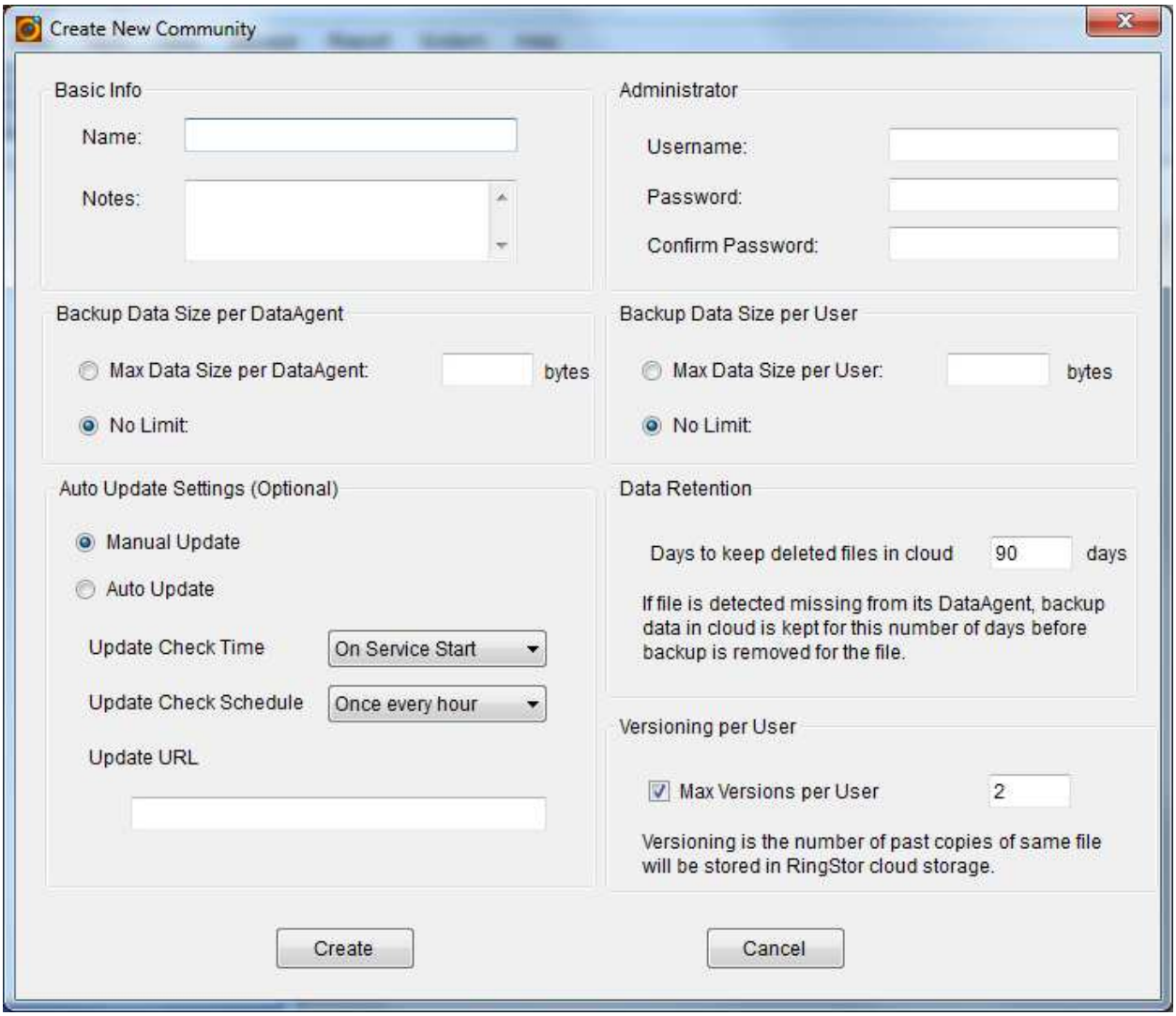
Community based data protection, recovery and management is added into RingStor 1.0 release. Community is a self-managed part of RingStor cloud system that the community only sees and manages its own components, DataAgent, DataServer, storage, users, configurations, etc. Each community possesses own resources and resources are not shared among the communities.



The support of community based data protection and recovery within one RingStor cloud system present a great flexibility and manageability to enterprise data center that requires different set of business rules and separate resources for their customers, while the system can be easily managed by the data center via just one simple user interface.

4.2 Community Management

Managing a community is simple via RingStor Explorer, just one form to fill out the required info to create a new community:



Basic Info – provide name and optional description for the new community

Administrator – Administrator for this community. The administrator can log into this community to manage all parts inside this community.

Backup Data Size per DataAgent – Set maximum data that can be backed up per DataAgent.

Backup Data Size per User – Set maximum data that can be backed up per User.

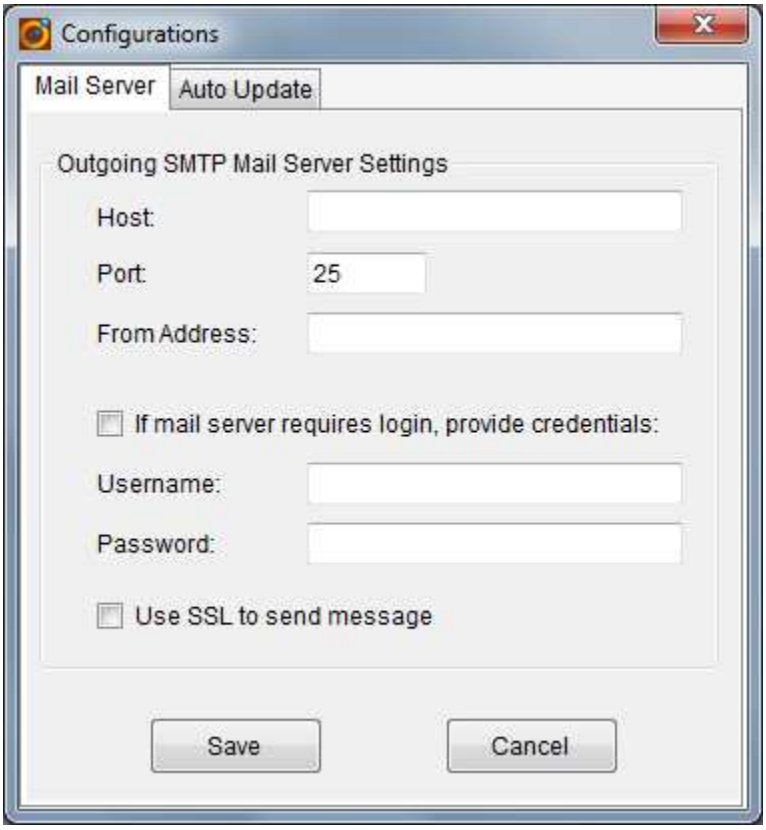
Active Directory – Provide Windows domain information so windows users in this domain can be imported into this community.

File Versions per User – Specify how many copies of a file will be retained for user in this community.

4.3 Community Settings

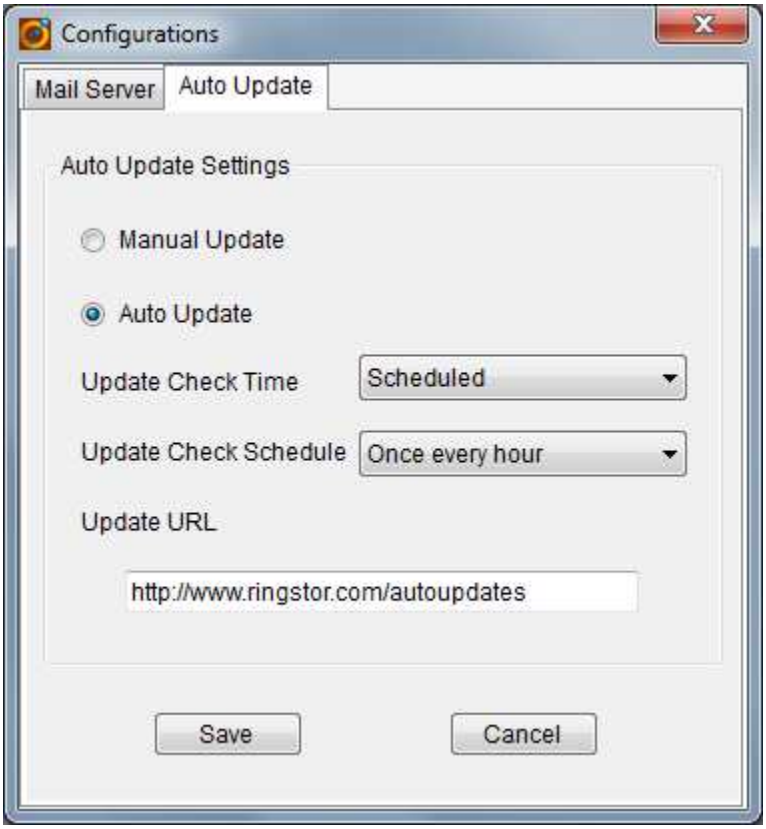
4.3.1 Mail

Mail server can be set up to enable emailing reports, etc.



4.3.2 Auto Update

RingStor DataAgent component can be updated either manually or automatically when the update becomes available.



Each community may have its own update URL where the update is checked and downloaded if available.

5 Data Protection

5.1 Planning Data Protection

Before define application data to protect, a right data protection plan must be selected. In this release.

5.1.1 Backup

Multiple copies of same application data may be preserved in RingStor storage system.

- File Backup

It has full and incremental.

Full Backup:

All application data are transmitted to RingStor, regardless if the data changes or not since last backup.

Incremental Backup for File

Only modified data since last successful backup are transmitted to RingStor.

- SQL Database Backup

It has File Level backup:

File Level Backup:

A file level full backup will take a snapshot of SQL database files and back them up.

- MySQL Database Backup

File Level backup is used to protect MySQL database. The database is exported from MySQL server via MySQL utility, the export file is backed up by RingStor.

- Exchange Backup

File Level backup is used to protect Microsoft Exchange. The data files, log files are backed up by RingStor.

- Exchange Mailbox Backup

Messages in selected Exchange mailbox are backed up.

- Bare Metal Backup

It has full and differential.

Full Backup:

The entire image of selected hard drives is transmitted to RingStor, regardless if the data changes or not since last backup.

Differential Backup:

Only modified data since last successful full backup are transmitted to RingStor.

Full backup or File Level Backup can be used to obtain a full copy of all application data.

Application data at different point of time can be recovered.

Pros:

All data are protected up to the point of time of last successful full or incremental backup.

Data at different point of time can be recovered.

Cons:

More storage might be required.

Data retention can be complex.

5.2 Agent

Agent is a RingStor configuration installed on DataAgent to support different data protection plan.

Each agent must be licensed to be installed and used. To add more agents into the license, please go to http://www.ringstor.com for details.

5.2.1 File Backup

File Backup is an agent that uses Backup to protect files and folder on a DataAgent.

5.2.2 SQL Database Backup

SQL Database Backup is an agent that uses Backup to protect SQL database on a DataAgent.

5.2.3 MySQL Database Backup

MySQL Database Backup is an agent that uses Backup to protect MySQL database on a DataAgent.

5.2.4 Exchange Backup

Exchange Backup is an agent that uses Backup to protect Microsoft Exchange on a DataAgent.

5.2.5 Exchange Mailbox Backup

Exchange Mailbox Backup is an agent that uses Backup to protect messages in Microsoft Exchange mailbox on a DataAgent.

Please note, in order for RingStor to backup mailbox contents, make sure:

a. For Microsoft Exchange 2007 or newer version, Microsoft Exchange Server MAPI Client and Collaboration Data Objects client library must be installed prior to use RingStor Exchange Mailbox backup. The library can be downloaded from Microsoft web site at: http://www.microsoft.com/en-us/download/details.aspx?id=1004.

b. DataAgent service account must have full permission to access Exchange mailboxes.

5.2.6 Bare Metal Backup

Bare Metal Backup is an agent that uses Backup to protect a hard drive partition on a DataAgent.

5.3 DataSet

DataSet is a collection of application data on DataAgent that require protection. DataSet's protection scheme is supported by its associated Agent explained above.

Creation of a DataSet is the first step to implement data protection plan in RingStor. You may start **New DataSet Wizard** from any of following places in **RingStor Explorer**.

Main Menu -> Data -> Create New DataSet

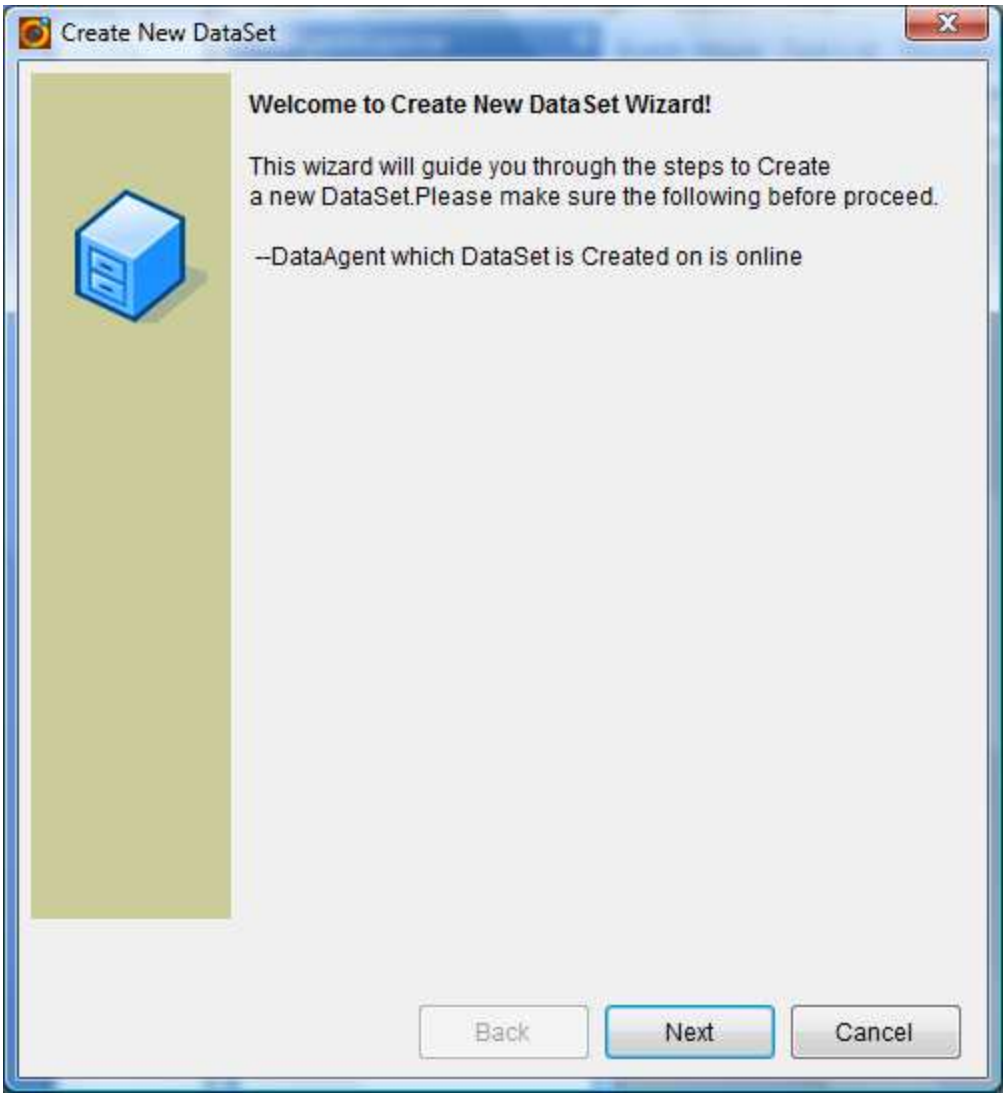
DataAgent Explorer -> DataAgent -> Right Click a DataAgent -> Create New DataSet

DataAgent Explorer -> DataAgent -> Right Click an Agent -> Create New DataSet

New DataSet Wizard

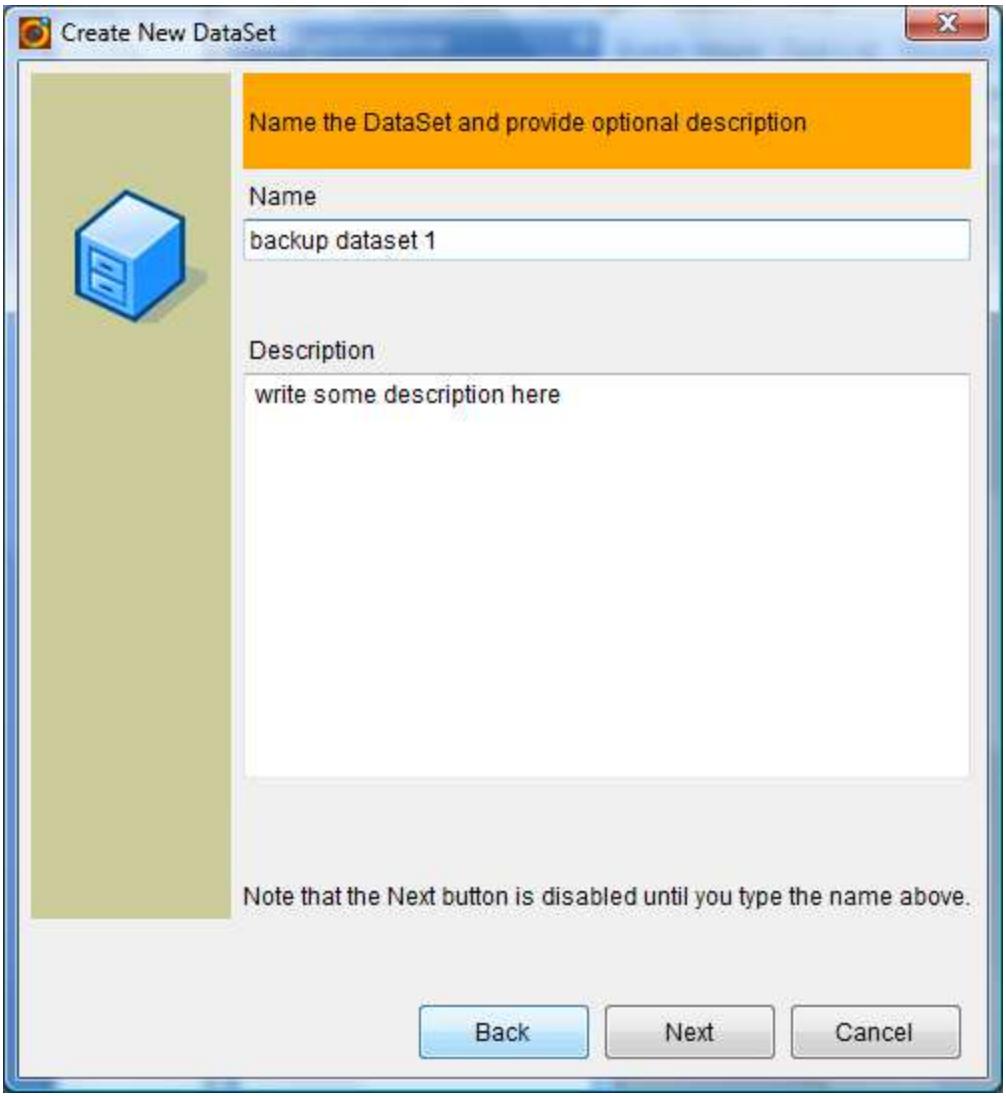
This wizard walks through several steps to create a new DataSet.

Step 1 – Introduction



Click Next to continue.

Step 2 – Name the DataSet

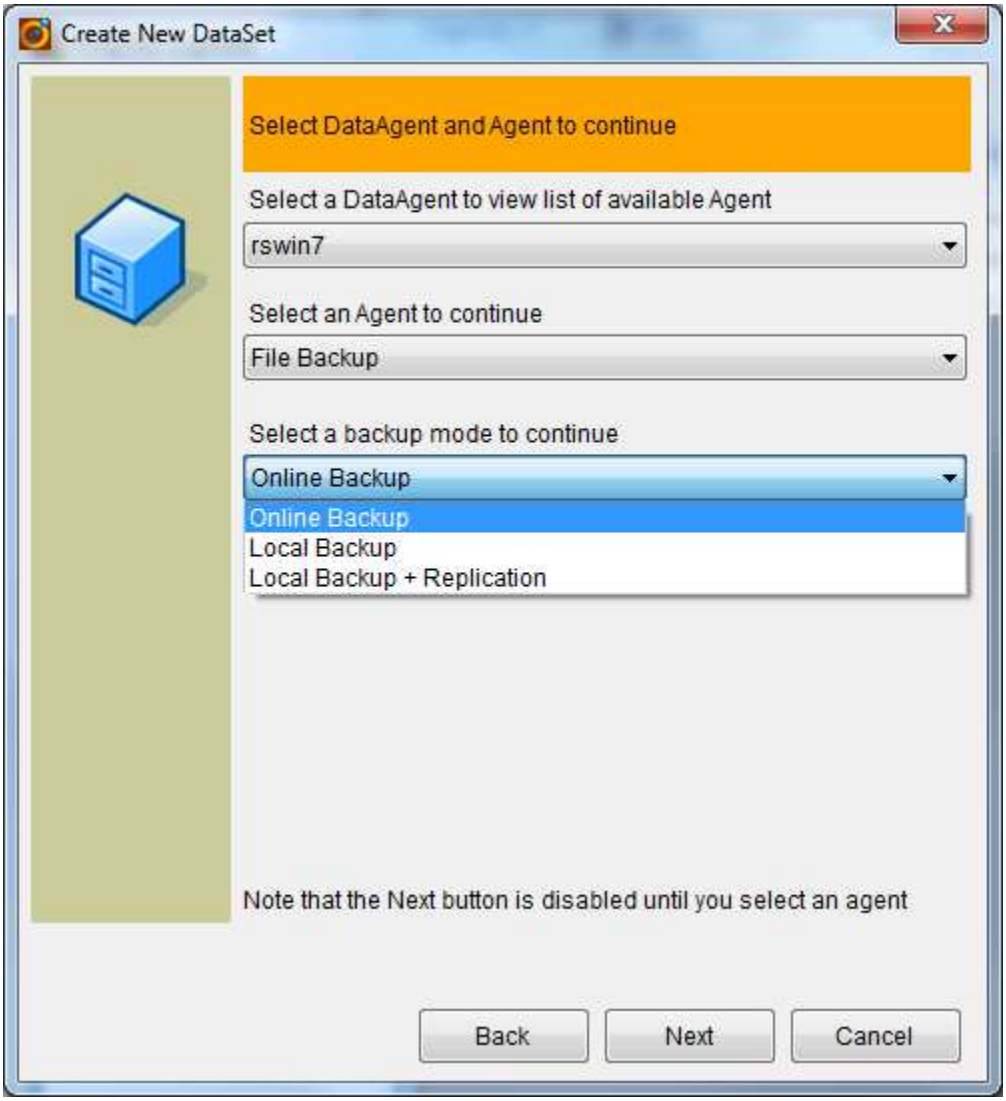


Provide a friendly name for the DataSet.

Provide optional description for the DataSet.

Click Next to continue.

Step 3 - Choose DataAgent/Agent



Select DataAgent, Agent for the DataSet. The available list of Agent is from installed agents on the selected DataAgent.

Select backup mode for this DataSet: Online Backup, Local Backup or Local Backup + Replication.

Online Backup: data is transmitted and saved to RingStor cloud storage.

Local Backup: data is backed up to local storage only

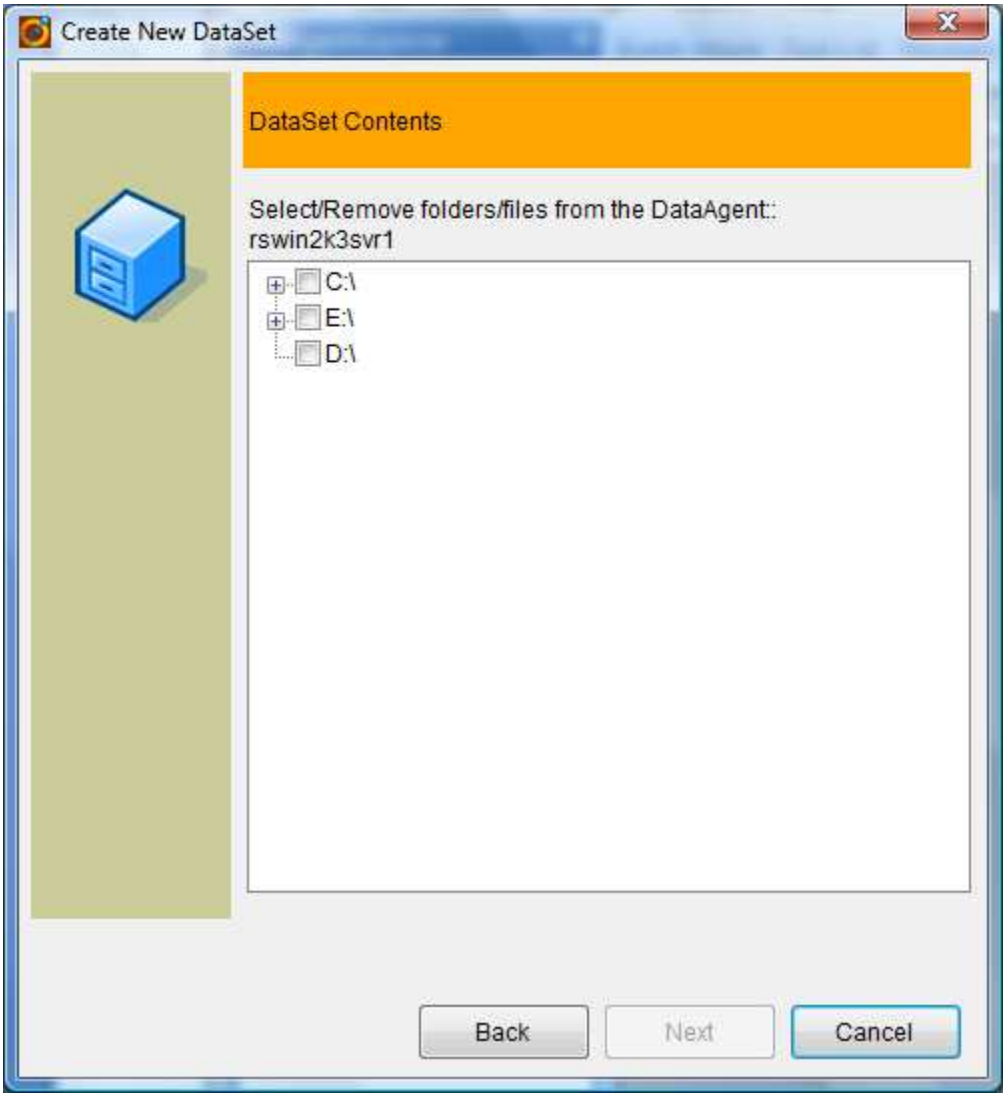
Local Backup + Replication: data is backed to local storage first, then replicated offsite to the remove storage, as shown in picture below.

Click Next to continue.

Step 4 – Depending on DataSet selected, specify contents for the DataSet

File Backup DataSet

Step 4a.1 – Select Files/Folders

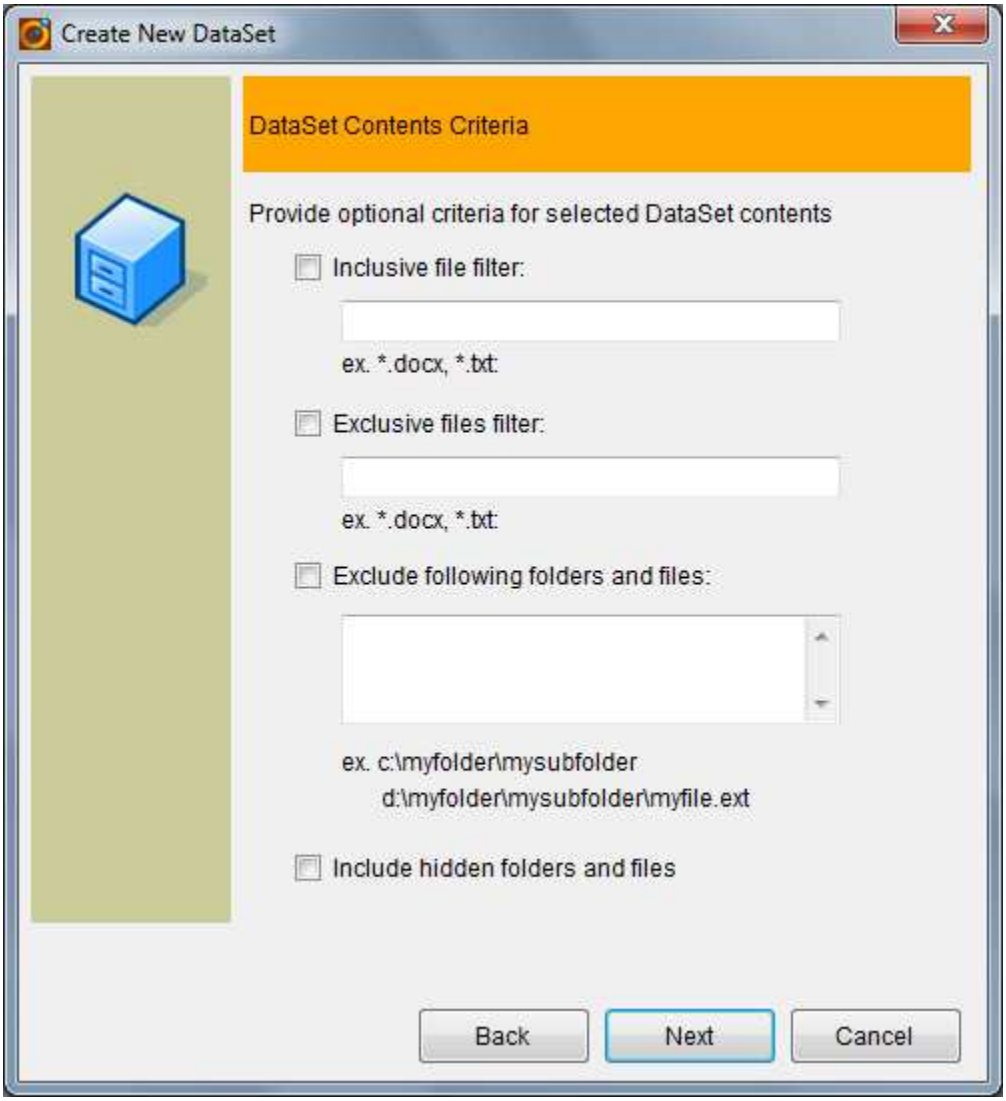


For File Backup agents, select folders and/or files on DataAgent.

Selected folders and/or files are DataSet's contents. All data in contents will be protected and thus can be recovered.

DataSet's contents can also be modified after its creation.

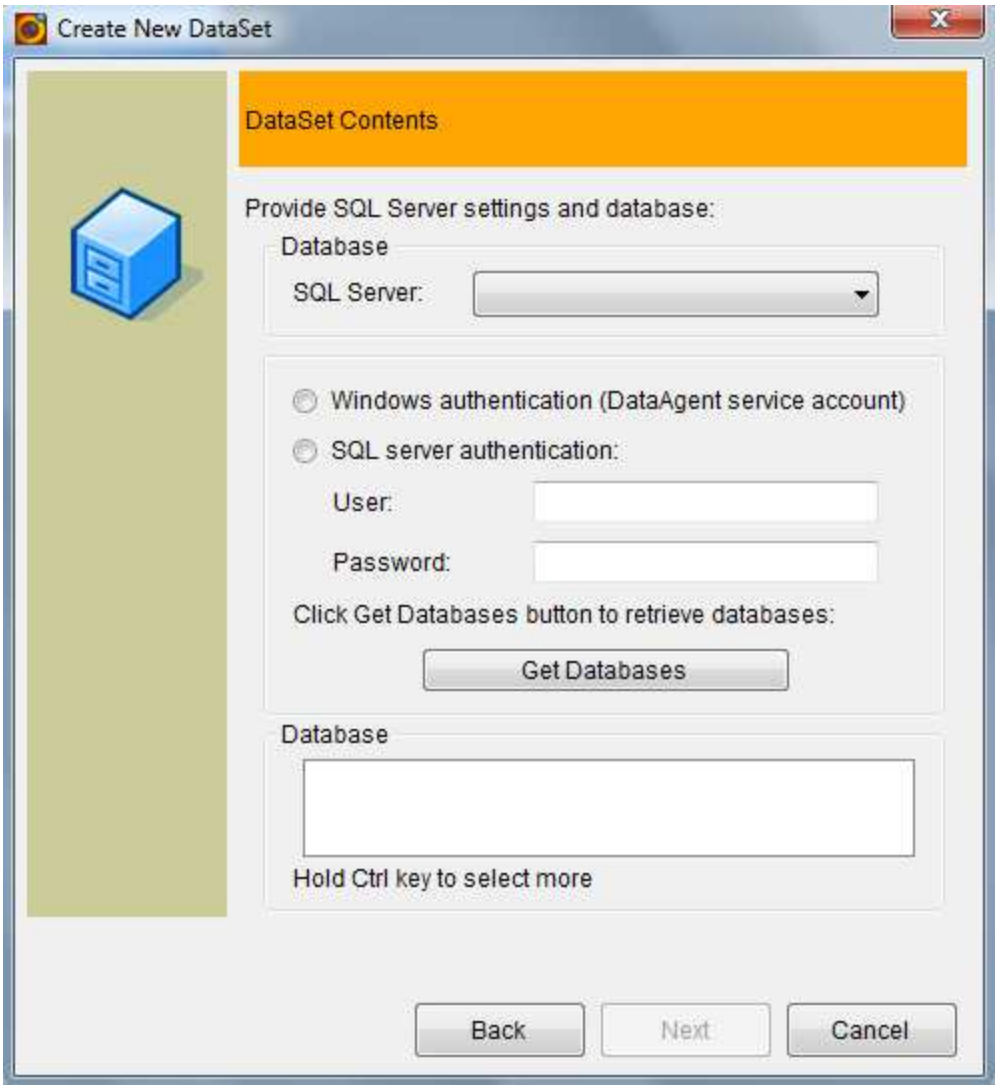
Step 4a.2 – Provide optional file type filter(s)



Optionally, filters can be added to skip files or folders in the DataSet:

SQL Database Backup DataSet

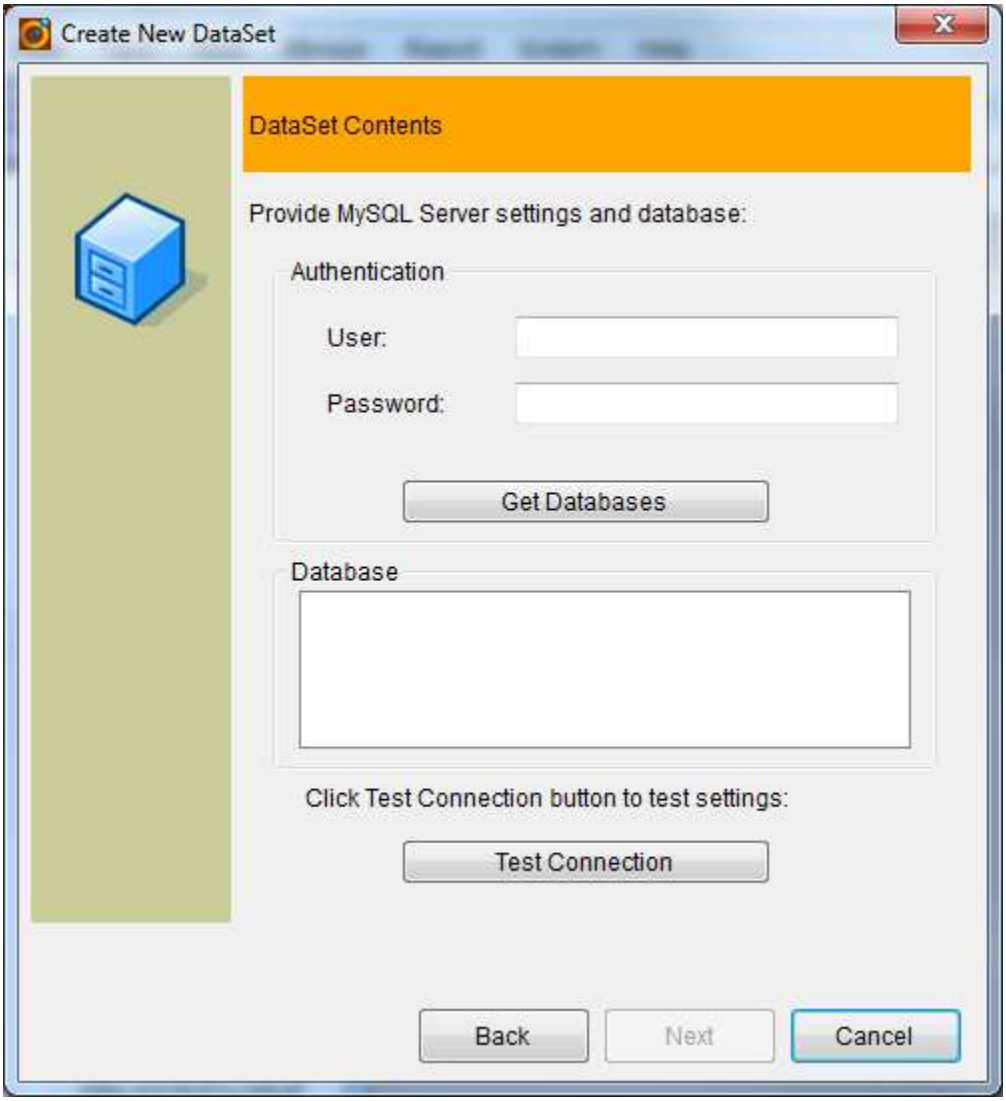
Step 4b.1 – Specify SQL Database



For SQL Database Backup agent, provide SQL server, username and password, database for protection. Click Get Databases button to list all databases and select one or more for DataSet.

MySQL Database Backup DataSet

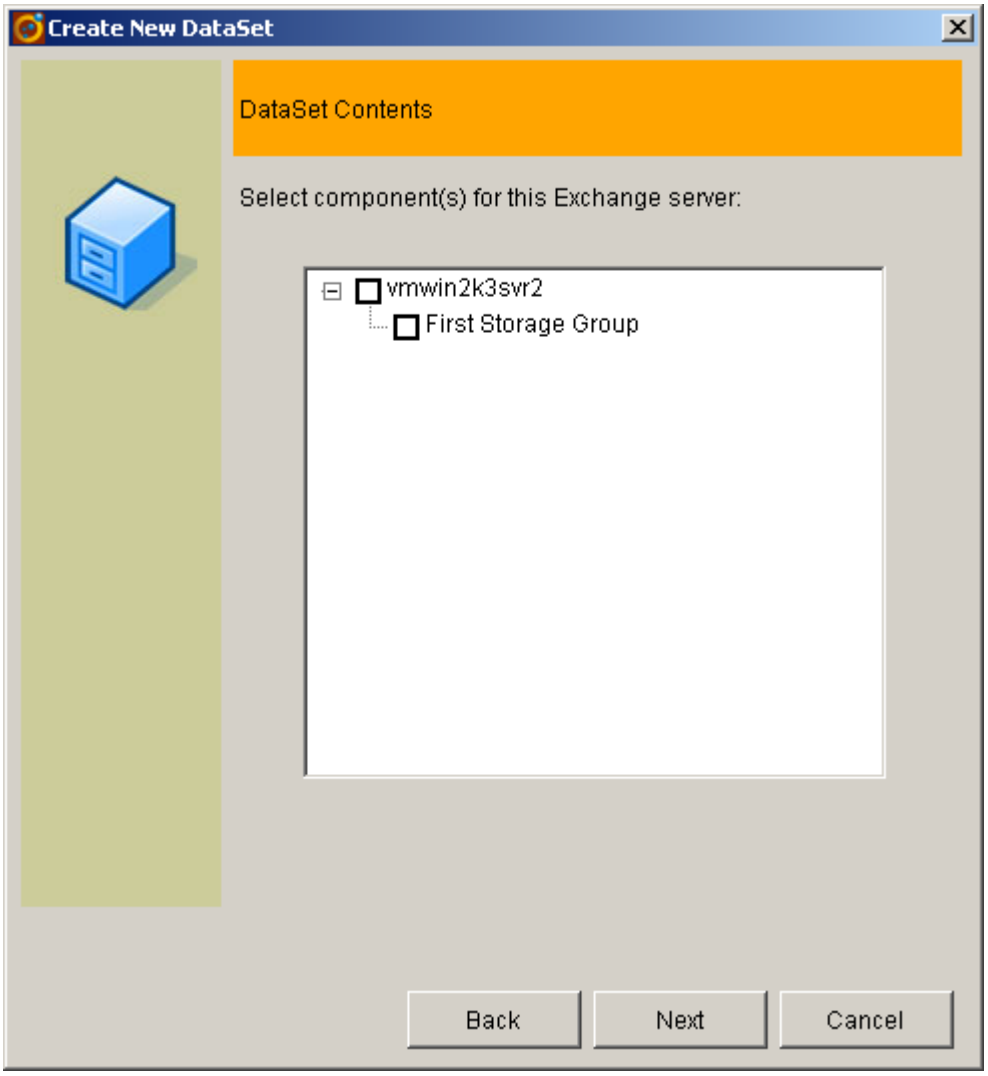
Step 4c.1 – Specify MySQL Database



For MySQL Database Backup agent, provide MySQL server username and password, retrieve and select database for protection. Click Test Connection button to verify the inputs.

Exchange Backup DataSet

Step 4e.1 – Specify Exchange components

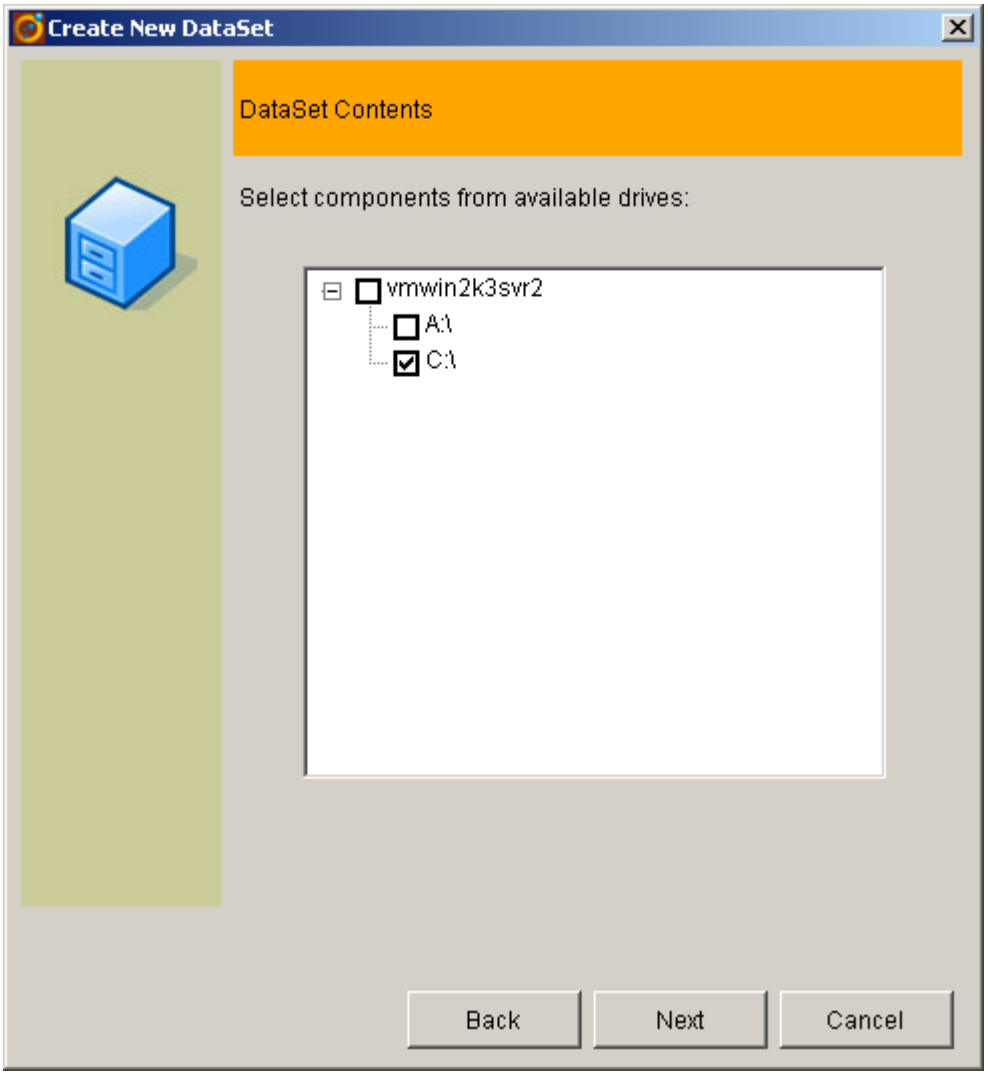


Exchange MailBox Backup DataSet

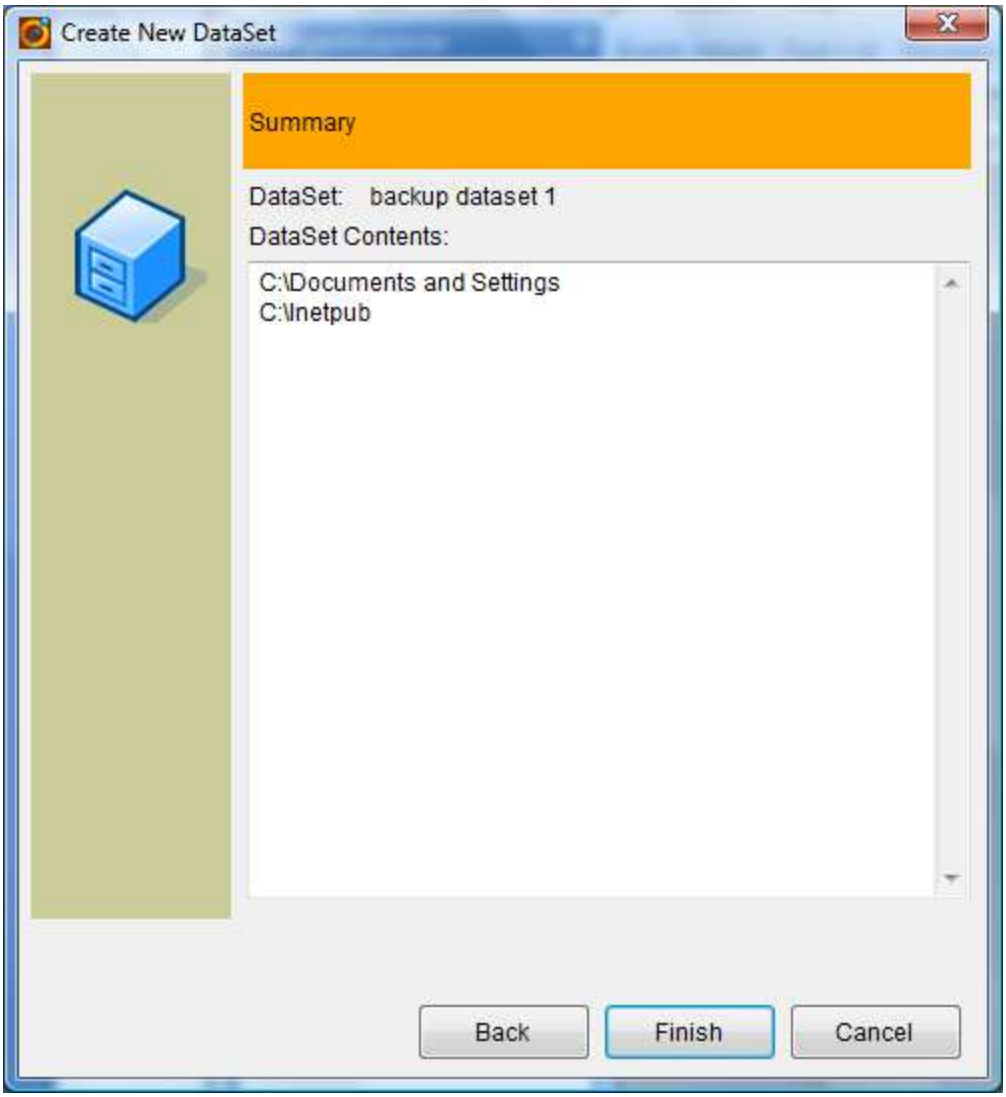
Step 4f.1 – Specify Exchange mailboxes

Bare Metal Backup DataSet

Step 4g.1 – Select volumes



Final Step – Summary



Verify DataSet's name and contents, click Back to make modifications, click Finish to create this DataSet.

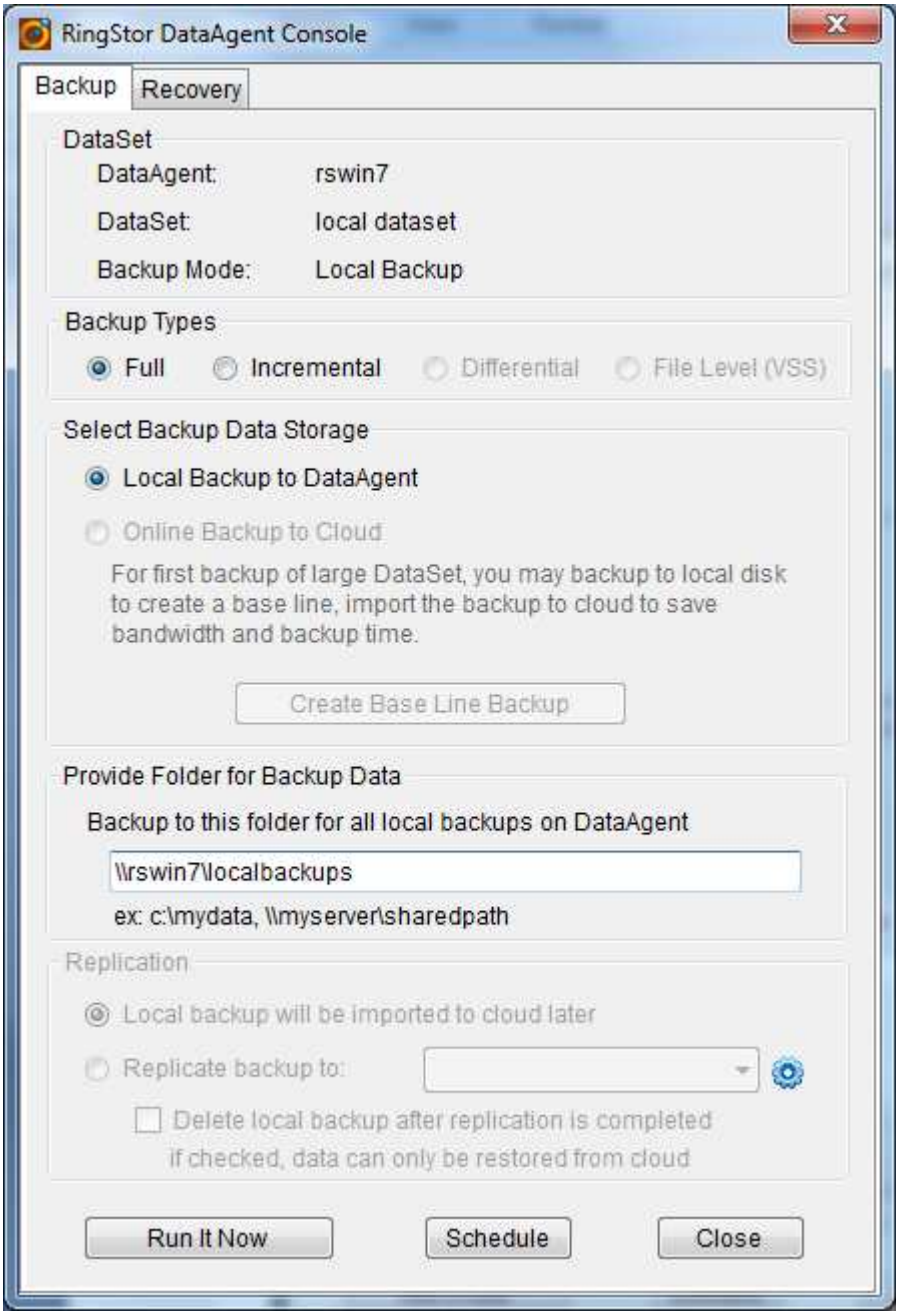
After creation, a pop up message will be displayed.

5.4 Backup

RingStor provides various ways to backup the data, backup to local disk, backup online to RingStor cloud, backup to selected public cloud storage, ex. Amazon S3.

5.4.1 Backup to Local Disk

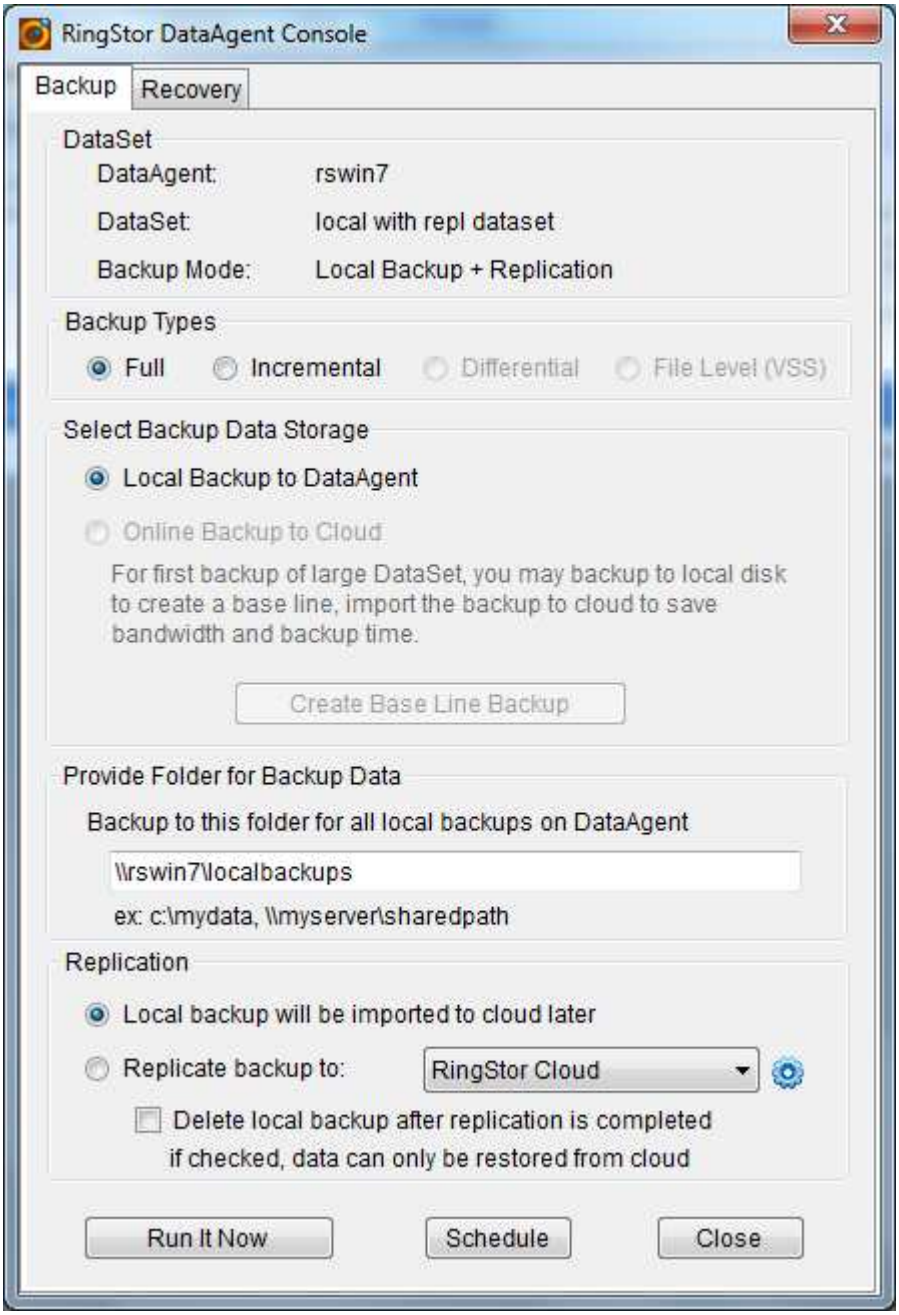
Each DataSet has an option to Backup to Local Disk. To access this feature, right click a DataSet, select "Backup and Recover".



Provide the folder on local disk of DataSet's DataAgent. All local backups will be stored at specified location and available to restore.

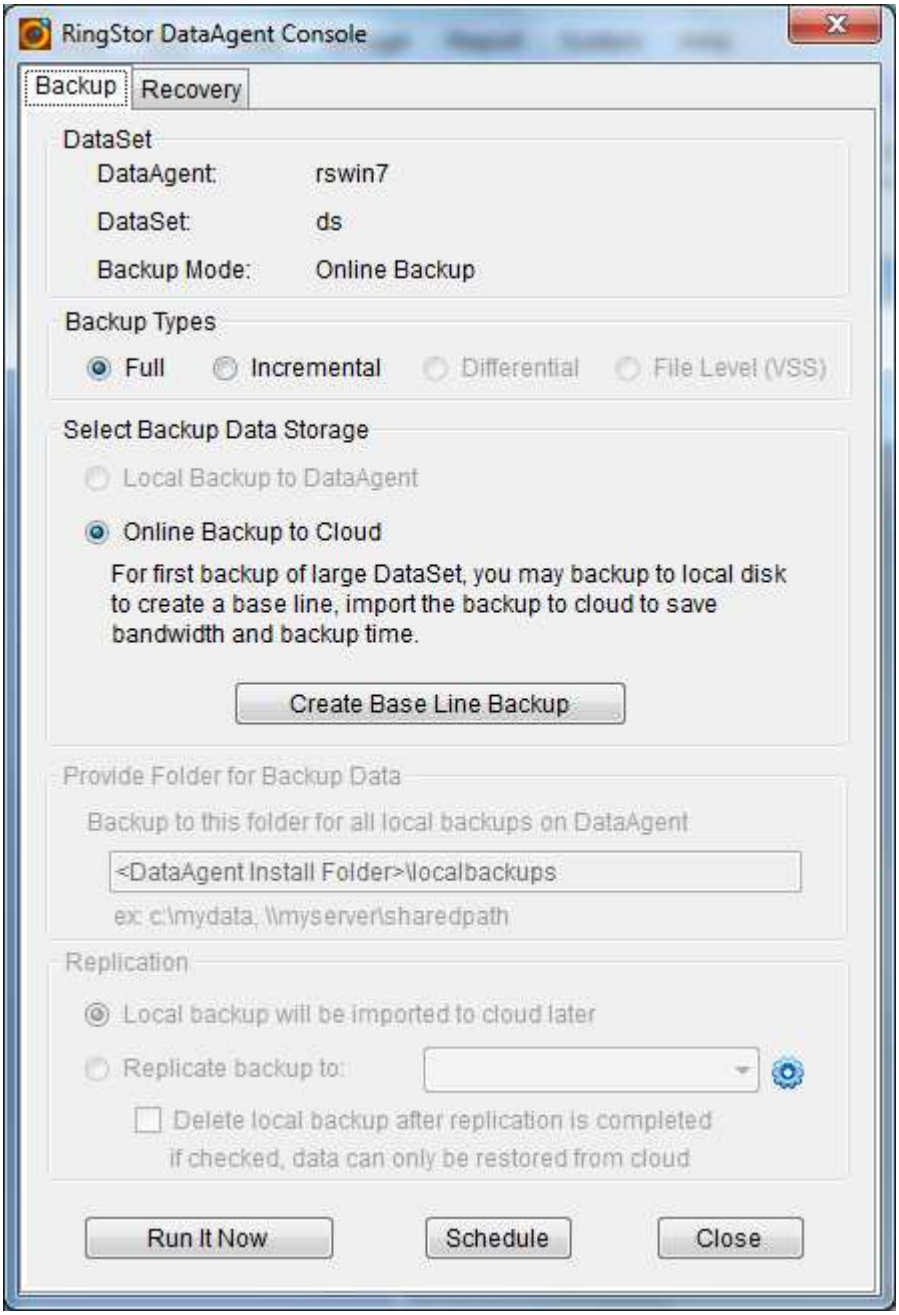
5.4.2 Backup to Local, Replicate to Cloud Storage

In addition to Backup to Local Disk, backup has an option to replicate the local backup to RingStor cloud, or other public cloud storage, ex. Amazon S3. To access this feature, right click a DataSet, select "Backup and Recover" as below:



5.4.3 Online Backup to RingStor Cloud

Each DataSet has an option to backup to RingStor cloud. To access this feature, right click a DataSet, select “Backup and Recover”.


RingStor DataAgent Console
Backup
Recovery
DataSet
DataAgent: rswin7
DataSet: ds
Backup Mode: Online Backup
Backup Types
Full
Incremental
Differential
File Level (VSS)
Select Backup Data Storage
Local Backup to DataAgent
Online Backup to Cloud
For first backup of large DataSet, you may backup to local disk to create a base line, import the backup to cloud to save bandwidth and backup time.
Create Base Line Backup
Provide Folder for Backup Data
Backup to this folder for all local backups on DataAgent
<DataAgent Install Folder>\localbackups
ex: c:\mydata, \\myserver\sharedpath
Replication
Local backup will be imported to cloud later
Replicate backup to:
Delete local backup after replication is completed
if checked, data can only be restored from cloud
Run It Now
Schedule
Close

6 Data Recovery

6.1 Planning Data Recovery

Data protected by RingStor system can be recovered via Restore. Different agent allows different restore scheme.

6.1.1 File Backup

Data protected under File Backup agent can be restored to different point of time:

- last full backup
- previous full backup
- specified point of time
- specified version at file level

6.1.2 SQL Database Backup

Data protected under SQL Database Backup agent can be restored to different point of time:

- last full backup
- previous full backup
- specified point of time

Or to any successful File Level backup.

6.1.3 MySQL Database Backup

Data protected under MySQL Database Backup agent can be restored to any successful File Level backup.

6.1.4 Exchange Backup

Data protected under Exchange Backup agent can be restored to any successful File Level backup.

6.1.5 Exchange Mailbox Backup

Data protected under Exchange Mailbox Backup agent can be browse and messages can be selected to restore.

6.1.6 Bare Metal Backup

Data protected under Bare Metal Backup agent can be restored to different point of time:

- last full backup
- previous full backup
- specified point of time

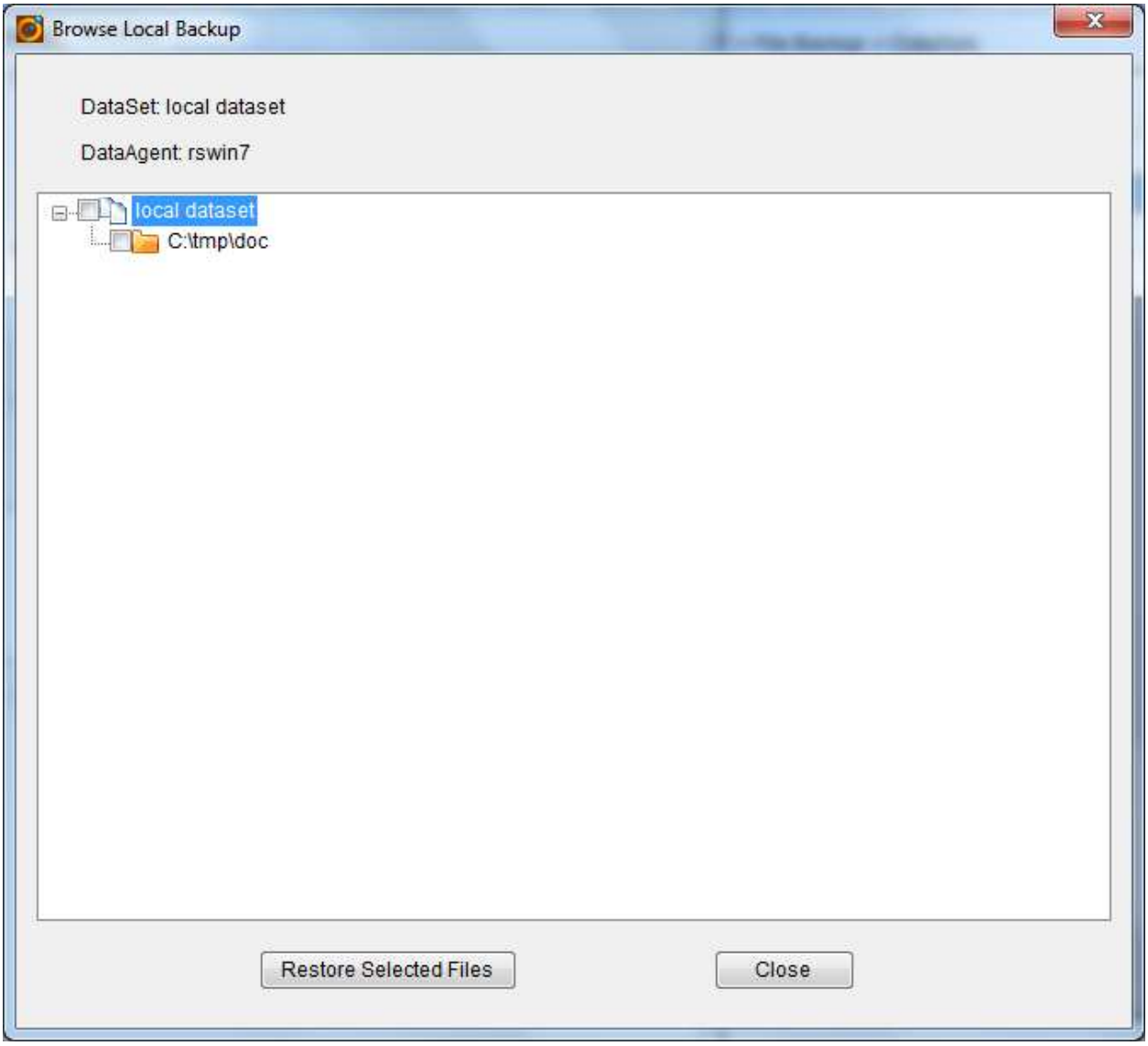
6.2 Data Recovery

RingStor provides various ways to restore the data, restore from local backup, restore from RingStor cloud,

restore local backup from selected public cloud storage, ex. Amazon S3.

6.2.1 Restore from Local Backup

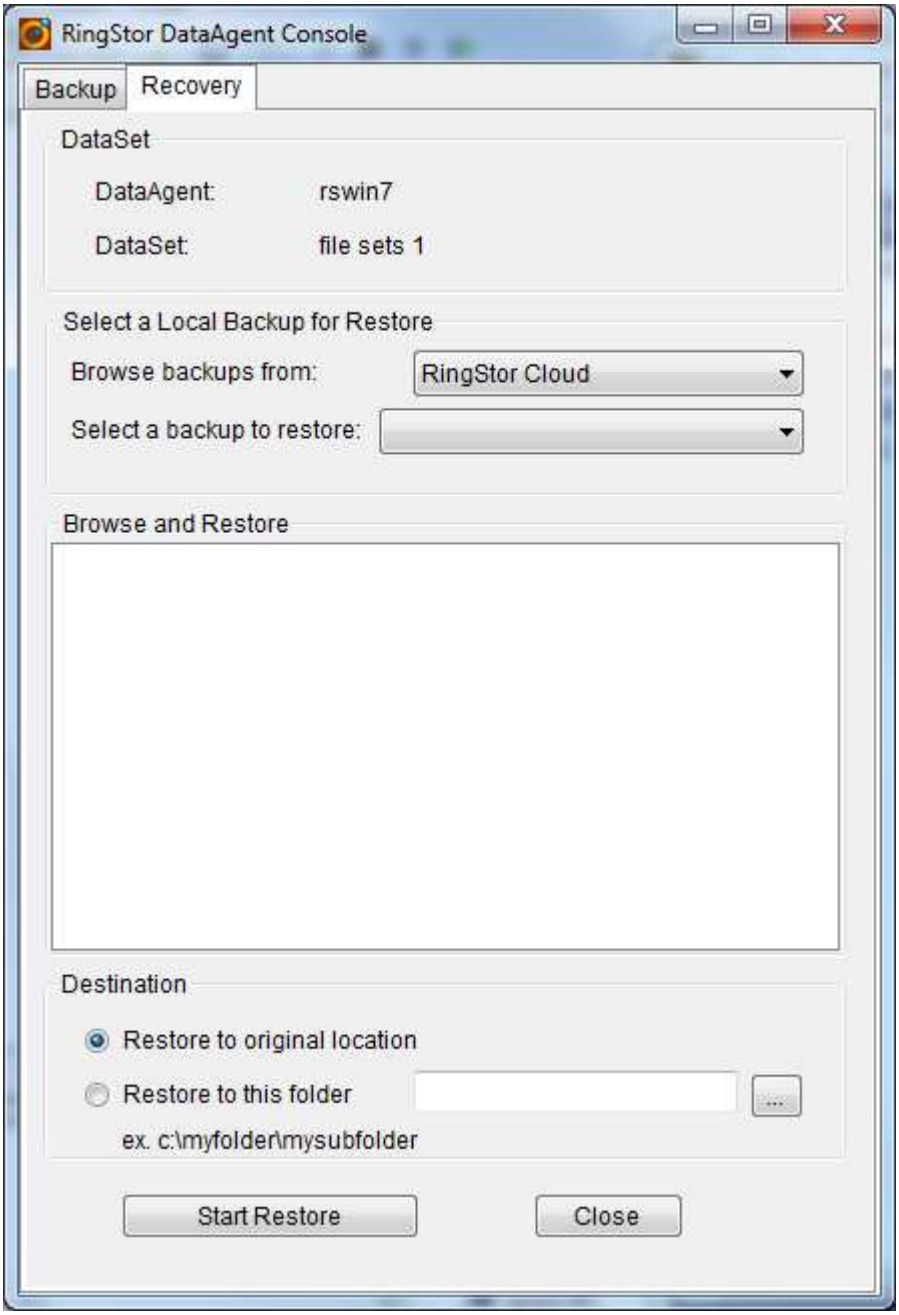
If local backup was done and present for the DataSet, data can be restored from these local backups. To access this feature, right click a DataSet, select “Backup and Recover”.



Select a local backup to restore, all data in selected local backup will be restored.

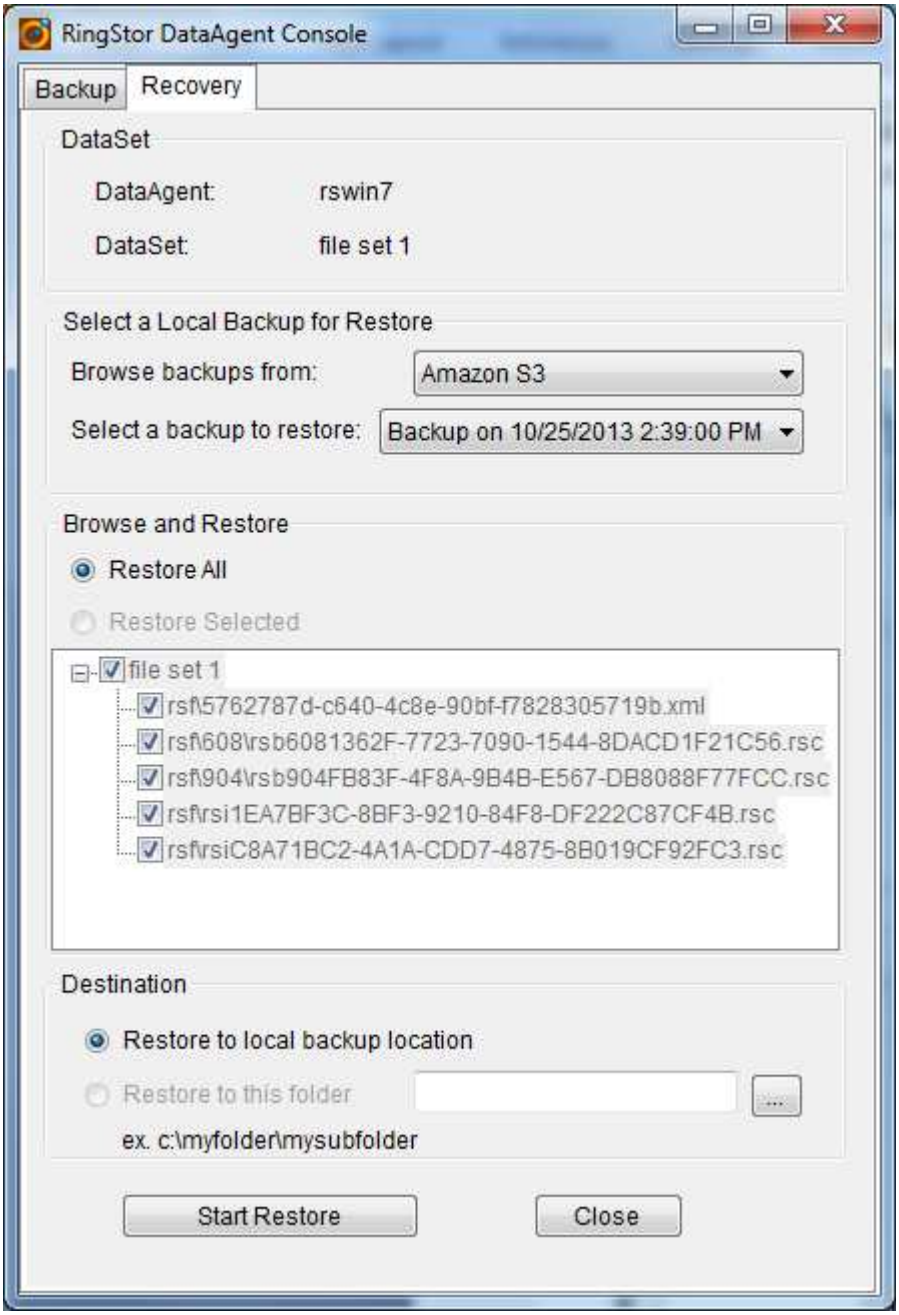
6.2.2 Restore from RingStor Cloud

If the backup was done to RingStor cloud, online or replicated, data can be restored from RingStor cloud.



6.2.3 Restore from Public Cloud

If backup was replicated to public cloud storage, ex. Amazon S3, data can be downloaded to local backup and restore from local backup can be used later to recover the data.


RingStor DataAgent Console
Backup
Recovery
DataSet
DataAgent: rswin7
DataSet: file set 1
Select a Local Backup for Restore
Browse backups from: Amazon S3
Select a backup to restore: Backup on 10/25/2013 2:39:00 PM
Browse and Restore
Restore All
Restore Selected
file set 1
rsf\5762787d-c640-4c8e-90bf-f7828305719b.xml
rsf\608\rsb6081362F-7723-7090-1544-8DACD1F21C56.rsc
rsf\904\rsb904FB83F-4F8A-9B4B-E567-DB8088F77FCC.rsc
rsf\rsi1EA7BF3C-8BF3-9210-84F8-DF222C87CF4B.rsc
rsf\rsiC8A71BC2-4A1A-CDD7-4875-8B019CF92FC3.rsc
Destination
Restore to local backup location
Restore to this folder
...
ex. c:\myfolder\mysubfolder
Start Restore
Close

7 Data Pruning

7.1 Planning Data Pruning

Data pruning is to purge old and unused data from RingStor system. The following data are eligible for pruning provided their retention rules are met:

- Copy of DataSet content in RingStor system, provided that DataSet retention is met
- RingStor events
- RingStor task history
- RingStor user activity history

7.2 Data Retention

The retention is based on number of file versions configured for the user or for the community. Please see Community section for instructions.

7.3 Data Pruning Task

Pruning task can be scheduled to run to provide automatic data pruning. For more details on how to schedule a data pruning task, please refer to **Task Scheduling** section.

8 Task Scheduling

8.1 Introduction

Task is the action to transmit data within RingStor system. All tasks are scheduled in RingStor system, kicked off by a DataServer when their schedules are due.

RingStor supports various types of task:

- Backup – to provide data protection for File Backup agent
- Restore – to provide data recovery
- Pruning – to purge old and unused data from RingStor

Scheduling a task is a series of steps managed by **Schedule New Task Wizard** accessible from any of following places within **RingStor Explorer**.

Main Menu -> Task -> Schedule New Task

DataAgent Explorer -> DataAgent -> Right Click a DataAgent -> Schedule New Task

DataAgent Explorer -> DataAgent -> Click an Agent -> Right Click a DataSet -> Schedule New Task

DataAgent Explorer -> DataAgent -> Click an Agent -> Right Click a DataSet -> Browse

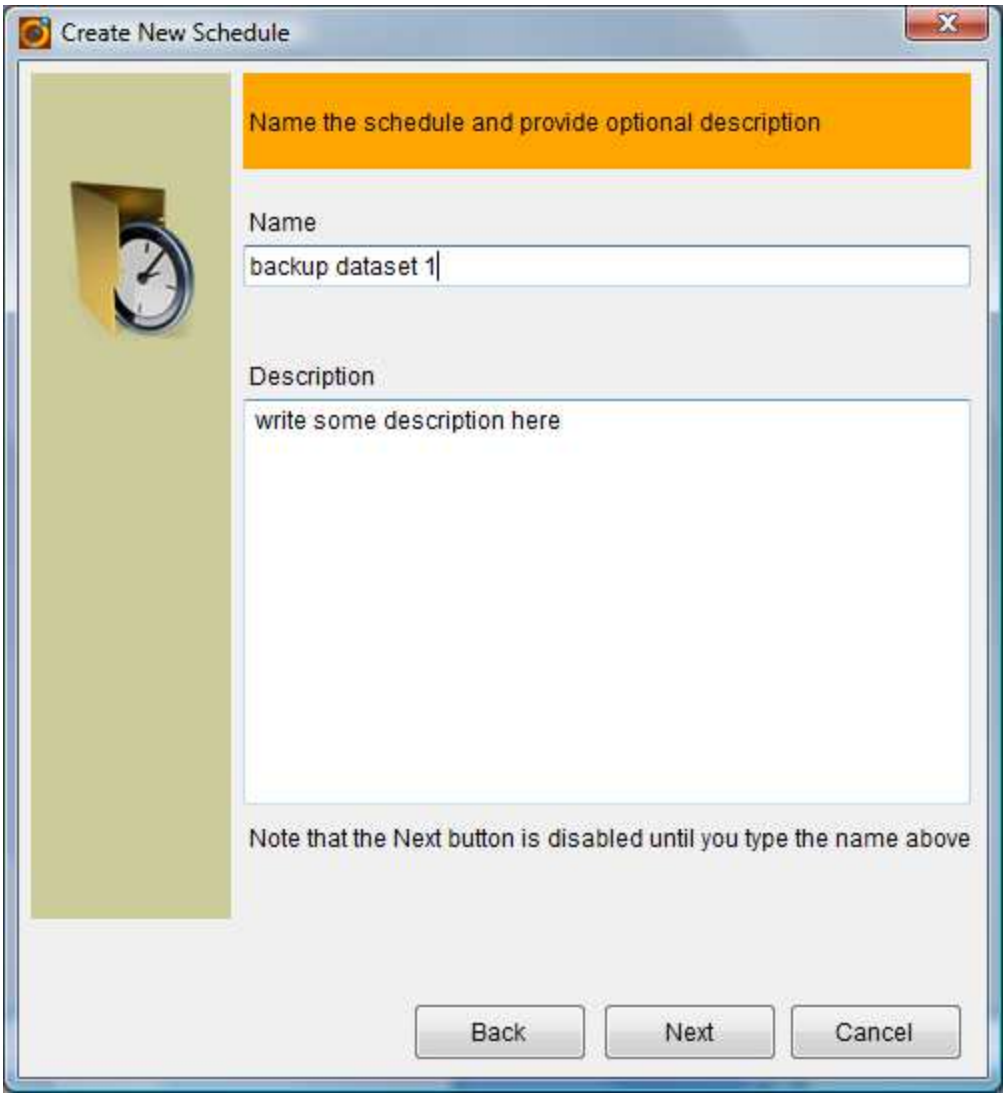
DataServer Explorer -> DataServer -> Right Click a DataServer -> Schedule New Task

8.2 Schedule Backup Task

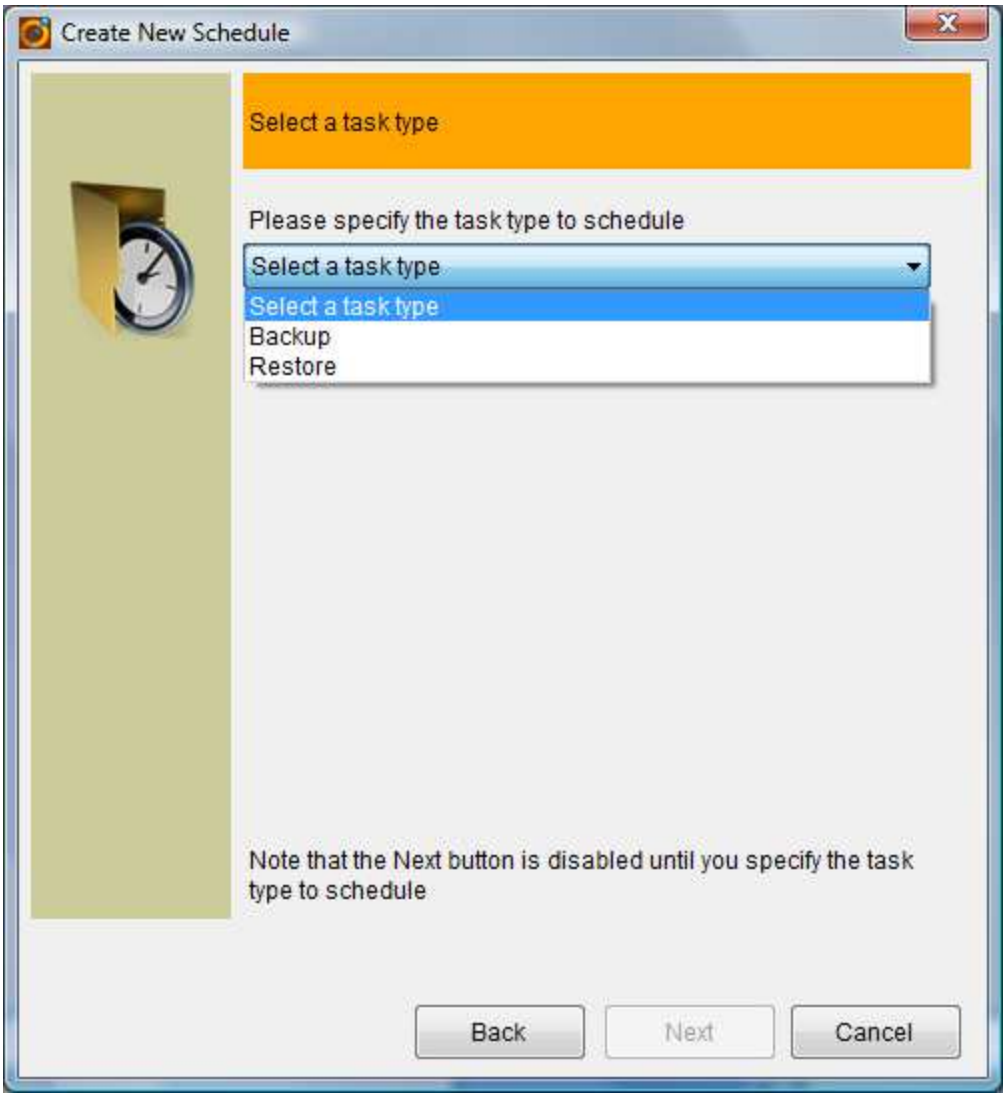
Schedule New Task Wizard walks through several steps to create a new schedule.

Step 1 – Introduction

Step 2 – Name Schedule



Step 3 – Select Task Type

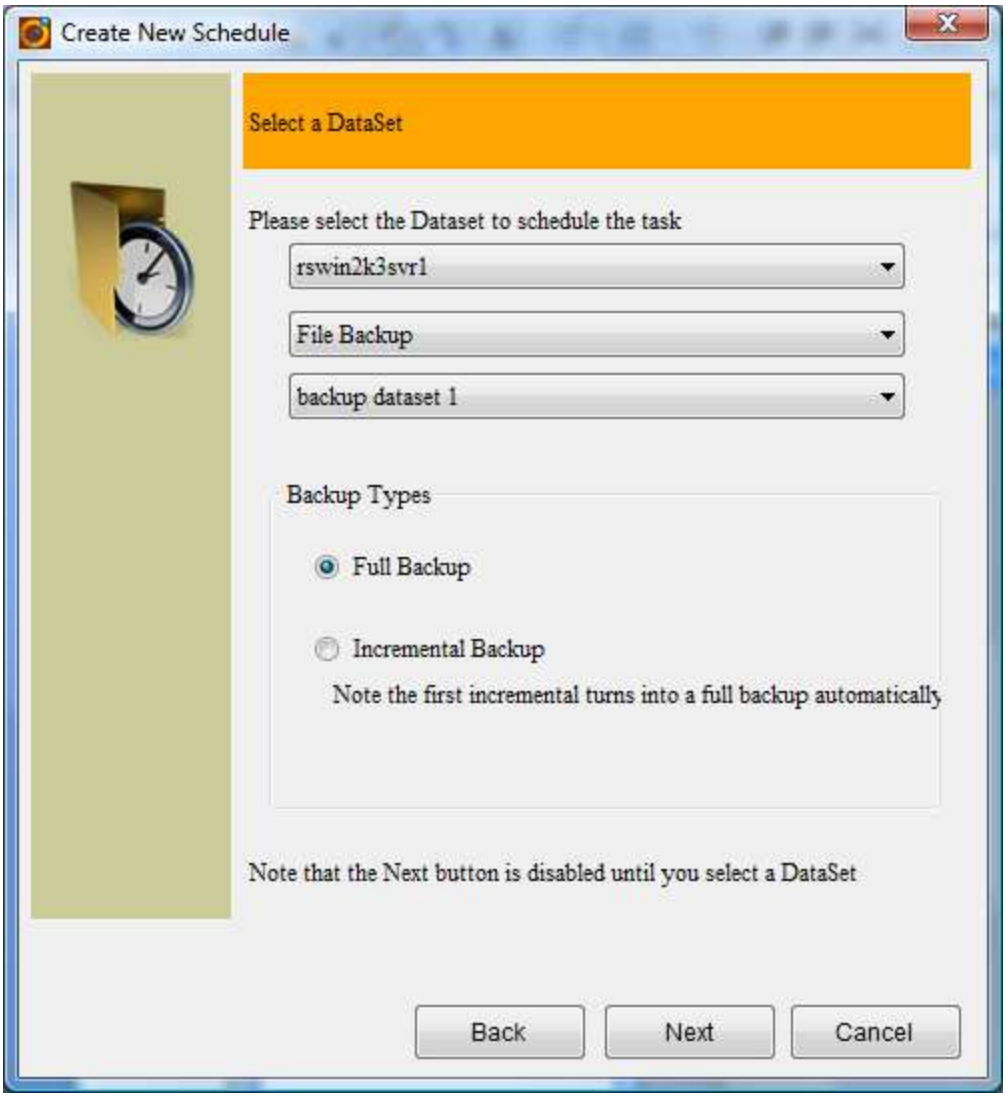


The available task type for selection depends on the DataSet. The picture above shows an example for a File Backup DataSet.

Step 4 – Following are steps by steps instruction to schedule a backup task:

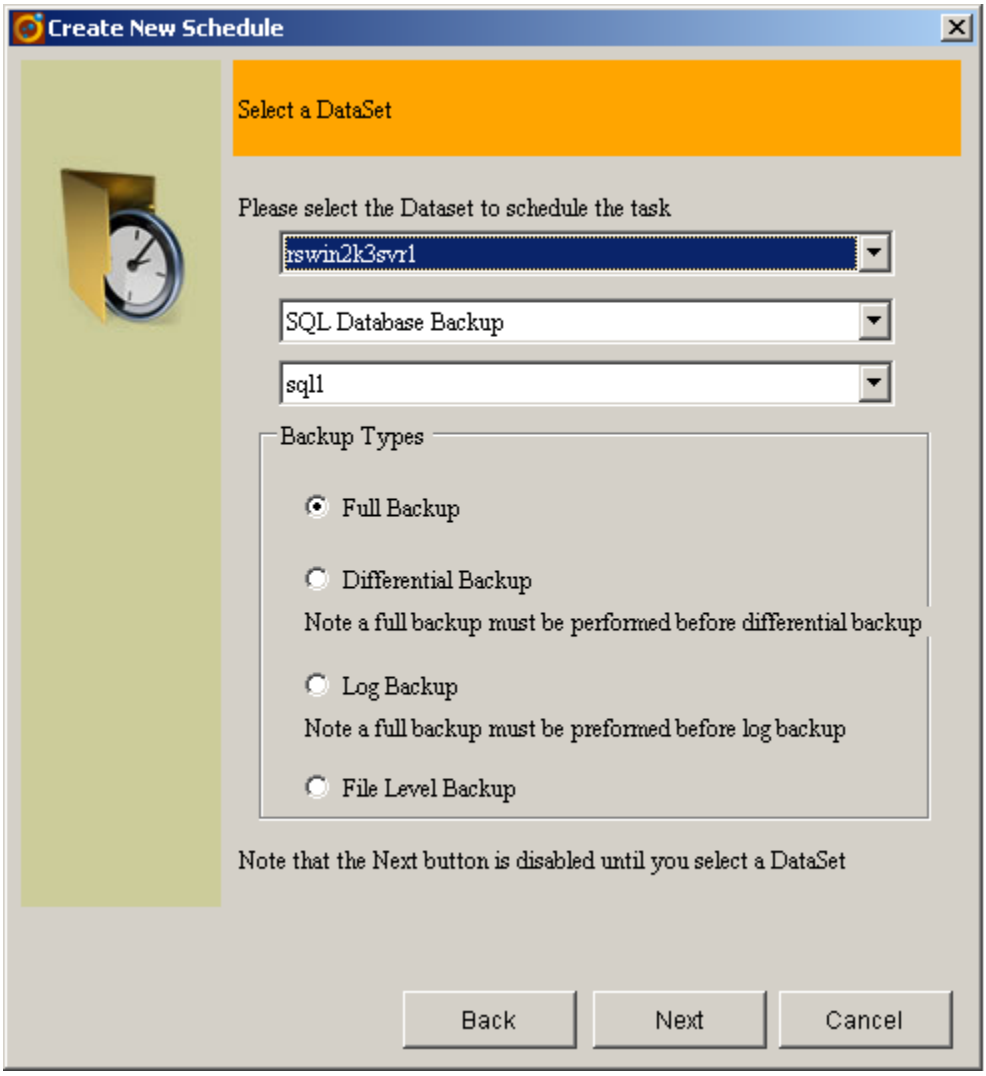
Backup for File Backup DataSet

Step 4.1 – Select DataAgent, Agent, DataSet and Backup Type, select Full or Incremental backup type as show below:



Backup for SQL Database Backup DataSet

Step 4.2 – Select DataAgent, Agent, DataSet and Backup Type, select one of four backup types as shown below:

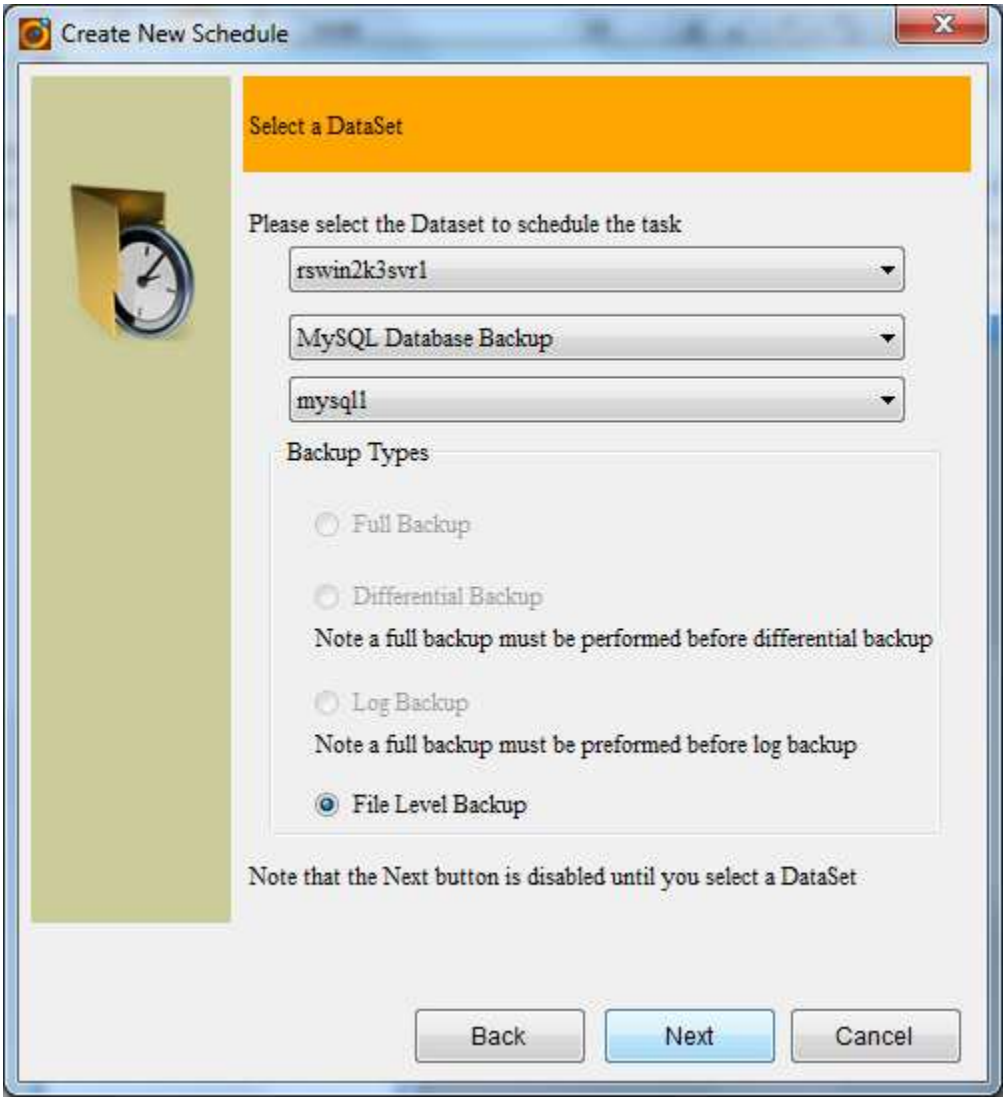


IMPORTANT NOTE: If select Full Backup, Differential Backup or Log Backup to protect SQL database, there must be no other database backup utility for selected database.

File Level Backup – SQL database files (.mdf, etc) will be backed up. This option is only valid on Windows servers.

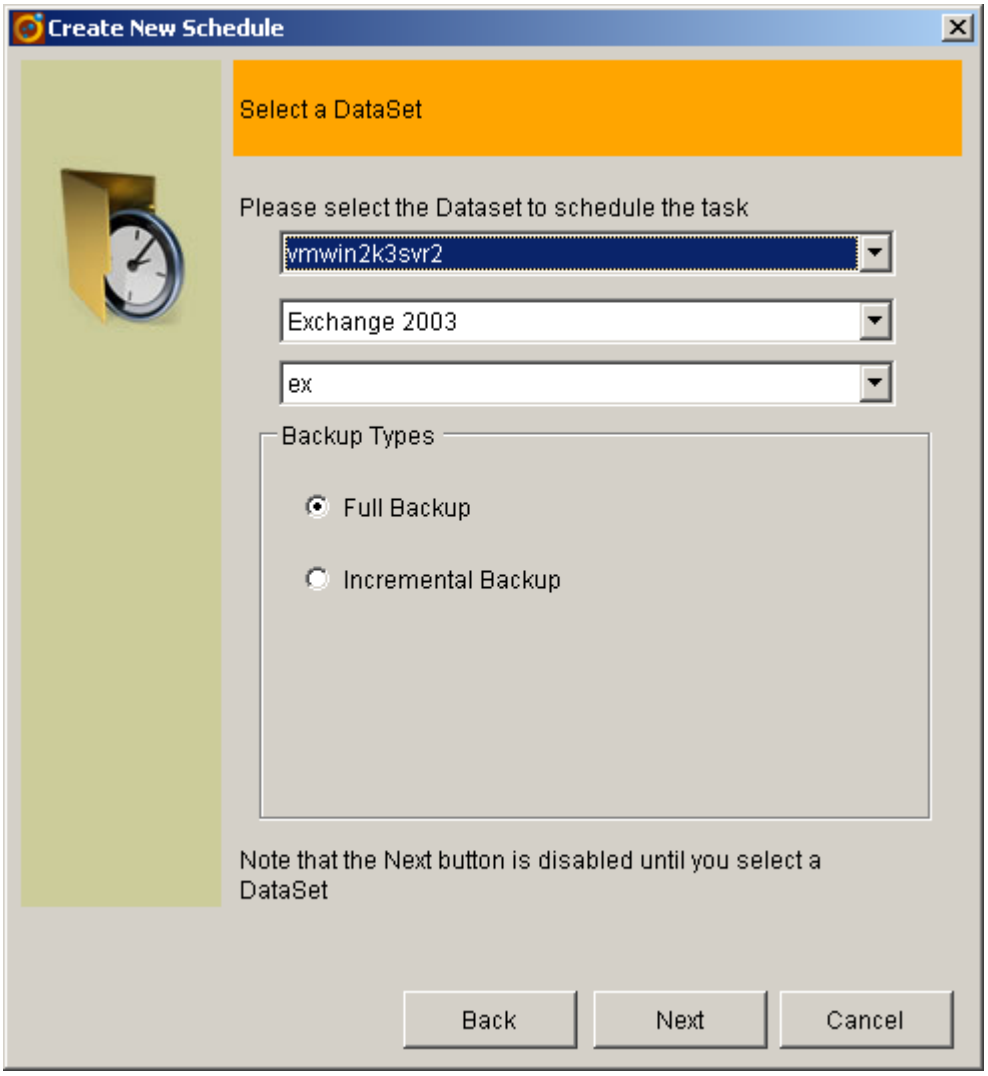
Backup for MySQL Database Backup DataSet

Step 4.3 - Select File Level Backup. File Level Backup will back up database data files, log files and configurations.



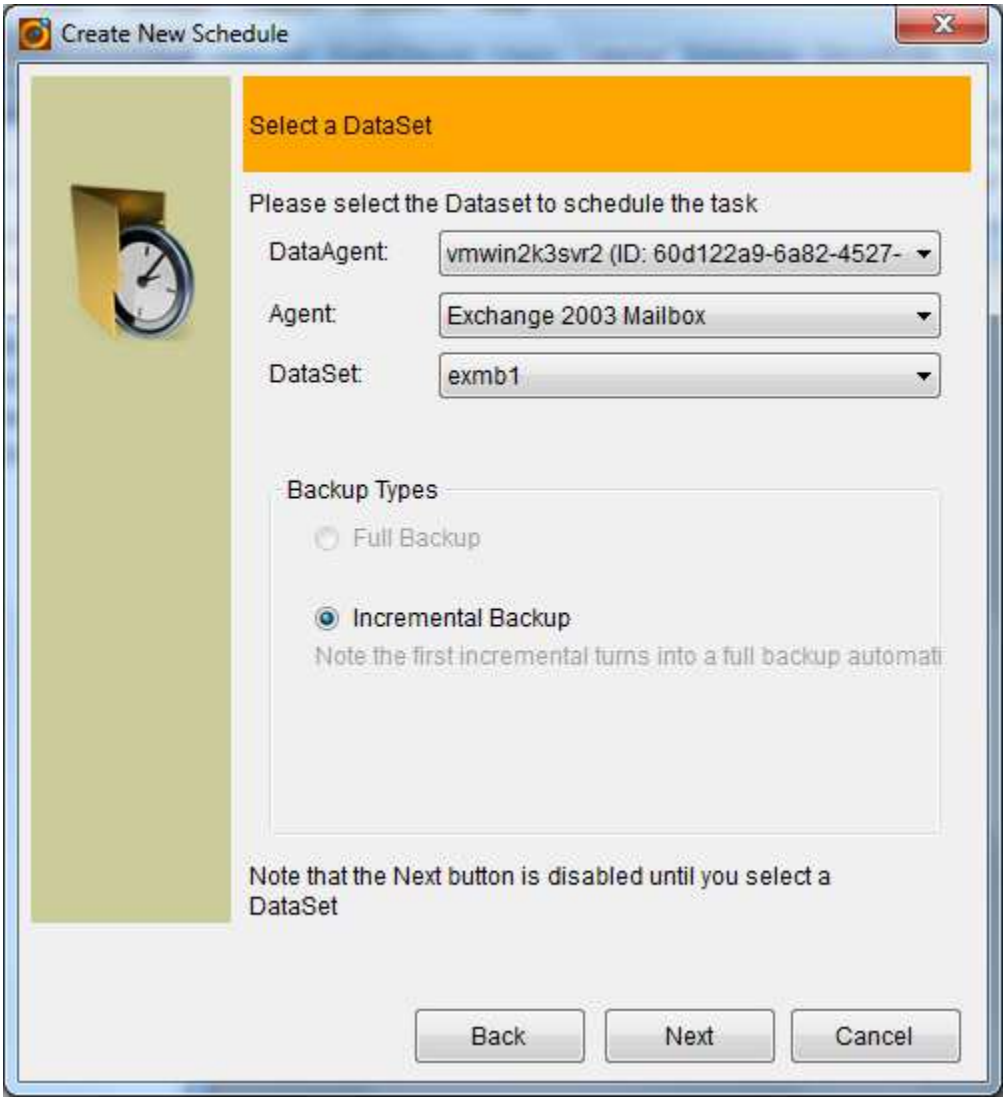
Backup for Exchange Backup DataSet

Step 4.4 - Select Exchange Backup.



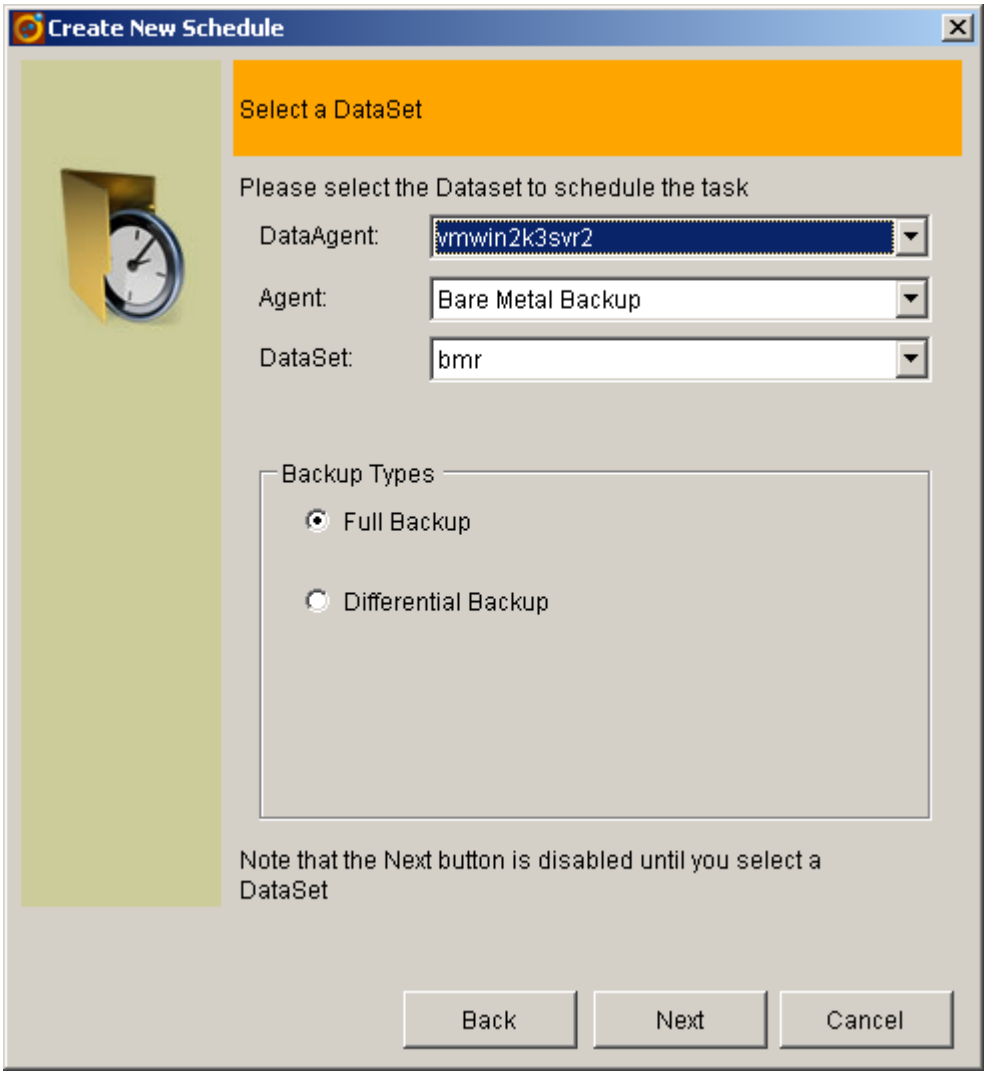
Backup for Exchange Mailbox Backup DataSet

Step 4.4 - Select Exchange Mailbox Backup.

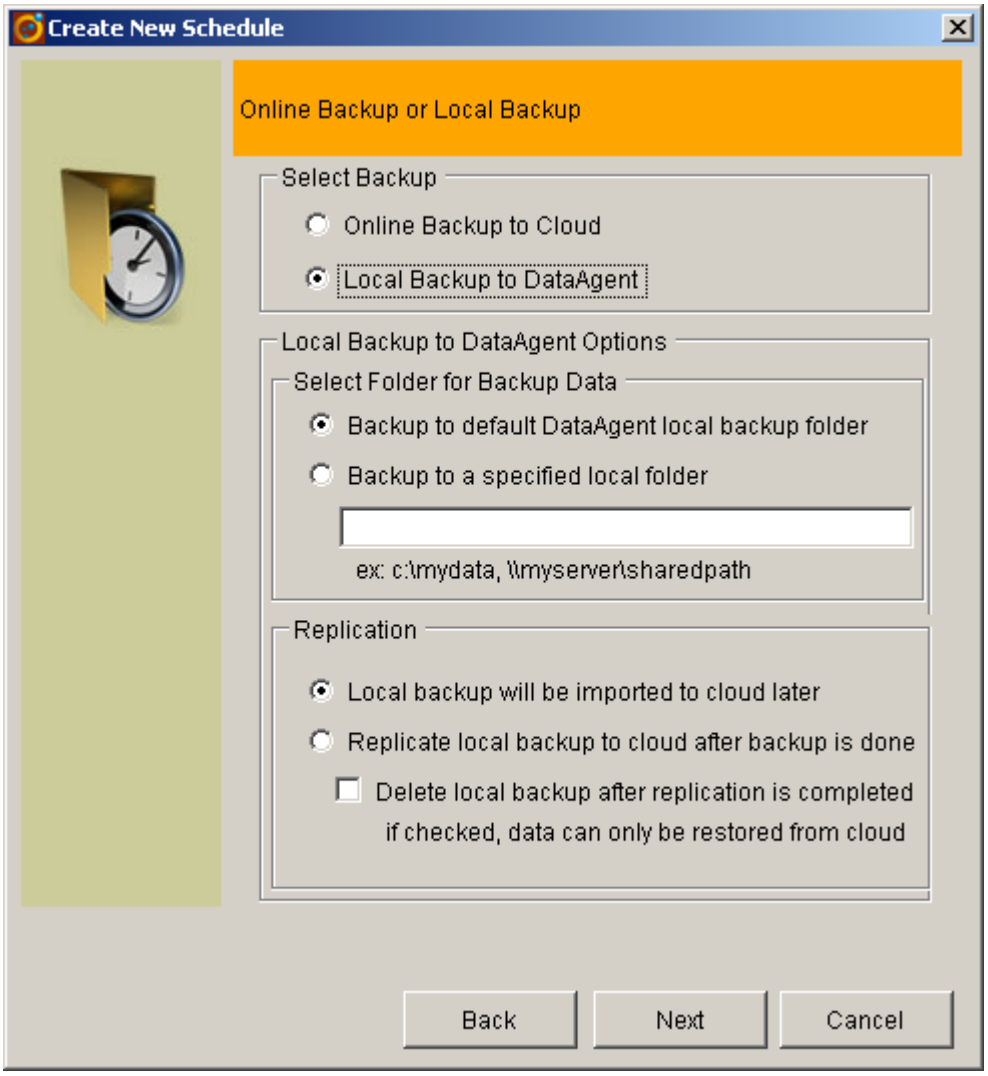


Backup for Bare Metal Backup DataSet

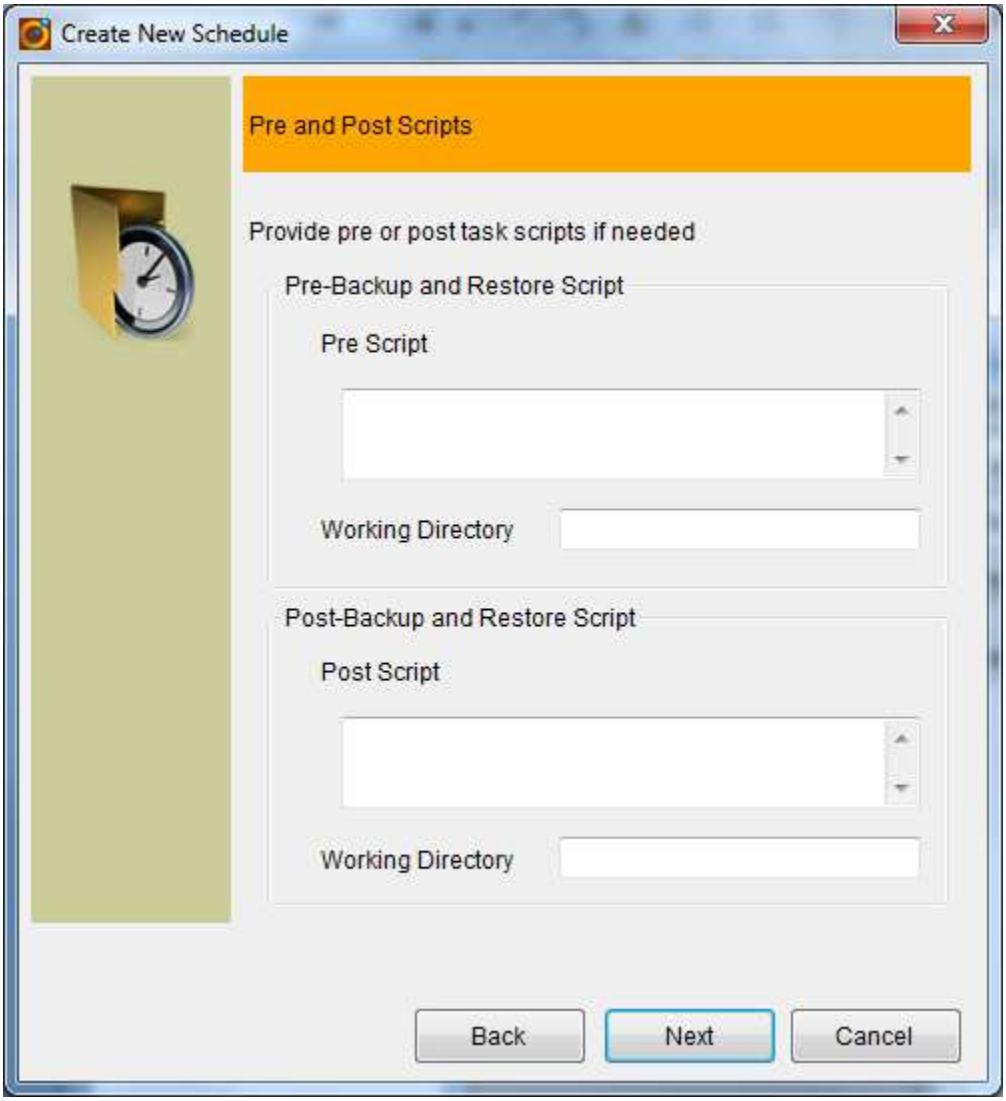
Step 4.6 – Select DataAgent, Agent, DataSet and Backup Type, select one of four backup types as shown below:



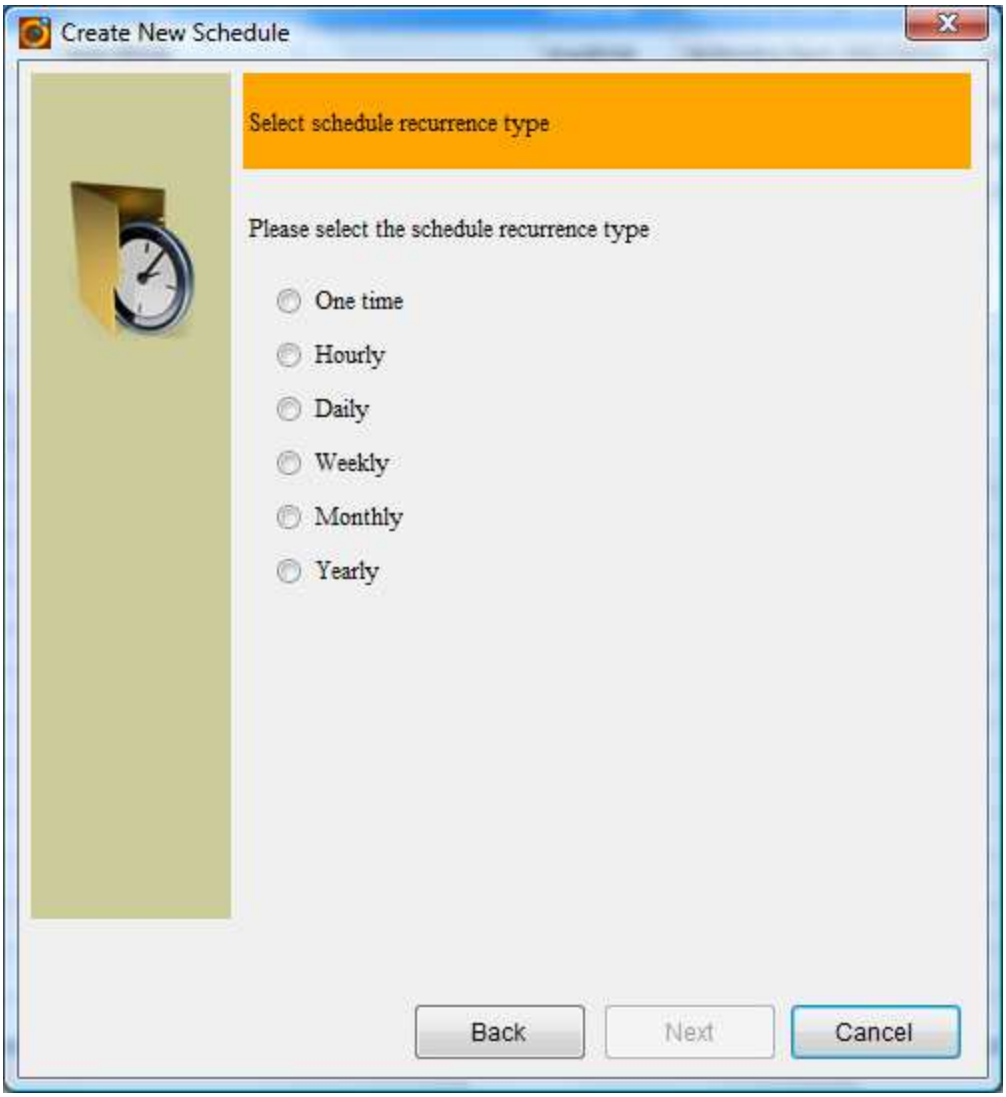
Step 5 – Select Online Backup or Local Backup



Step 6 – Provide pre/post scripts if needed



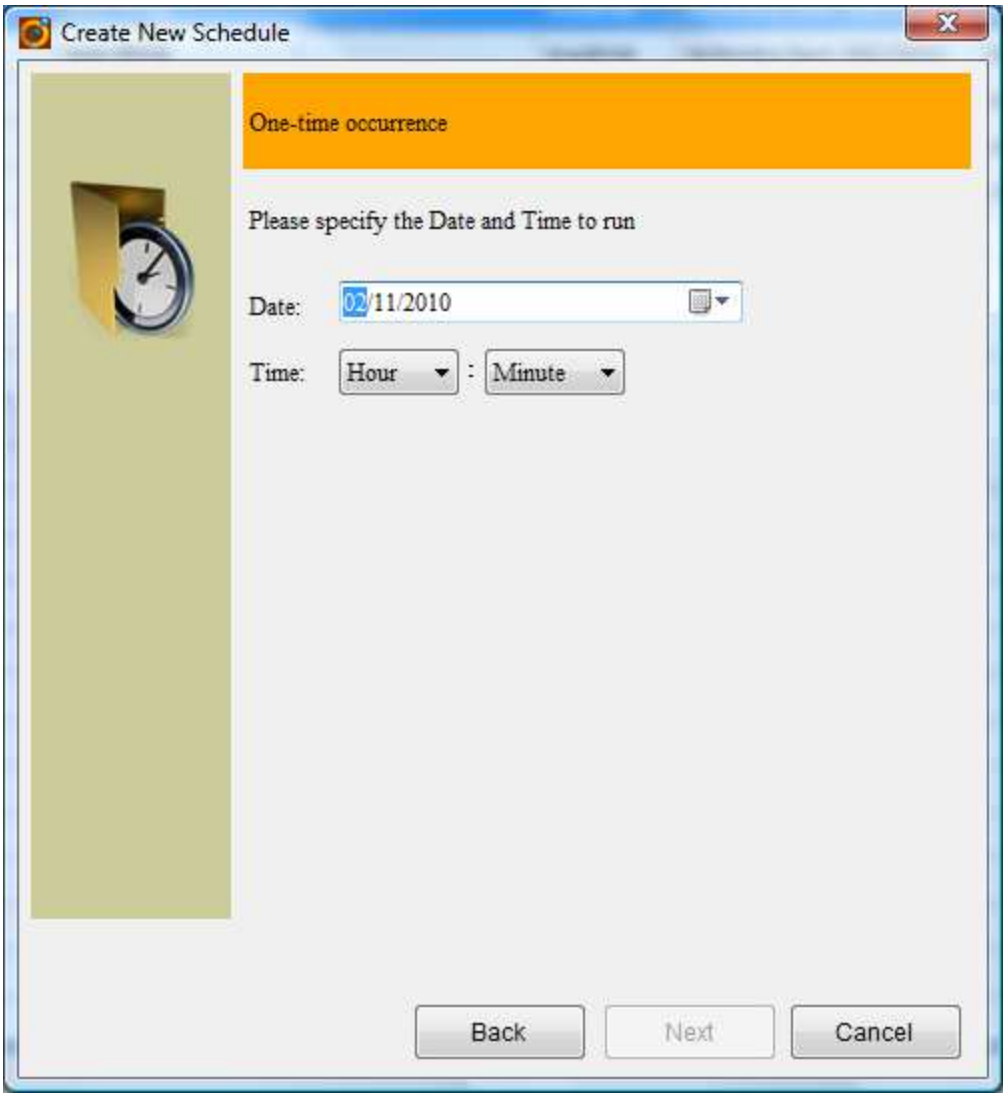
Step 7 – Select Schedule Recurrence Type



Depending on recurrence type selected:

One time

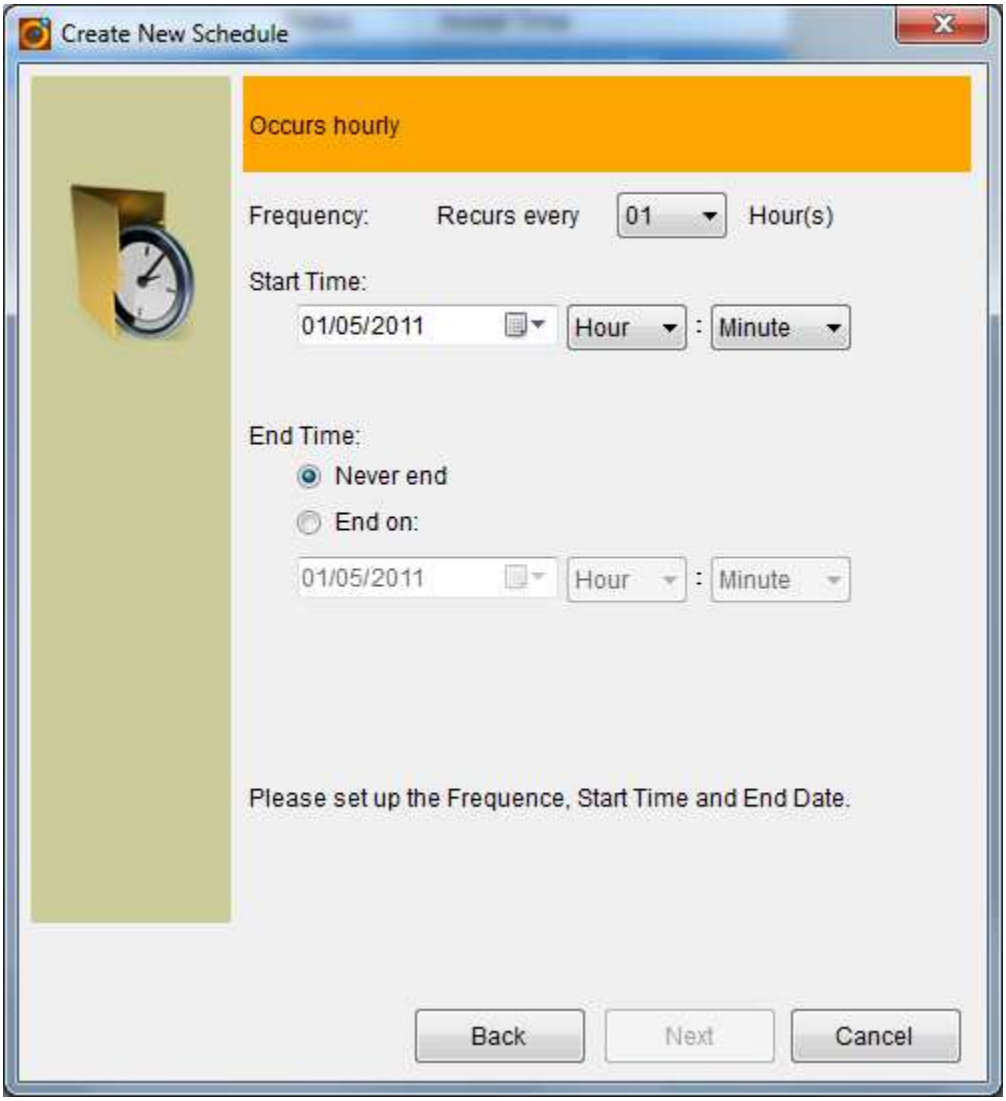
Step 7.1 – Specify the date and time to run the task



Next step is Final Step - Summary

Hourly

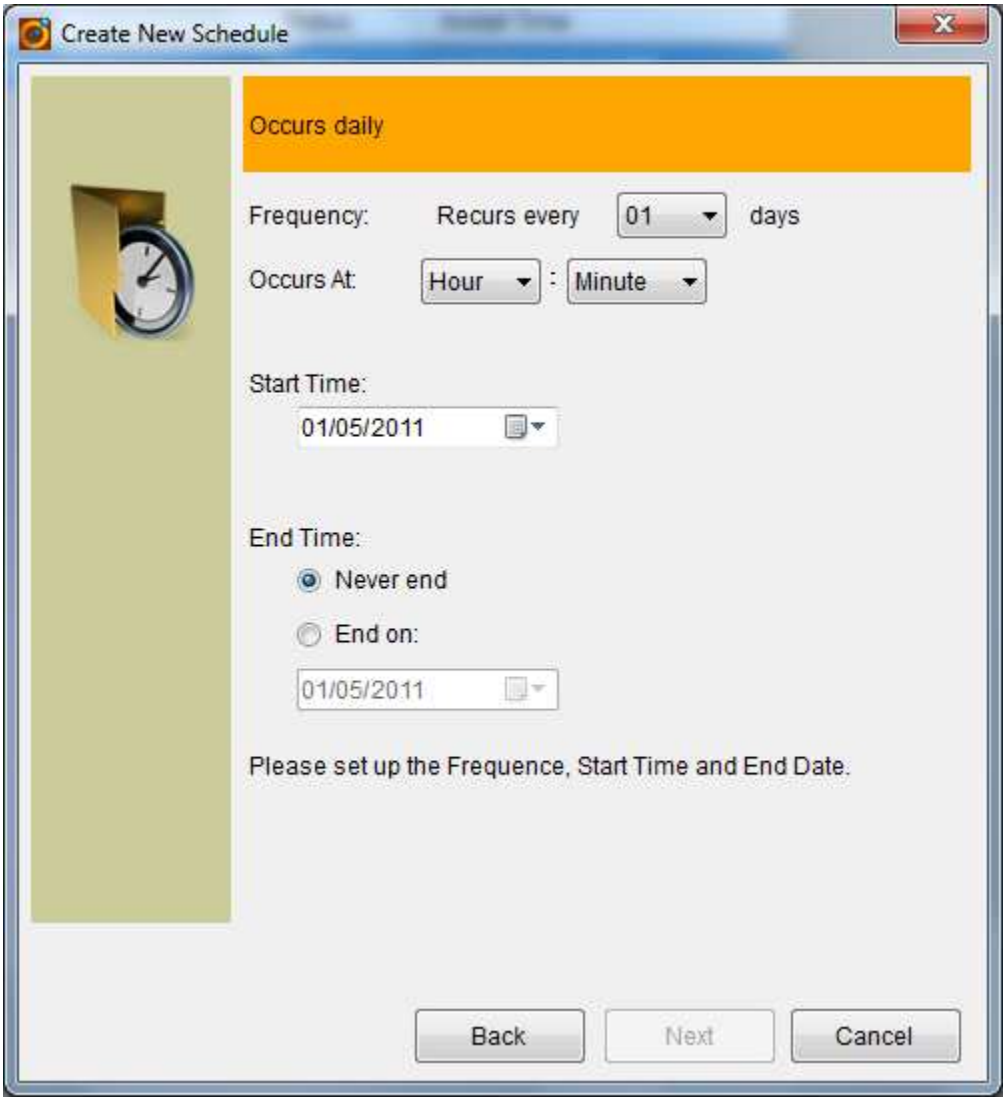
Step 7.2 – Select Frequency, Start Time and End Time



Next step is Final Step - Summary

Daily

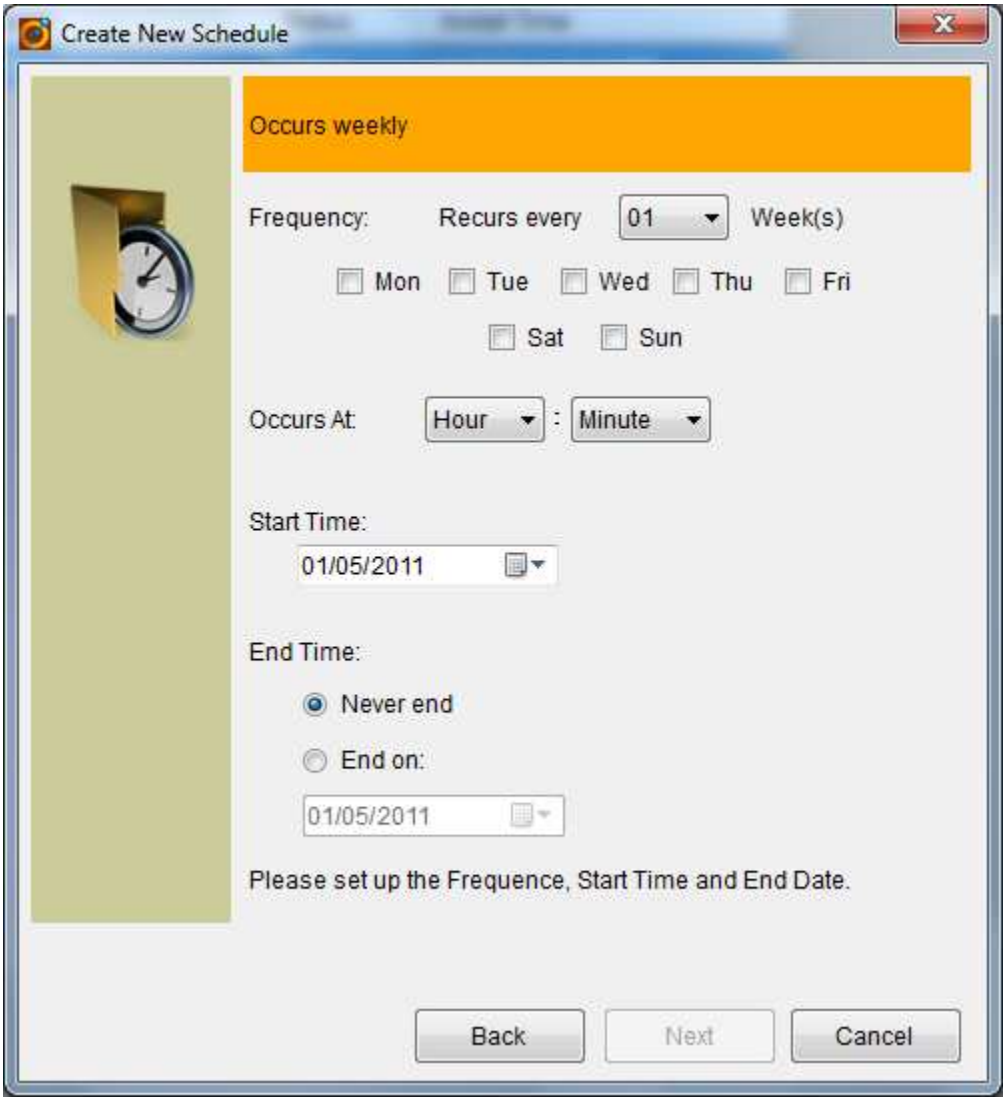
Step 7.3 – Select Frequency, Start Time and End Time



Next step is Final Step - Summary

Weekly

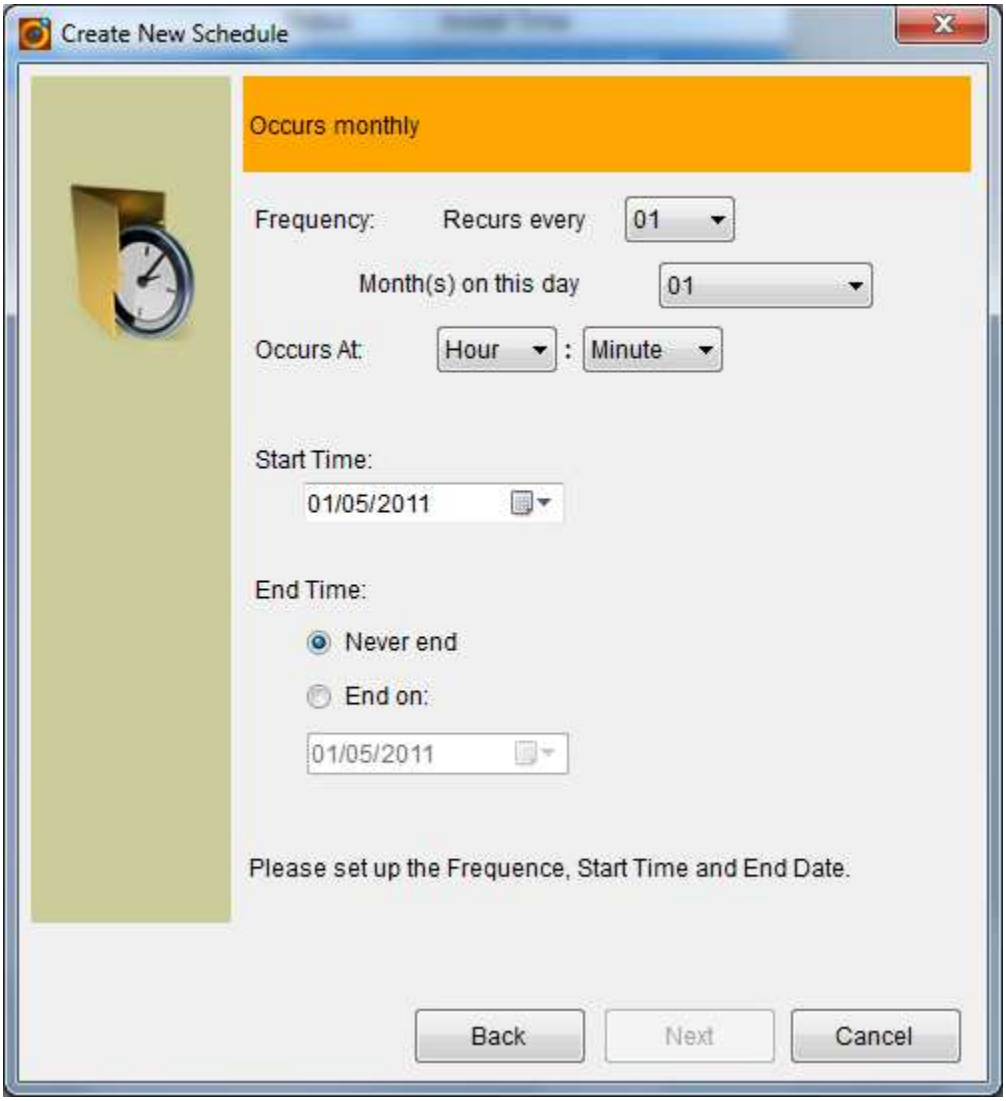
Step 7.4 – Select Frequency, Start Time and End Time



Next step is Final Step - Summary

Monthly

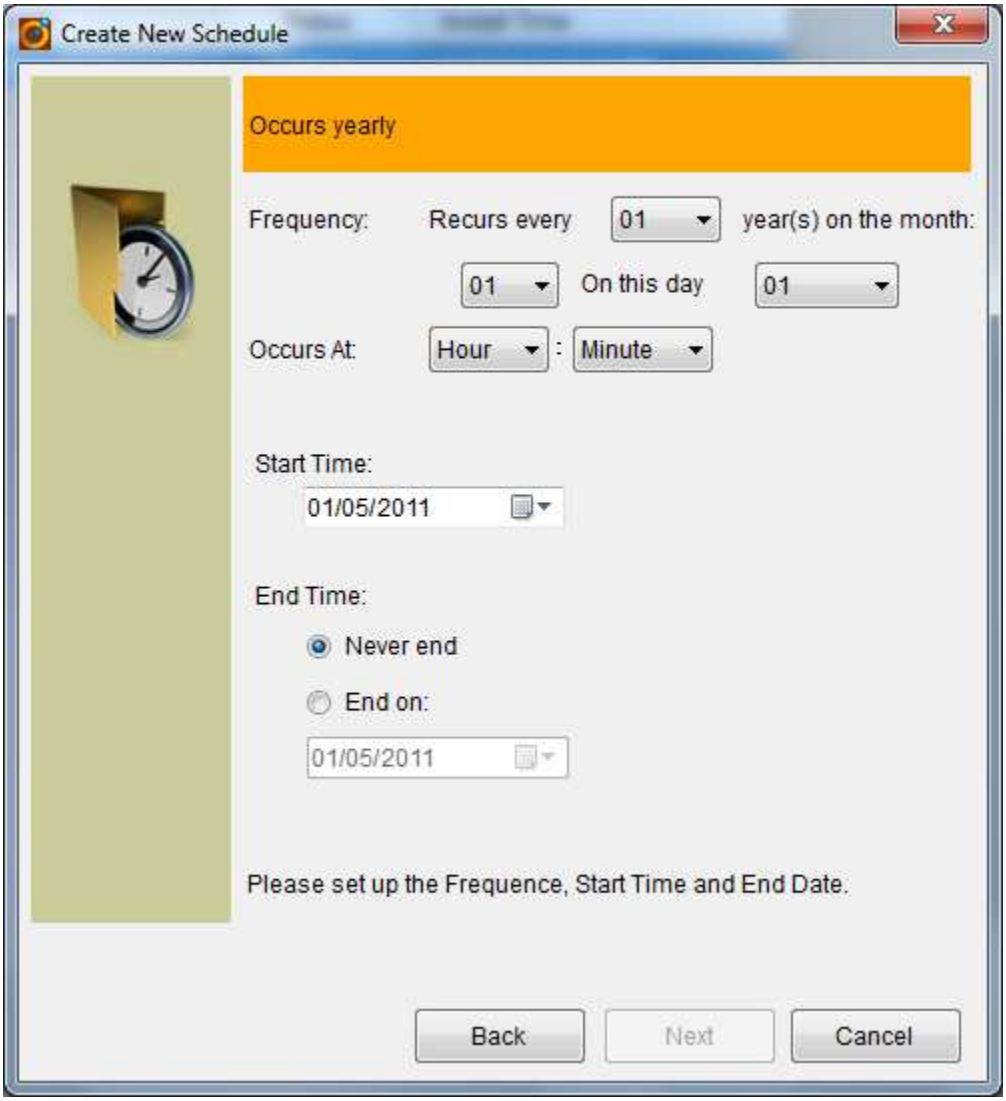
Step 7.5 – Select Frequency, Start Time and End Time



Next step is Final Step - Summary

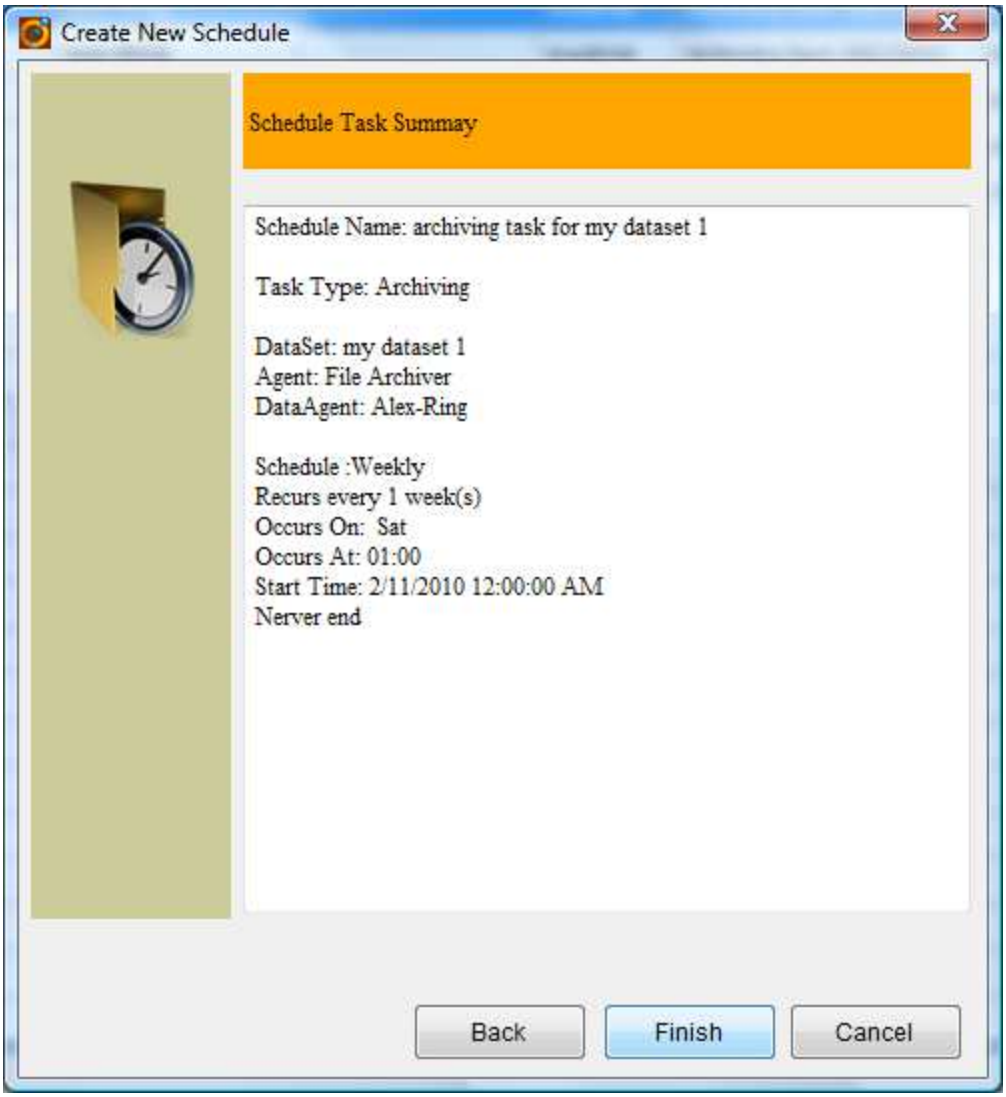
Yearly

Step 7.6 – Select Frequency, Start Time and End Time



Next step is Final Step - Summary

Final Step – Summary



Final step shows the summary of the schedule, click Back to make modifications, click Finish to create the schedule. A pop up message will be displayed after creation.

8.3 Schedule Restore Task

Schedule New Task Wizard walks through several steps to create a new schedule.

Step 1 – Introduction

Step 2 – Name Schedule

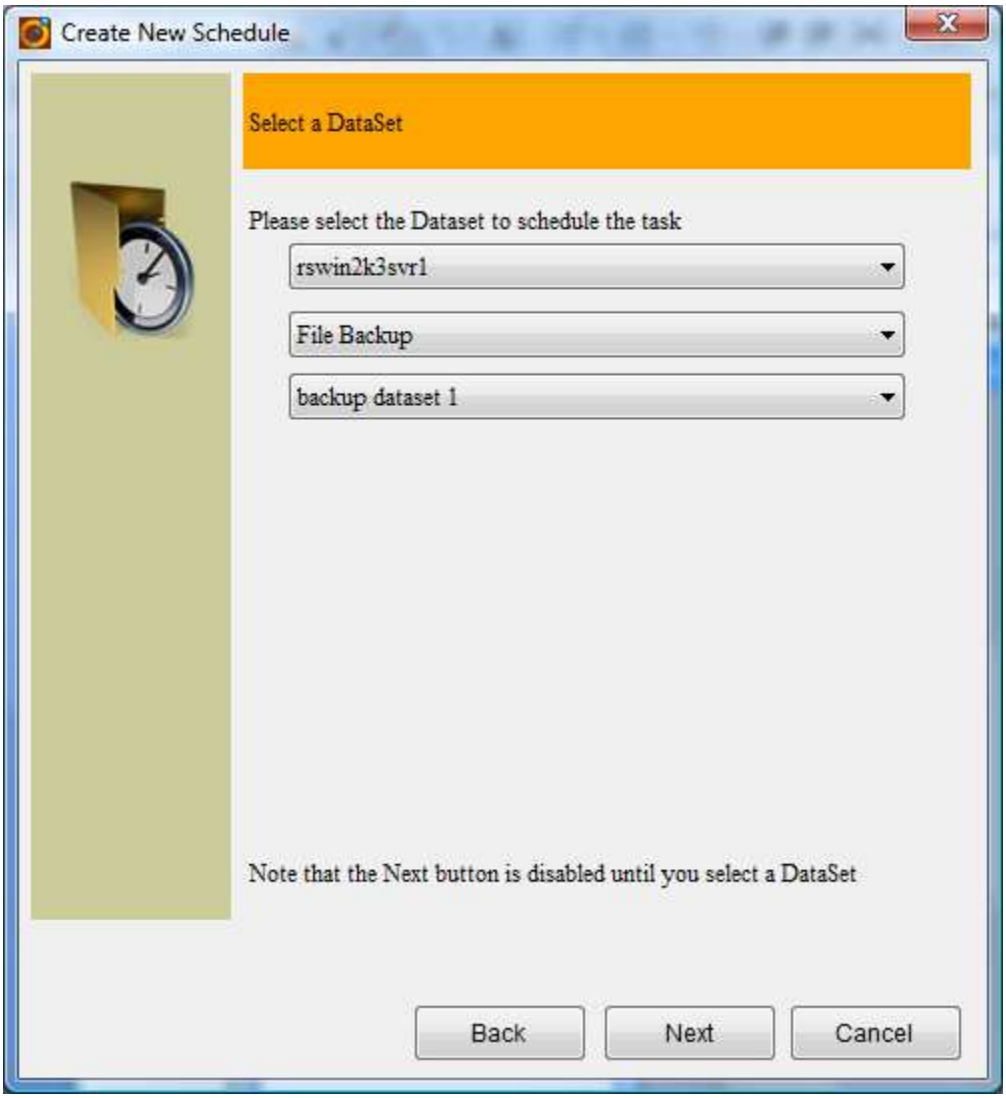
Step 3 – Select Task Type

The available task type for selection depends on the DataSet. The picture above shows an example for a File Backup DataSet.

Step 4 – Following are steps by steps instruction to schedule a restore task

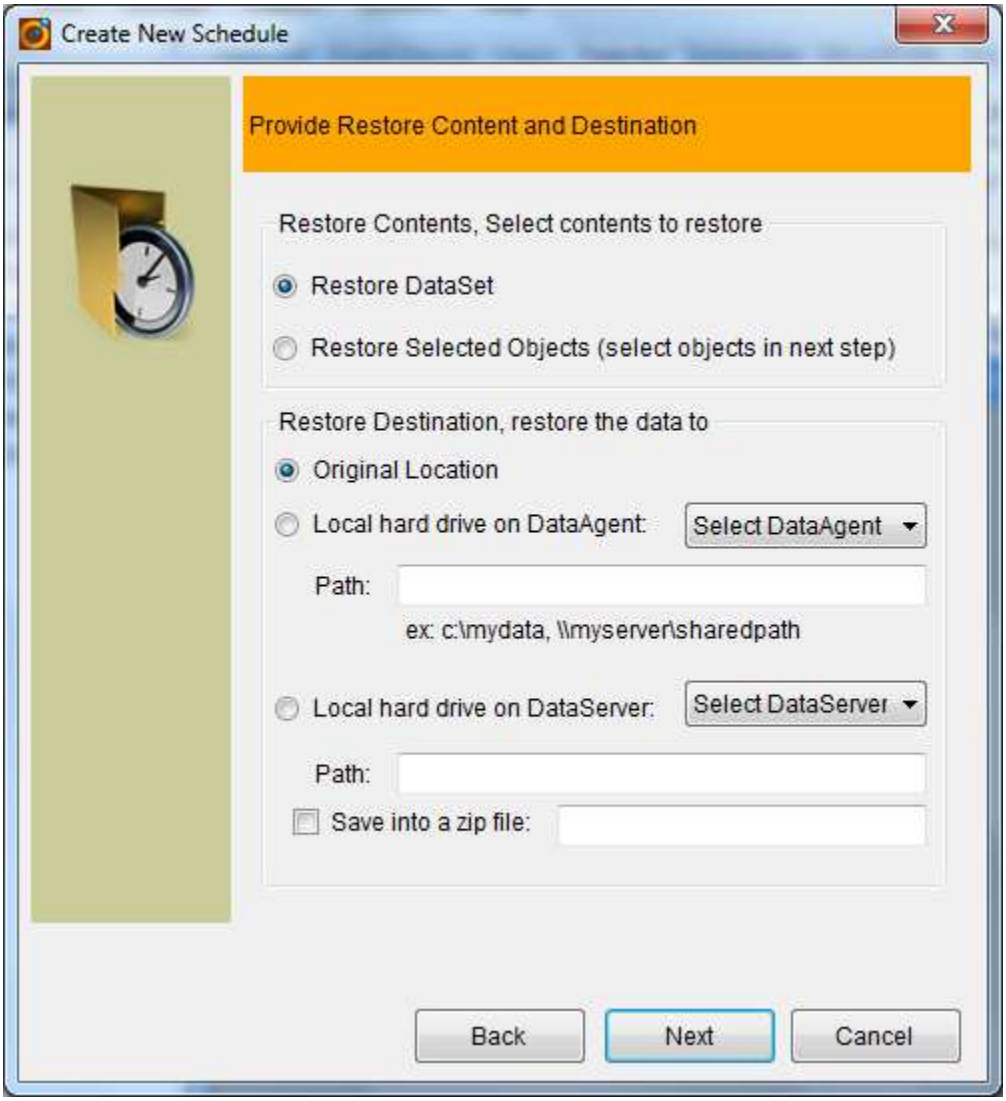
Restore for File Backup DataSet

Step 4a.1 – Select DataAgent, Agent and DataSet



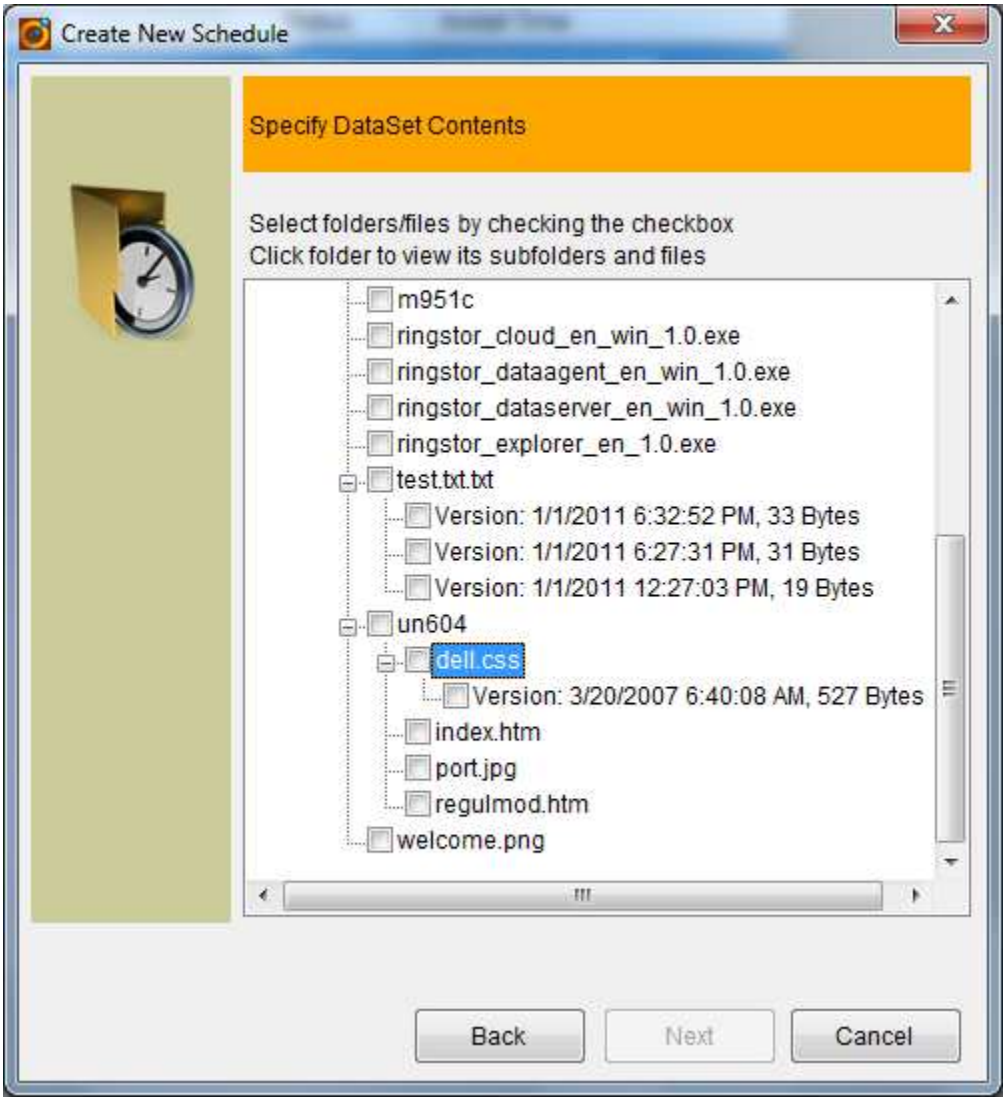
Step 4a.2 – Select Data To Restore and Restore Destination

If DataSet is under File Backup agent, select destination as shown below:



If “Restore Selected Objects” is selected, next step is 4f.3 to select objects to restore.

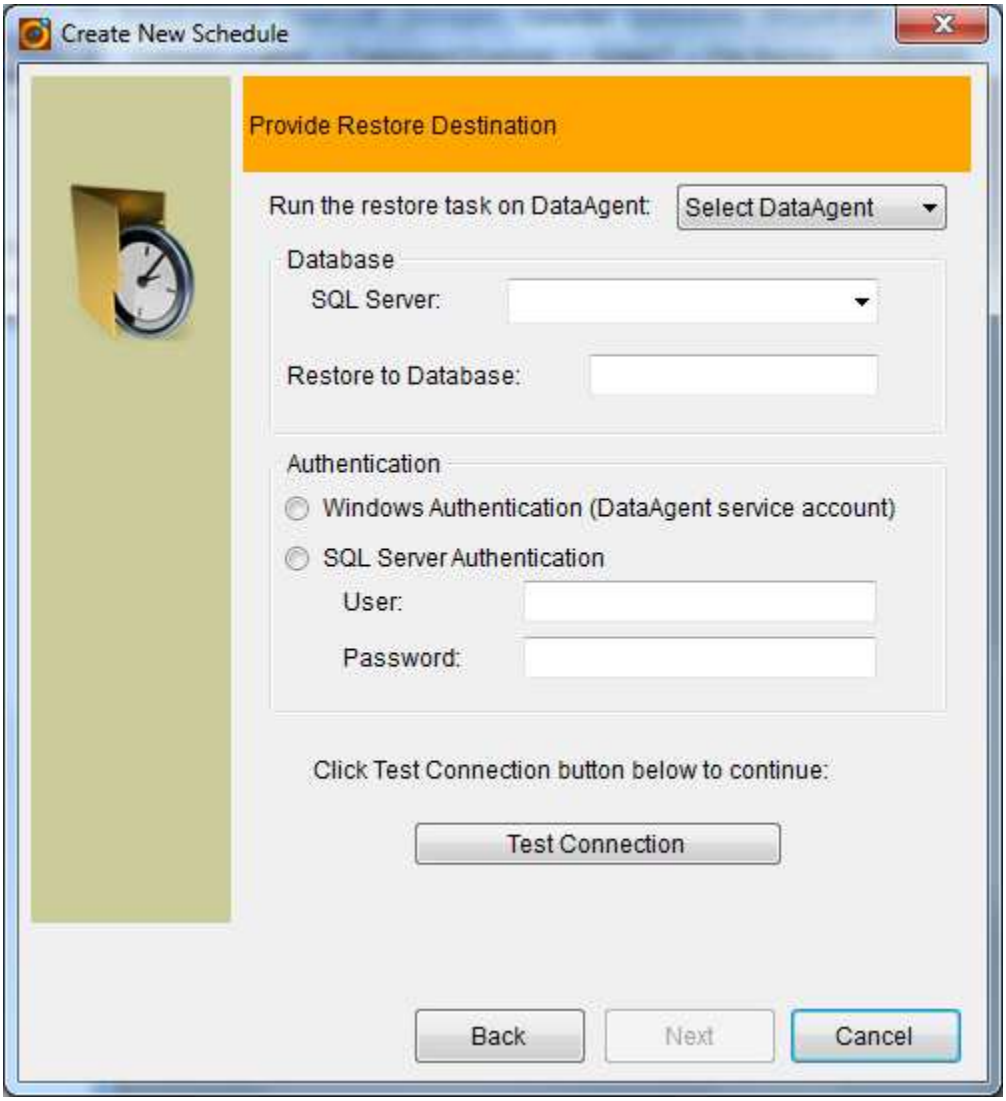
Step 4a.3 – Select Objects for Restore



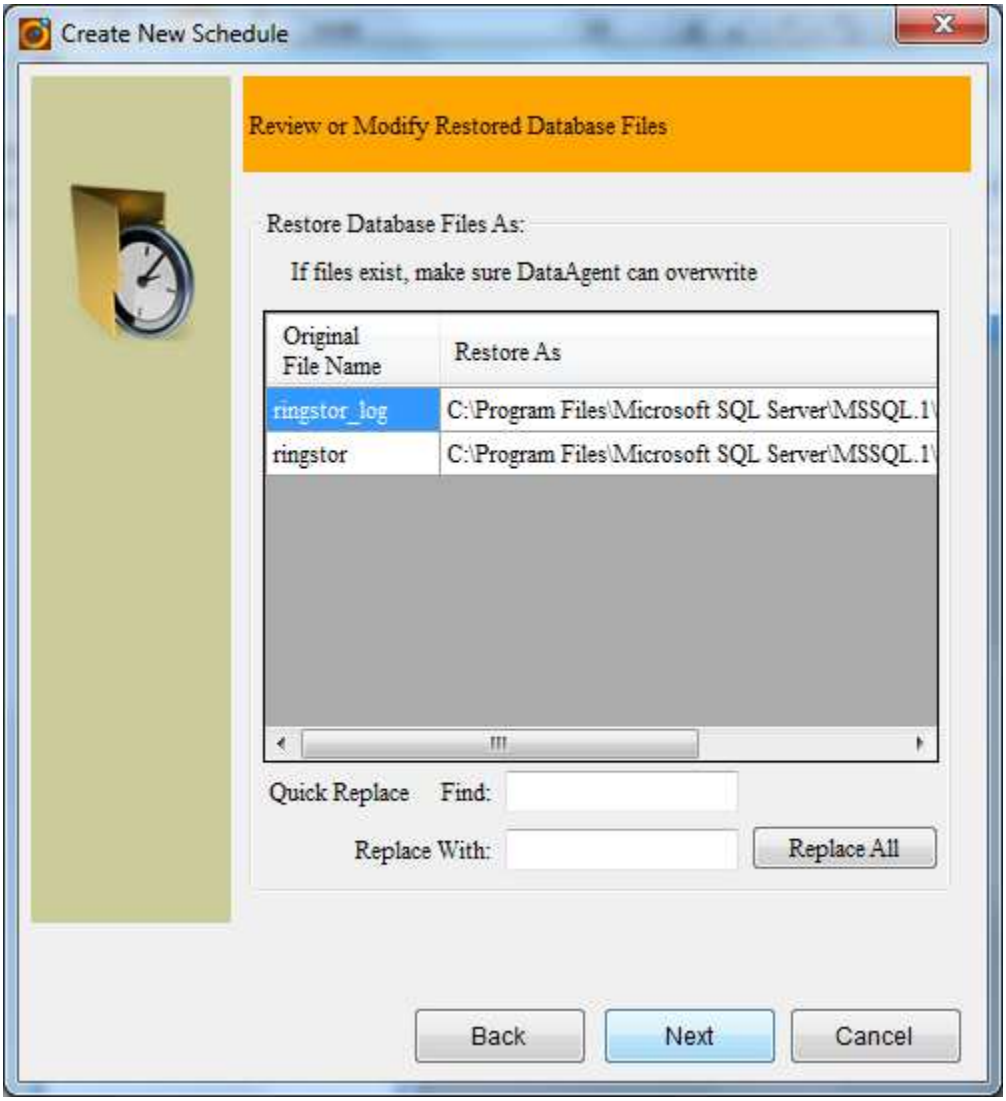
Click the checkbox to select or remove objects for the restore.

Restore for SQL Database Backup DataSet

Step 4b.1 – For SQL Database Backup agent, select destination as shown below:



Step 4b.2 - Review or modify SQL database files names and locations

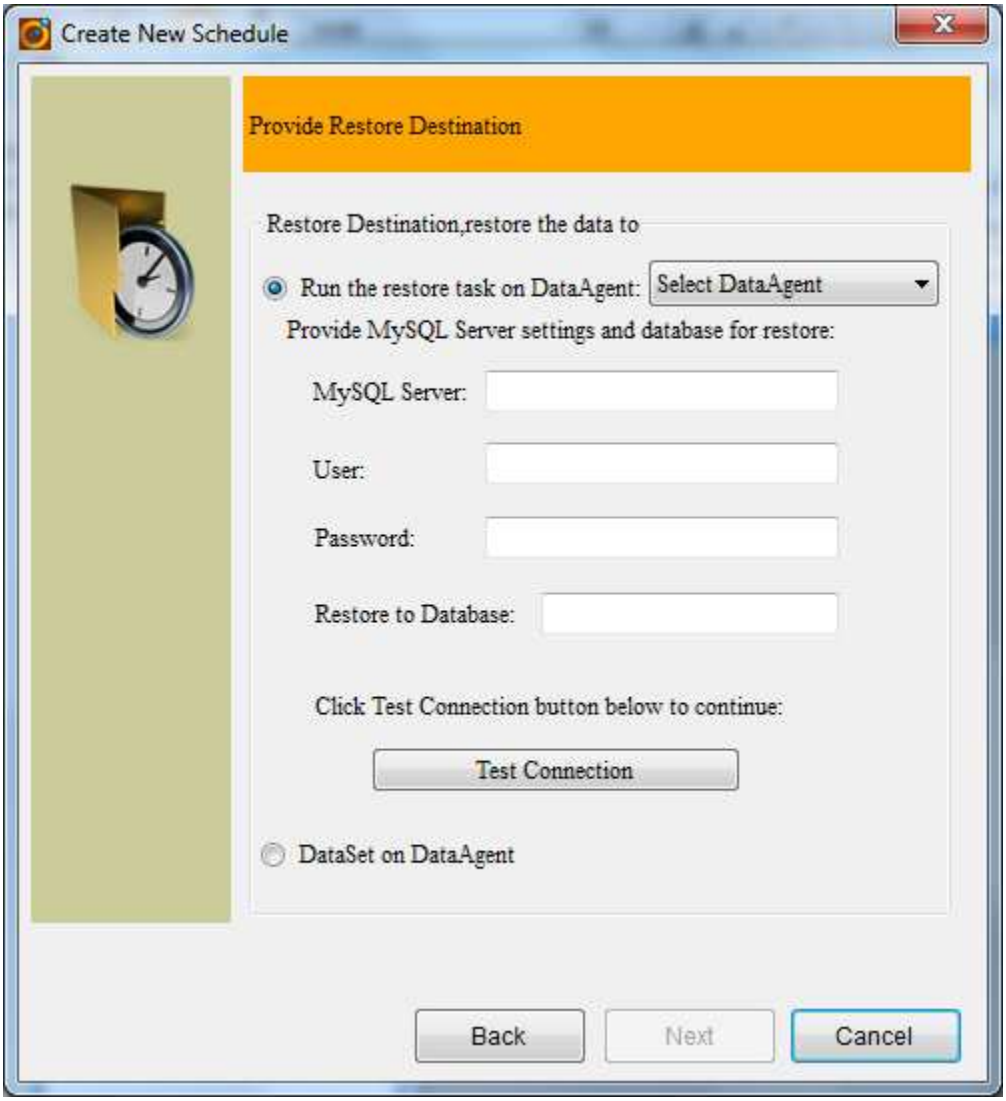


Click to change location and file name for original database files.

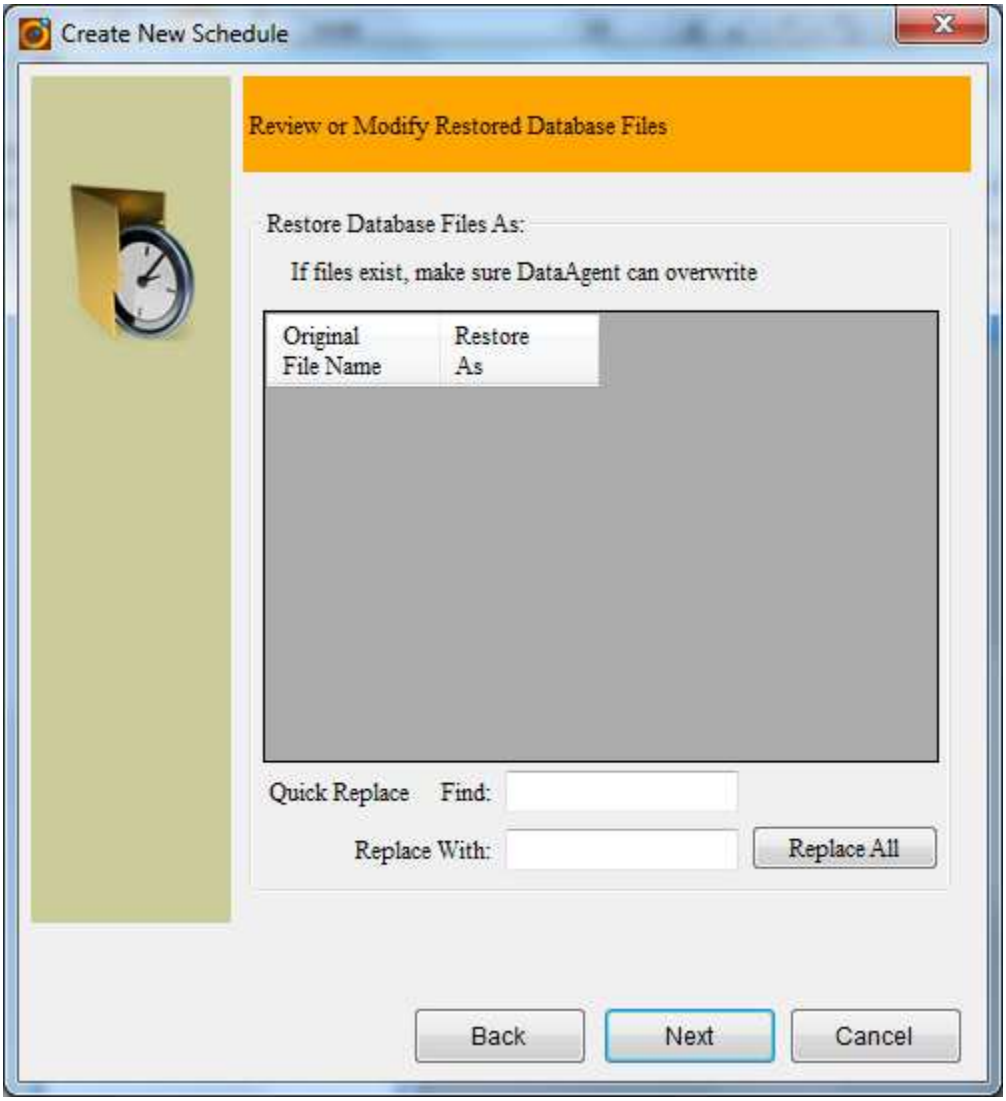
IMPORTANT NOTE: The file to restore as must either not exist, or DataAgent can overwrite the files if they exist.

Restore for MySQL Database Backup DataSet

Step 4c.1 – For MySQL Database Backup agent, select destination as shown below:

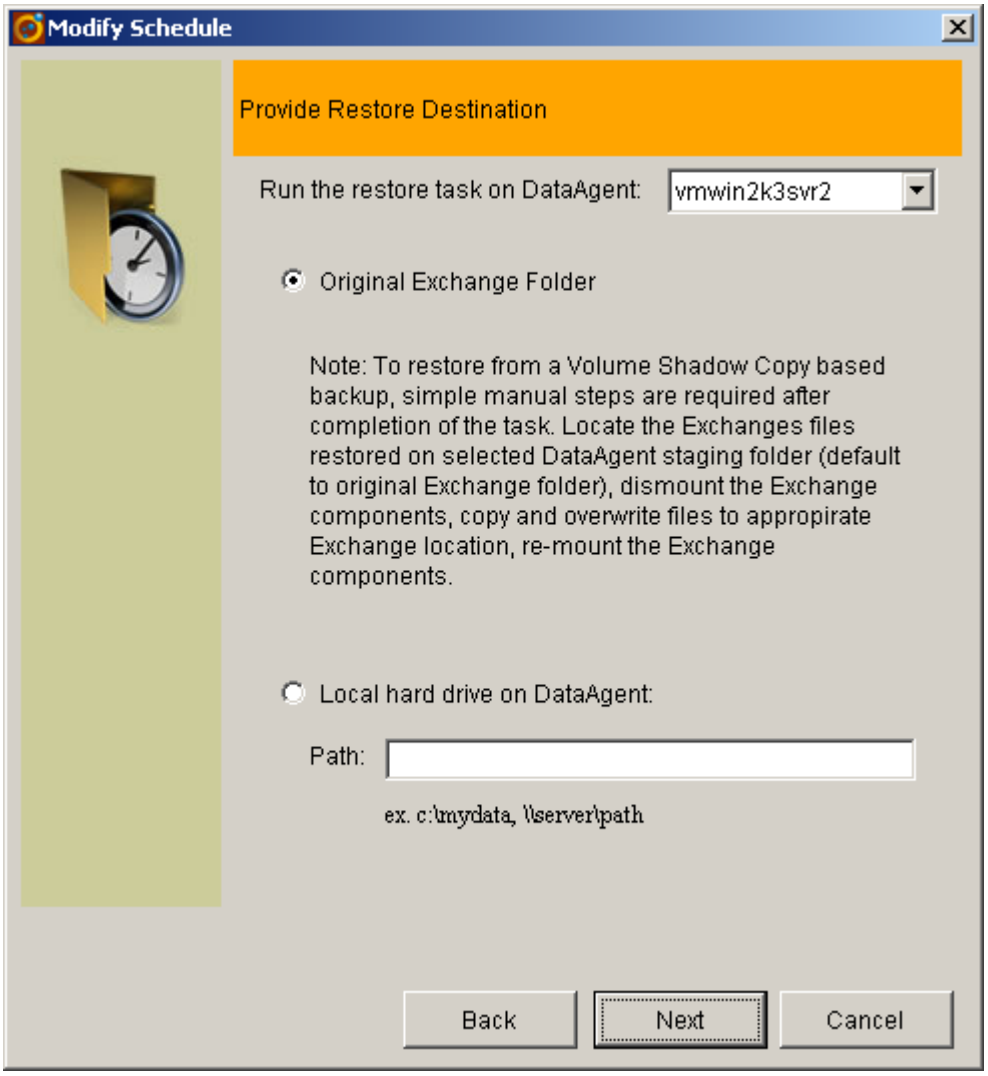


Step 4c.2 - Review or modify SQL database files names and locations



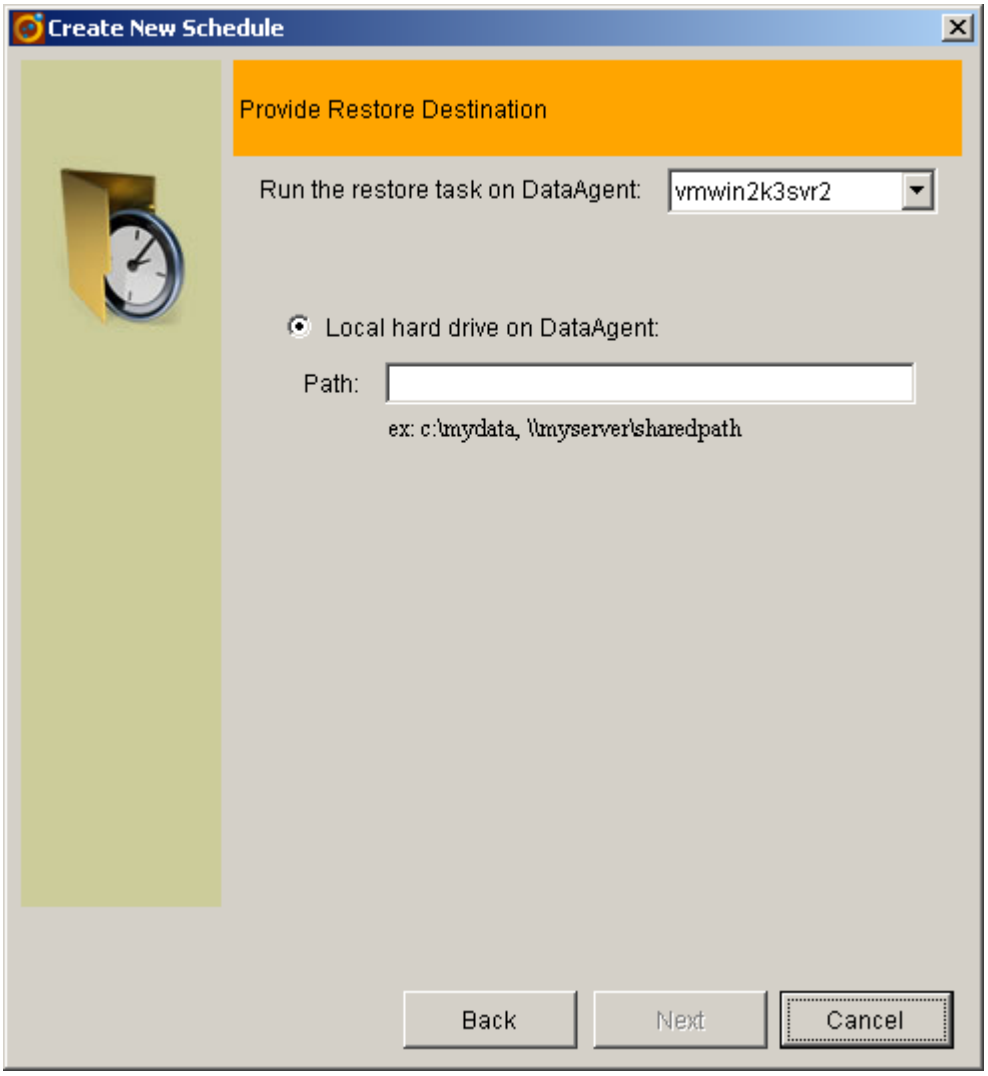
Restore for Exchange Backup DataSet

Step 4d.1 – For Exchange Backup agent, select destination as shown below

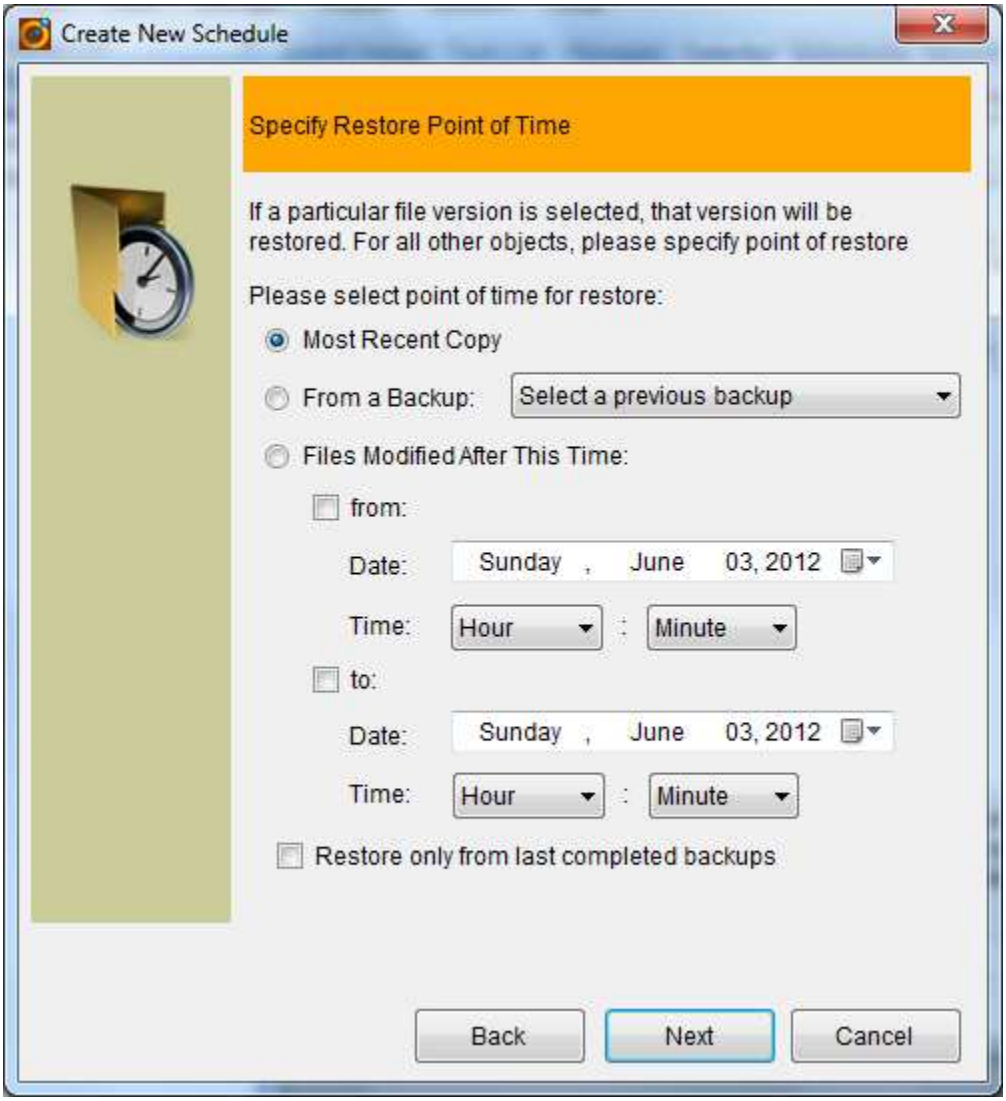


Restore for Bare Metal Backup DataSet

Step 4e.1 – For Bare Metal Backup agent, select destination as shown below for image files



Step 5 – Specify Point of Time for Restore

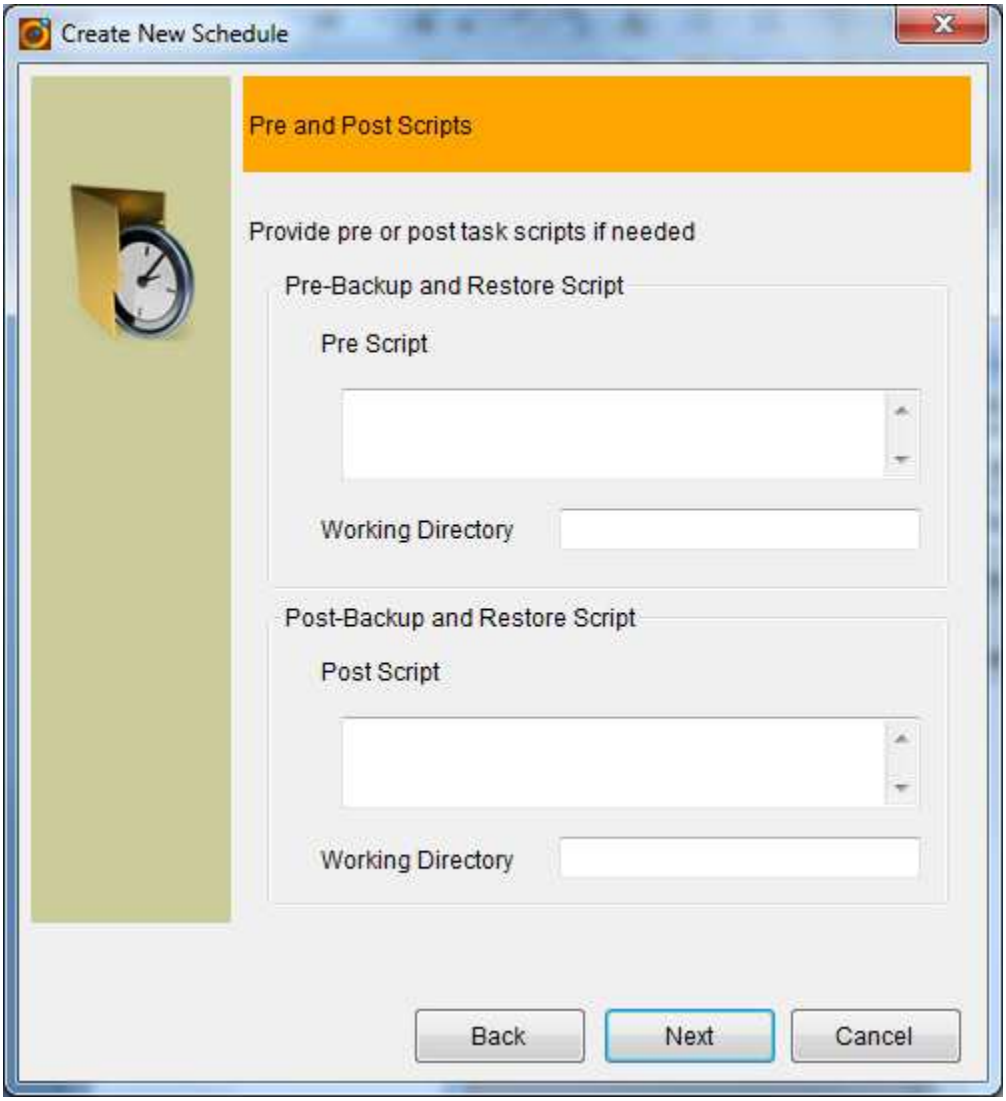


Most Recent Copy: most recent copy for the DataSet or selected objects will be restored.

From a Backup: data backed up in selected full backup will be all restored.

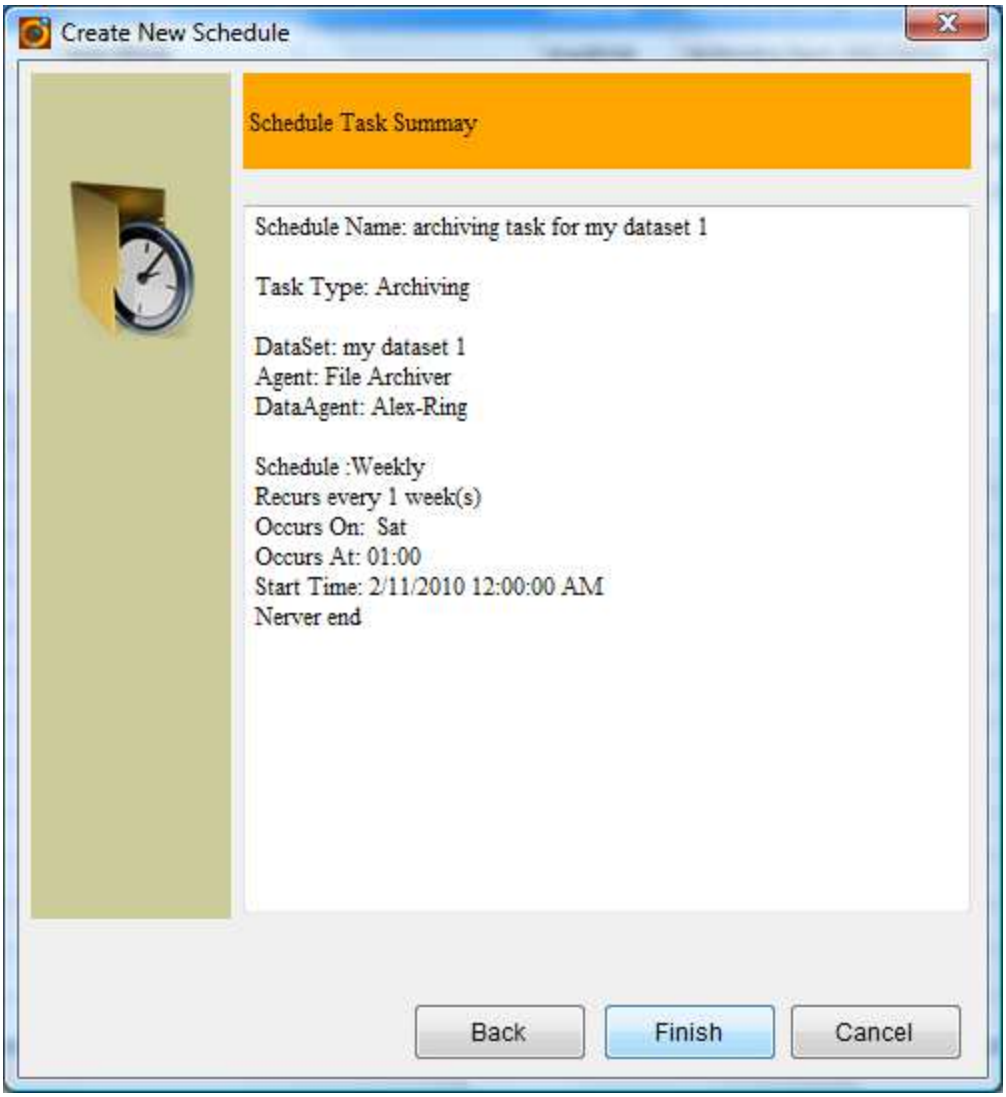
Point of Time As Specified: data backed up on and before specified time will be restored.

Step 6 – Provide pre/post scripts if needed



Step 7 – Select Schedule Recurrence Type

Final Step – Summary



Final step shows the summary of the schedule, click Back to make modifications, click Finish to create the schedule. A pop up message will be displayed after creation.

9 Data Storage

9.1 Introduction

Data transmitted to RingStor system are stored in MountPaths.

MountPath is a folder resided on a magnetic disk, hard drive, USB drive, SAN drive, etc. Based on its connection to the DataServer, MountPath is split into two types:

- Directly Attached – a local folder hard wired to a DataServer, for example, hard drive, USB drive
- Network Shared – a network shared path accessible to all DataServers, for example a UNC path, a SAN drive

IMPORTANT TIP: In order for DataServer to access a MountPath, the domain user account that DataServer service is runs with must have read/write access to the MountPath. Please see DataServer Installation for more details.

MountPaths are grouped into a MountPath Pool. MountPath Pool is designed to control storage access for DataServers in RingStor system. Please refer to Storage Access Control section for details.

9.2 MountPath Pool

MountPath Pool is a logic entity that contains a list of MountPaths.

MountPath Pool can be of any of these three types:

- Primary – MountPaths in the pool will be selected first by DataServer for storage
- Secondary – MountPaths in the pool will be selected by DataServer for storage if no MountPaths in primary pool can be used.
- Reserved – MountPaths in the pool will never be used.

MountPaths in a MountPath Pool can be selected based on pool's selection scheme:

- Randomly – DataServer will select MountPath randomly for storage
- Lowest Free Space First – DataServer will select MountPath with lowest free space first.
- Highest Free Space First – DataServer will select MountPath with highest free space first.

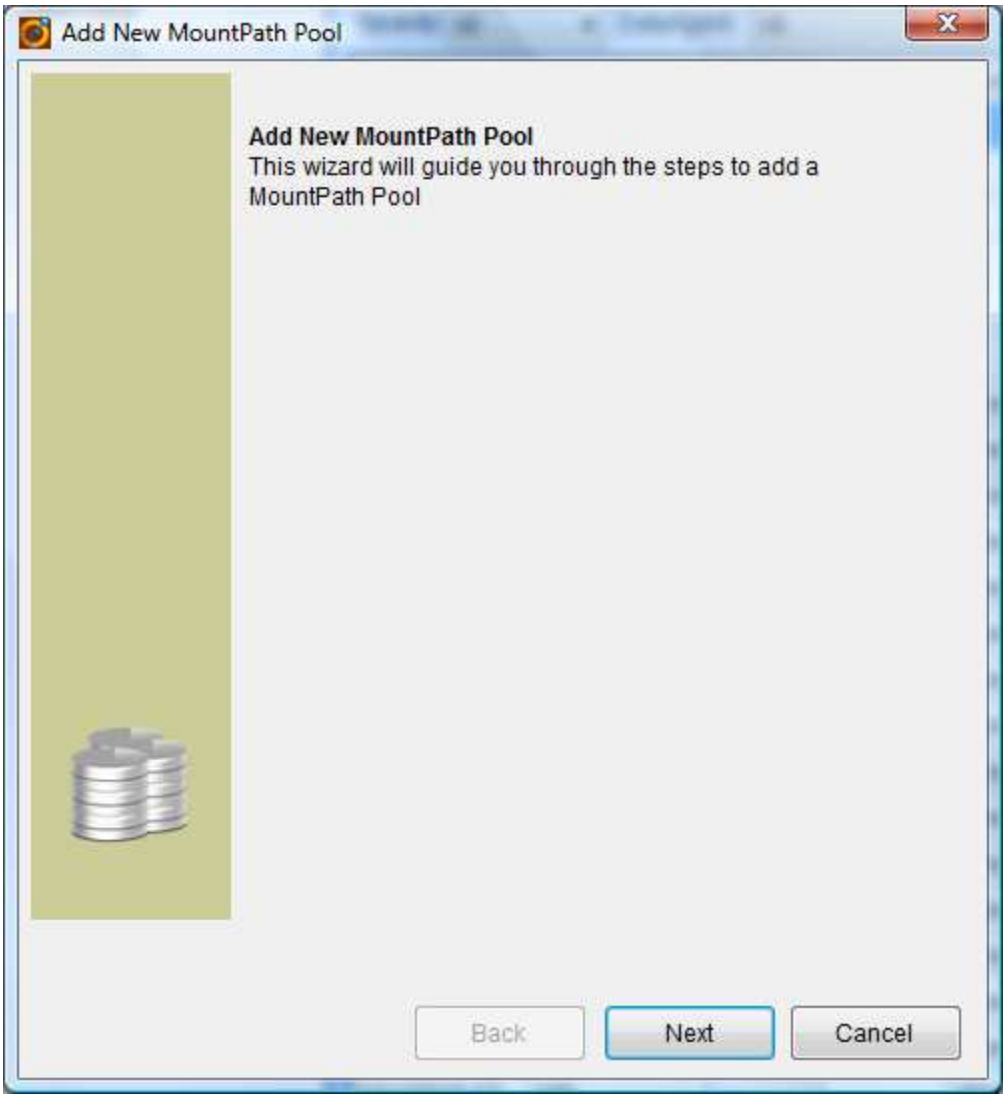
Creating a new MountPath Pool is a series of steps managed by **Create New MountPath Pool Wizard** accessible from any of following places within **RingStor Explorer**.

Main Menu -> Storage -> Create New MountPath Pool

Storage Explorer -> Right Click a MountPath Pool Type -> Create New MountPath Pool

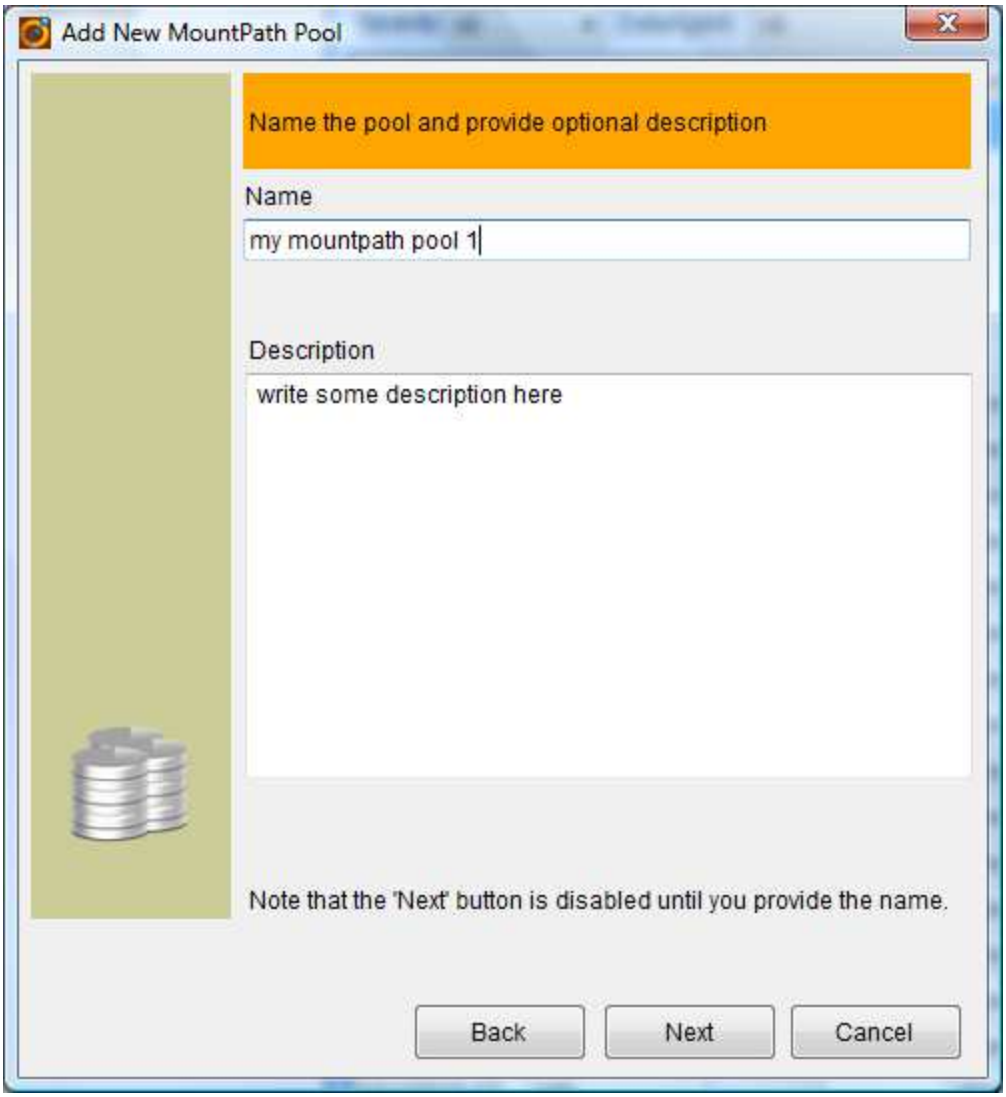
Create New MountPath Pool Wizard

Step 1 – Introduction



Click Next to continue.

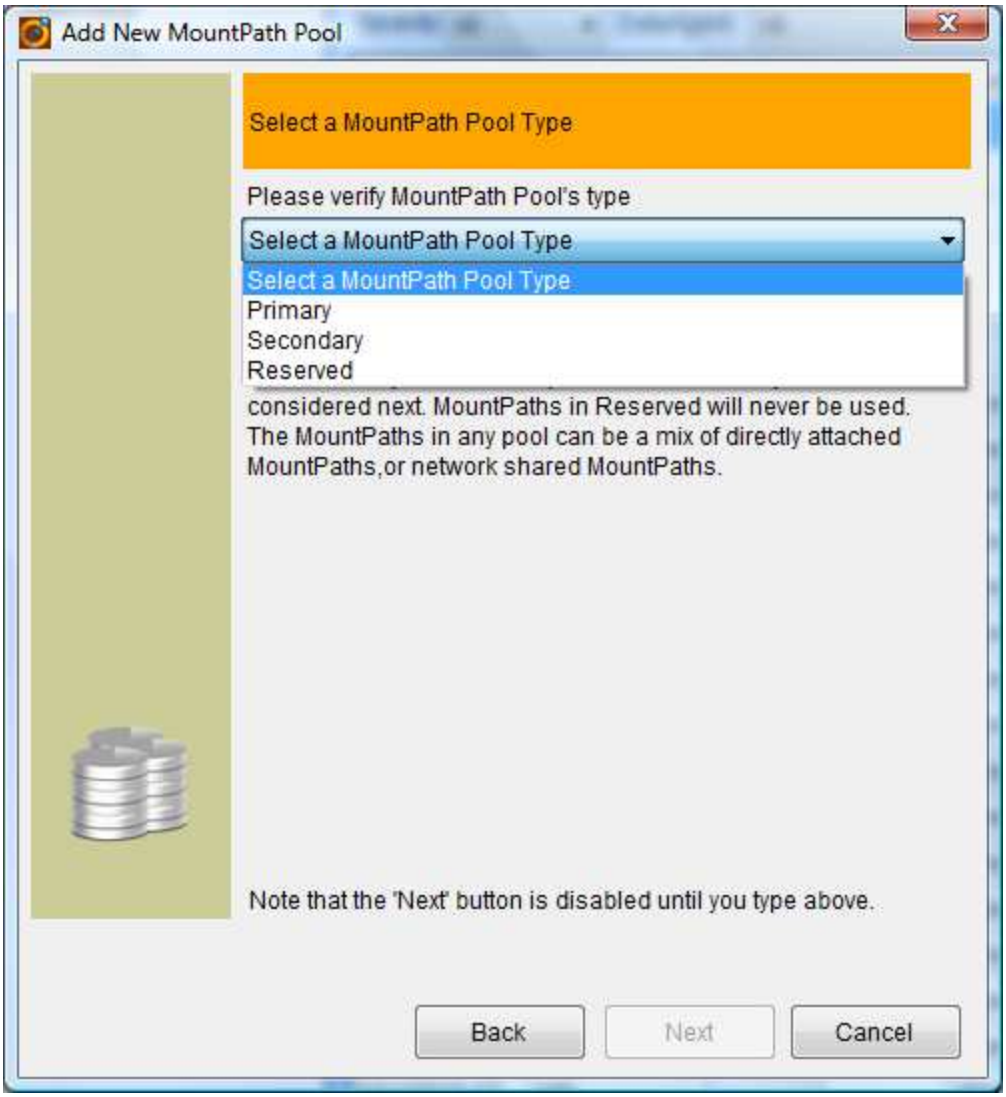
Step 2 – Name the MountPath Pool



Provide a friendly name for the MountPath Pool, provide optional description.

Click Next to continue.

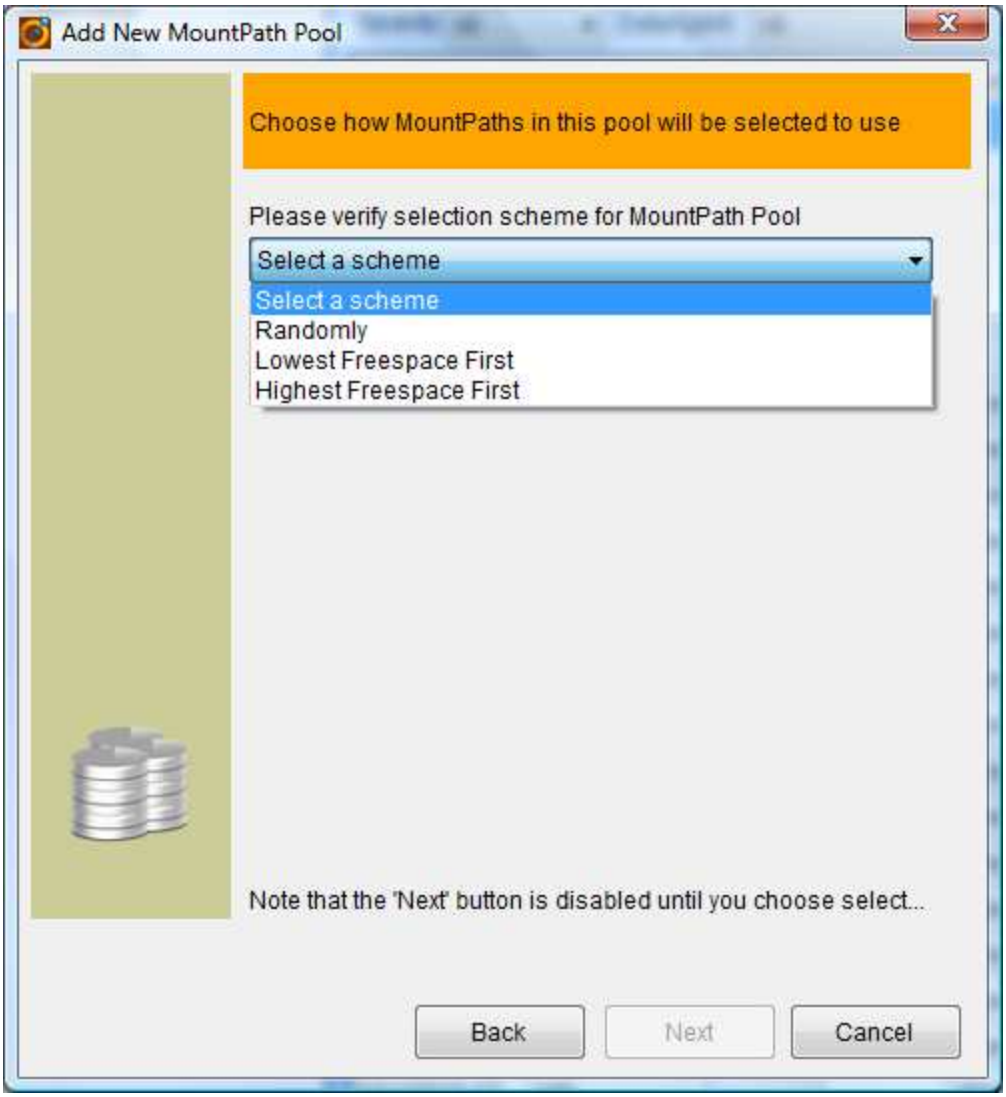
Step 3 – Select MountPath Pool Type



Select the type for this MountPath Pool.

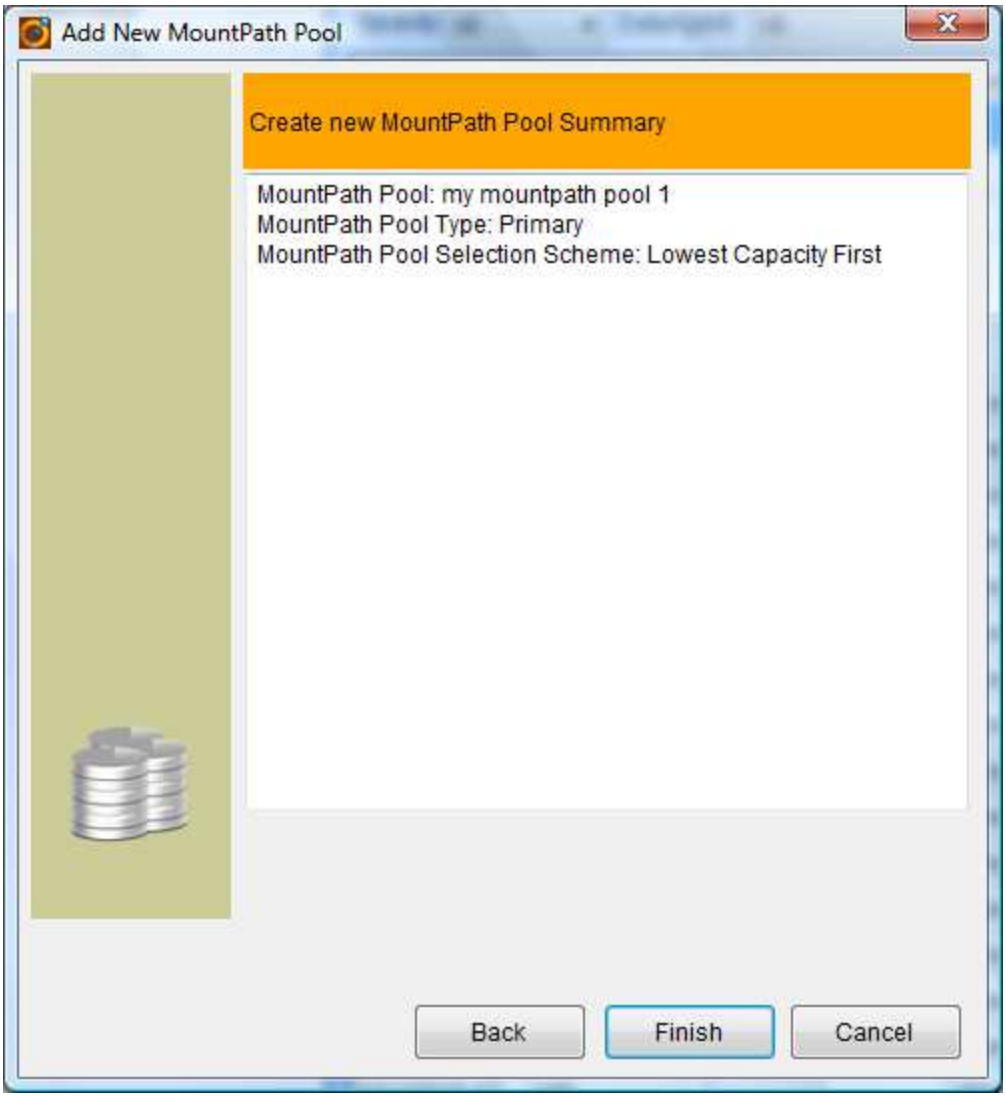
Click Next to continue.

Step 4 – Specify MountPath Selection Scheme



Click Next to continue.

Final Step - Summary



Final step shows the summary for the MountPath Pool. Click back to make modifications, click Finish to create the MountPath Pool. A pop up message will be displayed when creation completes.

9.3 MountPath

Creating a new MountPath is a series of steps managed by **Create New MountPath Wizard** accessible from any of following places within **RingStor Explorer**.

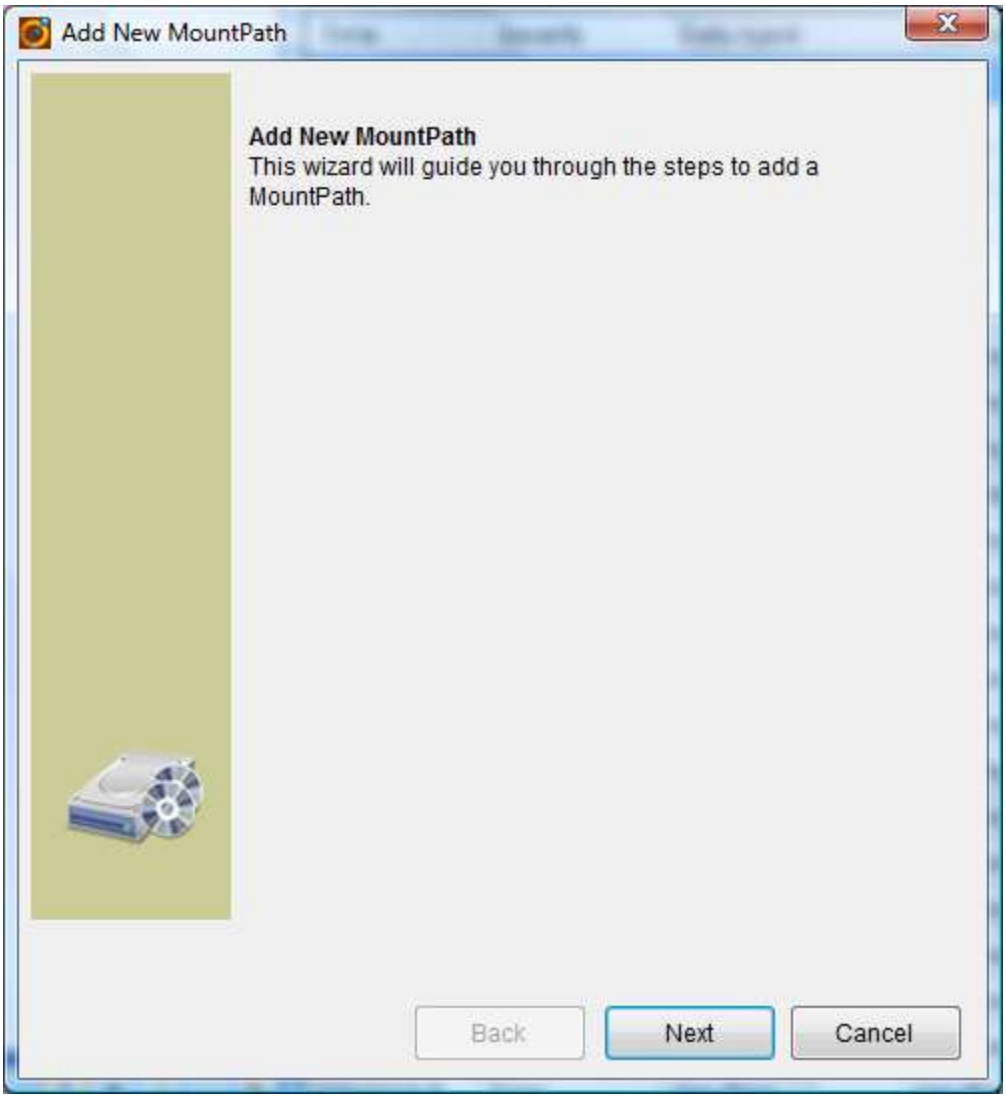
Main Menu -> Storage -> Create New MountPath

Storage Explorer -> Right Click a MountPath Pool Type -> Create New MountPath

Storage Explorer -> Right Click a MountPath Pool -> Create New MountPath

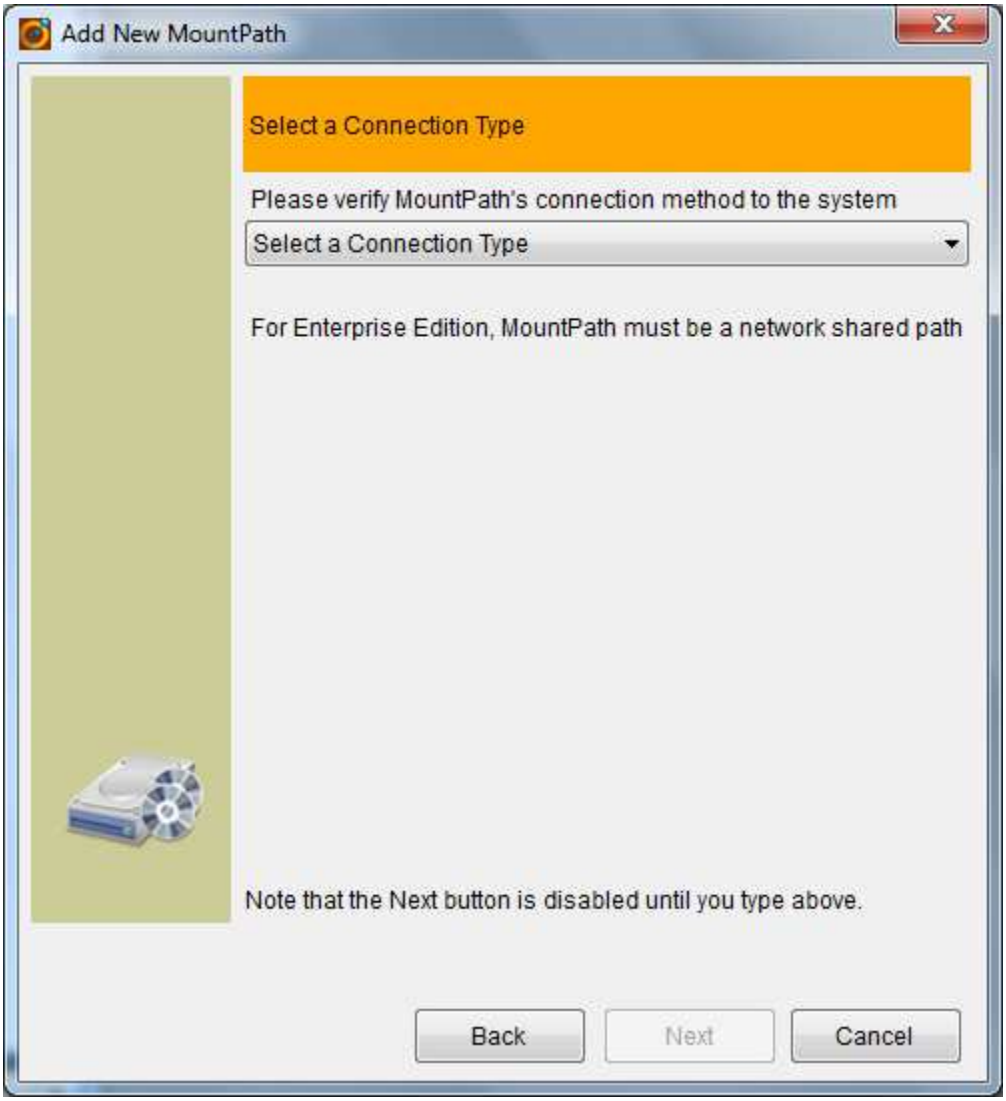
Create New MountPath Wizard

Step 1 – Introduction



Click Next to continue.

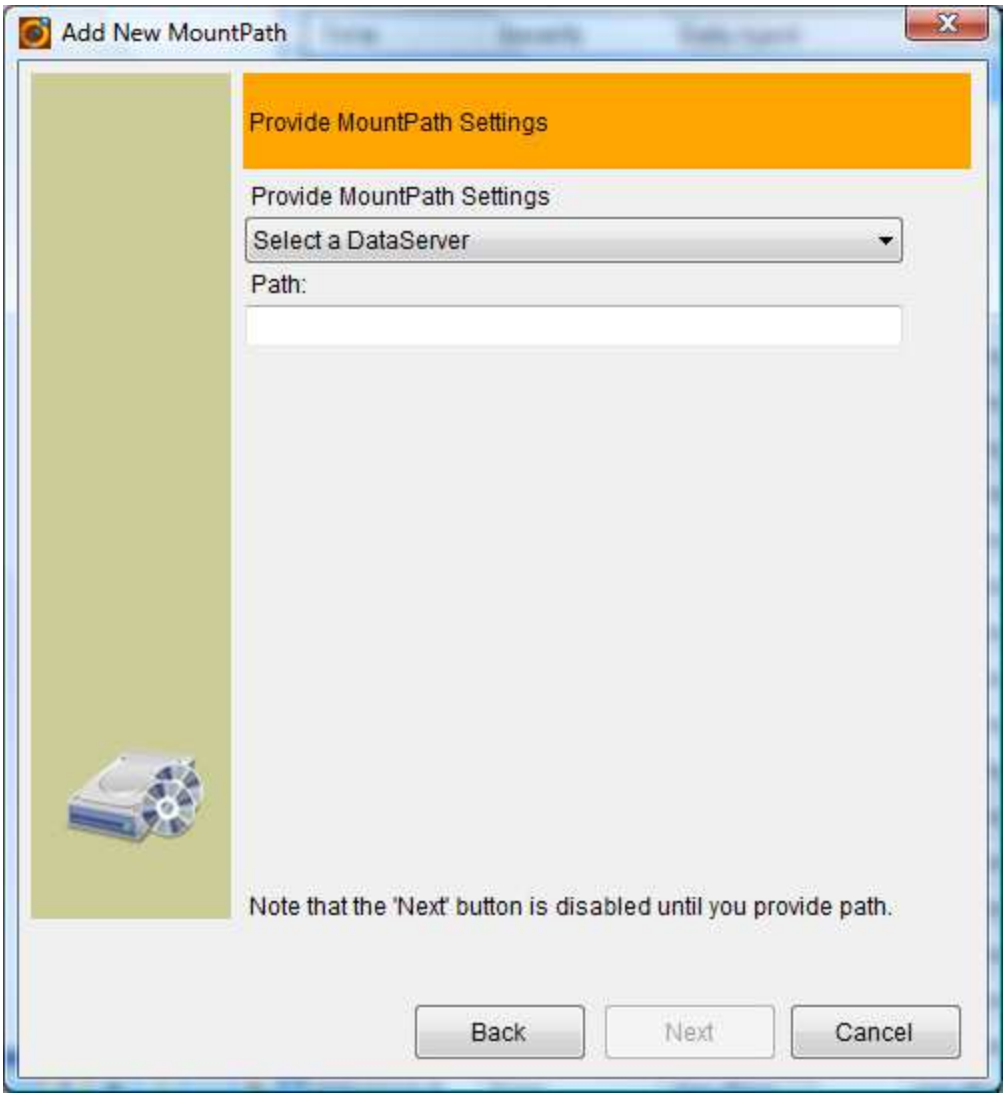
Step 2 – Select MountPath Connection Type



Depending on connection type selected:

Directly Attached

Step 2a.1 – Specify DataServer and full path

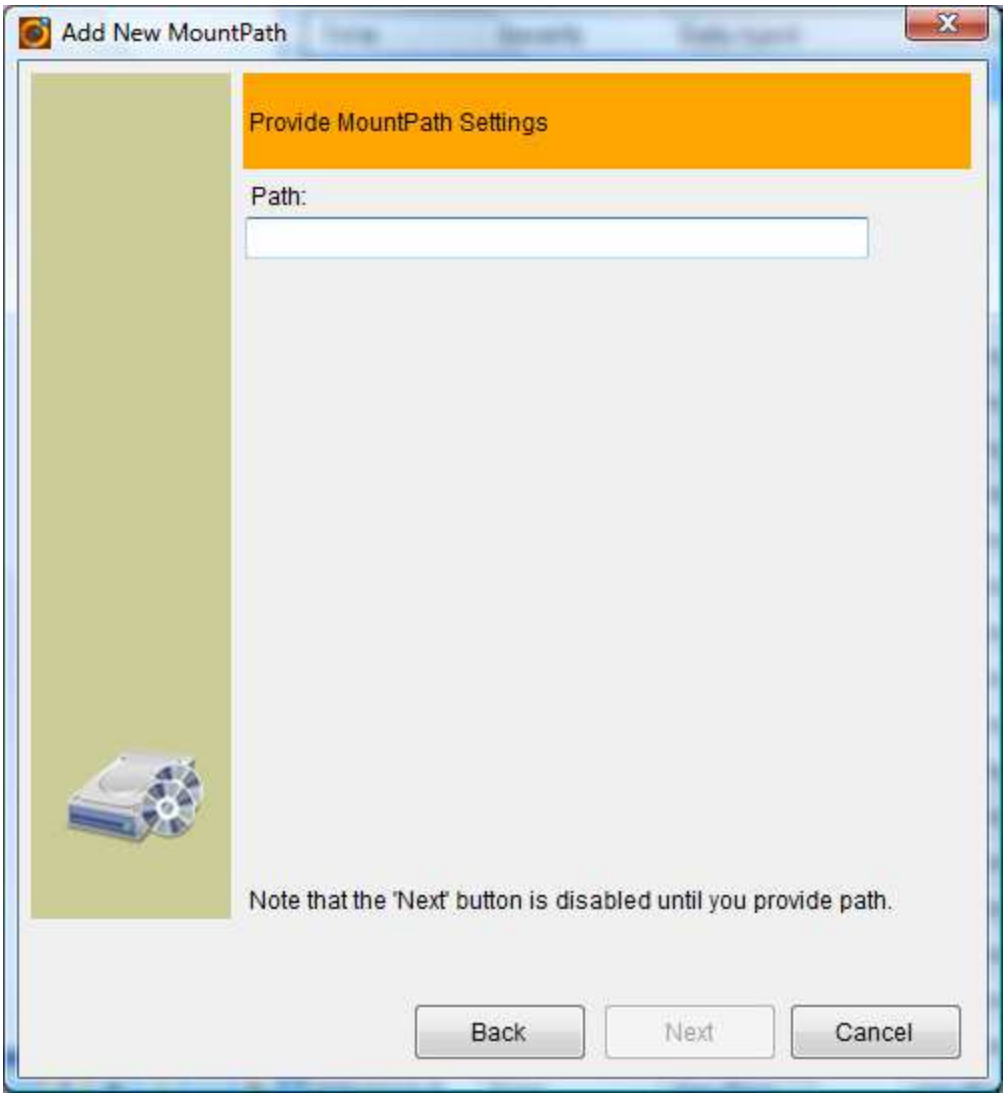


Please note, the full path folder must be accessible by the DataServer selected.

Click Next to continue to Step 3.

Network Shared

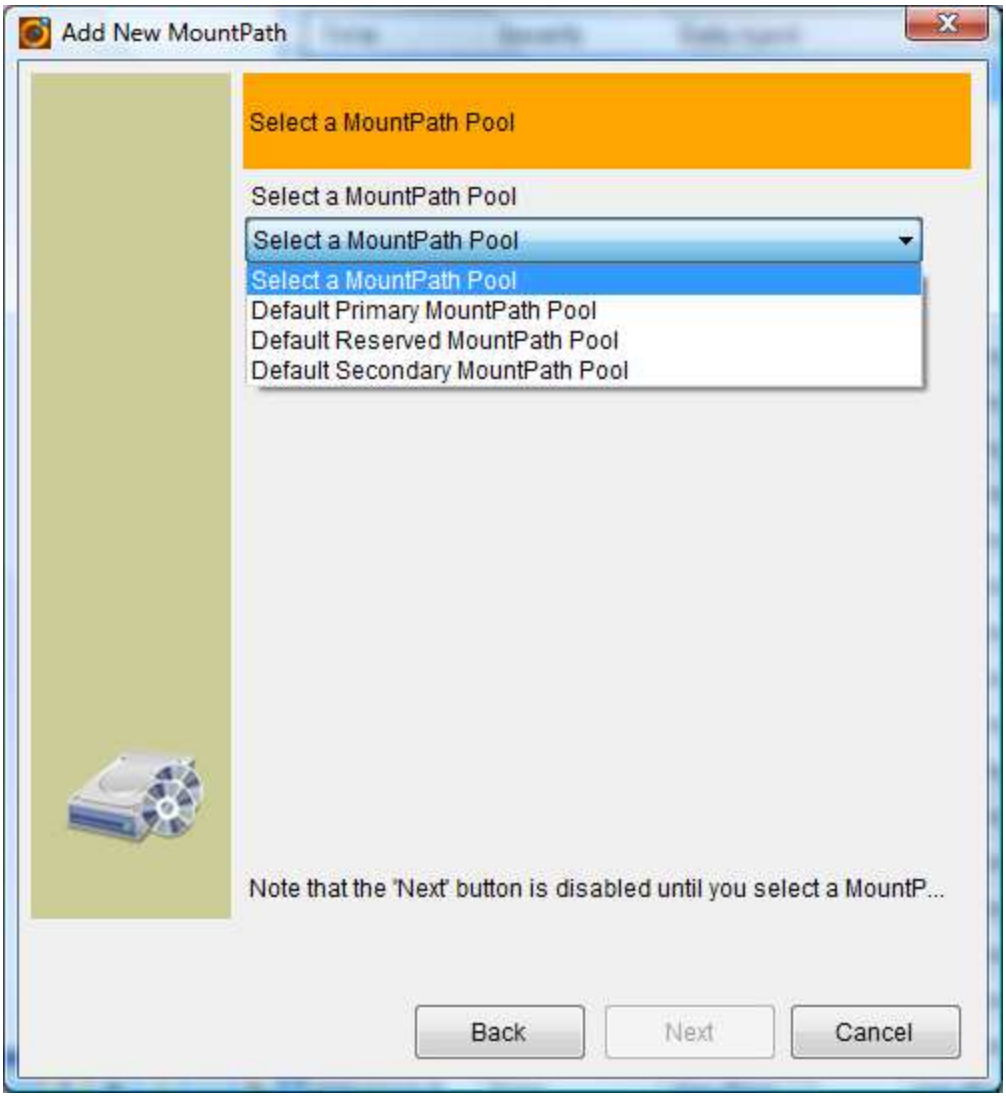
Step 2b.1 – Provide network shared path



Please note, the full path folder must be accessible by DataServers in RingStor system.

Click Next to continue to Step 3.

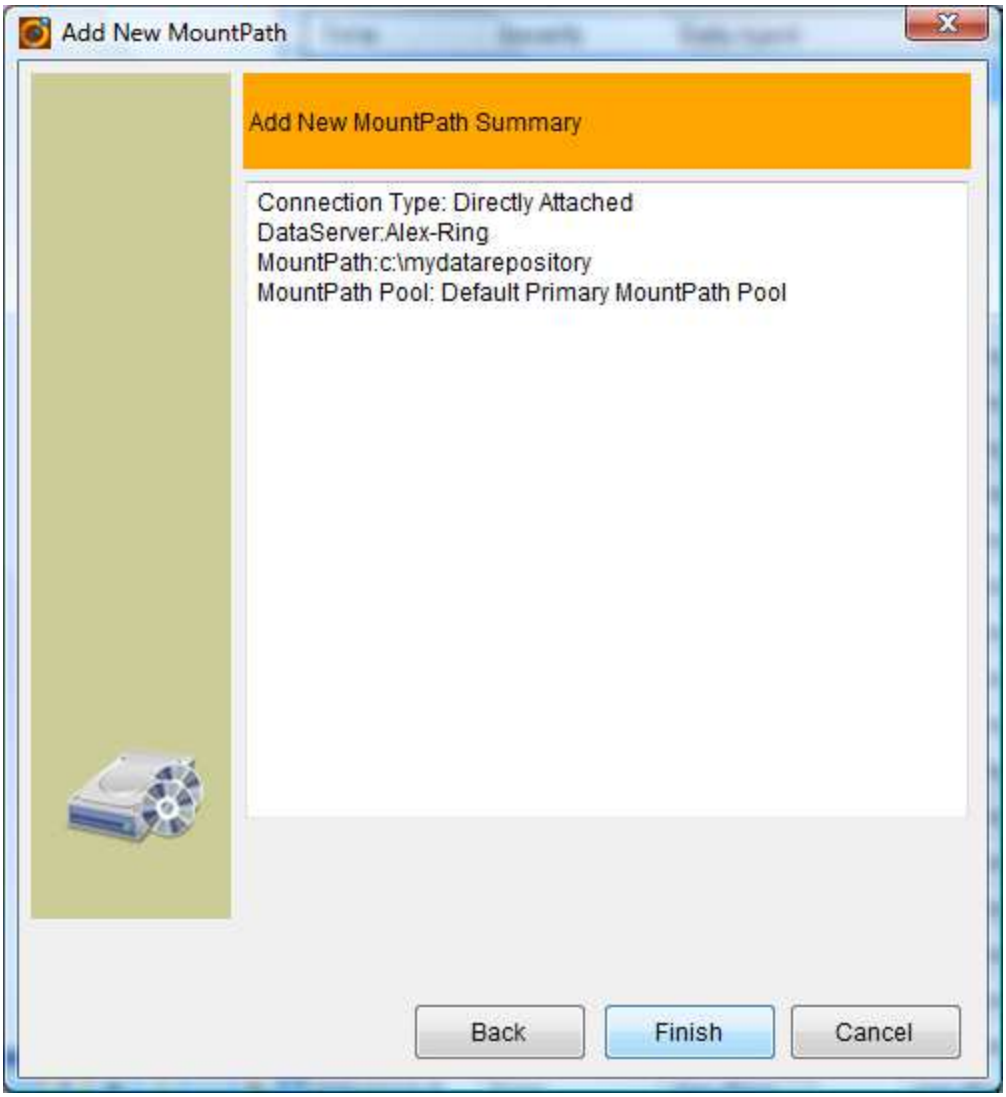
Step 3 – Select MountPath Pool



MountPath must belong to a MountPath Pool, select the MountPath Pool for this MountPath.

Click Next to continue.

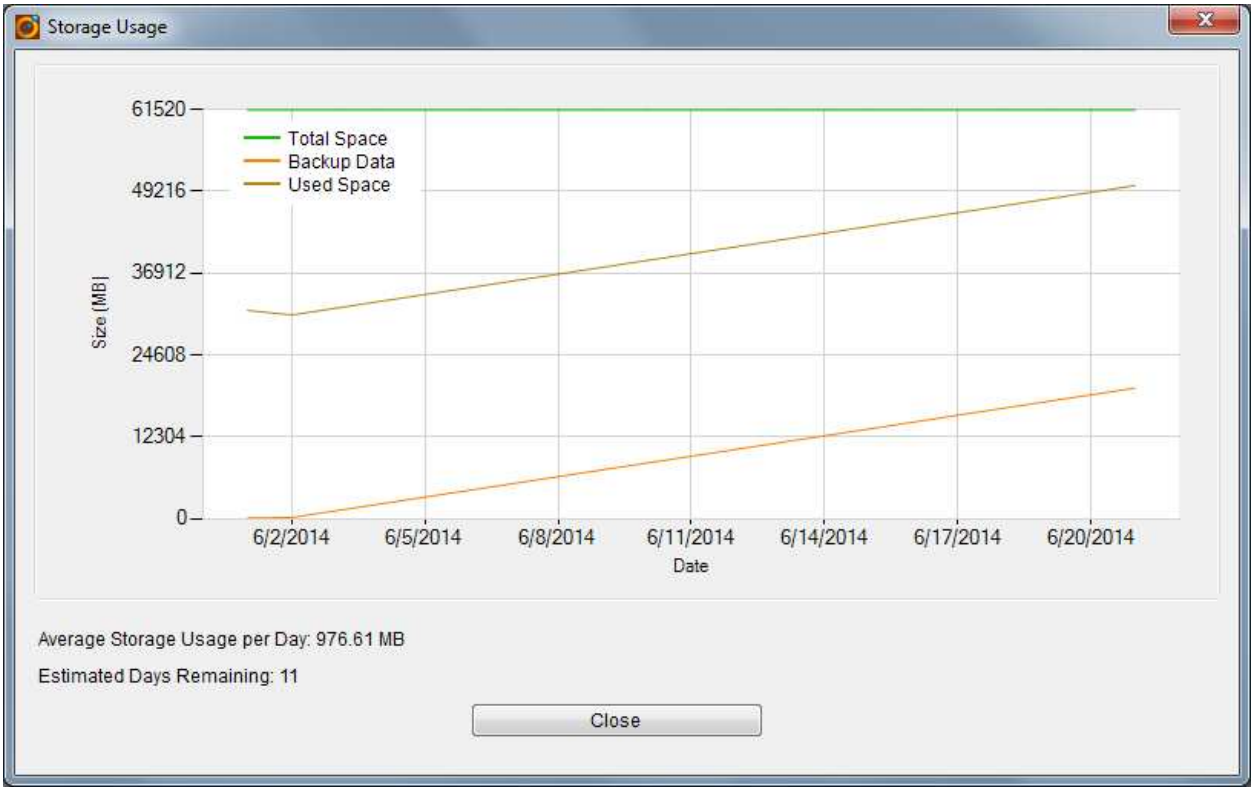
Final Step - Summary



Final step shows the summary for the MountPath. Click Back to make modifications, click Finish to create the MountPath. A pop up message will be displayed after creation completes.

9.4 Storage Usage

Storage Usage is a chart that display last 30 days of spaces for all Mount Paths and backup data. Administrator can view storage remaining and decide if and when more storage needs added to the cloud.



Average Storage Usage per Day: average growth of backup data

Estimated Days Remaining: if backup data grows at average rate, how many days all MountPath will be filled.

Please note, 5GB is default minimum reserve free space for each MountPath, backup will not be written to the Mount Path if its free space is less than minimum reserved space.

10 User Management

10.1 Role

User must log into RingStor system with username and password to access the system via RingStor Explorer. The activity of user is tracked by RingStor and available in User Activity Report.

Users are grouped by roles. Permission to RingStor system is determined by the role user belongs to. There are fixed roles supported in RingStor system.

- Administrator – have permission to access all aspects of RingStor
- DataAgent Operator –a user allowed to install and manage a DataAgent

10.2 User

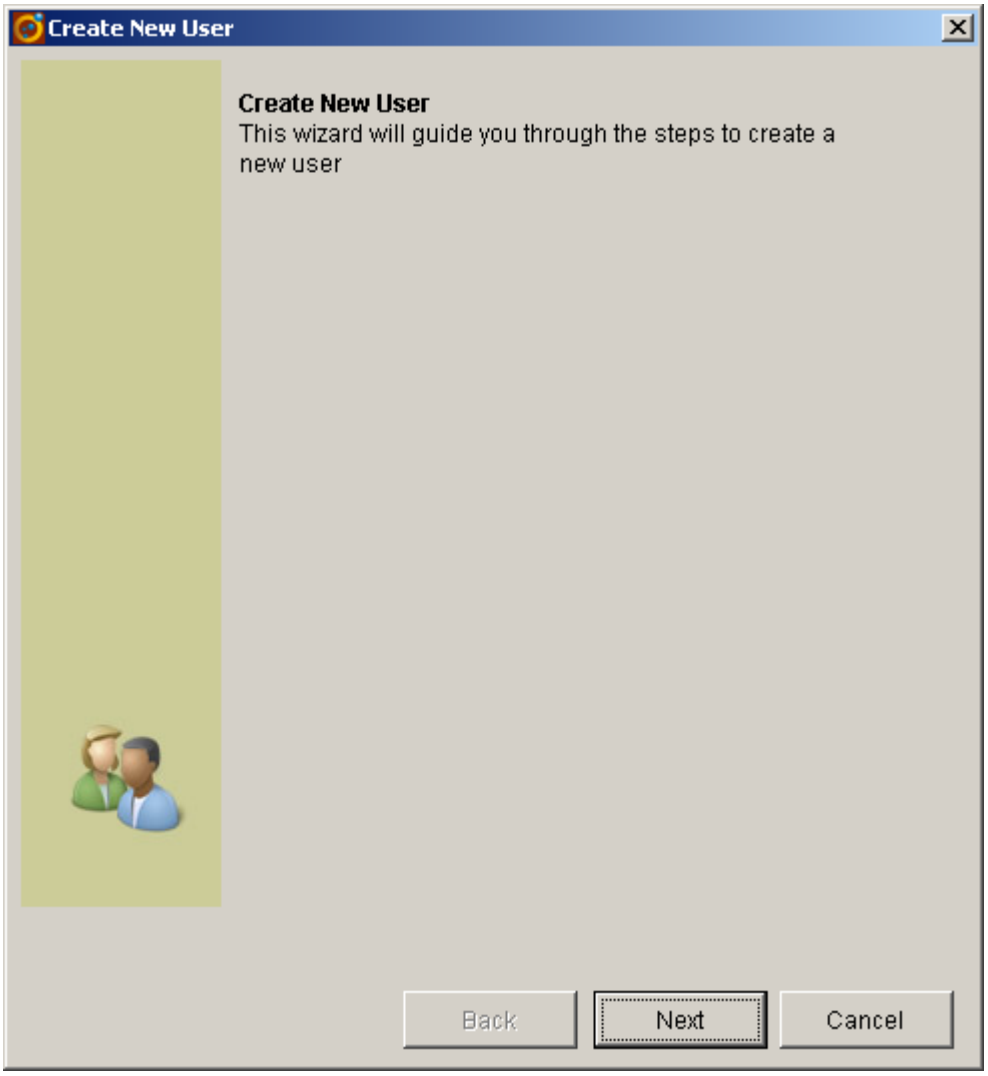
A user can belong to several roles. The permission of the user is aggregation of permission from all his/her roles.

Creating a new user is a series of steps managed by **Create New User Wizard** accessible from any of following places within **RingStor Explorer**.

User Explorer -> Right Click a Role -> Create New User

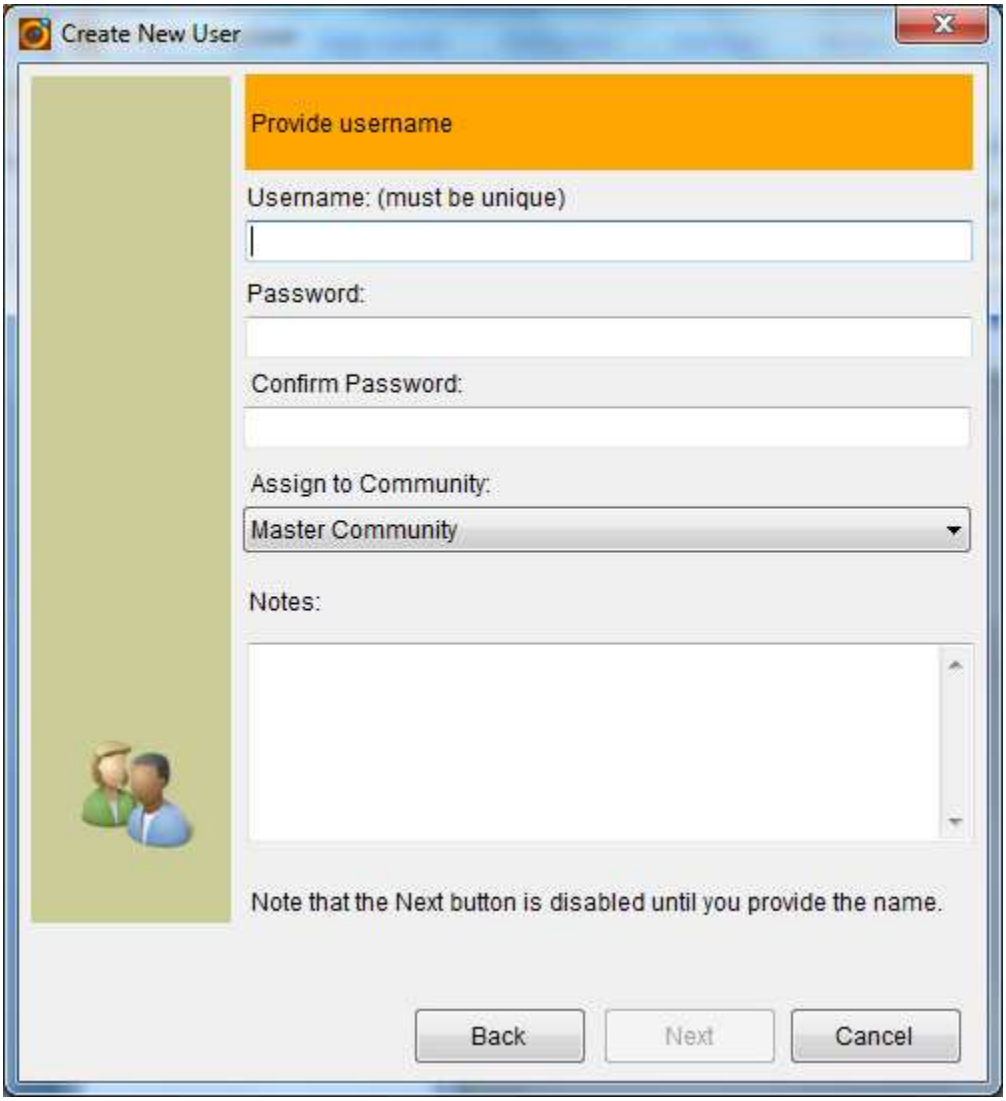
Create New User Wizard

Step 1 – Introduction



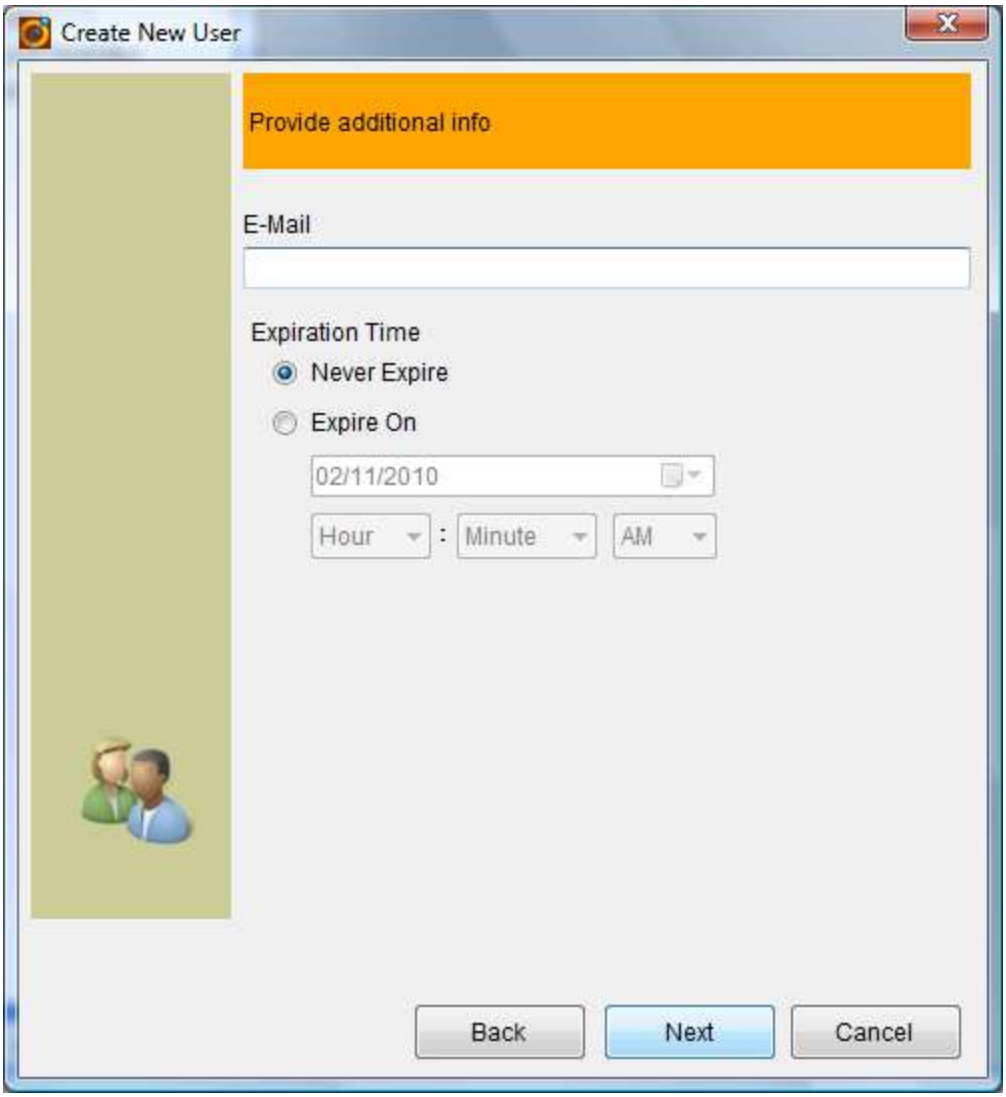
Create a new RingStor user. This user is only applicable to its community.

Step 2. – Username and Password



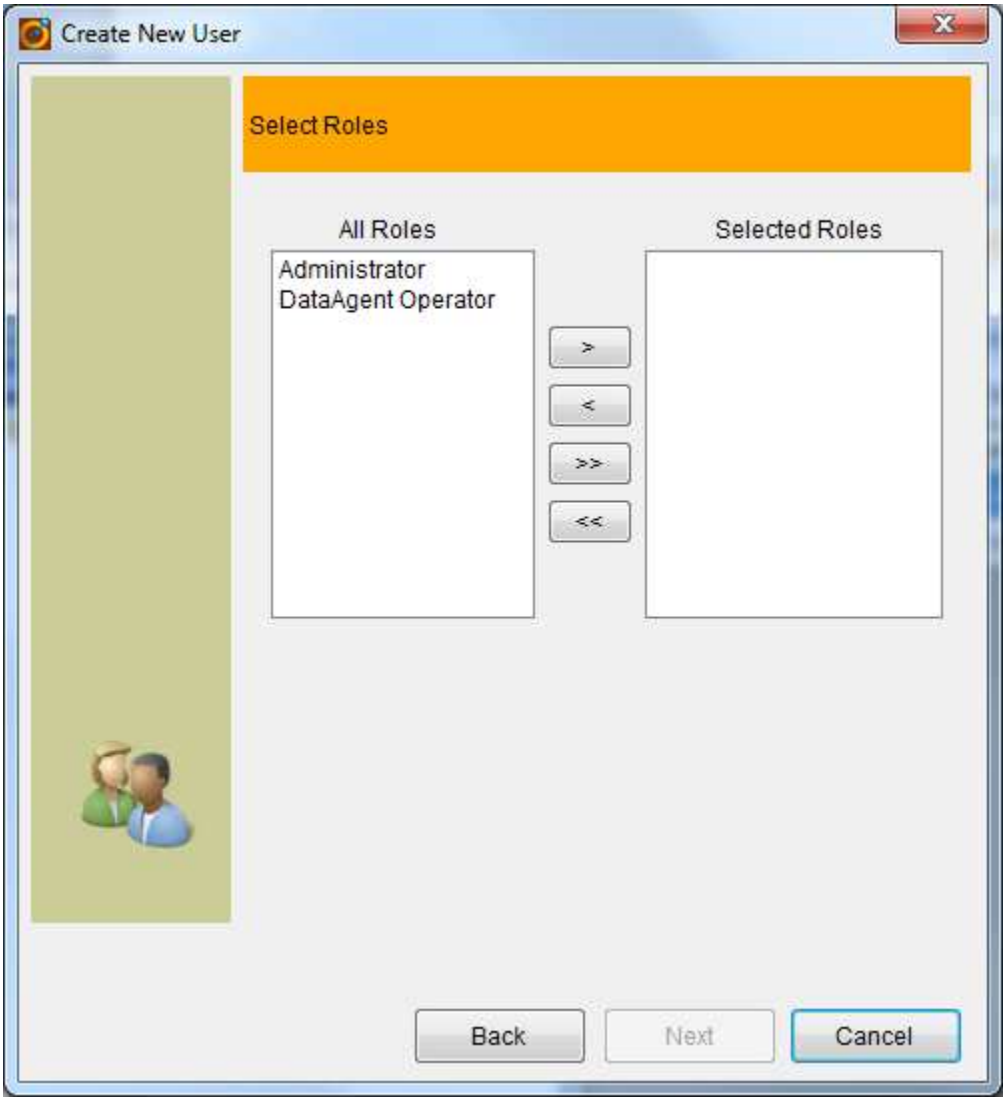
Username must be unique in RingStor system.

2.2 Provide email and expiration time

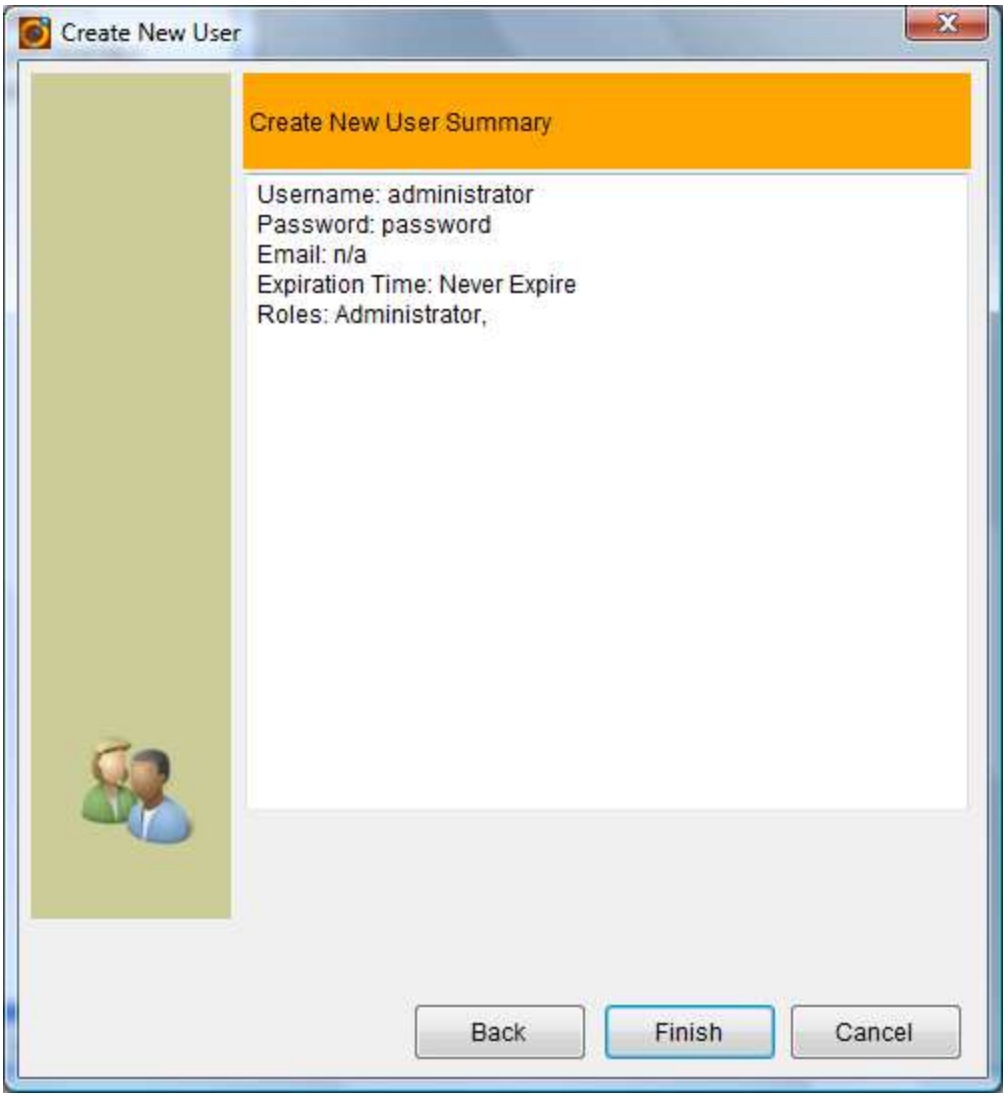


Email is optional field.

Step 3 – Assign roles



Step 5 – Summary



Review the user data, click Back to make modification, click Finish to create this user.

11 Reports

11.1 Introduction

Reports can be generated from RingStor Explorer to provide summary for RingStor. Following reports are supported in RingStor:

- Task Report – generate history info for tasks
- Event Report – generate events for a given time frame, etc
- Storage Report – generate summary info for all MountPaths
- DataServer Report – generate summary info for all DataServers
- DataAgent Report – generate summary info for all DataAgents
- User Report – generate summary info for all users
- User Activity Report – generate a list of activities for a user
- Data Protection Report – generate report on DataSet's protection status for a DataAgent
- Task Detail Report – generate report on files backed up by a task

Report can be generated in several formats, CSV, Html.

Report can also be scheduled and emailed to specified users when ready.

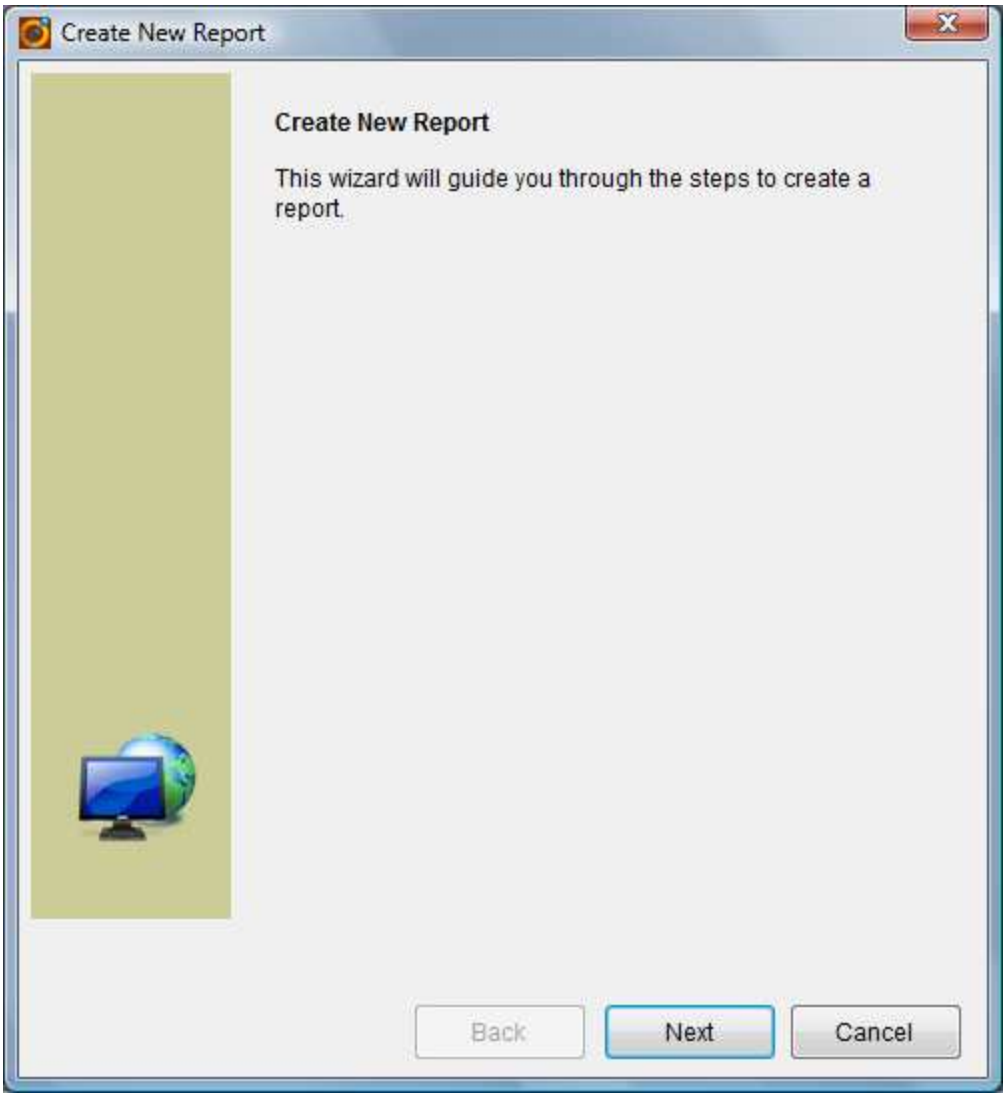
11.2 Create New Report

Creating a new report is a series of steps managed by **Create New Report Wizard** accessible from any of following places within **RingStor Explorer**.

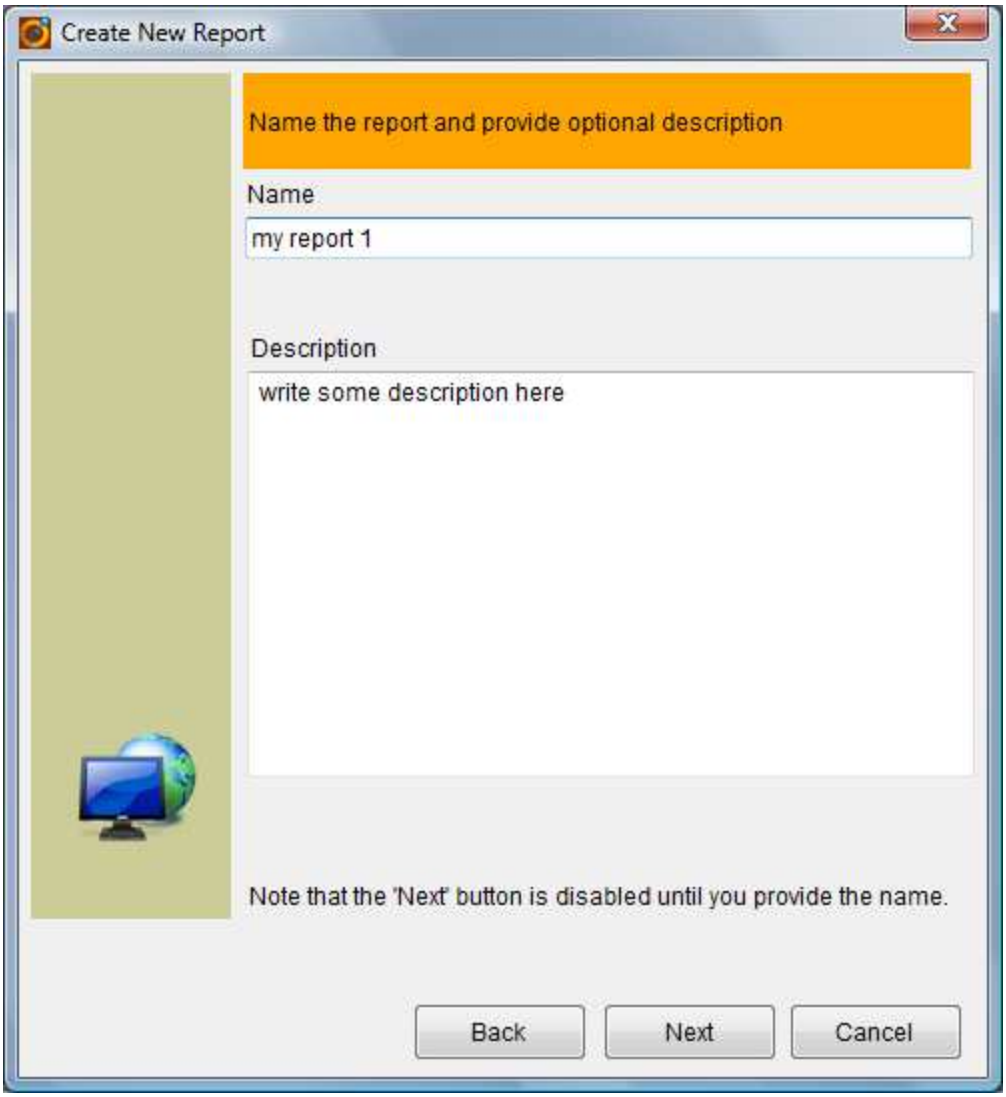
Top Menu -> Report -> Create New Report

Create New Report Wizard

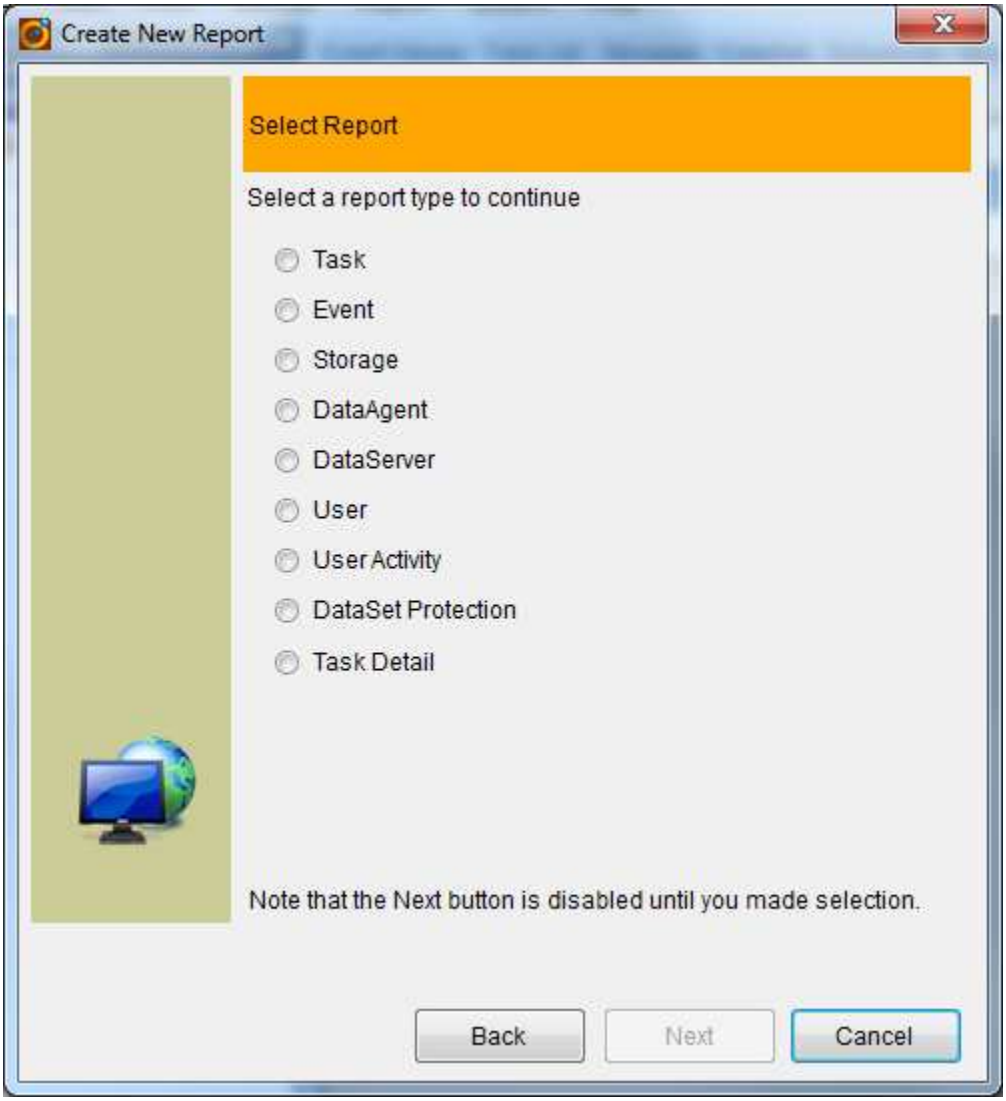
Step 1 – Introduction



Step 2 – Name the report

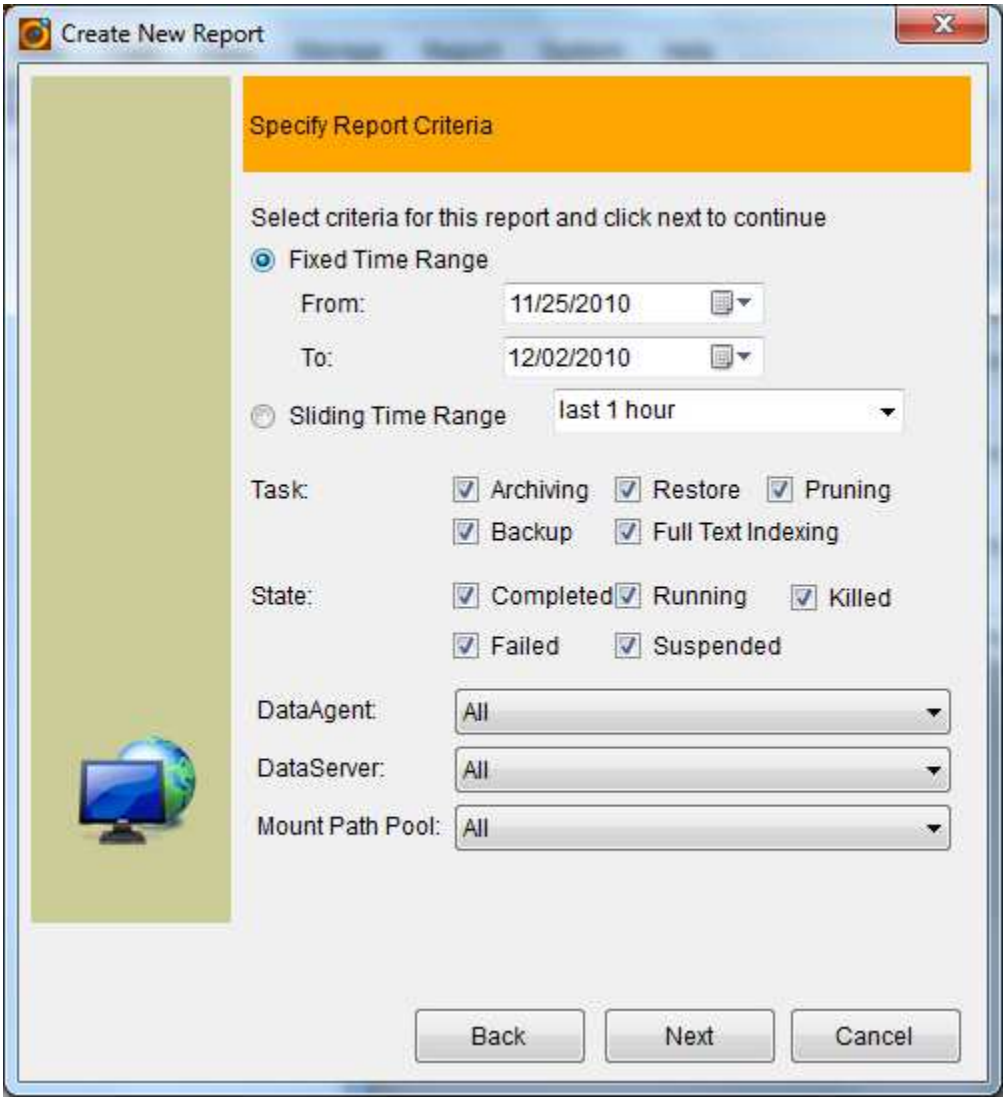


Step 3 – Select report type

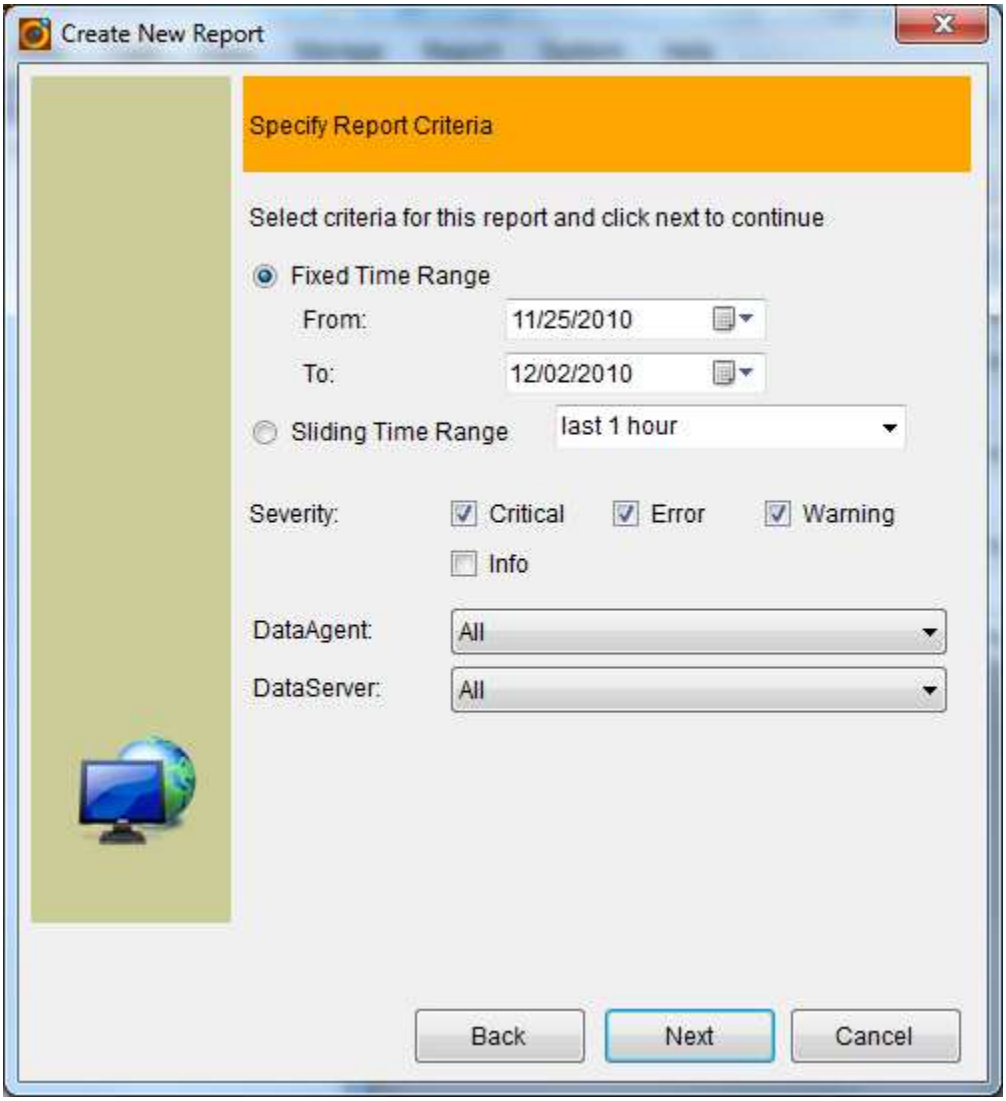


Step 4 – Set report criteria

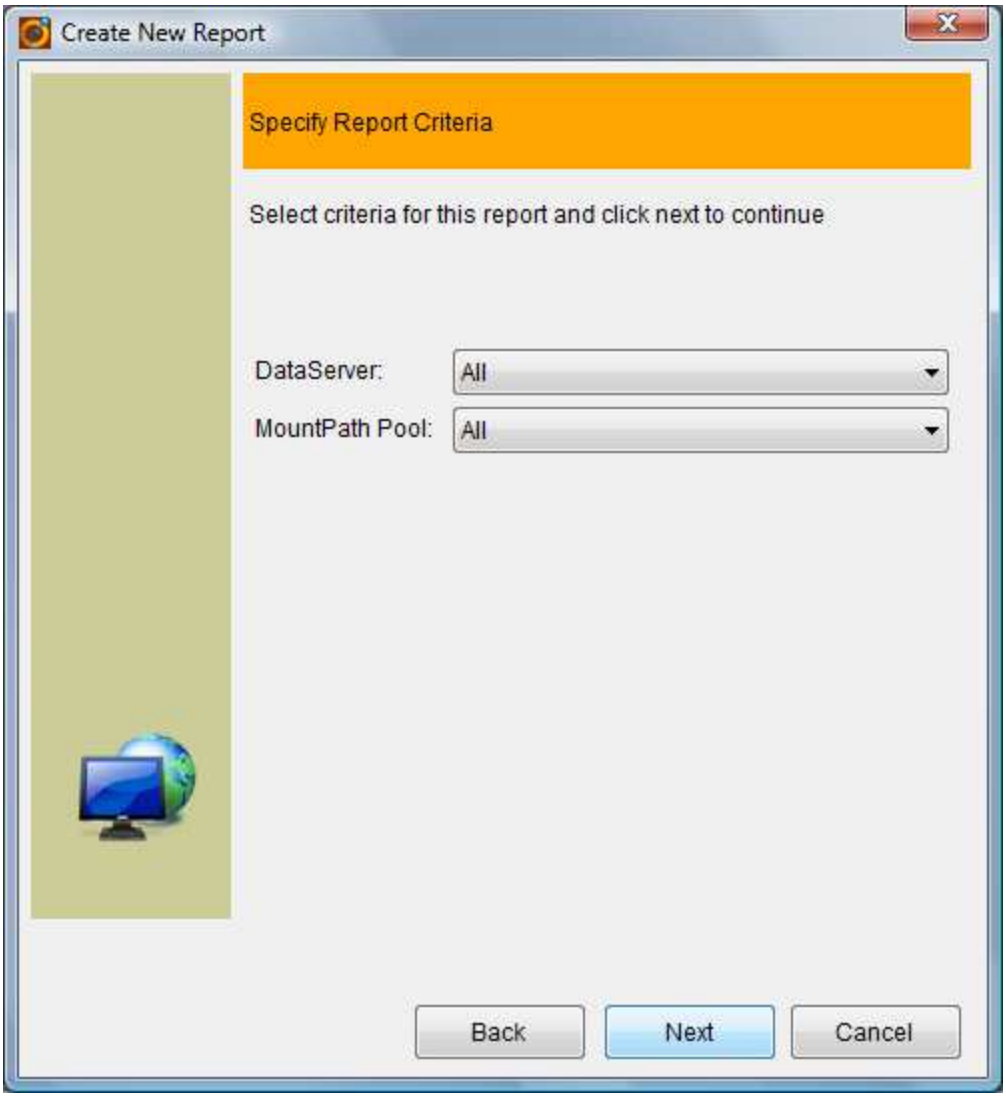
Task Report



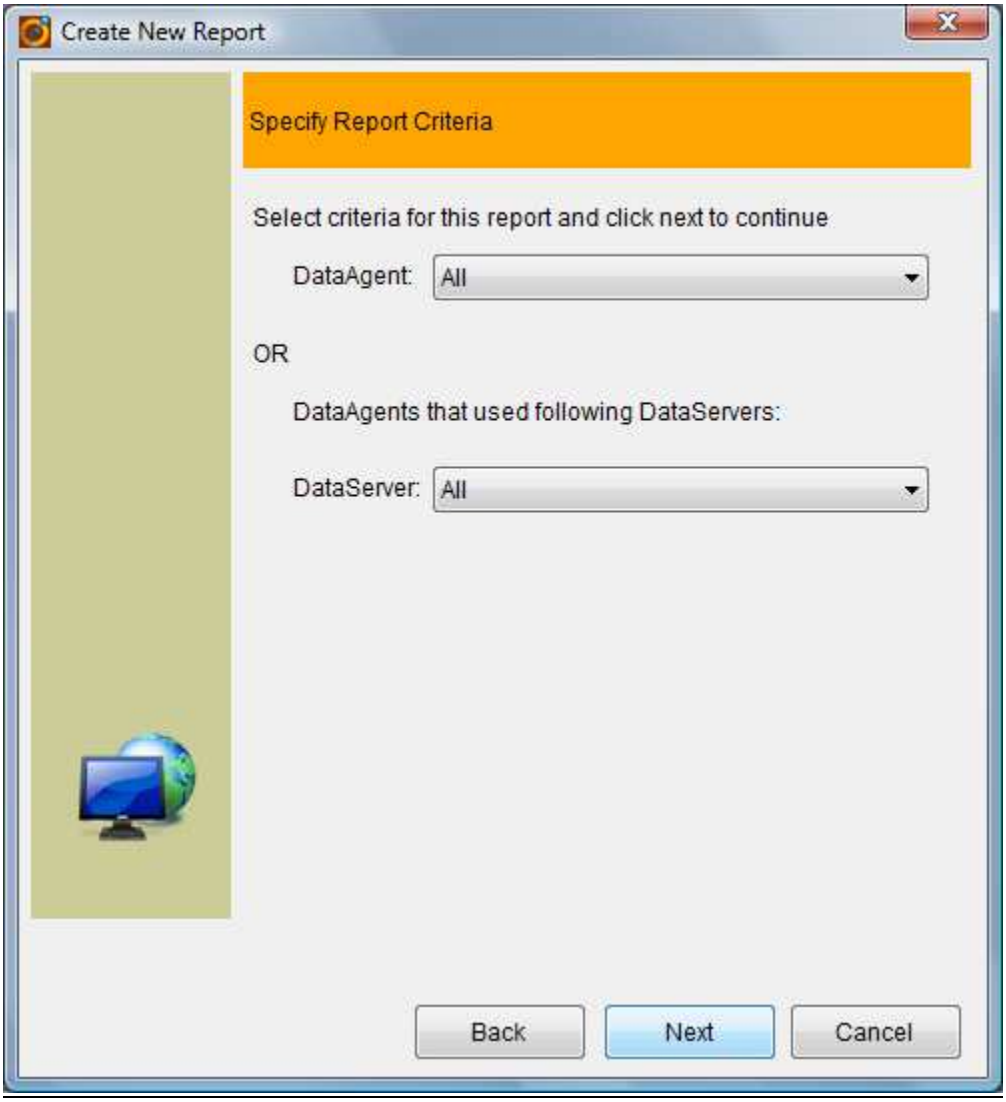
Event Report



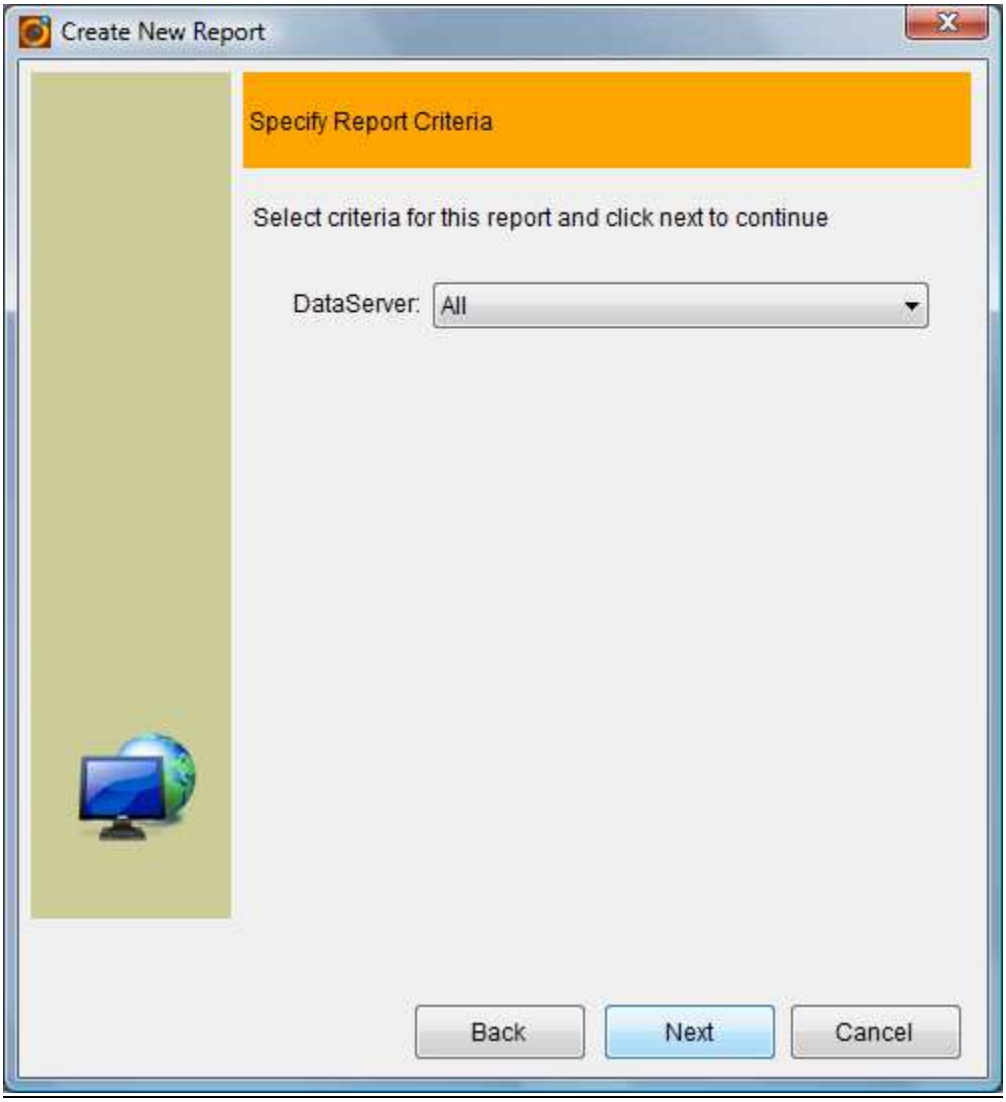
Storage Report



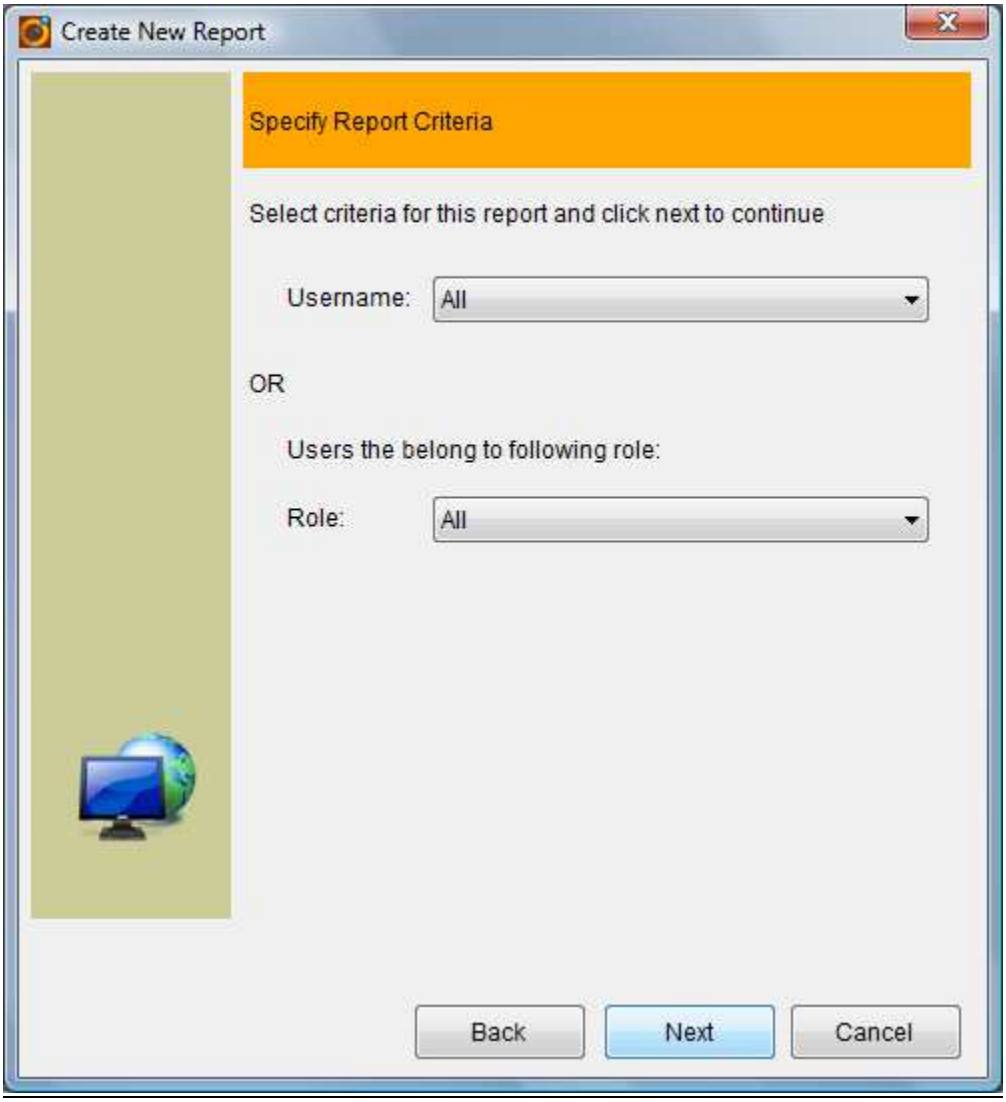
DataAgent Report



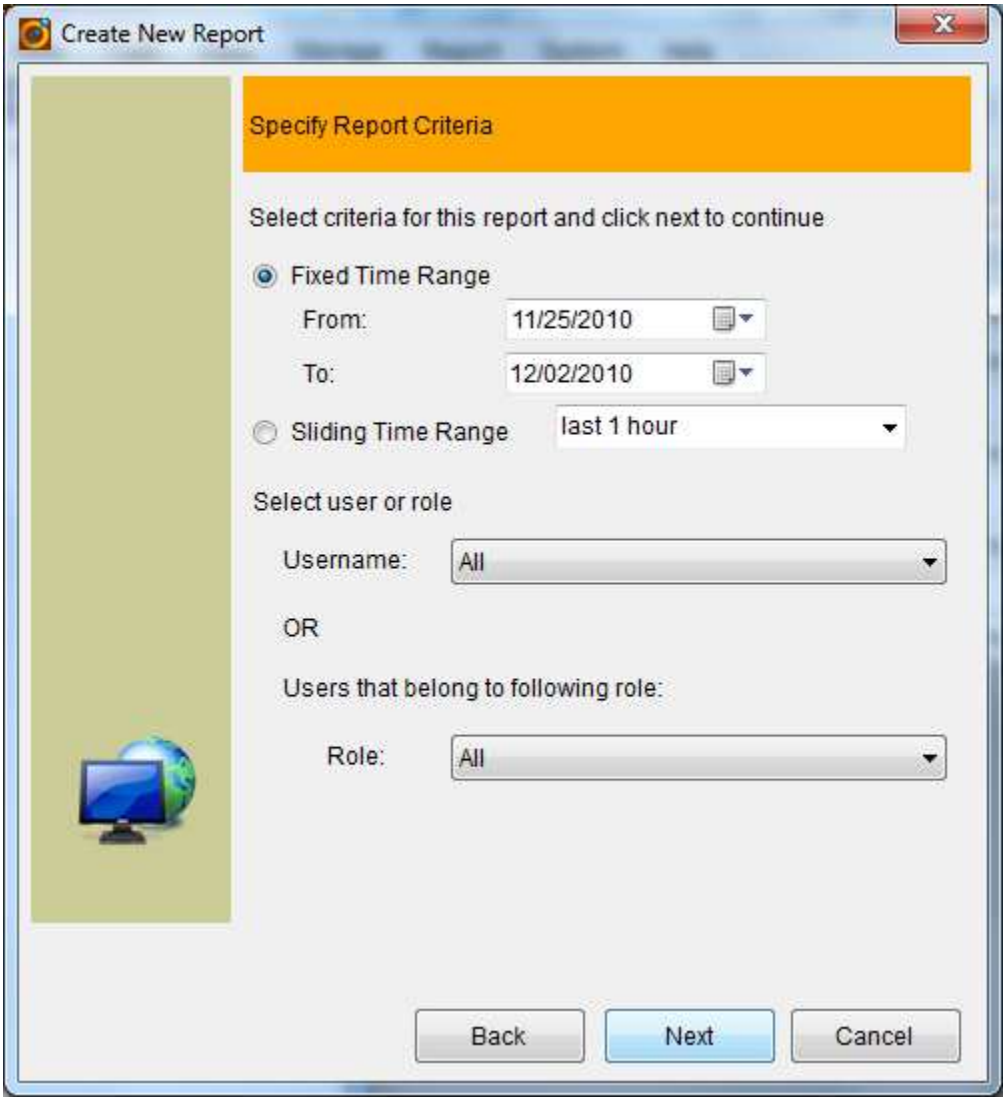
DataServer Report


Create New Report
Specify Report Criteria
Select criteria for this report and click next to continue
DataServer:
All
Back
Next
Cancel

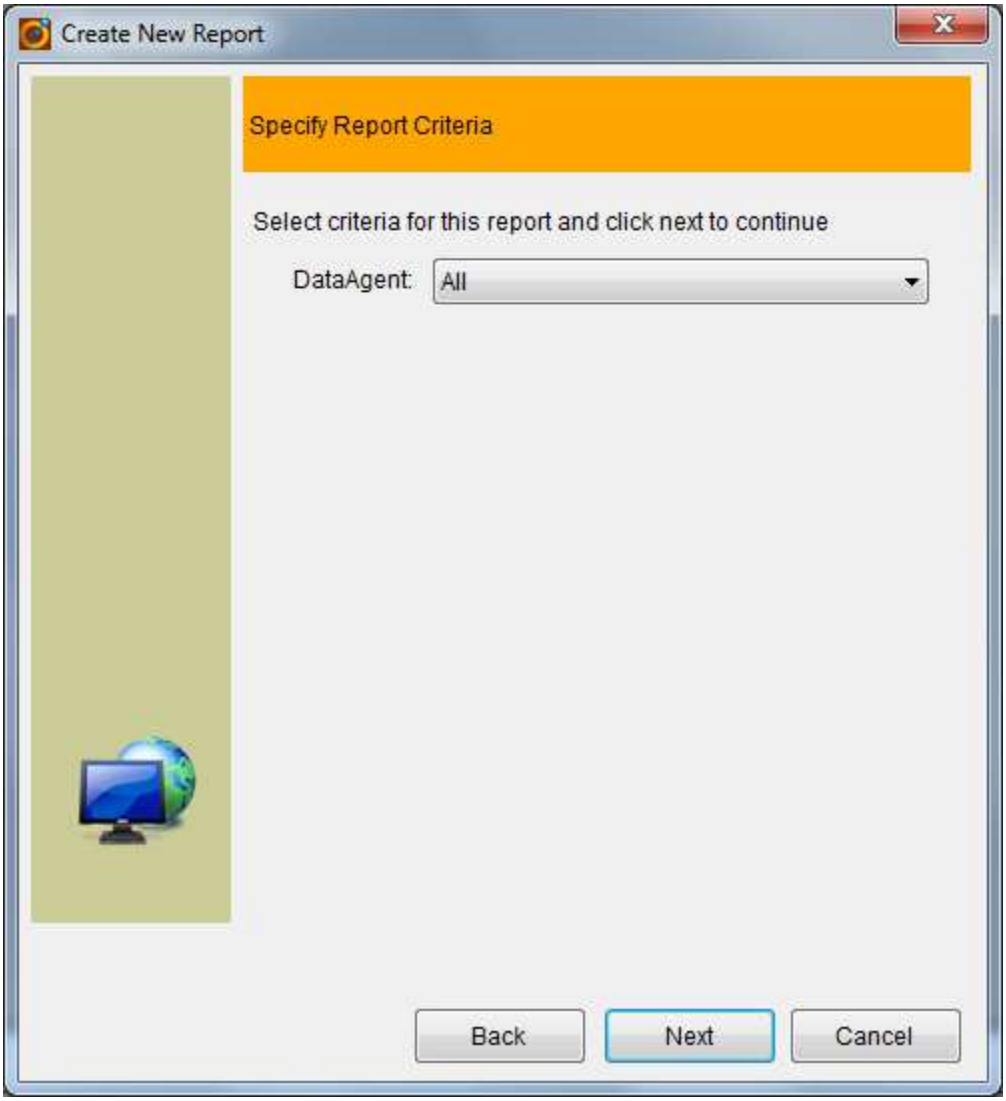
User Report



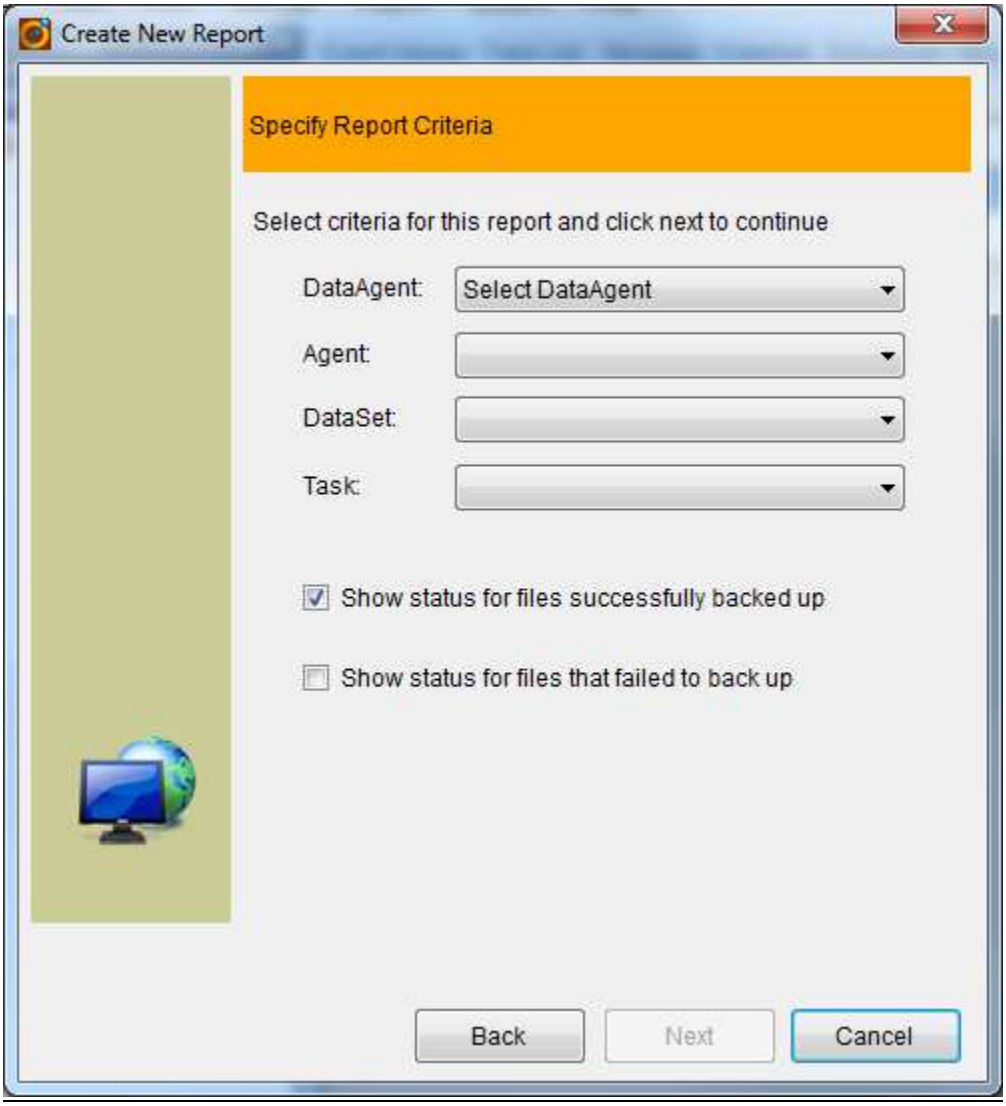
User Activity Report



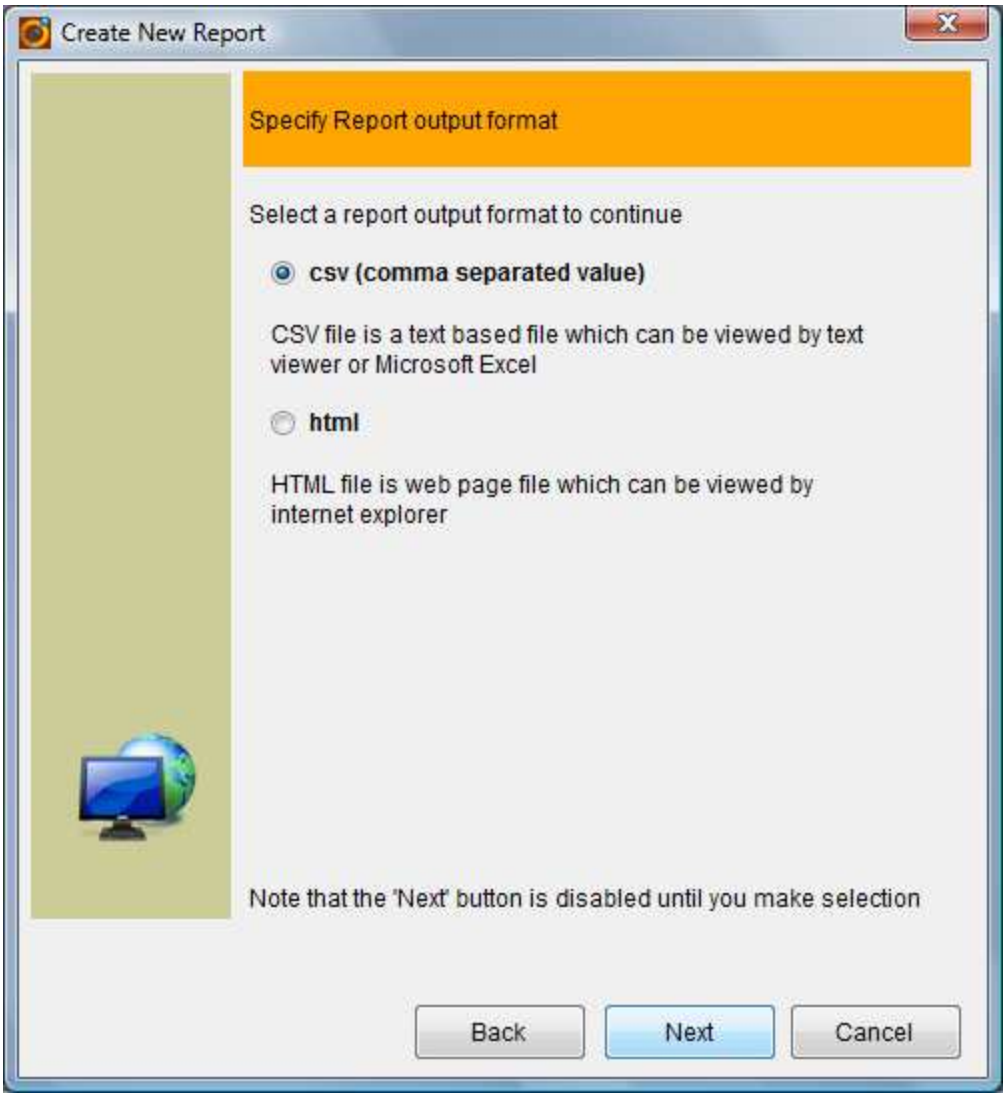
Data Protection Report



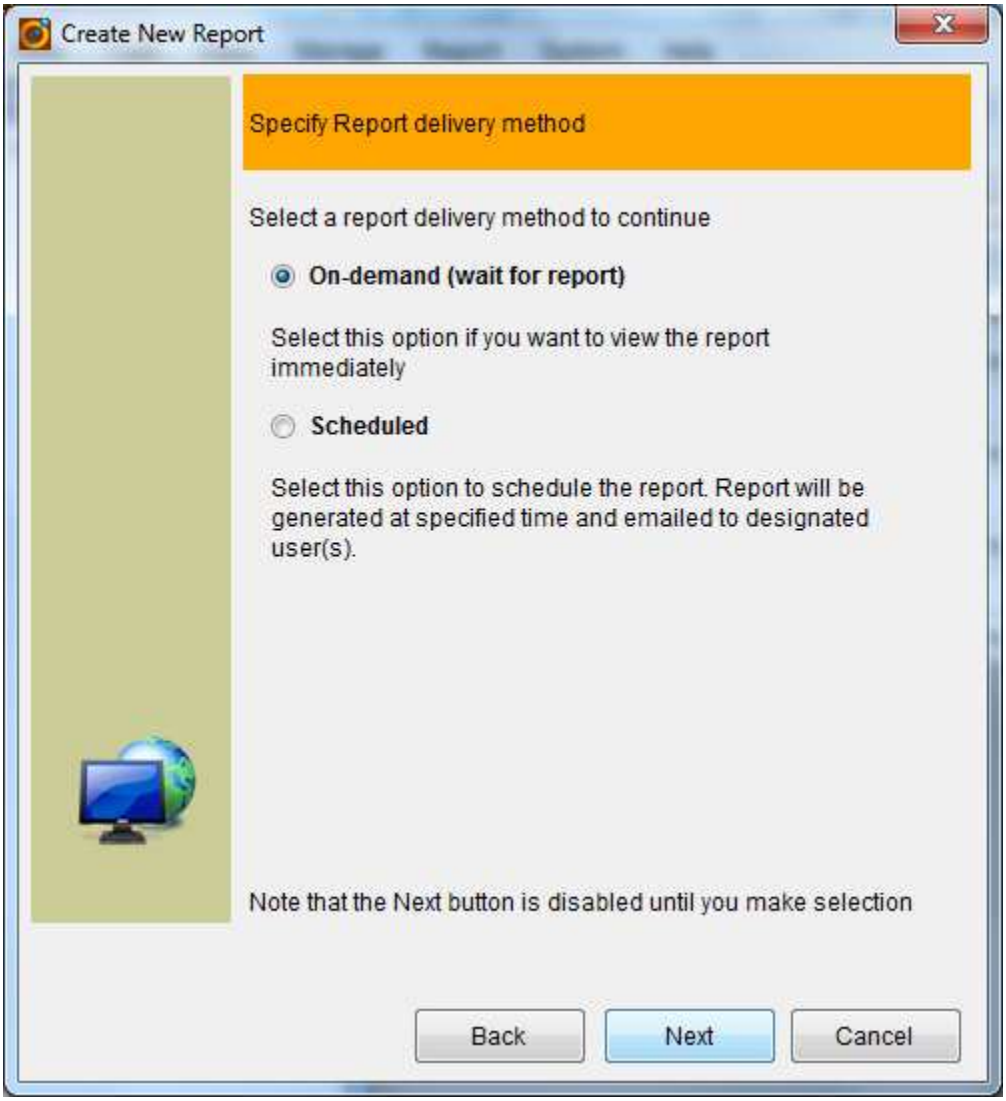
Task Detail Report



Step 5 – Select output format



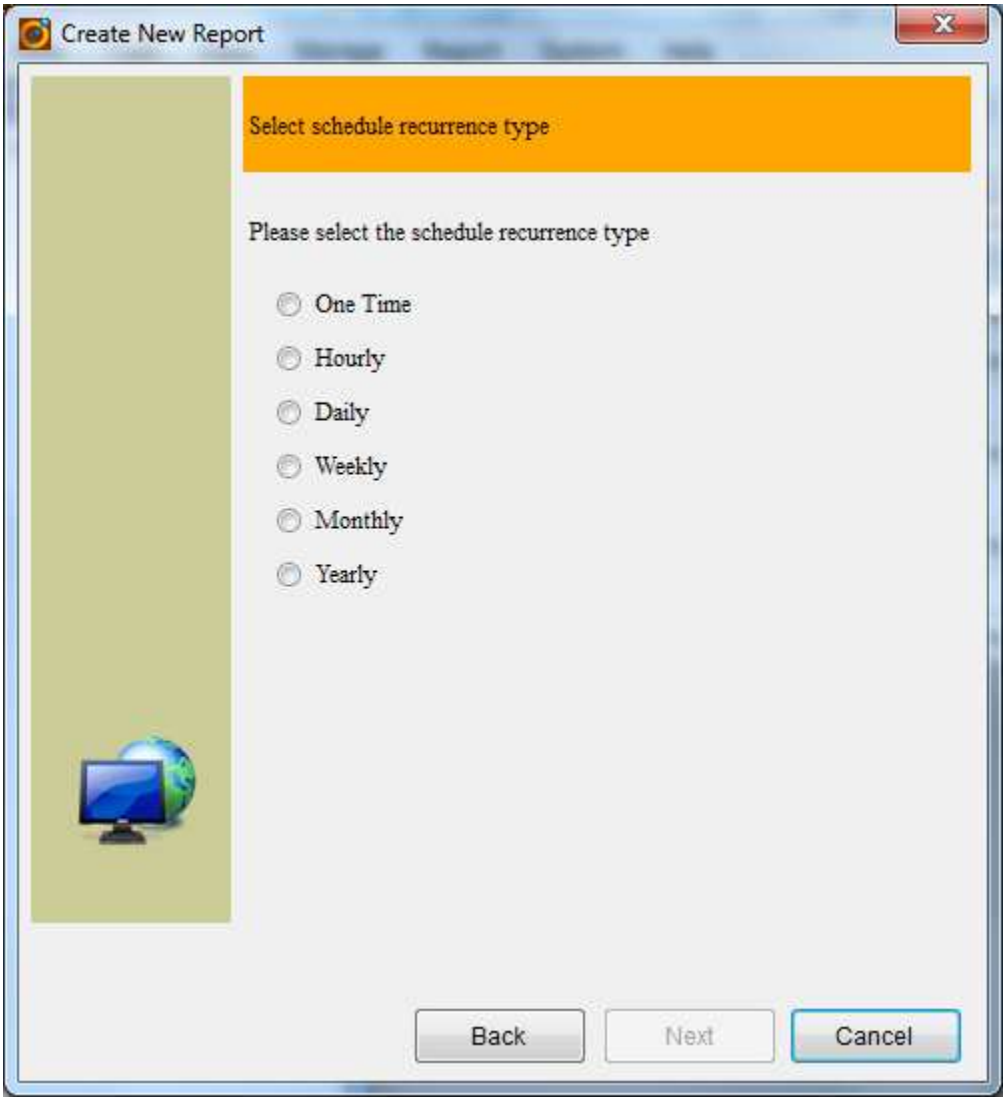
Step 6 – Select delivery method



If On-demand is selected, click Next to go to final step.

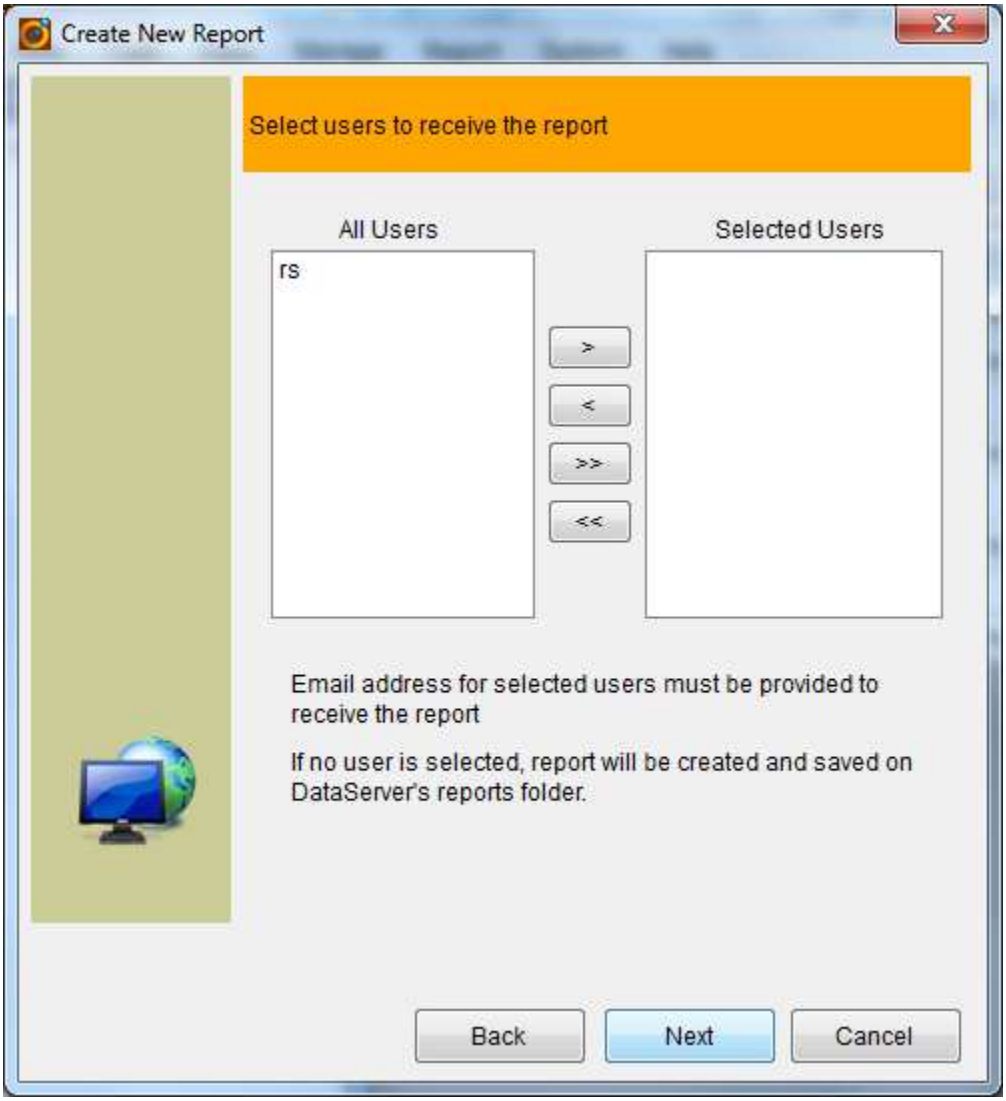
If Scheduled is selected, click Next to continue to set up the schedule.

Step 7 – Select schedule reoccurrence

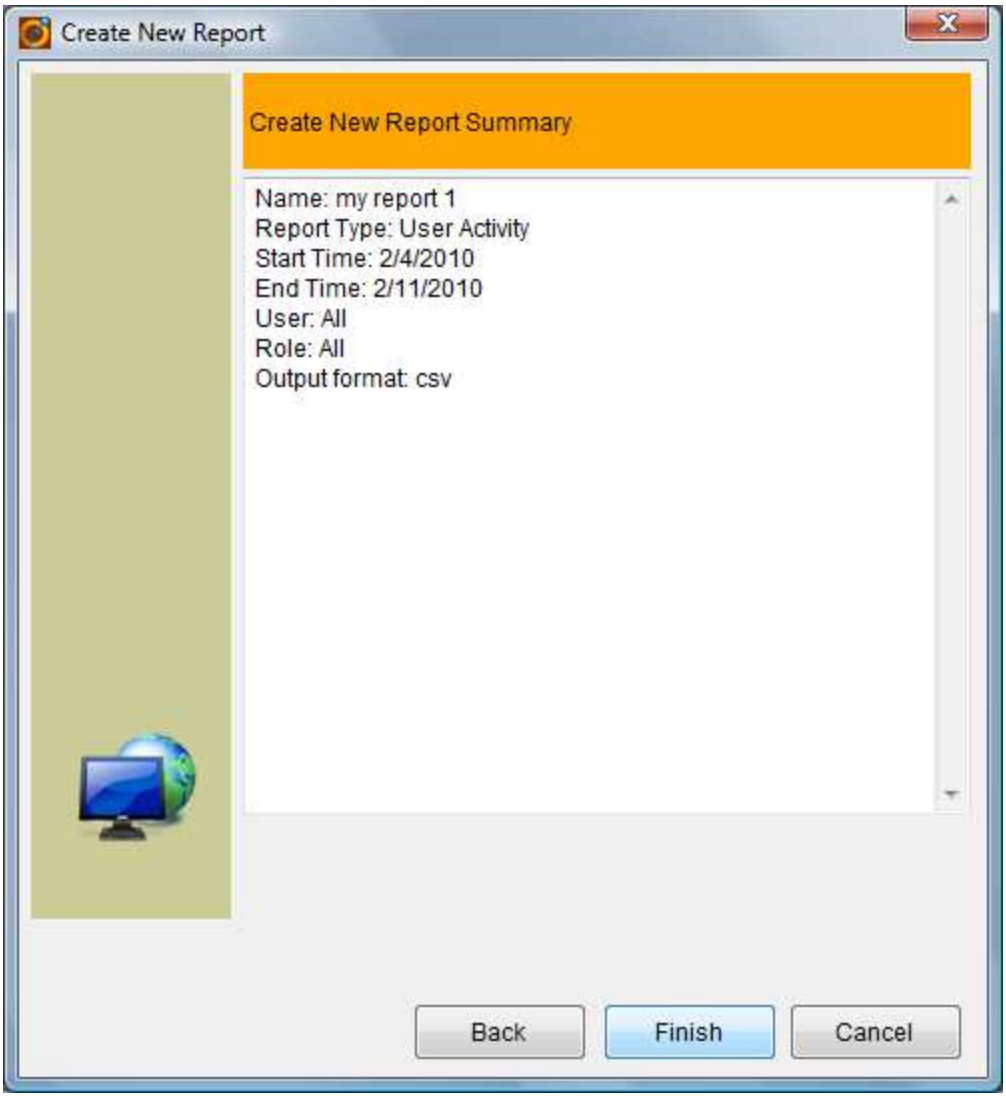


Depending on which recurrence is selected, use following step to provide schedule's details.

Step 8 – Select users that will receive the report



Step – Final Step



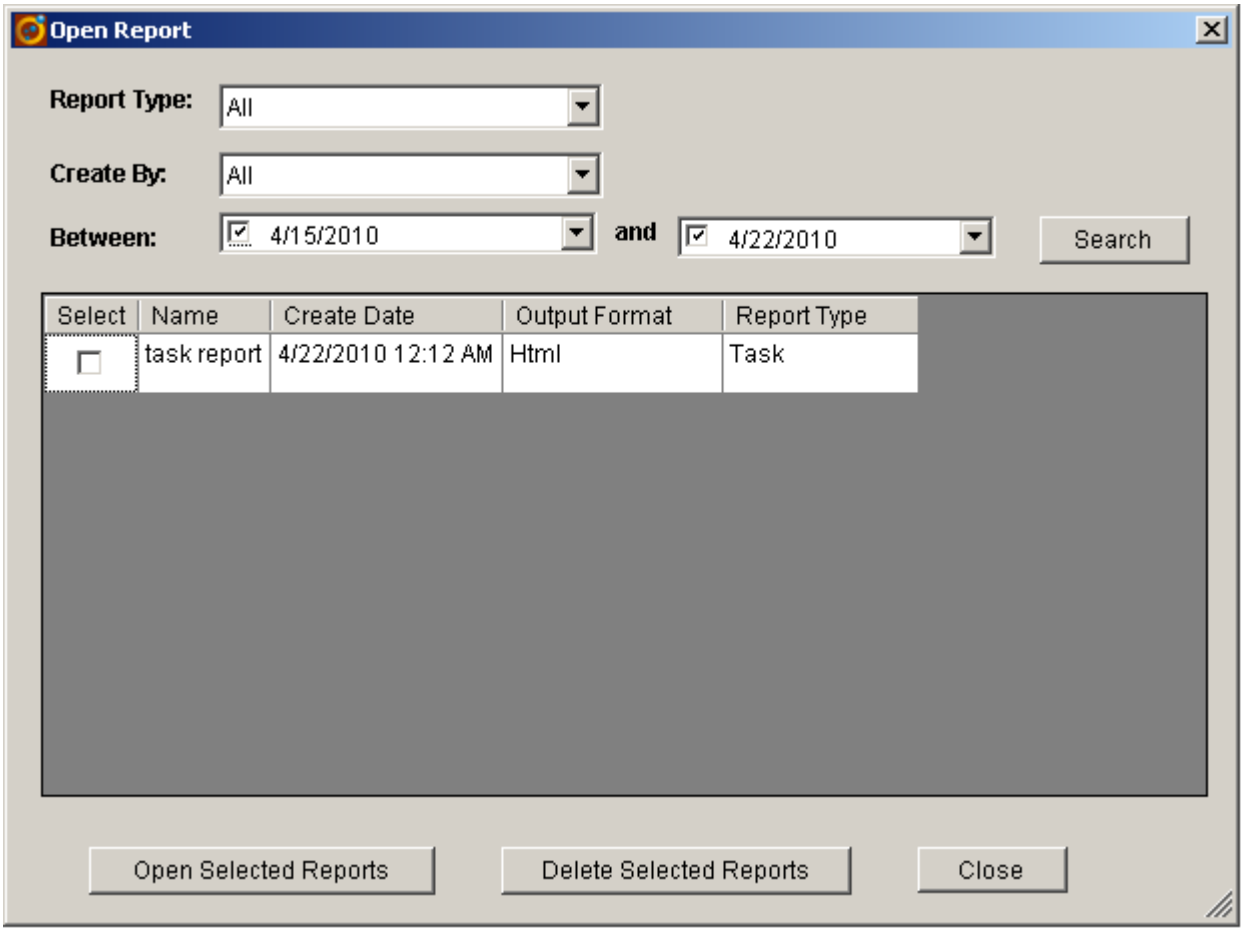
Click Back to make modification, click Finish to generate and open the report.

11.3 Open Report

Generated reports are saved in cloud system and can be retrieved and opened for review. User can access open report menu from the following place:

Main Menu -> Reports -> Open Report

Following screen is the Open Report screen where user can specify the criteria to search reports. User can further select operation on selected reports.


Open Report
Report Type:
All
Create By:
All
Between:
4/15/2010
and
4/22/2010
Search
Select
Name
Create Date
Output Format
Report Type
task report
4/22/2010 12:12 AM
Html
Task
Open Selected Reports
Delete Selected Reports
Close

12 System Administration

12.1 DataServer

12.1.1 Attach

Attach is an operation to add a DataServer to RingStor system and make it available for DataAgents for data protection. You may need attach in following scenarios:

- Put a detached DataServer back to RingStor from RingStor Explorer
- Add a newly installed DataServer to RingStor during its installation

Attaching a DataServer “grows” RingStor system. More DataServers in RingStor, less load each DataServer takes, thus faster data can be transmitted to RingStor for protection.

This feature of RingStor provides a real time, adaptive infrastructure. You may consider attaching more DataServers in the following scenarios:

- More data on existing DataAgents are added for protection
- New DataAgents are added
- DataServers are overloaded, some tasks are running slow or halting due to lack of data streams

12.1.2 Detach

Detach is an operation to remove a DataServer out of RingStor system and make it unavailable for DataAgents for data protection. You may need detach in following scenarios:

- DataServer fails due to hardware, operating system
- DataServer requires upgrade
- Make DataServer unavailable for DataAgents to use temporarily

Detach will automatically occur for a DataServer if any of following occurs:

- License is invalid or expired

Detaching a DataServer “shrinks” RingStor system. Less DataServers in RingStor, more loads other DataServers will take, thus slower data can be transmitted to RingStor for protection.

12.2 DataAgent

12.2.1 Attach

Attach is an operation to add a DataAgent to RingStor system and make the data on it available for data protection. You may need attach DataAgent in following scenarios:

- Put a detached DataAgent back to RingStor from RingStor Explorer
- Add a newly installed DataAgent to RingStor during its installation

12.2.2 Detach

Detach is an operation to remove a DataAgent out of RingStor system and make data on it unavailable for protection. You may need detach DataAgent in following scenarios:

- DataAgent fails due to hardware, operating system
- DataAgent requires upgrade
- Temporarily stop all future tasks on DataAgent

12.3 Event Viewer

System events can be viewed from Event Viewer tab in RingStor Explorer. Please see RingStor Explorer section for more details.

12.4 Task Manager

Current tasks are displayed and can be managed in Task Manager from RingStor Explorer.

Depending on the state of the task, you may manage task by

Resume – resume a task that is either suspended or in wait state

Suspend – suspend a task that is either running or in wait state

Kill – kill a task

Each task goes through different state. Following tables list the possible states:

Scanning – task is scanning files and folders

Running – task is transmitting data

Assembling – task is assembling data blocks into application data

Suspended – task is suspended by user, stop running

Killed – task is killed by user

Failed – task failed

12.5 License Management

License must be valid for DataServer to start successfully. If license is invalid or expired, DataServer will detach

itself from RingStor, thus make it unavailable for all tasks.

For current license info and usage, click Menu -> System -> License. Following is an example of such screen:

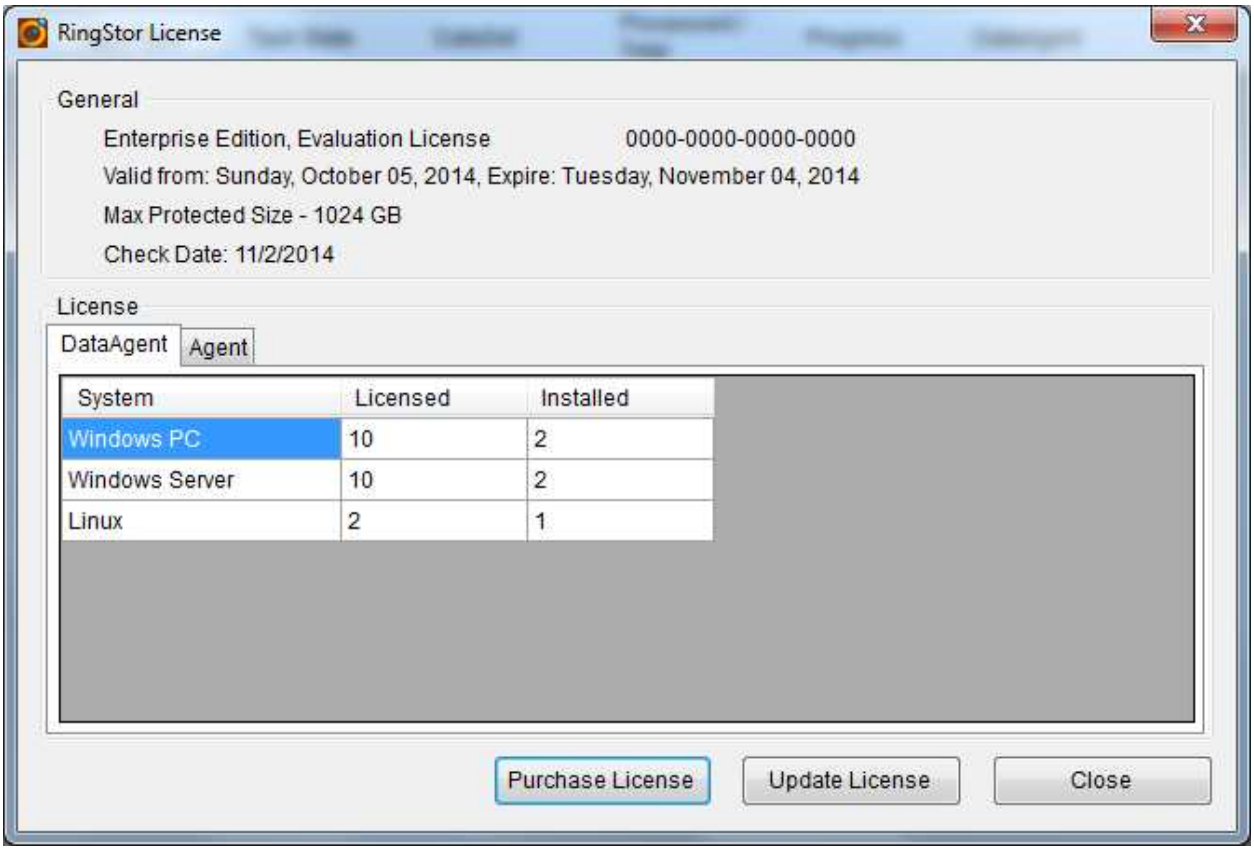


Figure 13.1 License Sample

12.5.1 Activation

To apply a full commercial license, or upgrade your license, follow the steps below to apply and activate the license:

- Log into RingStor Explorer with administrator's credentials (you created this during DataServer install)
- From top menu, click System -> License, click Update License to upload license file.
- Click Activate to activate the license. The license will be automatically prorogated to all DataServers in RingStor system.

12.6 Upgrades

The RingStor upgrades are provided at http://www.ringstor.com/ when they become available.

You must register on ringstor.com web site, then log into your account to view and download upgrades. Please visit http://www.ringstor.com for details.

13 Support

Support is available to all customers who have valid license.

Standard support is provided for customers with free trial license. Please visit http://www.ringstor.com for details.

Premium support packages are provided and can be purchased by contacting RingStor.

Documentation can be downloaded from http://www.ringstor.com/

Appendix A: Error Code

Following table lists all error codes and corresponding error message.

Error Code	Message	Notes
0	Operation succeeded	
1	folder/file does not exist	
2	folder/file cannot be read	
3	data transfer is stopped due to request	
108	MSSQL vss is in progress	
109	data transfer is stopped due to request	
110	fail to create task	
111	fail to stop task	
112	fail to resume task	
113	fail to suspend task	
114	fail to kill task	
115	fail to update task	
116	scan failed	
117	task fail to start	
118	task fails to read DataAgent's configuration	
119	task fails to load DataServers from DataAgent's configuration	
120	task fails to load DataSet from DataAgent's configuration	
121	task fails to load data contents for DataSet from DataAgent's configuration	
122	task fails to load task configuration	
125	received an unknow task control command	
127	DataAgent is detached	
128	DataAgent is disabled	
129	DataAgent is offline	

130	DataAgent is uninstalled	
131	fail to write data to specified destination folder/file	
132	fail to access specified destination folder/file	
133	task fails to read task configuration	
135	to create task configuration	
140	fail to access the MountPath	
141	fail to establish connection for data transfer	
144	task fails to connect to DataAgent for status update	
145	unknown task type	
146	task cannot be suspended in current state	
153	task fails to connect to DataServer for data transfer	
154	task started on wrong DataAgent	
155	task is already created	
156	fail to read index file	
158	fails to access the chunk to read/write data	
159	task has no running streams	
199	file archiving task failed	
200	file backup task failed	
201	file restore task failed	
206	file restore task failed	
208	task fail to respond	
209	file object already exists on DataAgent	
210	fail to combine segments into one file object	
211	chunk in use	
213	data block already exists	
214	fail to connect to Cloud End Point	
215	data stream stopped running	
216	task is not found	

217	task is not in running state	
218	fail to send task suspend message to DataAgent	
219	fail to send task suspend message to DataServer	
220	task platform is not supported	
221	task is not in suspended state	
222	fail to send task resume message to DataAgent	
223	fail to send task resume message to DataServer	
224	fail to send task kill message to DataAgent	
225	fail to send task kill message to DataServer	
226	db backup fail	
227	restore fail	
228	fail to compute hash for data block	
229	fail to back up sql database	
230	database backup type is missing	
231	database files are missing	
232	fail to restore database	
233	data quota for DataAgent is exceeded	
234	data quota for user is exceeded	
235	task is not completed	
236	task has no enought free space for its data	
237	Exchange backup failed	
238	Exchange restore failed	
301	fail to send message	
302	fail to receive message	
303	fail to establish connection	
381	unknown message received	
402	failed to load DataServer's license file	
403	DataServer's license has expired	

404	maximum number of DataServers allowed by license has been exceeded	
405	maximum number of DataAgents allowed by license has been exceeded	
406	maximum number of Devices allowed by license has been exceeded	
407	maximum number of Agents allowed by license has been exceeded	
408	agent type is not supported by the license	
409	license key is invalid	
410	license file is invalid	
411	licensed time has not yet started	
412	Full Text Indexer is not supported on this platform	
413	cannot upgrade license to evaluation license	
414	number of Full Text Indexer allowed by license has been exceeded	
415	IP for DataServer is not allowed by the license	
416	OS for DataServer is not allowed by the license for this DataServer	
417	# of processors for DataServer exceeds the allowed by the license for this DataServer	
418	user allowd to install has been exceeded	
419	Cloud is not licensed, or license is not valid for this Cloud	
420	License has been updated for this Cloud	
501	fail to attach devices to DataServer	
502	device is attached to DataServer	
503	fail to detach devices from DataServer	
504	device is detached from DataServer	
510	device is not accessible	
515	fail to create volume	
518	no MountPath found	

519	fail to create folder/file	
521	fail to close segment for read/write	
526	fail to access MountPath	
529	MountPath is full	
531	MountPath pool is not found	
534	fail to retrieve child folders	
535	fail to stamp MountPath	
536	stamp for MountPath is not found	
537	fail to verify MountPath	
538	fail to mount MountPath	
540	fail to access chunk	
541	fail to create chunk	
543	fail to seek segment in chunk	
544	fail to delete chunk	
600	fail to detach DataServer	
601	fail to attach DataServer	
602	DataServer is in detached mode, fail to start	
603	master deamon fail to start	
604	failed to mark DataServer online	
605	failed to mark DataServer routings online	
606	failed to start scheduler on DataServer	
607	failed to start synchronization on DataServer	
608	failed to start task monitor on DataServer	
609	failed to start device monitor on DataServer	
610	DataServer is detached by user	
611	DataServer is attached by user	
614	DataServer fails to connect to repository	
618	user has no permission to detach DataServer	

619	user has no permission to attach DataServer	
620	user has no permission to update license on DataServer	
621	DataServer is running in distributed mode	
622	DataServer is running in shared mode	
624	DataServer with same hostname already exists	
625	DataServer fails to install	
627	repository cannot be found	
628	repository already exists	
629	DataServer already installed	
630	fail to save repository properties for DataServer	
631	fail to create repository	
633	fail to create DataServer service	
634	fail to start DataServer service	
635	fail to load DataServer property	
636	fail to register DataServer to cloud	
637	fail to unregister DataServer from cloud	
638	unable to connect to cloud, cloud service might be not running	
639	DataServer does not exist	
640	DataServer configuration fail to connect to cloud	
641	DataServer Pool is not provided	
642	fail to access Active Directory	
643	fail to authenticate in Active Directory	
644	DataAgent and DataServer are not in same community	
645	DataServer fail to start deamon	
800	user is missing	
801	user has no permission	
802	user does not exist	

900	fail to raise event	
903	fail to subscribe alert	
904	fail to unsubscribe alert	
1000	VSS is supported	
1001	VSS is not supported	
1002	Wrong VSS command	
1003	fail to create VSS copy	
1004	fail to delete VSS copy	
1500	cloud fail to load property	
1501	cloud fail to start deamon	
1502	no DataServer is online	
1503	cloud fail to create registry file	
1504	cloud fail to load registry file	
1505	cloud fail to save registry file	
1506	cloud fail to get hostname	
1507	cloud fail to get port	
1508	cloud fail to save property	
1509	cloud fail to install service	
1510	cloud fail to start service	
1511	license file is not found	
1512	fail to read license file	
1513	cloud update already installed	
1514	required update is not installed	
1515	update on wrong platform	
1516	cloud not found	
1517	cloud update failed	
1518	cloud update not installed	
1519	cloud update is required by others	

1520	newer update is detected	
1521	only one DataServer can be installed for Limited edition	
1522	cloud fail to access index path	
2001	fail to log in	
2002	fail to connect to end point	
2003	DataServer is not specified	
2004	fail to parse xml	
2005	user did not log in	
2006	no role is specified for the user	
2007	no DataAgent is found	
2008	fail to update DataAgent info	
2009	fail to attach DataAgent	
2010	fail to detach DataAgent	
2011	fail to load DataAgent info	
2012	fail to stop DataAgent	
2013	no RingStor Cloud is configured	
2014	fail to load DataAgent routing info	
2015	fail to update DataAgent routing info	
2016	no DataServer is found	
2017	fail to load DataServer info	
2018	fail to attach DataServer	
2019	fail to detach DataServer	
2020	fail to update DataServer info	
2021	fail to load DataServer routing info	
2022	fail to update DataServer routing info	
2023	no DataAgent Pool is found	
2024	fail to load DataAgent Pool info	
2025	fail to update DataAgent Pool info	

2026	fail to create DataAgent Pool	
2027	fail to delete DataAgent Pool	
2028	there are DataAgent(s) in the pool	
2029	no DataServer Pool is found	
2030	fail to load DataServer Pool info	
2031	fail to create DataServer Pool	
2032	fail to delete DataServer Pool	
2033	fail to update DataServer Pool info	
2034	fail to load DataSet	
2035	no DataSet is found	
2036	fail to create DataSet	
2037	fail to create DataSet	
2038	fail to create DataSet	
2039	fail to create DataSet	
2040	fail to create DataSet	
2041	fail to update DataSet info	
2042	fail to update DataSet info	
2043	fail to update DataSet info	
2044	fail to update DataSet info	
2045	fail to update DataSet info	
2046	no DataSet is specified	
2047	no content is specified	
2048	content is not found	
2049	fail to delete DataSet	
2050	fail to browse DataSet	
2051	fail to browse DataSet	
2052	fail to browse DataSet	
2053	fail to browse DataSet	

2054	no object(s) are specified	
2056	no account is specified	
2057	no account is found	
2058	no account is found	
2059	no store is specified	
2060	no store is found	
2061	no site is specified	
2062	no site is found	
2063	fail to update DataSet info	
2064	fail to load events	
2065	fail to check license	
2066	fail to update license	
2067	user does not exist	
2068	role does not exist	
2069	user does not have sufficient rights	
2070	license key does not match	
2071	fail to load MountPath info	
2072	fail to create MountPath	
2073	no MountPath is specified	
2074	no MountPath is found	
2075	fail to update MountPath info	
2076	fail to delete MountPath	
2077	fail to load MountPath Pool info	
2078	no MountPath Pool is specified	
2079	no MountPath Pool is found	
2080	fail to update MountPath Pool info	
2081	fail to create MountPath Pool	
2082	cannot delete reserved MountPath Pool	

2083	fail to delete MountPath Pool	
2084	fail to load schedules	
2085	fail to delete schedule	
2086	no schedule is specified	
2087	no schedule is found	
2088	fail to update schedule	
2089	fail to create schedule	
2090	fail to get system status	
2091	no event is specified	
2092	fail to acknowledge system status	
2093	fail to load tasks	
2094	fail to load clouds	
2095	fail to load roles	
2096	no role is configured	