BACKUP APP V7

MICROSOFT HYPER-V GUEST VIRTUAL MACHINE BACKUP & RESTORE GUIDE

Revision History

Date	Descriptions	Type of modification
20 Sept 2016	First Draft	New
25 Sept 2016	Ch. 1.3	Modified
23 Nov 2016	Ch. 1.4, 2, 5.1.2, 5.2.1	Modified
27 Jan 2017	Ch. 1.3, 2	Modified
3 Feb 2017	Added instructions and screen shots for Encryption key handling in Ch. 5; added new limitation in Ch. 2	New
5 Apr 2017	Added Overview section; revised requirements in Ch.2; content restructured in Ch.9 & added steps for restore VM to another host; Added Encryption Type option in Ch. 5.1 & Ch. 5.2	New & Modified
31 May 2017	Added Ch.4 Granular restore section, added step in Create new backup set, added Granular restore sub-section in the Restore section	New
20 Jun 2017	Updated Ch.4, Ch. 9, Ch. 12, Updated all granular screen shots	Modified
13 Jul 2017	Updated Ch.4, Ch. 9, Ch. 12, Updated all granular screen shots	Modified

Table of Contents

1 Overview

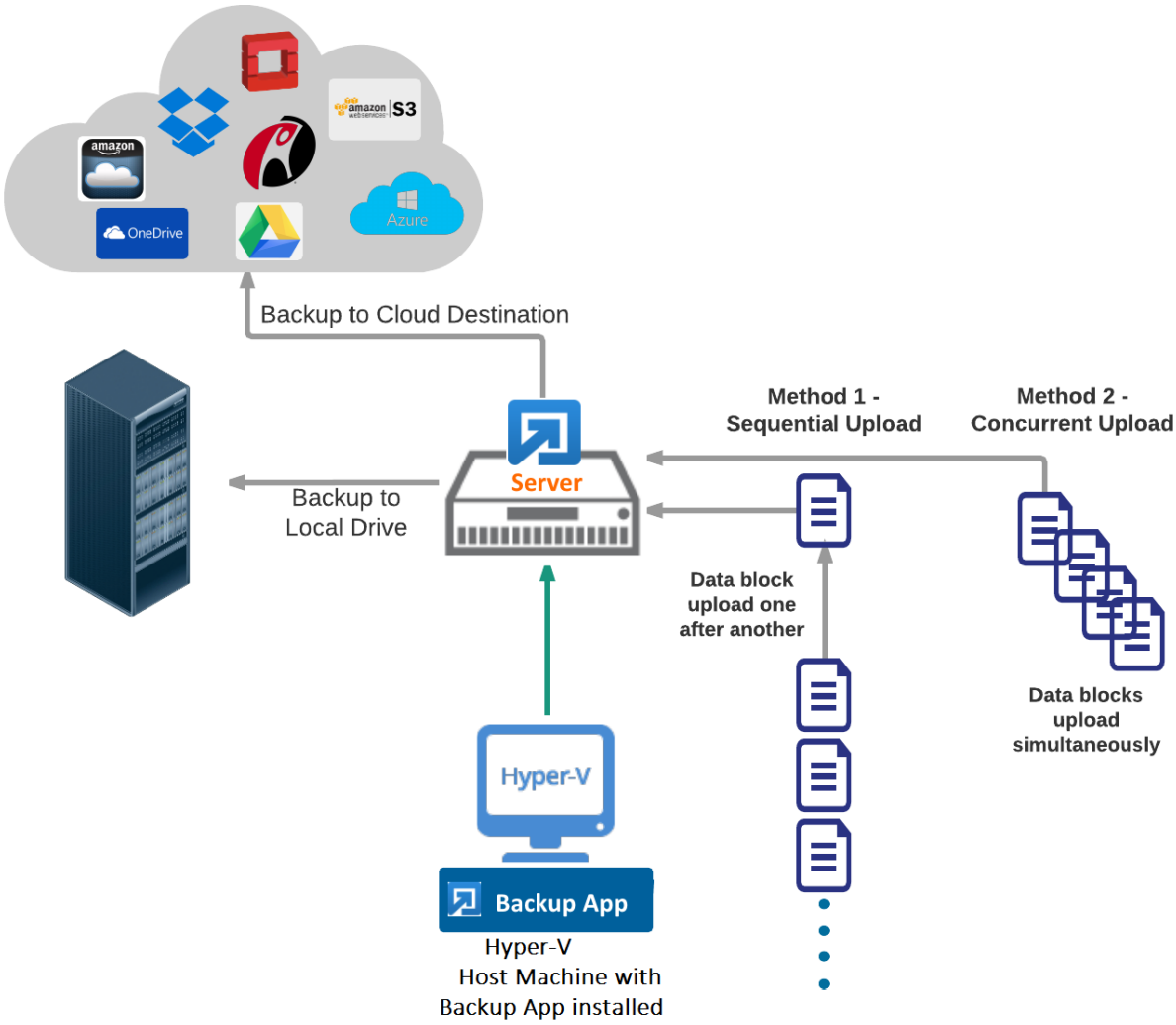
What is this software?

Backup App brings you specialized client backup software, namely Backup App, to provide a comprehensive backup solution for your Hyper-V host machine backup. The Hyper-V module of Backup App provides you with a set of tools to protect Hyper-V host machine and guest virtual machines. This includes a machine backup feature and instant recovery feature (with the use of **Run Direct** technology), to ensure that mission critical machines are back up and running within minutes of a disaster.

System Architecture

The following high level system architecture diagram illustrates the major elements involved in the backup process of a Hyper-V host with Backup App and CBS.

In this user guide, we will focus on the software installation, as well as the end-to-end backup and restore process using the Backup App as a client backup software.



2 Preparing for Backup and Restore

Hardware Requirement

- Dual Core architecture or above [1]
- Minimum: 2 GB
- Recommended: 4 GB or more
- Minimum: 500 MB
- TCP/IP
- Java 1.7u76 or above [3]

Software Requirement

- **Windows platforms**:

  Vista Home Basic / Home Premium / Business / Enterprise / Ultimate

  7 Home Basic / Home Premium / Professional / Enterprise / Ultimate

  8 Pro / Enterprise

  8.1 Pro / Enterprise

  10 Pro / Enterprise

  Server 2008 Standard / Enterprise / Datacenter

  Server 2008 R2 Standard / Enterprise / Datacenter

  Server 2012 Standard / Essentials / Datacenter

  Server 2012 R2 Standard / Essentials / Datacenter

  Server 2016 Standard / Premium

  Small Business Server 2008 Standard / Essentials / Datacenter

  Small Business Server 2011 Standard / Essentials / Datacenter

- **Linux platforms**:

  CentOS 6

  CentOS 7

  Red Hat Enterprise Linux 6

  Red Hat Enterprise Linux 7

- **Unix platforms**:

  FreeBSD 9.0 / 9.1 / 9.2 / 10.0 [9]

  FreeBSD 10.1

  Solaris 10 x64

  Solaris 11 Express x64

Solaris 11 x64

- **Mac OS X platforms**:

Mac OS X 10.7.3 or above [10]

OS X 10.8

OS X 10.9

OS X 10.10

OS X 10.11

macOS 10.12

General Requirement

1. Backup of guest machines located on a SMB 3.0 shares are not supported.
2. Backup of virtual machine with pass through disk (directly attached physical disk) is not supported.

Backup App

1. Backup App is installed on the Hyper-V server. For Hyper-V Cluster environment Backup App is installed on all Cluster nodes.
2. The operating system account for setting up the Hyper-V / Hyper-V Cluster backup set must have administrator permission (e.g. administrative to access the cluster storage).
3. Backup App user account has sufficient Hyper-V add on modules or CPU sockets assigned. Hyper-V Cluster backup sets will require one Backup App license per node. (Please contact your backup service provider for details)
4. Backup App user account has sufficient quota assigned to accommodate the storage of the guest virtual machines. (Please contact your backup service provider for details).

   Hyper-V guest virtual machines contain three types of virtual disks:

   - Fixed Hard Disk.
   - Dynamic Hard Disk.
   - Differencing Hard Disk.

   When Backup App backs up a Hyper-V guest virtual machines for an initial or subsequent full backup jobs:

   - Using fixed Hard Disks it will back up the provisioned size, i.e. for a 500GB fixed virtual hard disk 500GB will be backed up to the storage designation.
   - Using Dynamic Hard Disk or Differencing Hard Disk it will back up the used size, i.e. for a 500GB fixed virtual hard disk, 20GB will backed up to the storage designation if only 20GB are used.

5. The default Java heap size setting on Backup App is 1024MB, for Hyper-V backups it is highly recommended to increase the Java heap size setting to improve backup and restore performance. (The actual heap size is dependent on amount of free memory available on your Hyper-V server).

   Delta generation of large VHD files is a memory intensive process, therefore, it is recommended that the Java heap size to be increased to at least 2048MB - 4096MB. The actual required Java heap size is subject to various factors including files size, delta mode, backup frequency, etc.

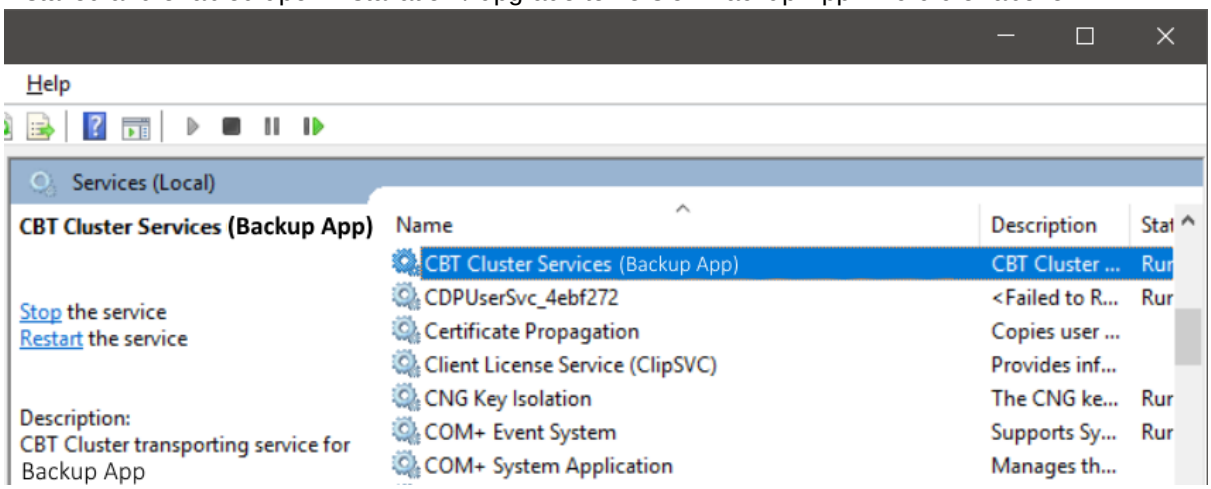
6. Backup App uses the temporary folder for storing backup set index files and any incremental or differential delta files generated during a backup job. To ensure optimal backup/restore performance, it should be located on a local drive with plenty of free disk space. **It should not be on the Windows system C:\ drive.**

7. Backup App UI must be running when a guest virtual machine is started using Run Direct Restore or when migration process is running.

8. For local, mapped drive, or removable drive storage destinations with Run Direct enabled the compression type will always be set to **No Compression** and data encryption is **disabled** to ensure optimal backup and restore performance. The backup set compression type and data encryption settings will only be applied to CBS, SFTP/FTP, or Cloud storage destinations.

9. For ease of restore it is recommended to back up the whole guest machine (all the virtual disks) rather than individual virtual disks.

10. Since Backup App version 7.9, a new service **CBT Cluster Services (Backup App)** is installed and enabled upon installation / upgrade to version Backup App v7.9.0.0 or above.



11. Make sure NFS service has started for Run Direct to operate. If the backup destination is located on network drive, the logon must have sufficient permission to access the network resources.

12. CBT cluster service is only applicable to Windows x64 installation.

13. CBT Cluster Service and CBTFilter will **NOT** be installed on Windows Server 2016 where a built-in system called Resilient Change Tracking (RCT) will be used instead.

14. Check if **CBTFilter** is enabled. This can be verified by running the net start CBTFilter command.

Example:

```
C:\Users\Administrator>net start CBTFilter
The requested service has already been started.

More help is available by typing NET HELPMSG 2182.
```

***Note**: For Windows Server 2008 R2, if the following error is displayed*

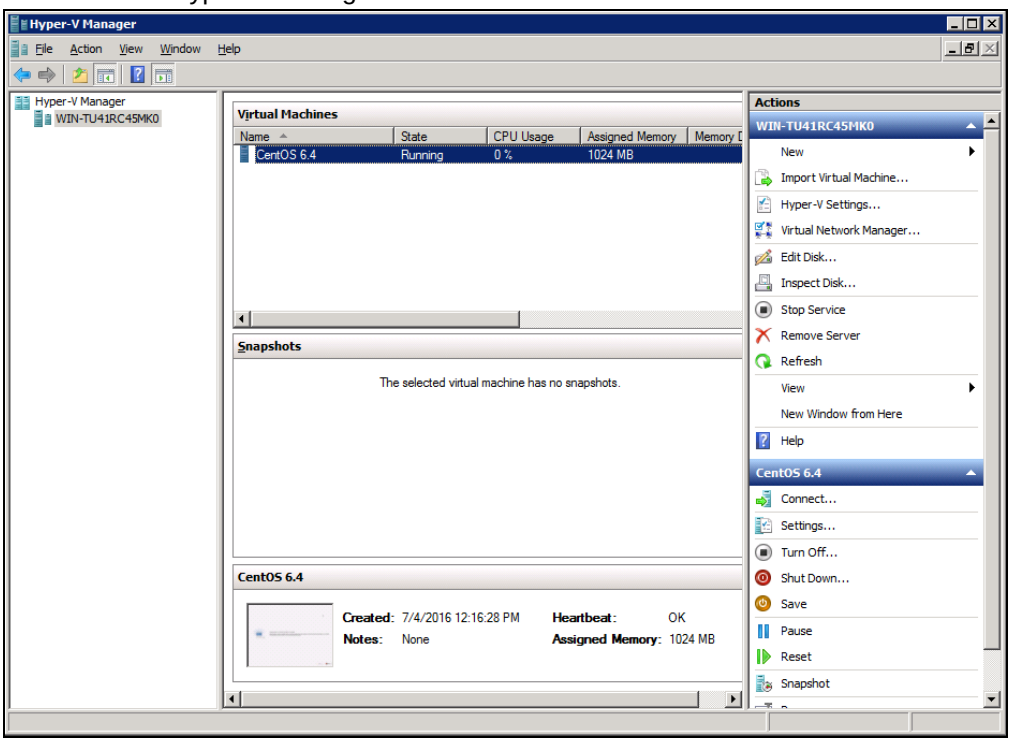
```
C:\Users\Administrator>net start CBTFilter
System error 577 has occurred.

Windows cannot verify the digital signature for this file. A
recent hardware or software change might have installed a file
that is signed incorrect or damaged, or that might be malicious
software from an unknown source.
```

The issue may be related to the availability of SHA-2 code signing support for Windows Server 2008 R2 (https://technet.microsoft.com/en-us/library/security/3033929). To resolve the issue, install the following patch from Microsoft https://www.microsoft.com/en-us/download/confirmation.aspx?id=46083

Restart the affected server afterward for Backup App to operate properly.

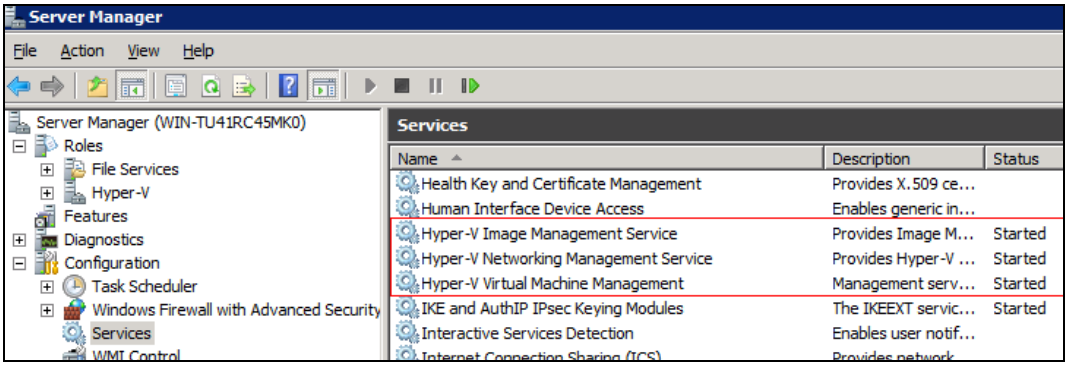
Hyper-V Server Requirement

1. The Hyper-V management tools are installed on the server. For Hyper-V Cluster environments Hyper-V management tools is installed on all Cluster nodes.



2. The Hyper-V services are started on the server. For Hyper-V Cluster environments the Hyper-V services are started on all Cluster nodes.

Example: Windows 2008 R2 Hyper-V



3. The **Microsoft Hyper-V VSS Writer** is installed and running on the Hyper-V server and the writer state is Stable. This can be verified by running the vssadmin list writers command.

Example:

```
C:\Users\Administrator>vssadmin list writers
vssadmin 1.1 - Volume Shadow Copy Service administrative
command-line tool
(C) Copyright 2001-2005 Microsoft Corp.
Writer name: 'Task Scheduler Writer'
   Writer Id: {d61d61c8-d73a-4eee-8cdd-f6f9786b7124}
   Writer Instance Id: {1bddd48e-5052-49db-9b07-b96f96727e6b}
   State: [1] Stable
   Last error: No error

Writer name: 'VSS Metadata Store Writer'
   Writer Id: {75dfb225-e2e4-4d39-9ac9-ffaff65ddf06}
   Writer Instance Id: {088e7a7d-09a8-4cc6-a609-ad90e75ddc93}
   State: [1] Stable
   Last error: No error

Writer name: 'Performance Counters Writer'
   Writer Id: {0bada1de-01a9-4625-8278-69e735f39dd2}
   Writer Instance Id: {f0086dda-9efc-47c5-8eb6-a944c3d09381}
   State: [1] Stable
   Last error: No error

Writer name: 'System Writer'
   Writer Id: {e8132975-6f93-4464-a53e-1050253ae220}
   Writer Instance Id: {8de7ed2b-8d69-43dd-beec-5bfb79b9691c}
   State: [1] Stable
   Last error: No error

Writer name: 'SqlServerWriter'
   Writer Id: {a65faa63-5ea8-4ebc-9dbd-a0c4db26912a}
   Writer Instance Id: {1f668bf9-38d6-48e8-81c4-2df60a3fab57}
   State: [1] Stable
   Last error: No error

Writer name: 'ASR Writer'
   Writer Id: {be000cbe-11fe-4426-9c58-531aa6355fc4}
   Writer Instance Id: {01499d55-61da-45bc-9a1e-76161065630f}
   State: [1] Stable
   Last error: No error

Writer name: 'Microsoft Hyper-V VSS Writer'
```

```
   Writer Id: {66841cd4-6ded-4f4b-8f17-fd23f8ddc3de}
   Writer Instance Id: {a51919e3-0256-4ecf-8530-2f600de6ea68}
   State: [1] Stable
   Last error: No error

Writer name: 'COM+ REGDB Writer'
   Writer Id: {542da469-d3e1-473c-9f4f-7847f01fc64f}
   Writer Instance Id: {7303813b-b22e-4967-87a3-4c6a42f861c4}
   State: [1] Stable
   Last error: No error

Writer name: 'Shadow Copy Optimization Writer'
   Writer Id: {4dc3bdd4-ab48-4d07-adb0-3bee2926fd7f}
   Writer Instance Id: {d3199397-ec58-4e57-ad04-e0df345b5e68}
   State: [1] Stable
   Last error: No error

Writer name: 'Registry Writer'
   Writer Id: {afbab4a2-367d-4d15-a586-71dbb18f8485}
   Writer Instance Id: {25428453-2ded-4204-800f-e87204f2508a}
   State: [1] Stable
   Last error: No error

Writer name: 'BITS Writer'
   Writer Id: {4969d978-be47-48b0-b100-f328f07ac1e0}
   Writer Instance Id: {78fa3f1e-d706-4982-a826-32523ec9a305}
   State: [1] Stable
   Last error: No error

Writer name: 'WMI Writer'
   Writer Id: {a6ad56c2-b509-4e6c-bb19-49d8f43532f0}
   Writer Instance Id: {3efcf721-d590-4e50-9a37-845939ca51e0}
   State: [1] Stable
   Last error: No error
```

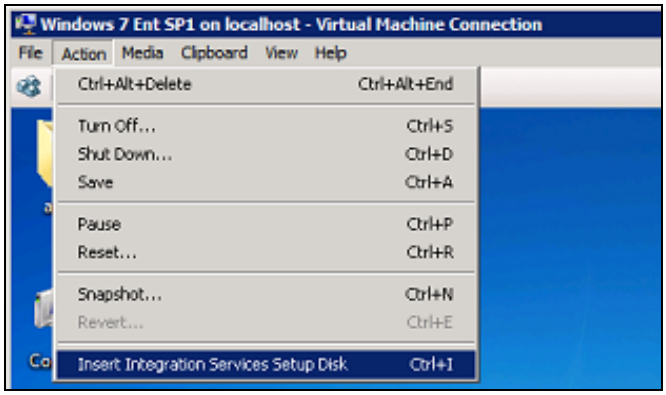
4. If Integration services is not installed / updated on a guest virtual machine or the guest operating system is not supported by Integration Services, the corresponding virtual machine will be paused or go into a saved stated during the snapshot process for both backup and restore, and resume when the snapshot is completed. Furthermore, the corresponding virtual machine uptime will also be reset to 00:00:00 in the Hyper-V Manager.

5. Installing or updating Integration Services guest virtual machine(s) may require a restart of the guest virtual machine to complete the installation.

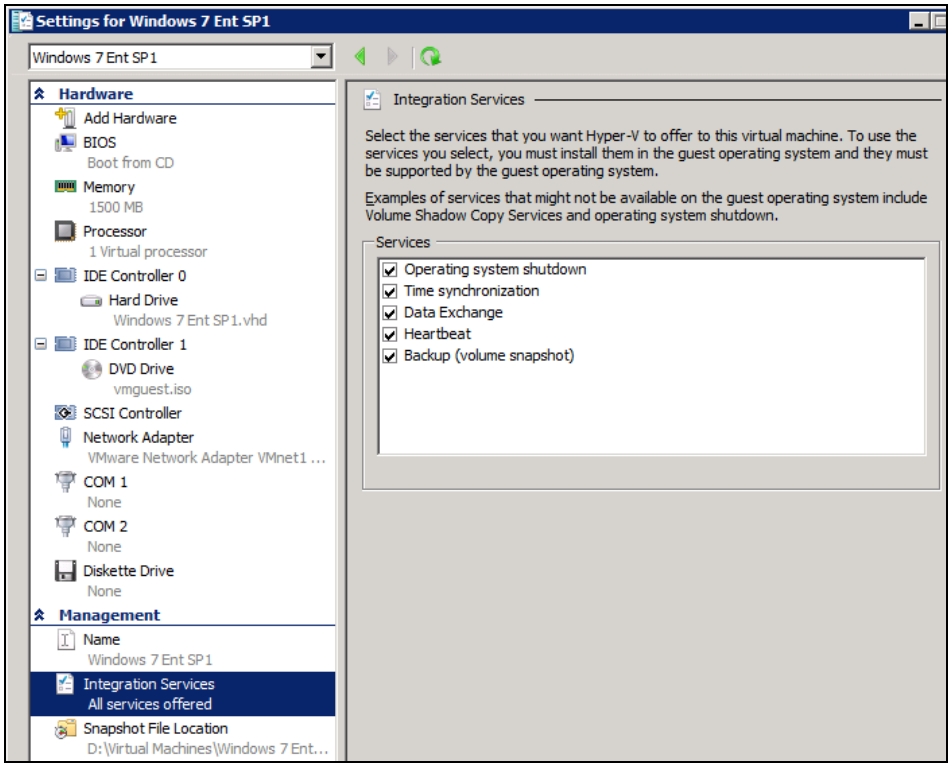
    i. **To install Integration Services**

    In Hyper-V Manager connect to the guest virtual machine and select Action > Insert Integration Services disk

Example: Windows 7 Enterprise guest

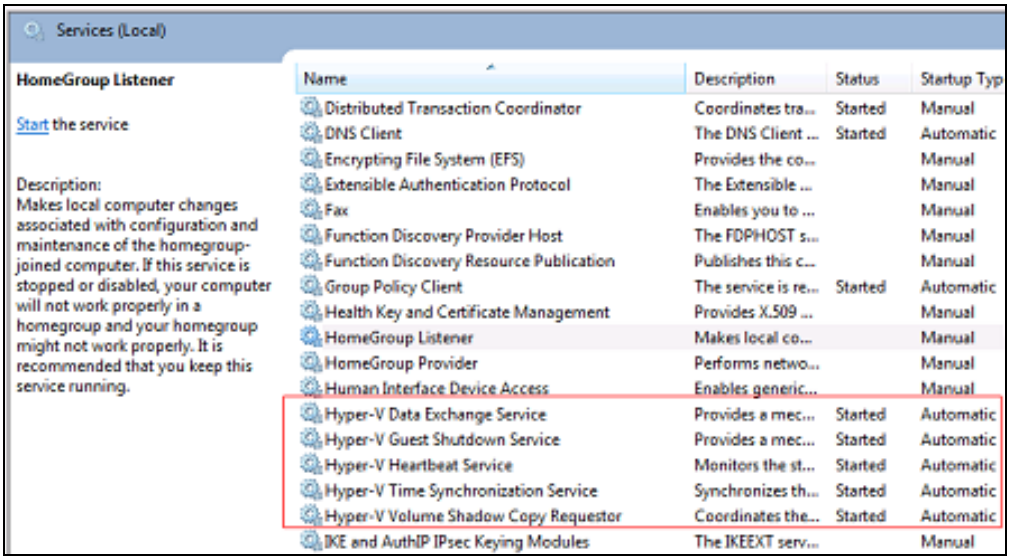


ii. If the guest operating system supports live virtual machine backup the Backup (volume checkpoint) is enabled.



iii. The related Integration Services are running on the guest virtual machine:

Example: Windows 7 Enterprise guest



Example: CentOS 6.4 Linux guest

To check if Linux Integration Services is running on the Linux guest:

```
# lsmod | grep hv

hv_netvsc             23667  0
hv_utils              7012  0
hv_storvsc            10022  2
hv_vmbus              91567  4
hv_netvsc,hv_utils,hid_hyperv,hv_storvsc

# ps -ef|grep hv
root       267     2  0 18:07 ?        00:00:00
[hv_vmbus_con/0]
root       268     2  0 18:07 ?        00:00:00
[hv_vmbus_ctl/0]
root       269     2  0 18:07 ?        00:00:00
[hv_vmbus_ctl/0]
root       270     2  0 18:07 ?        00:00:00
[hv_vmbus_ctl/0]
root       271     2  0 18:07 ?        00:00:00
[hv_vmbus_ctl/0]
root       272     2  0 18:07 ?        00:00:00
[hv_vmbus_ctl/0]
root       273     2  0 18:07 ?        00:00:00
[hv_vmbus_ctl/0]
root       274     2  0 18:07 ?        00:00:00
[hv_vmbus_ctl/0]
root       275     2  0 18:07 ?        00:00:00
[hv_vmbus_ctl/0]
root       276     2  0 18:07 ?        00:00:00
[hv_vmbus_ctl/0]
root       277     2  0 18:07 ?        00:00:00
[hv_vmbus_ctl/0]
root      1174     1  0 18:07 ?        00:00:00
/usr/sbin/hv_kvp_daemon
root      1185     1  0 18:07 ?        00:00:00
/usr/sbin/hv_vss_daemon
```

```
root      1332  1316  0 18:11 pts/0    00:00:00 grep hv
```

iv. Please refer to the following articles for further details on:

- Considerations for backing up and restoring virtual machines
  https://technet.microsoft.com/en-us/library/dn798286.aspx
- Supported Windows Guest Operating Systems for Hyper-V in Windows Server 2012
  https://technet.microsoft.com/en-us/library/dn792028(v=ws.11).aspx
- Supported Windows Guest Operating Systems for Hyper-V in Windows Server 2012 R2
  https://technet.microsoft.com/en-us/library/dn792027(v=ws.11).aspx
- Supported Linux and FreeBSD virtual machines for Hyper
  https://technet.microsoft.com/library/dn531030.aspx
- Linux Integration Services Version 4.0 for Hyper-V
  https://www.microsoft.com/en-us/download/details.aspx?id=46842
- Managing Hyper-V Integration Services
  https://msdn.microsoft.com/en-us/virtualization/hyperv_on_windows/user_guide/managing_ics

6. For Hyper-V 2008 R2 server in order to use Run Direct restore feature the "**Microsoft Security Advisory 3033929**" security update must be installed.

   Please refer to the following KB article from Microsoft for further details:
   https://support.microsoft.com/en-us/kb/3033929

7. For Run Direct Hyper-V Cluster backup sets the storage destination must be accessible by all Hyper-V nodes.

8. For Hyper-V Cluster backup sets the guest virtual machines must be created and managed by the Failover Cluster Manager.

9. The guest virtual machine will not start up if the virtual disk containing the guest operating system is not restored.

Limitations

1. Backup of guest machines located on a SMB 3.0 shares is not supported.

2. Backup of virtual machine with pass through disk (directly attached physical disk) is not supported.

3. For backup of individual virtual disks, the restored virtual machine does not support the reversion of previous snapshots, if the snapshot contains disks which are not previously backed up by Backup App.

4. A guest virtual machine can only be restored to the Hyper-V server with the same version, i.e. backup of a guest on Hyper-V 2012 R2 server cannot be restored to Hyper-V 2008 R2 Server or vice versa.

5. The guest virtual machine will not start up if the virtual disk containing the guest operating system is not restored.

6. Restore of individual virtual disks is only supported using the **Restore raw file** option for a virtual disk with no snapshots.

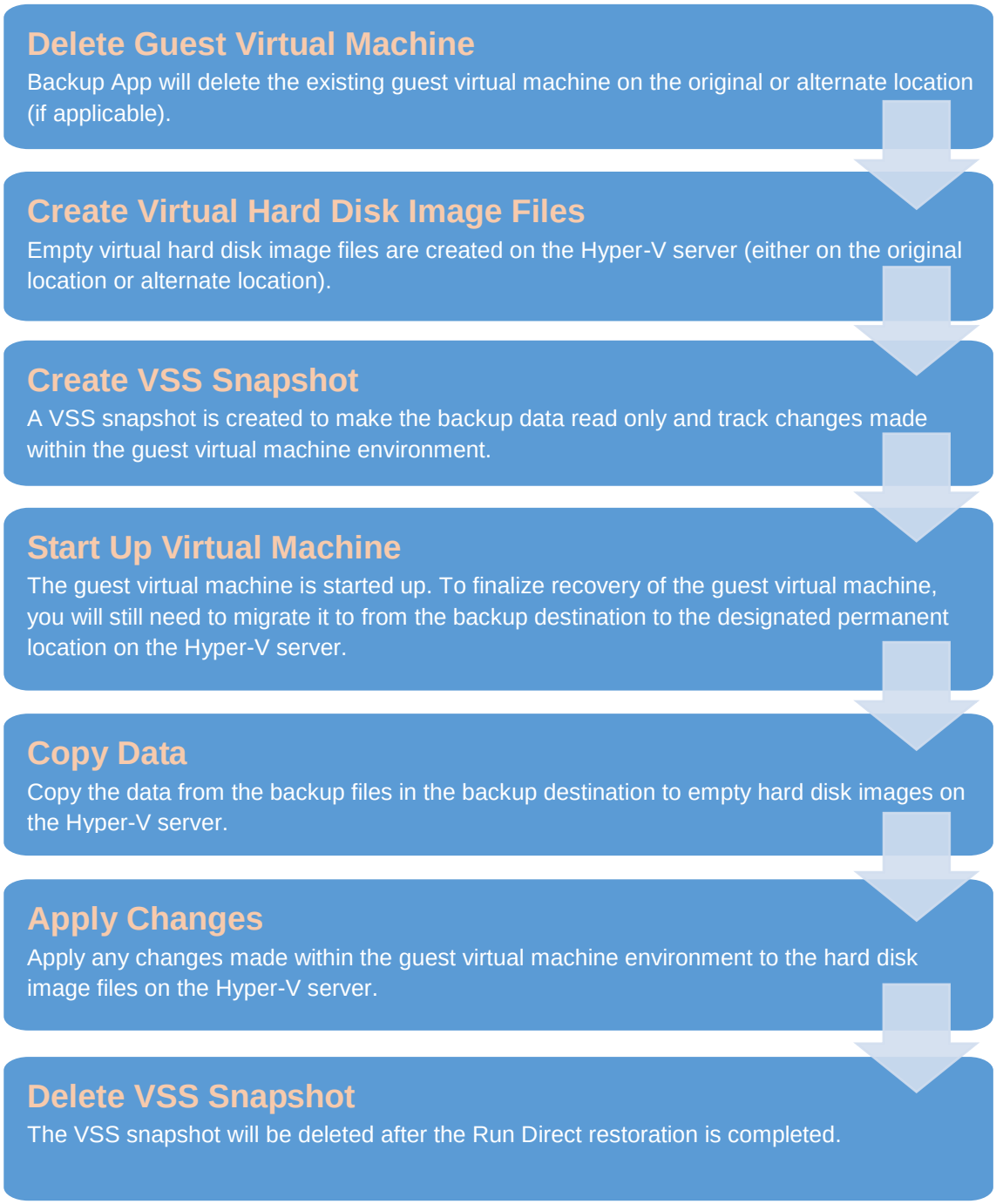
> **Note**
>
> This will require modification of Hyper-V guest configuration files, and this only should be done if you have in-depth knowledge and understanding of Hyper-V, otherwise the guest virtual machine may not startup properly.

3 Run Direct

Hyper-V Run Direct is a recovery feature introduced in Backup App version v7.5.0.0, it helps to reduce disruption and downtime of your production guest virtual machines.

Unlike normal recovery procedures where the guest virtual machine(s) are restored from the backup destination and copied to production storage, which can take hours to complete. Restore with Run Direct can instantly boot up a guest virtual machine by running it directly from the backup file in the backup destination; this process can be completed in minutes.

The following steps are taken when a Run Direct restore is initiated:



The restored virtual machine, at this stage (e.g. before the restore is finalized) is in a read-only state to avoid unexpected changes. All changes made to the virtual disks (e.g. operation within the guest virtual machine) are stored in a VSS snapshot created for the Run Direct restore. These changes are discarded when Run Direct is stopped, where the restored guest virtual machine will be removed and all changes will be discarded, or the changes will be consolidated with the original virtual machine data when the restore is finalized.

For more details on Run Direct restore options, refer to Restore Options.

4 Granular Restore Technology

What is Granular Restore Technology?

Backup App granular restore technology enables the recovery of individual files from a guest VM without booting up or restoring the whole guest VM first.

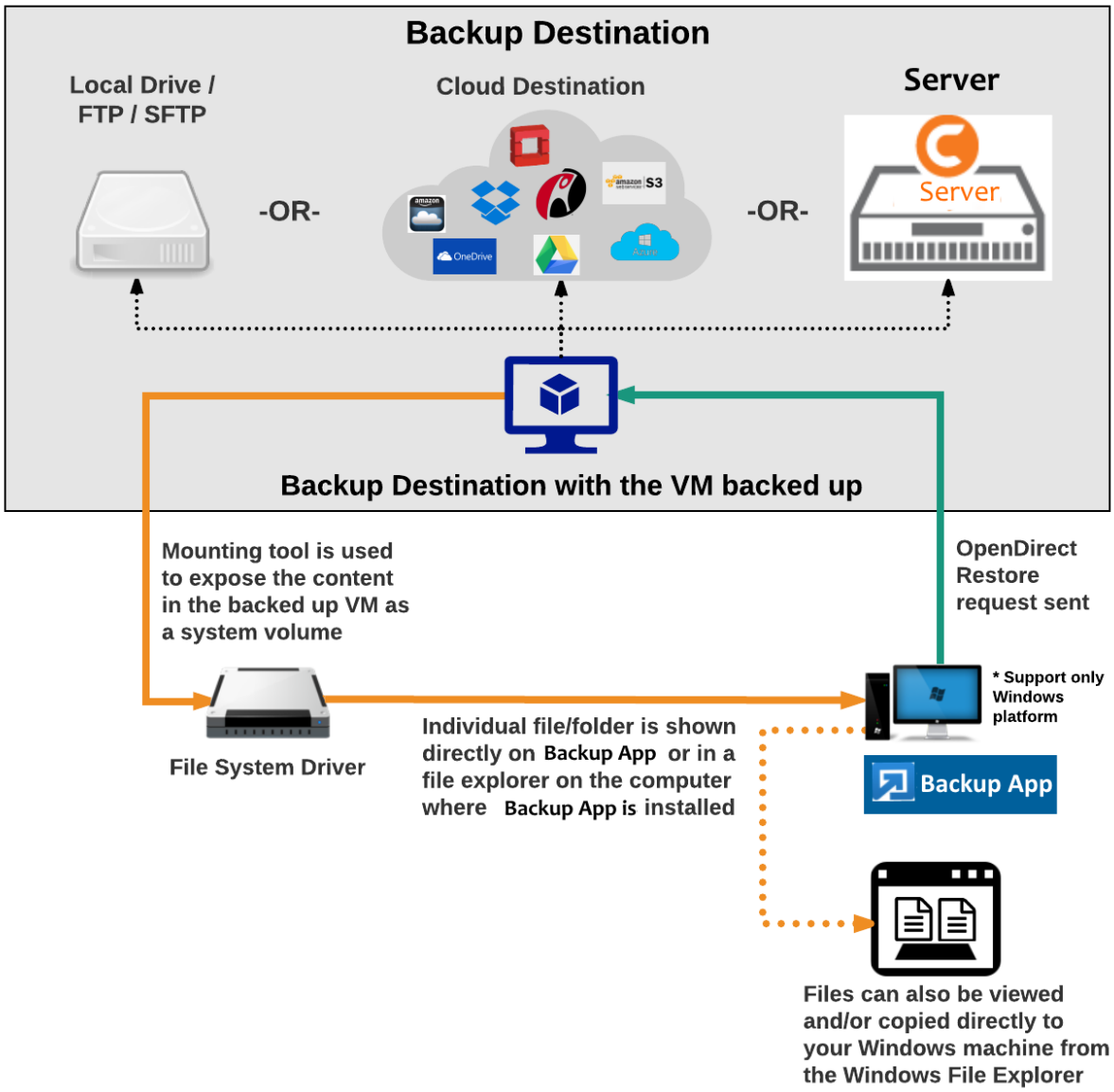
Granular restore is one of the available restore options for Hyper-V backup sets from Backup App v7.13.0.0 or above. Backup App makes use of granular restore technology to enable a file level restore from a virtual disk file (VHD) of guest VM backup possible. It is particularly useful if you only need to restore individual file(s) from a guest VM which would normally take a long time to restore and then startup before you can gain access the files on the virtual disks. Granular restore gives you a fast and convenient way to recover individual files from a guest VM.

During the granular restore process, the virtual disks of the guest VM can be mounted on the Hyper-V host or on another Windows machine as a local drive. This will allow the individual files on the virtual disks to be viewed via the file explorer within Backup App or from the Windows File Explorer on the Windows machine you are performing the restore on, without having to restore the entire virtual machine. Granular restore can only mount virtual disks if the guest VM is running on a Windows Platform. The mounting of Linux/Unix file systems from virtual disk file is currently not available due to limitations of the file system drivers. It is supported for all backup destinations, i.e. CBS, Cloud storage, or Local/Network drives.

IMPORTANT

Granular restore requires an additional OpenDirect / Granular restore add-on module license to work. Contact your backup service provider for further details.

How does Granular Restore work?



Benefits of using Granular Restore

Comparison between Granular Restore and Traditional Restore

Granular Restore
Introduction
Granular restore allows you to quickly mount virtual disk(s) directly from the backup file of a guest VM, so that individual files from virtual disk(s) can be exposed via the file explorer on Backup App, or to be copied from the file explorer on to a 32 bit or 64 bit Windows machine you are performing the restore.

Pros	
Restore of Entire Guest VM Not Required	Compared to a traditional restore where you have to restore the entire guest VM first, before you can access any individual files/folders, granular restore allows you to view and download individual files, without having to restore the entire guest VM first.
Ability to Restore Selected Files	In some cases, you may only need to restore a few individual file(s) from the guest VM, therefore, granular restore gives you a fast, convenient, and flexible tool to restore selected file(s) from a guest VM quickly.
Only One Backup Set Required	With traditional restore methods, if you wish to restore individual file(s) from a guest VM, you will have to create two different backup sets; a Hyper-V guest VM backup set and a separate file backup set for the file(s) you wish to restore. You will required an additional Backup App installation on the guest VM environment, with Granular Restore feature, only one backup set is required. ➢ **Fewer CAL (Client Access License) required** – you will only need one Backup App CAL to perform guest VM, Run Direct, and Granular restore. ➢ **Less storage space required** - as you only need to provision storage for one backup set. ➢ **Less backup time required** – As only one backup job needs to run. ➢ **Less time spent on administration** - As there are fewer backup sets to maintain.
Cons	
No Encryption and Compression	To make ensure optimal restore performance, the backup of the guest VM will **NOT** be encrypted and compressed, therefore, you may have to take this factor in consideration when using this restore method.

Traditional Restore
Introduction
The traditional restore method for guest VMs, restores the entire backup files to either to the original VM location or another a standby location. The files or data on the guest VM can only be accessed once the guest VM has been fully recovered and booted up.
Pros

Backup with Compression and Encryption	Guest VM is encrypted and compressed, therefore is in smaller file size, and encrypted before being uploaded to the backup destination.
Cons	
Slower Recovery	As the entire guest VM has to be restored before you can access any it's file(s) or data, the restore time could be long if the guest VM size is large.
Two Backup Sets and CALs Required	If you only wish to restore individual files from VM, two separate backup sets are required, one for the VM image and the other for the individual files, and therefore two CAL (client access licenses) are required.

Requirements

Supported Backup Modules

Granular restore is supported on Hyper-V backup sets created and backed up using Backup App v7.13.0.0 or above installed on a Windows platform with the Granular Restore feature enabled on the backup set.

License Requirements

An OpenDirect / Granular restore add-on module license is required per backup set for this feature to work. Contact your backup service provider for more details.

Backup Quota Storage

As compression is not enabled for Granular backup sets, to optimize restore performance, the storage quota required will be higher than non-Granular backup sets. Contact your backup service provider for details.

Operating System

Backup App must be installed on a 64 bit Windows machine as libraries for Granular only supports 64 bit Windows operating system. Backup App must be installed on the following Windows Operating Systems:

Windows 2012	Windows 2012 R2	Windows 2016
Windows 8	Windows 8.1	Windows 10

Temporary Directory Requirement

The temporary Directory Folder should have at least the same available size as the guest VM to be restored and should be located on a local drive to ensure optimal performance.

Available Spare Drive Letter

One spare drive letter must be available on the Windows machine for the granular restore process, as the VHD virtual disk is mounted on Windows as a logical drive. Backup App will automatically take the next available drive letter in alphabetical order for the mounted virtual disk.

Note

1. The Windows drive letters A, B, and C are not used by granular restore.
2. The granular restore assigned drive letter(s) will be released once you exit from Backup App UI.

Network Requirements

Recommended minimum network speed is **at least 100Mbps download speed**.

The network bandwidth requirements will increase in proportion to the size of the guest VM and or the incremental delta chain length to ensure optimal performance. Working with limited network bandwidth may severely affect the granular restore performance.

You can use an online network speed test website (e.g. www.speedtest.net) to get an idea of the actual bandwidth of the machine.

Other Dependencies

The following dependencies are required for restore and therefore they are verified by Backup App only when an granular restore is performed. Absence of these dependencies will not affect the backup job but would cause the granular restore to fail.

- Microsoft Visual C++ 2015 Redistributable (x86) / (x64)
  https://www.microsoft.com/en-us/download/details.aspx?id=48145
- Update for Universal C Runtime in Windows
  https://support.microsoft.com/en-us/help/2999226/update-for-universal-c-runtime-in-windows

Permissions

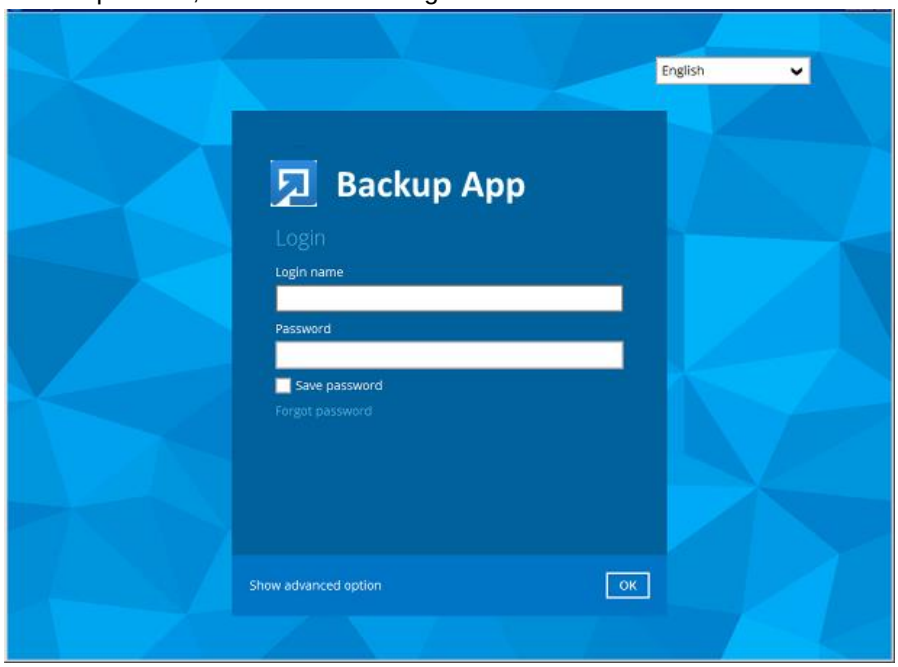
The Windows login account used for installation and operation of the Backup App client machine requires Administrator privileges

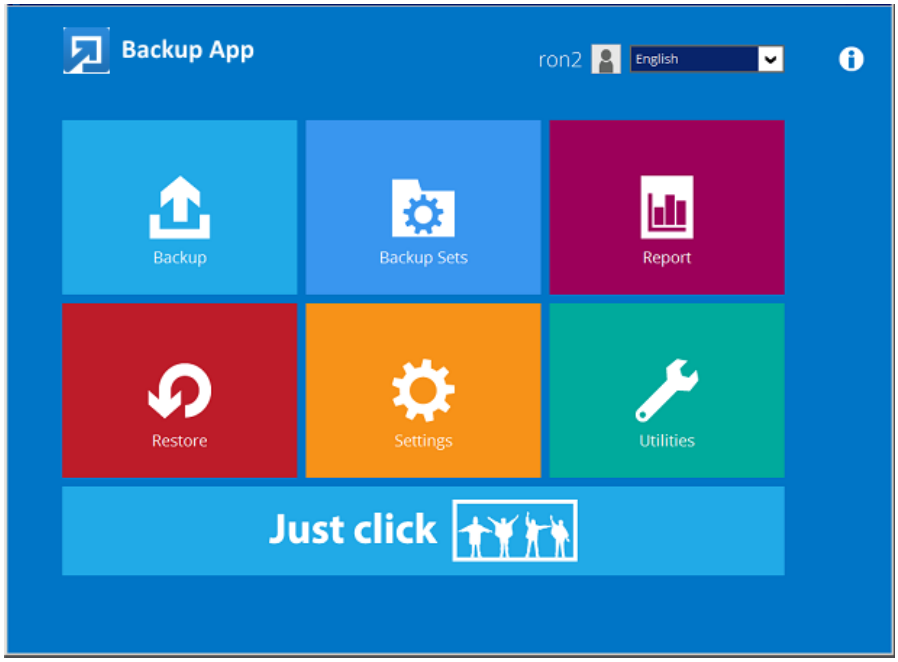
5 Starting Backup App

Login to Backup App

1. A shortcut icon of Backup App should have been created on your Windows desktop after installation. Double click the icon to launch the application.

2. Enter the login name and password of your Backup App account provided by your backup service provider, then click **OK** to login.



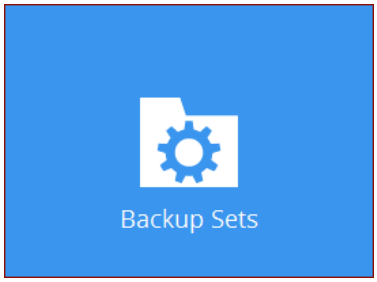

Backup App
ron2
English
Backup
Backup Sets
Report
Restore
Settings
Utilities
Just click

6 Creating a Hyper-V Backup Set

6.1 Non-Cluster Environment

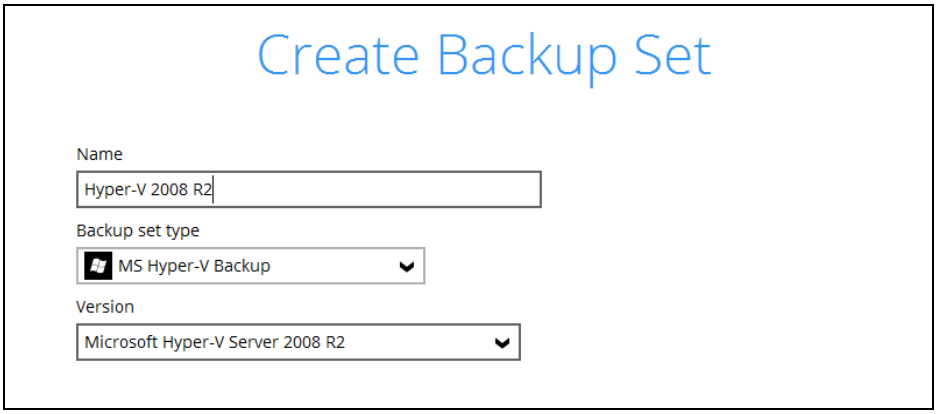
Run Direct Backup Set

1. Click the **Backup Sets** icon on the main interface of Backup App.

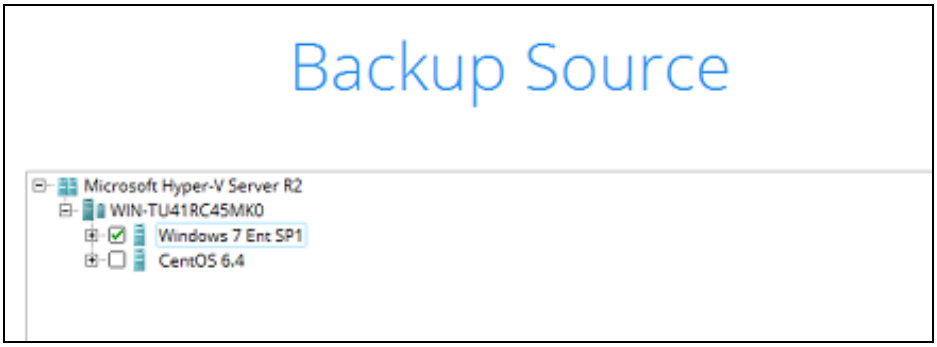


2. Create a new backup set by clicking the "**+**" icon or **Add** button to created new backup set.

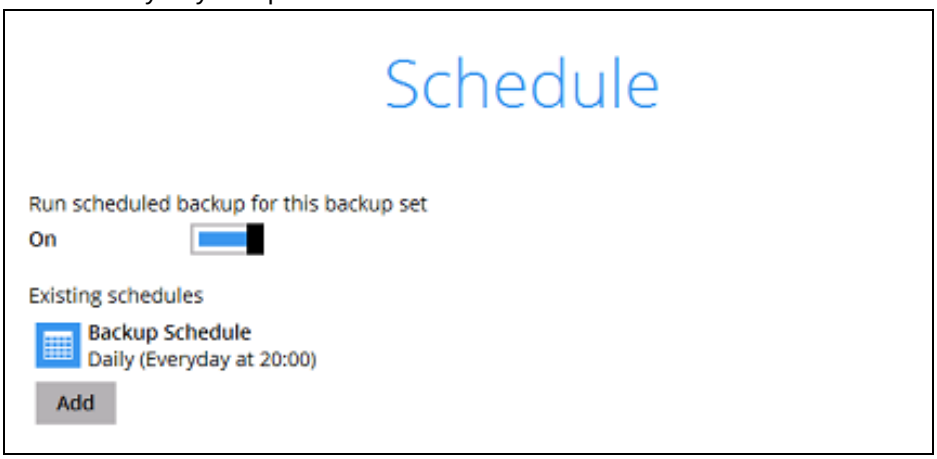
3. Select the **Backup set type** and name your new backup set then click **Next** to proceed.



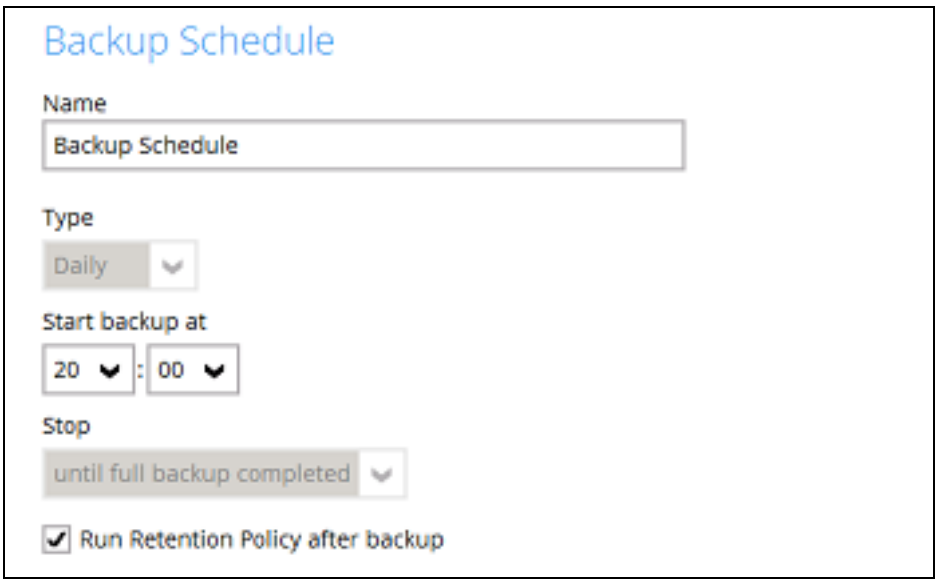
4. In the Backup Source menu, select the guest virtual machines you would like to backup. Click **Next** to proceed.



5. In the Schedule menu, you can configure a backup schedule for backup job to run automatically at your specified time interval.

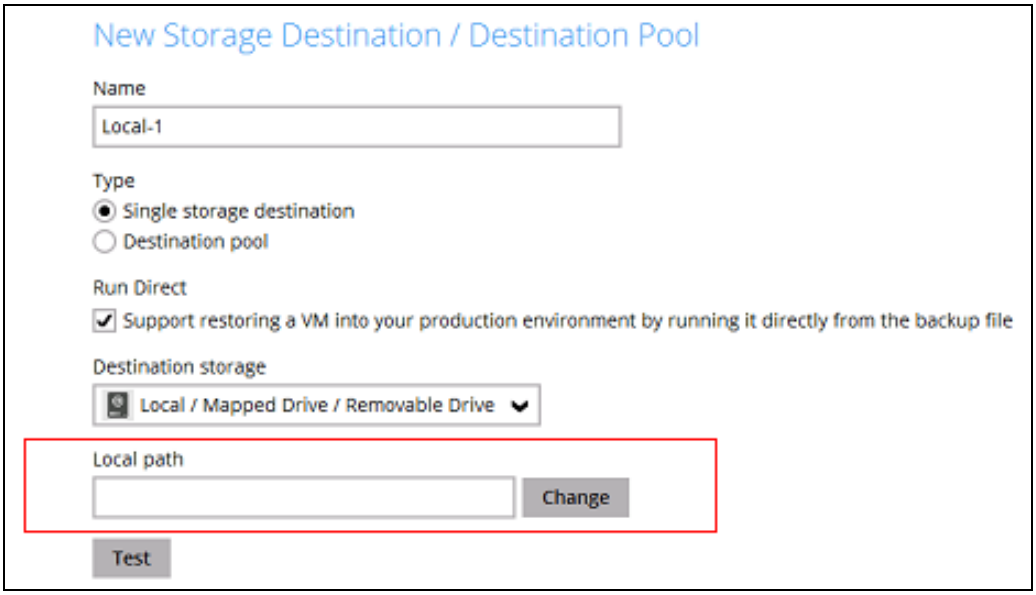


Click **Add** to add a new schedule or double click on the existing schedule to change the values. Click **Next** to proceed when you are done setting.



Note: *The default backup schedule is daily backup at 22:00, the backup job will run until completion and the retention policy job will be run immediately after the backup job*.

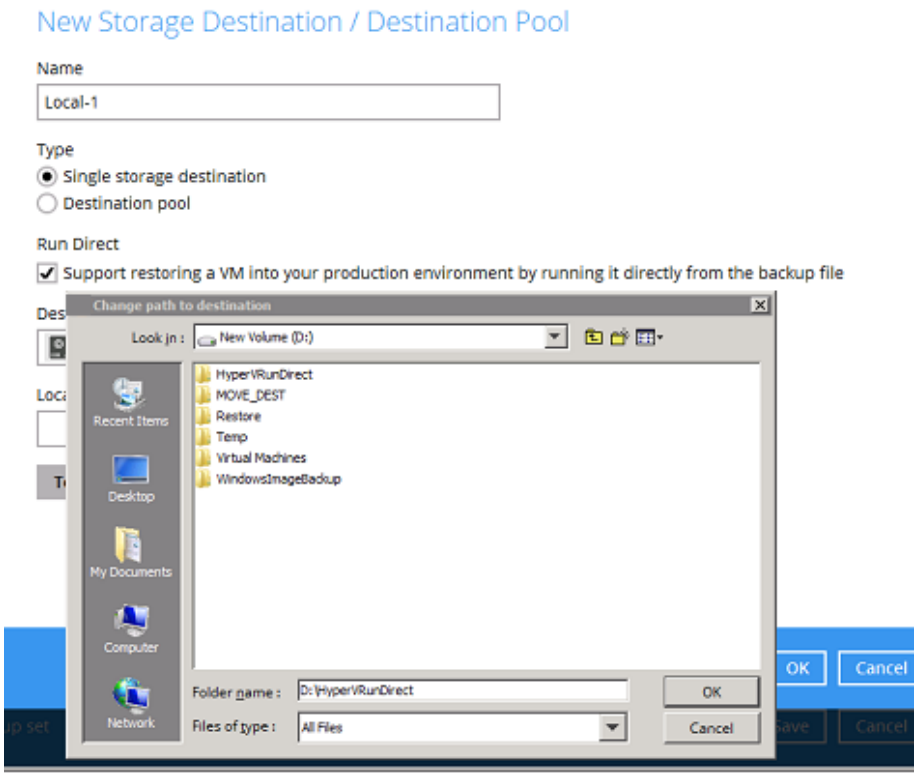
6. Select the backup storage destination.



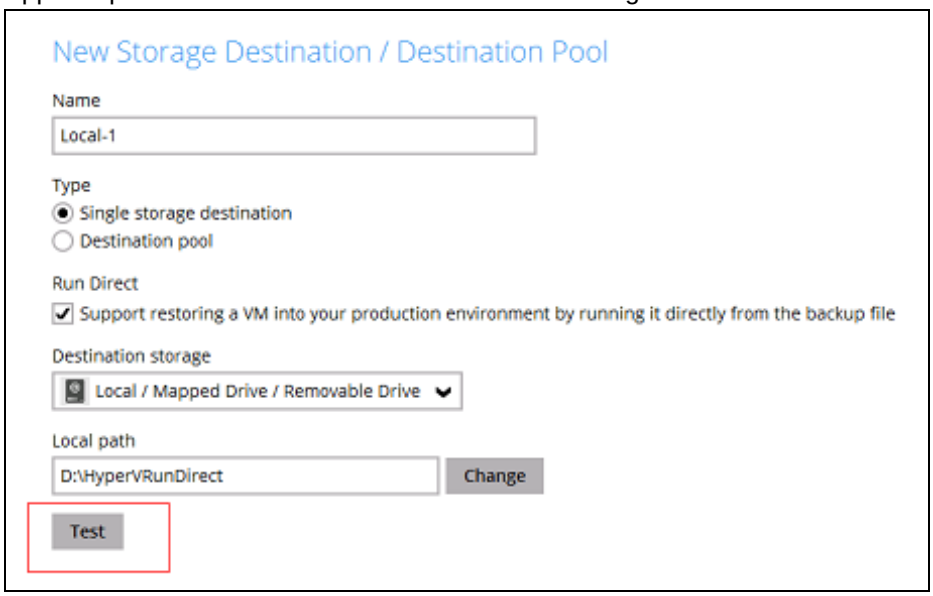
Note

1. For Hyper-V backup sets by the default the **Run Direct** feature is enabled.
2. For Run Direct enabled backup sets, the storage destination is restricted to Local, Mapped Drive, or Removable Drive.

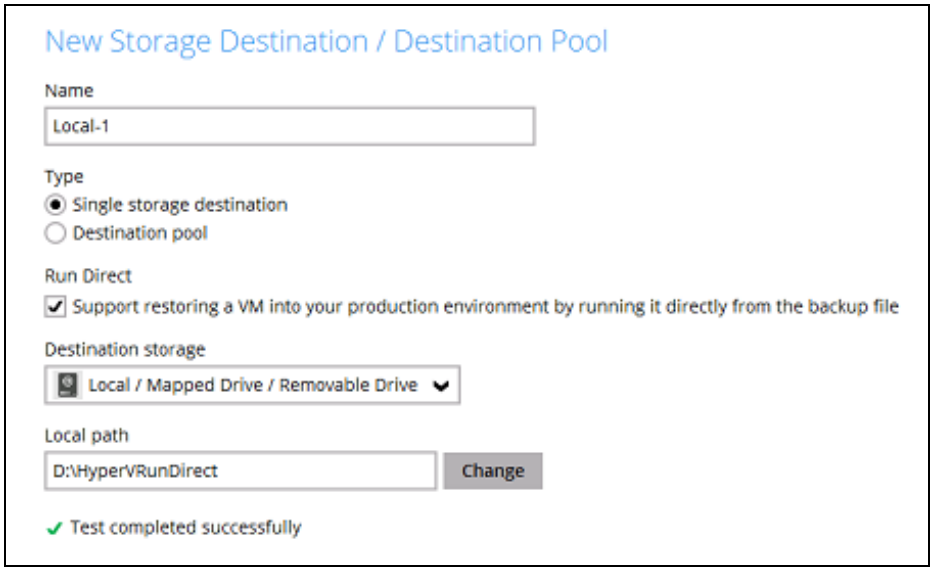
i. Click on **Change** to select the storage destination a Local, Mapped Drive, or Removable Drive.



ii. After selecting the storage destination click on the **Test** button to verify if Backup App has permission to access the folder on the storage destination.



iii. Once the test is finished Backup App will display "**Test completed successfully**" message. Click **OK** to proceed.



iv. To add extra storage destination click **Add**, otherwise Click **Next** to proceed.

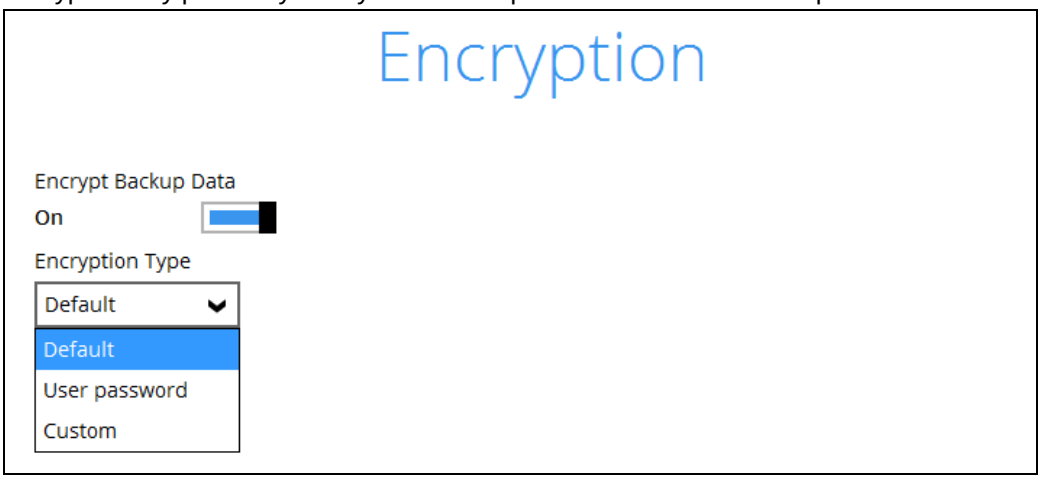
7. If you wish to enable the granular restore feature, make sure you turn on the **Granular Restore** switch in this menu. Click **Next** to proceed.

Notes

1. Once the Granular Restore feature is enabled and the backup set is saved, it is **NOT** possible to disable it afterwards, and vice versa. If you wish to change the Granular Restore settings, a new backup set will have to be created.
2. It is possible to enable both Granular Restore and Run Direct restore on the same backup set. However, Backup App will only allow either Granular Restore or Run Direct restore to run, but not both to run concurrently.
3. Granular Restore requires an additional OpenDirect / Granular restore add-on module license to work. Contact your backup service provider for further details.

8. **IMPORTANT:** If you have enabled the Granular restore or Run Direct restore feature, the backup data will not be compressed and encrypted to optimize the restore performance, therefore you can skip to step 10.

In the Encryption window, the default **Encrypt Backup Data** option is enabled with an encryption key preset by the system which provides the most secure protection.

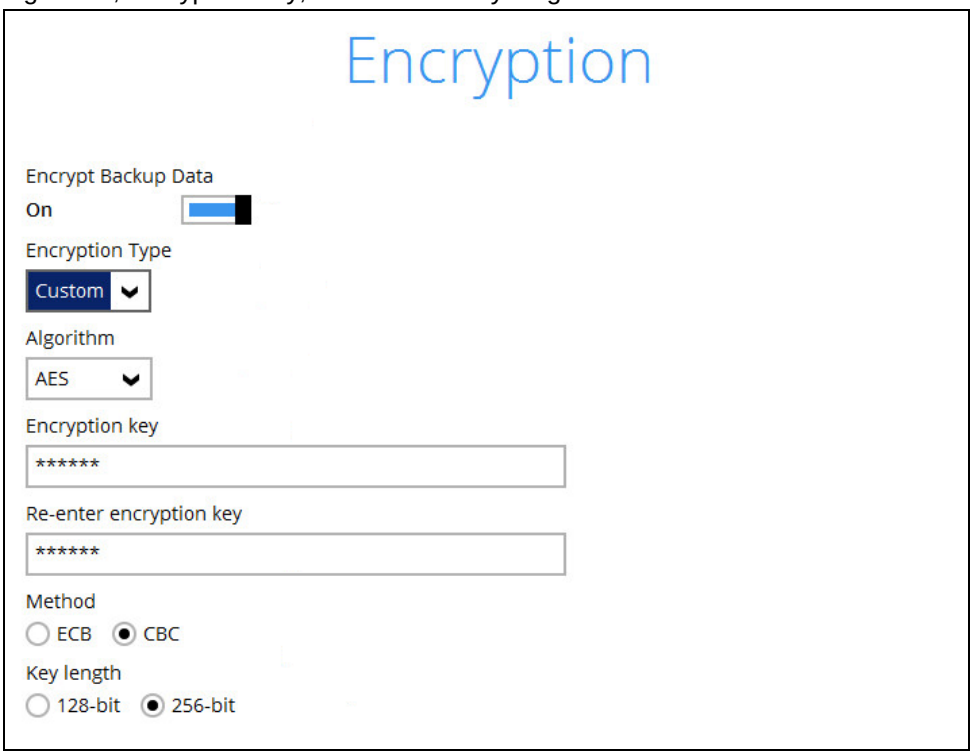


You can choose from one of the following three Encryption Type options:

- **Default** – an encryption key with 44 alpha numeric characters will be randomly generated by the system
- **User password** – the encryption key will be the same as the login password of your Backup App at the time when this backup set is created. Please be reminded that if

you change the Backup App login password later, the encryption keys of the backup sets previously created with this encryption type will remain unchanged.

- **Custom** – you can customize your encryption key, where you can set your own algorithm, encryption key, method and key length.

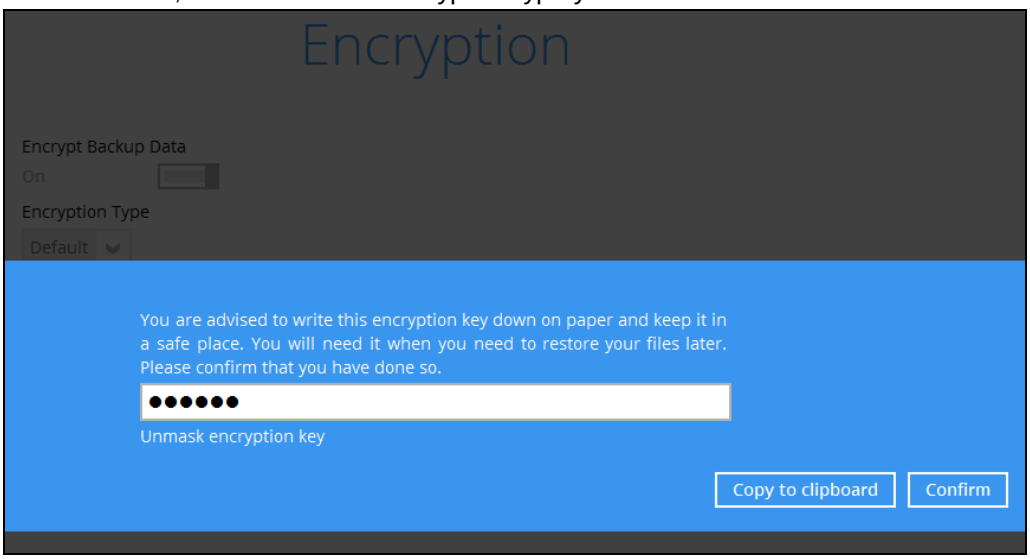


Notes:

1. For local, mapped drive, or removable drive storage destinations with Run Direct enabled the compression type will a be set **No Compression** and data encryption is **disabled** to ensure optimal backup and restore performance. The backup set compression type and data encryption settings will only be applied to CBS, SFTP/FTP, or Cloud storage destinations for the backup set.

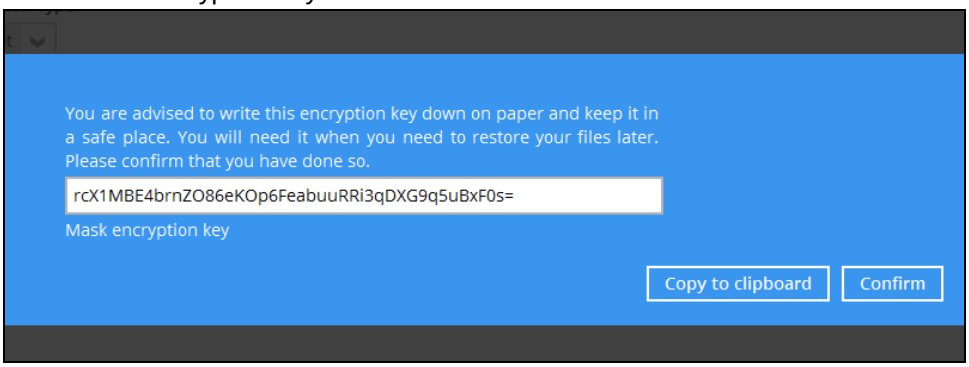
Click **Next** when you are done setting.

9. If you have enabled the Encryption Key feature in the previous step, the following pop-up window shows, no matter which encryption type you have selected.



The pop-up window has the following three options to choose from:

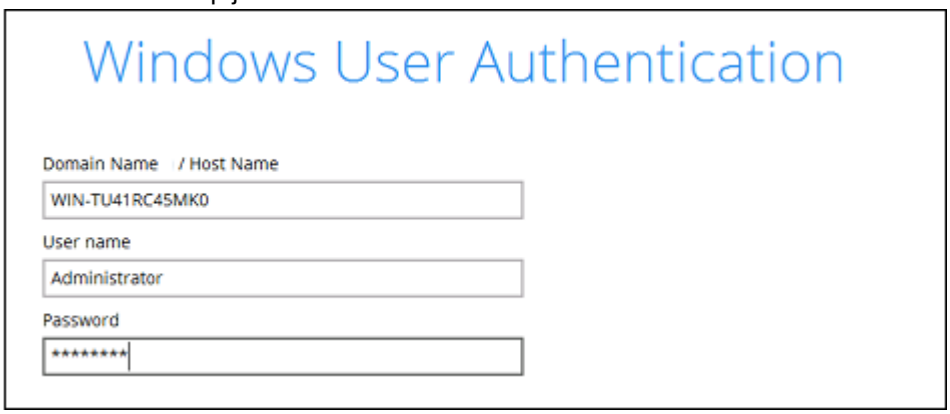
- **Unmask encryption key** – The encryption key is masked by default. Click this option to show the encryption key.



- **Copy to clipboard** – Click to copy the encryption key, then you can paste it in another location of your choice.

- **Confirm** – Click to exit this pop-up window and proceed to the next step.

10. Enter the Windows login credentials used by Backup App to authenticate the scheduled or continuous backup job.

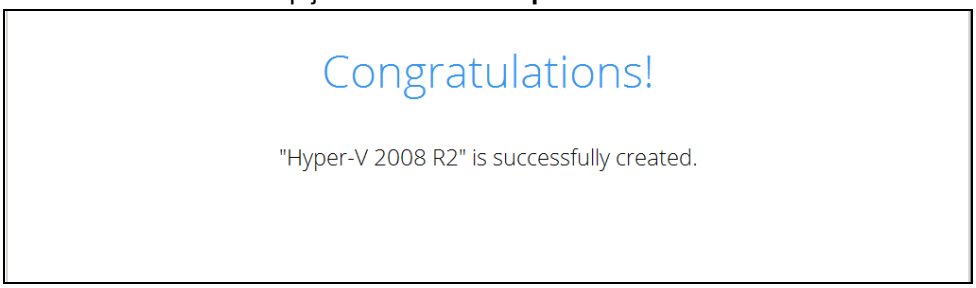


Note

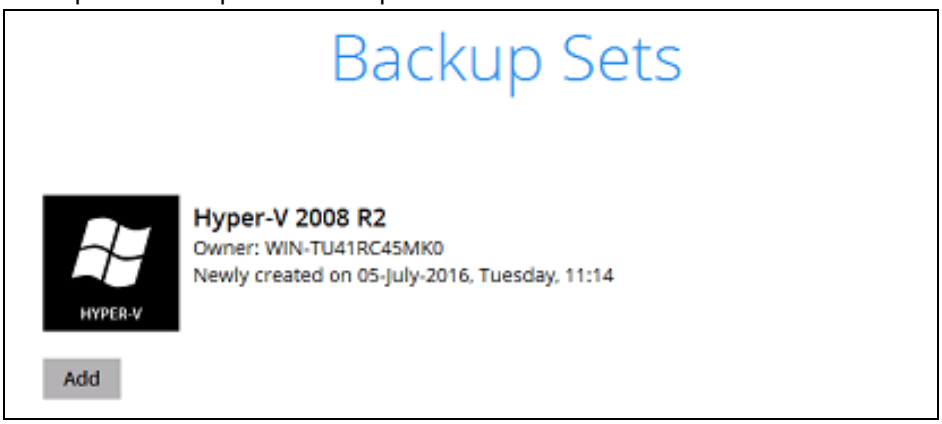
If the backup schedule is turned off for the backup set the Windows User Authentication screen will be automatically skipped. The Windows User Authentication login credentials can be added or updated post backup set creation.

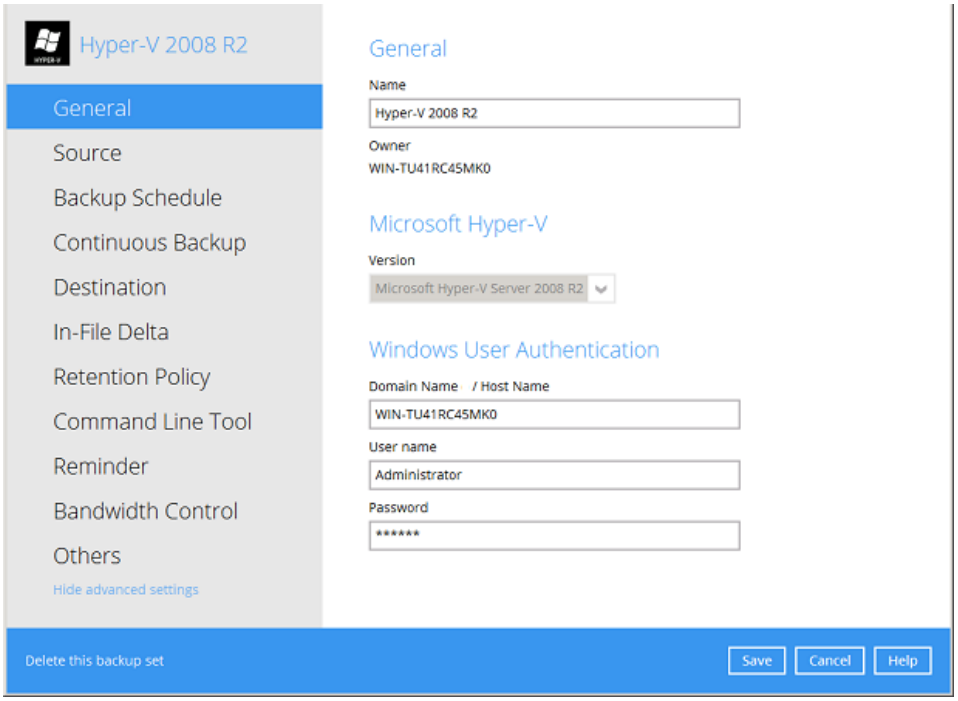
11. **Backup set created.**

i. To start a manual backup job click on **Backup now.**



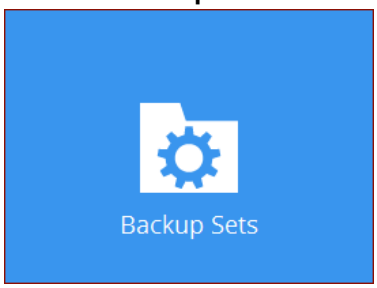
ii. To verify the backup set settings click on **Close** and then click on the Hyper-V backup set to complete the setup.




Hyper-V 2008 R2
General
Source
Backup Schedule
Continuous Backup
Destination
In-File Delta
Retention Policy
Command Line Tool
Reminder
Bandwidth Control
Others
Hide advanced settings
General
Name
Hyper-V 2008 R2
Owner
WIN-TU41RC45MK0
Microsoft Hyper-V
Version
Microsoft Hyper-V Server 2008 R2
Windows User Authentication
Domain Name / Host Name
WIN-TU41RC45MK0
User name
Administrator
Password
******
Delete this backup set
Save
Cancel
Help

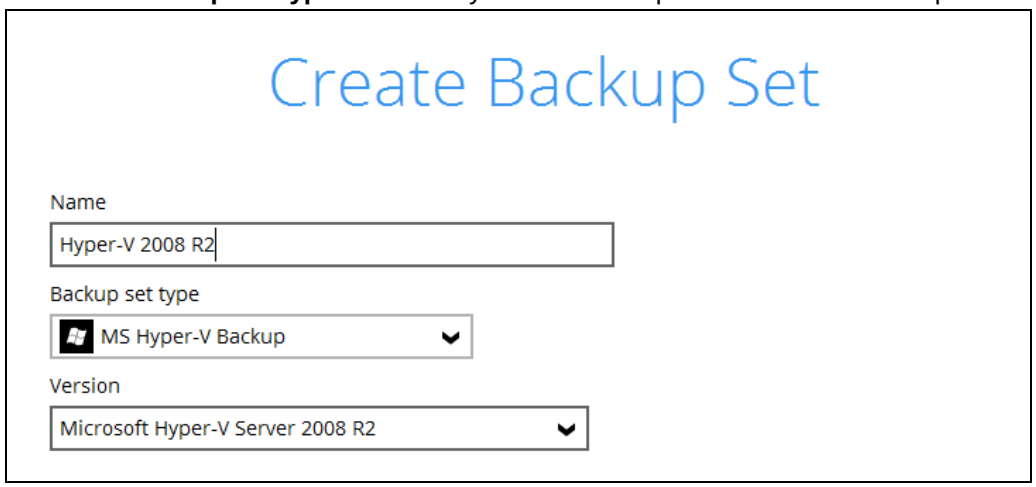
Non Run Direct Backup Set

1. Click the **Backup Sets** icon on the main interface of Backup App.



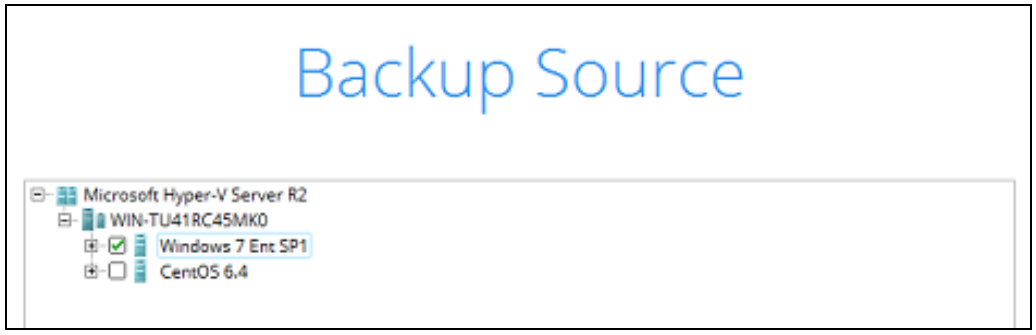
2. Create a new backup set by clicking the "**+**" icon next to **Add new backup set**.

3. Select the **Backup set type** and name your new backup set then click **Next** to proceed.

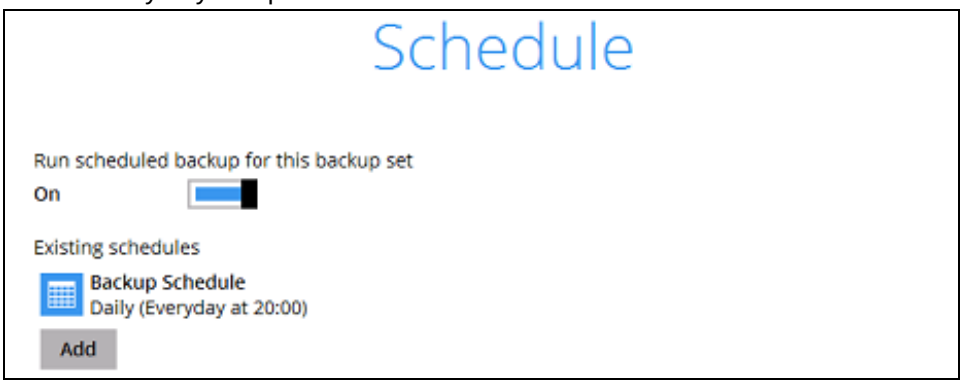


Note: *Backup App will automatically detect the Hyper-V version installed on the host.*

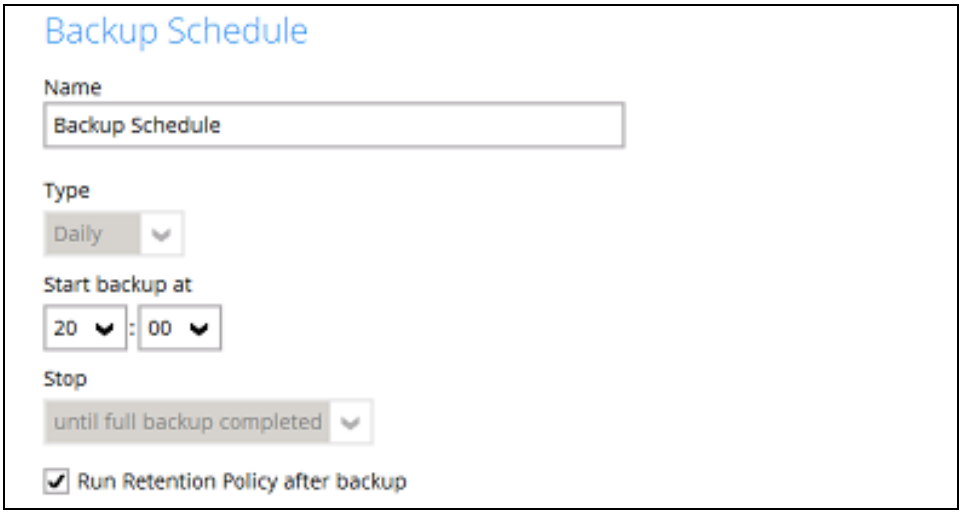
4. In the Backup Source menu, select the guest virtual machines you would like to backup. Click **Next** to proceed.



5. In the Schedule menu, you can configure a backup schedule for backup job to run automatically at your specified time interval.

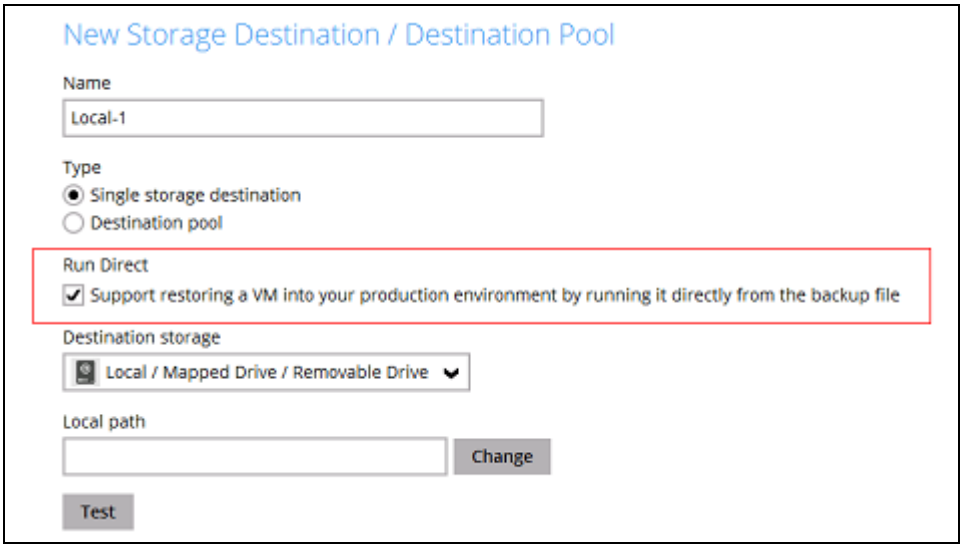


Click **Add** to add a new schedule or double click on the existing schedule to change the values. Click **Next** to proceed when you are done setting.



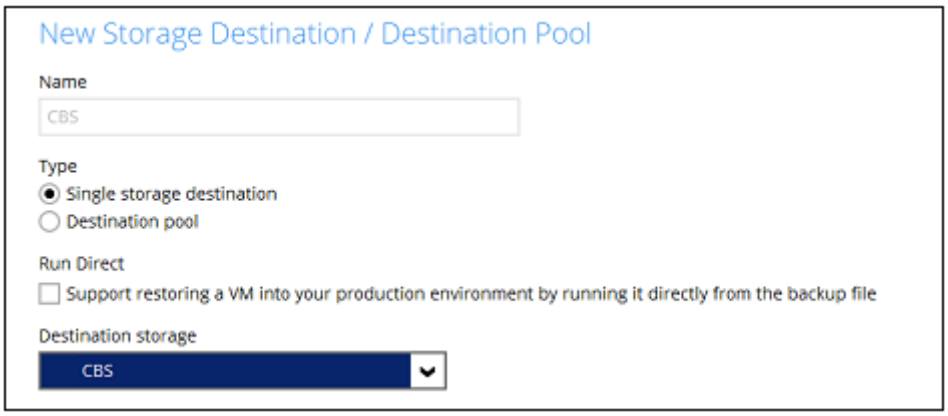
Note: *The default backup schedule is daily backup at 22:00 with the backup job will run until completion and the retention policy job will be run immediately after the backup job*.

6. Select the backup storage destination.



Note: For Hyper-V backup sets, the default setting is for **Run Direct** to be enabled and the storage destination is either a **Local, Mapped Drive, or Removable Drive.**

To select a cloud, sftp/ftp, or CBS as a storage destination un-select ***Run Direct*** *setting and select* your desired cloud, sftp/ftp, or CBS as a storage destination. Click **OK** to proceed when you are done.



7. Click **Add** to an additional storage destination or click **Next** to proceed when you are done.

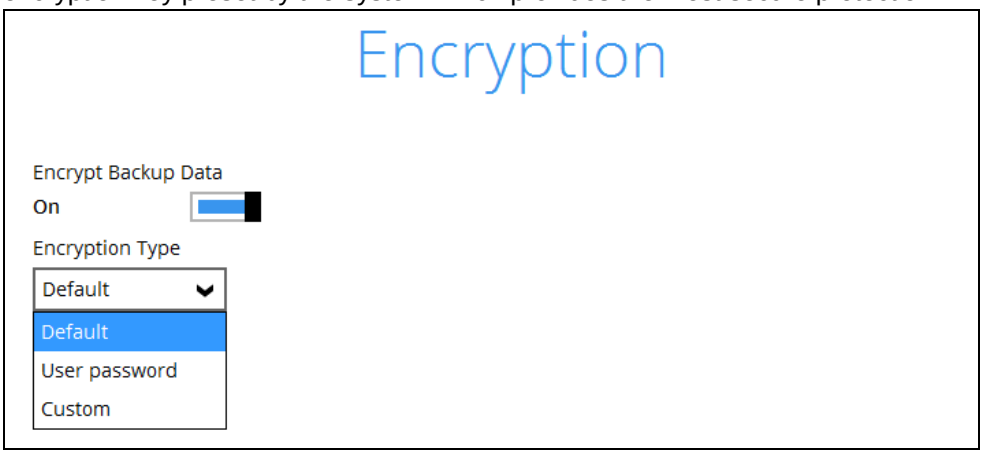
8. If you wish to enable the Granular restore feature, make sure you turn on the **Granular Restore** switch in this menu. Click **Next** to proceed.

Notes

1. Once the Granular Restore feature is enabled and the backup set is saved, it is **NOT** possible to disable it afterwards, and vice versa. If you wish to change the Granular Restore settings, a new backup set will have to be created.
2. It is possible to enable both Granular Restore and Run Direct restore on the same backup set. However, Backup App will only allow either Granular Restore or Run Direct restore to run, but not both to run concurrently.
3. Granular Restore requires an additional OpenDirect / Granular restore add-on module license to work. Contact your backup service provider for further details.

9. **IMPORTANT:** If you have enabled the Granular restore or Run Direct restore feature, backup data will not be compressed and encrypted to optimize the restore performance, therefore you can skip to step 11.

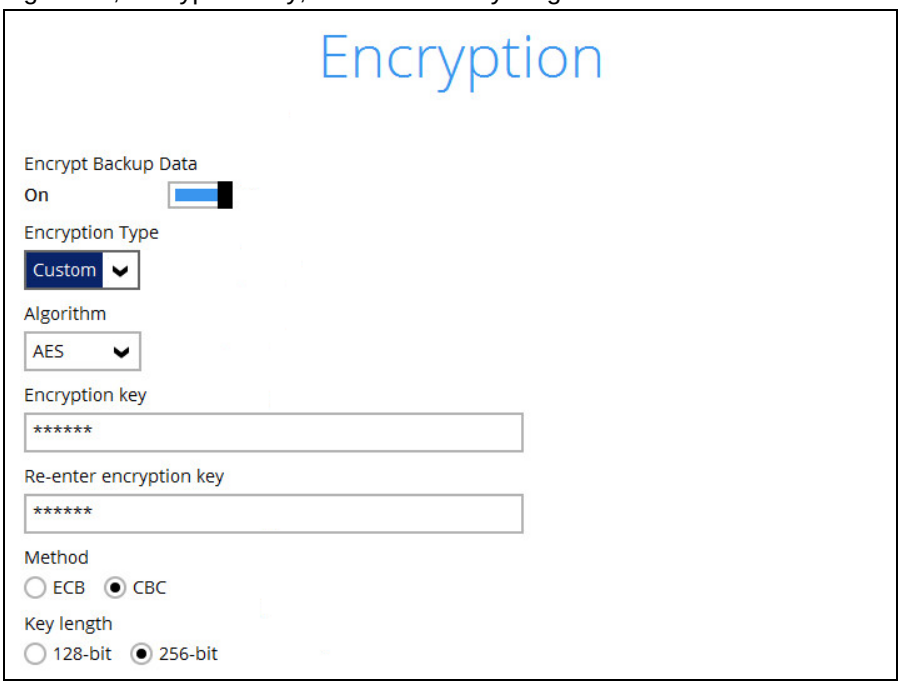
In the Encryption window, the default **Encrypt Backup Data** option is enabled with an encryption key preset by the system which provides the most secure protection.



You can choose from one of the following three Encryption Type options:

- **Default** – an encryption key with 44 alpha numeric characters will be randomly generated by the system
- **User password** – the encryption key will be the same as the login password of your Backup App at the time when this backup set is created. Please be reminded that if you change the Backup App login password later, the encryption keys of the backup sets previously created with this encryption type will remain unchanged.

- **Custom** – you can customize your encryption key, where you can set your own algorithm, encryption key, method and key length.

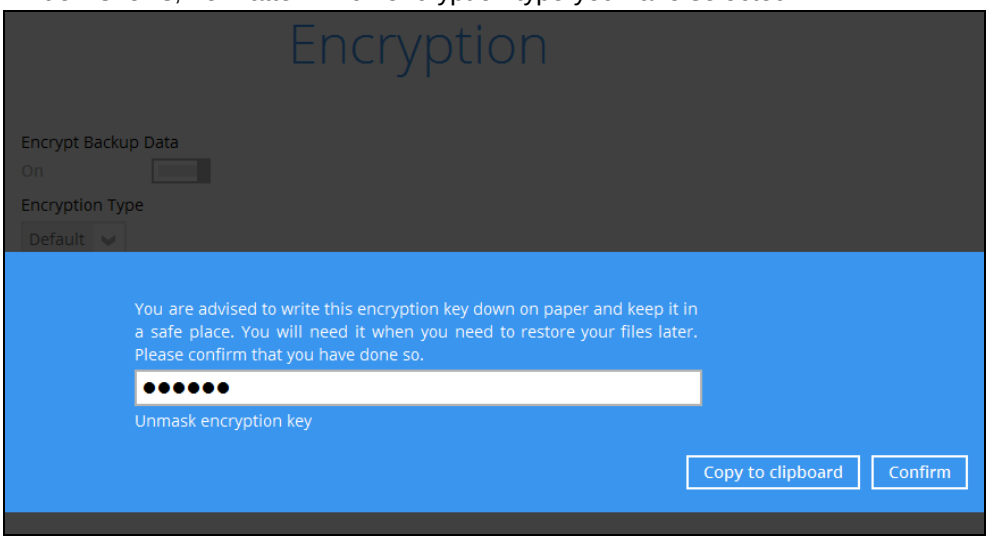


Notes:

*i. For local, mapped drive, or removable drive storage destinations with Run Direct enabled the compression type will be set **No Compression** and data encryption is **disabled** to ensure optimal backup and restore performance. The backup set compression type and data encryption settings will only be applied to CBS, SFTP/FTP, or Cloud storage destinations for the backup set.*

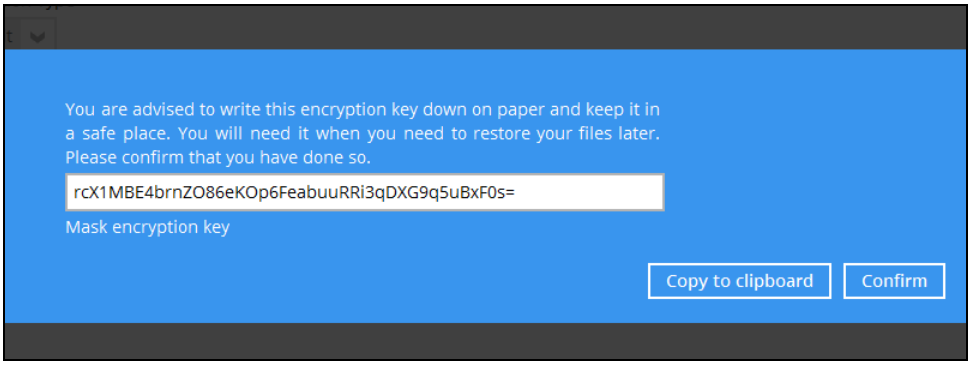
Click **Next** when you are done setting.

10. If you have enabled the Encryption Key feature in the previous step, the following pop-up window shows, no matter which encryption type you have selected.



The pop-up window has the following three options to choose from:

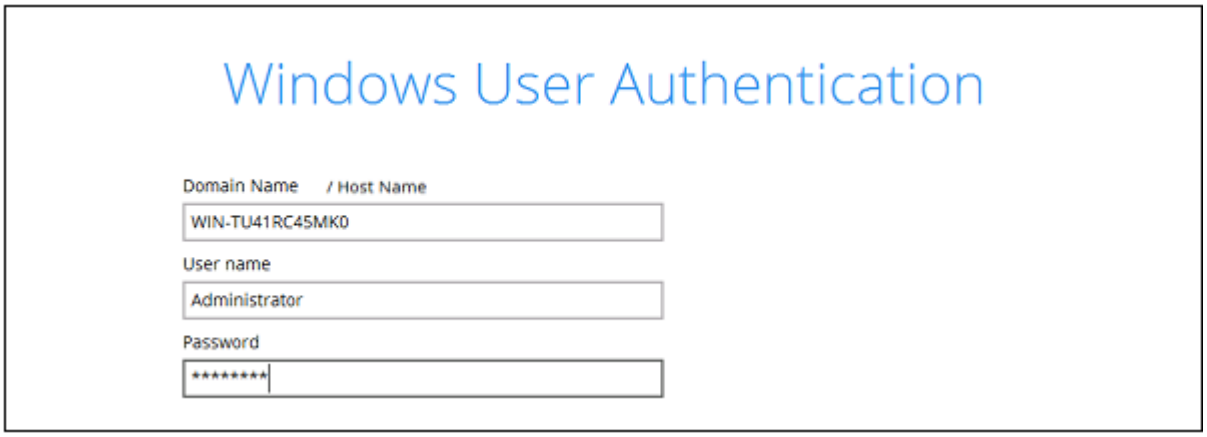
- **Unmask encryption key** – The encryption key is masked by default. Click this option to show the encryption key.



- **Copy to clipboard** – Click to copy the encryption key, then you can paste it in another location of your choice.

- **Confirm** – Click to exit this pop-up window and proceed to the next step.

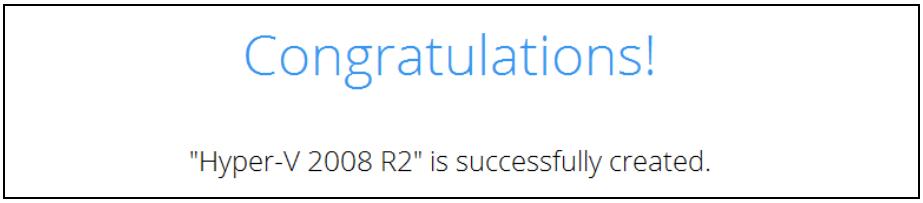
11. Enter the Windows login credentials used by Backup App to authenticate the scheduled backup job.



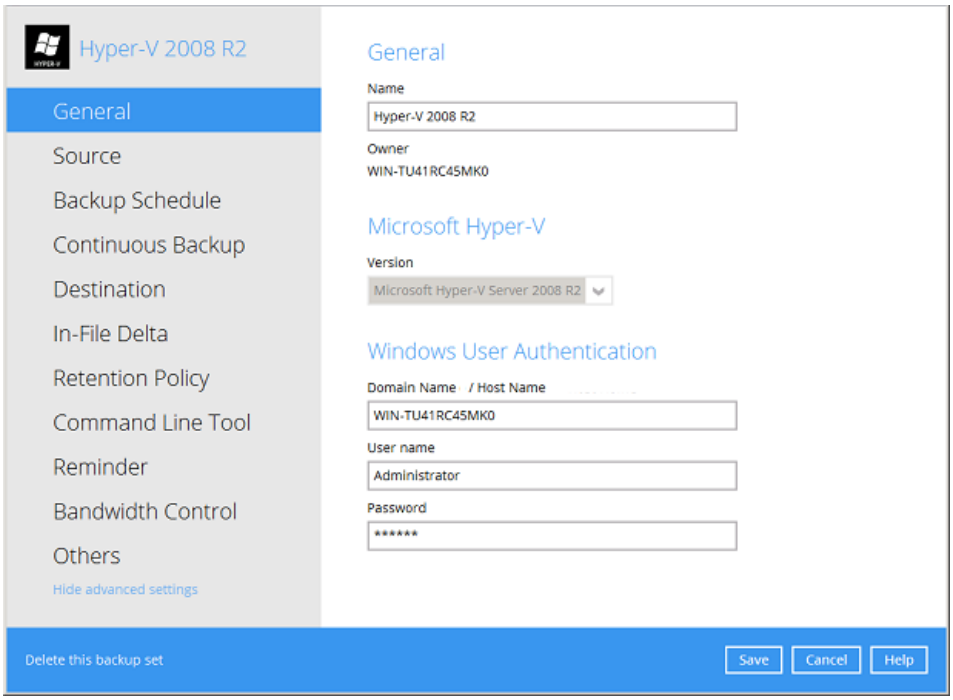
Note: *If the backup schedule is turned off for the backup set the Windows User Authentication screen will be automatically skipped. The Windows User Authentication login credentials can be added or update post backup set creation.*

12. **Backup set created.**

    i. To start a manual backup job click on **Backup now**.



ii. To verify the backup set settings click on Close and then click on the Hyper-V backup set to complete the setup.



6.2 Cluster Environment

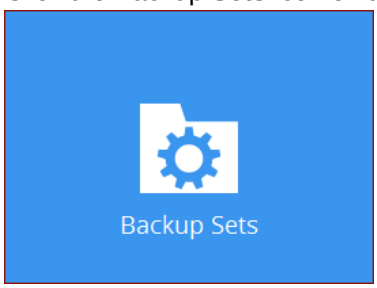
Requirements

For Hyper-V Cluster backup sets:

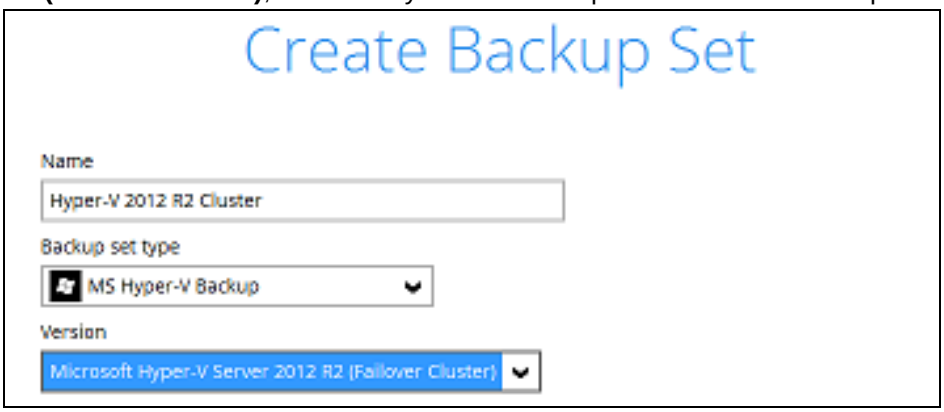
1. The same version of Backup App must be installed on all Hyper-V Cluster nodes.
2. The same backup user account must be used.
3. The backup schedule must be enabled on all Hyper-V Cluster nodes.

Run Direct Backup Set

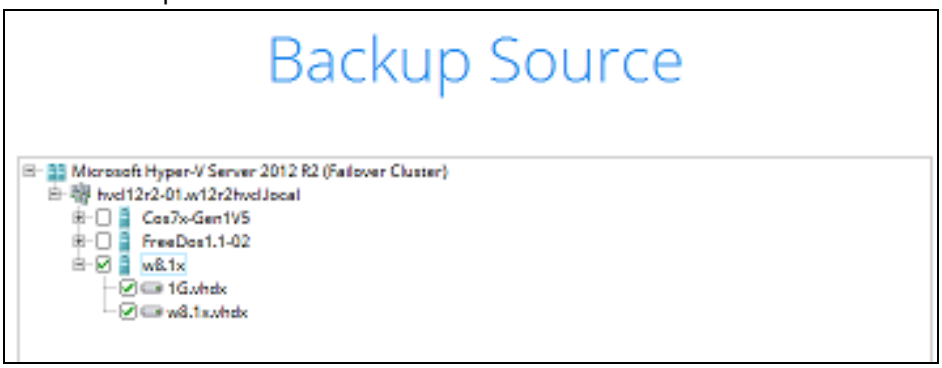
1. Click the Backup **Sets** icon on the main interface of Backup App



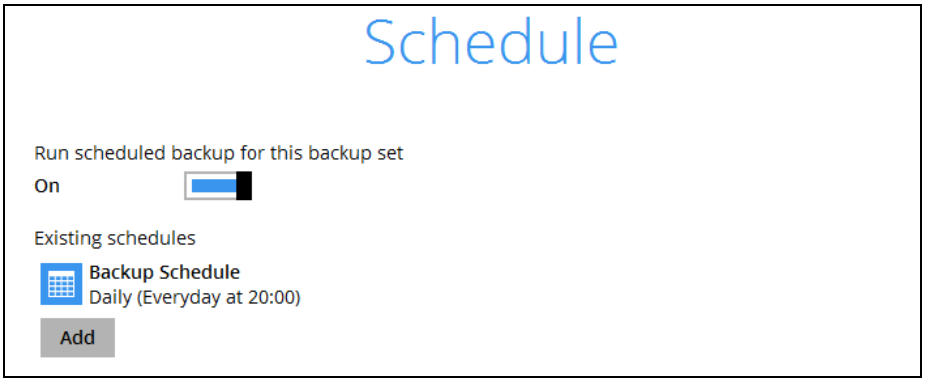
2. Create a new backup set by clicking the "**+**" icon or **Add** button to created new backup set.
3. Select the **Backup set type** MS Hyper-V Backup, Version **Microsoft Hyper-V Server 2012 R2 (Failover Cluster)**, and name your new backup set then click **Next** to proceed.



4. In the Backup Source menu, select the guest virtual machines you would like to backup. Click **Next** to proceed.

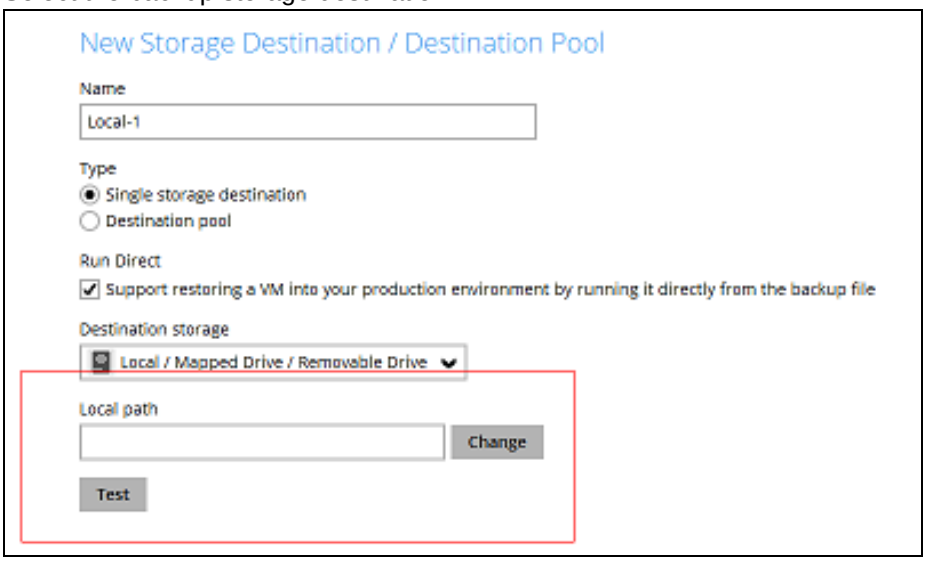


5. Click **Add** to add a new schedule or double click on the existing schedule to change the values. Click **Next** to proceed when you are done setting.



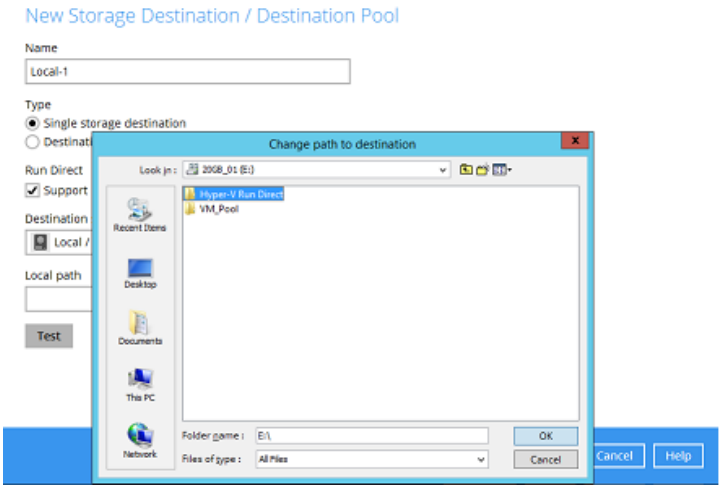
Note: *The default backup schedule is daily backup at 22:00 with the backup job will run until completion and the retention policy job will be run immediately after the backup job*.

6. Select the backup storage destination.

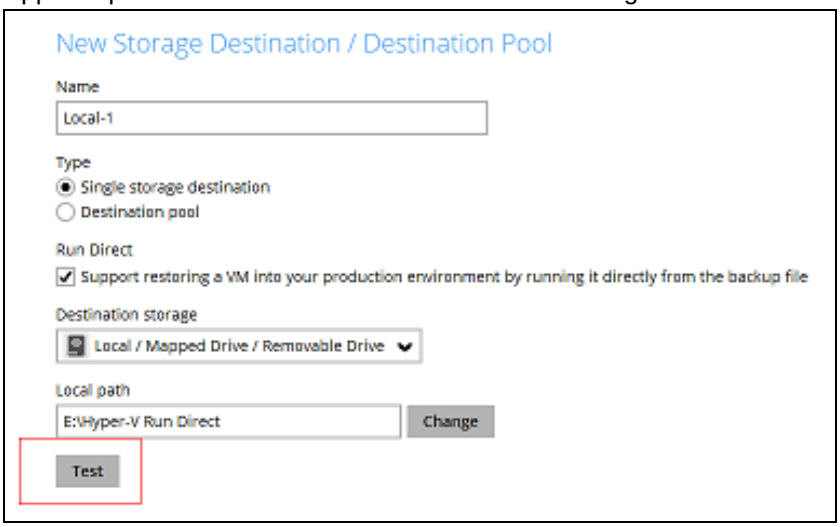


Note: *For Hyper-V backup sets by the default the* ***Run Direct*** *feature is enabled.*

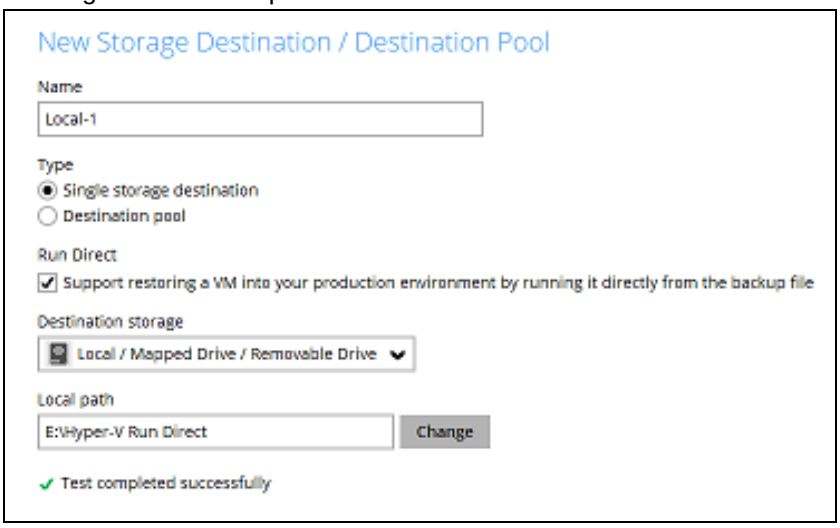
i. Click on Change to select the storage destination a Local, Mapped Drive, or Removable Drive.



ii. After selecting the storage destination click on the Test button to verify if Backup App has permission to access the folder on the storage destination.



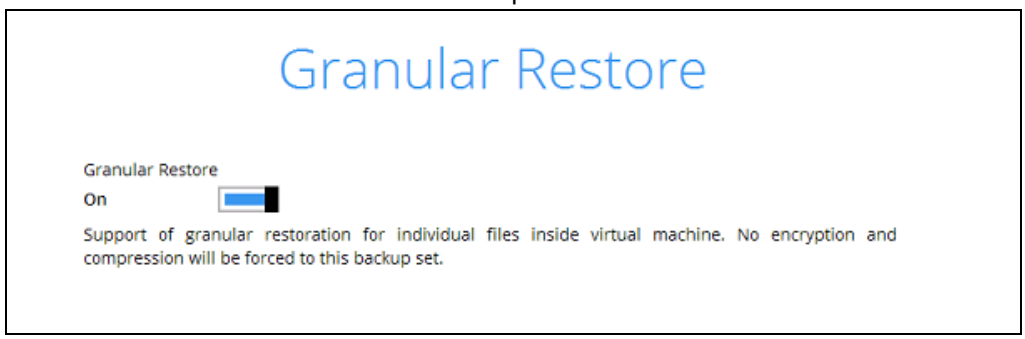
iii. Once the test is finished Backup App will display “Test completed successfully” message. Click **OK** to proceed.



Note: *For Hyper-V Cluster backup set with Run Direct enabled please ensure all nodes have access to the* ***Local, Mapped Drive, or Removable Drive*** *destination storage.*

iv. To add extra storage destinations click **Add**, otherwise Click **Next** to proceed.

7. If you wish to enable the Granular Restore feature, make sure you turn on the **Granular Restore** switch in this menu. Click **Next** to proceed.

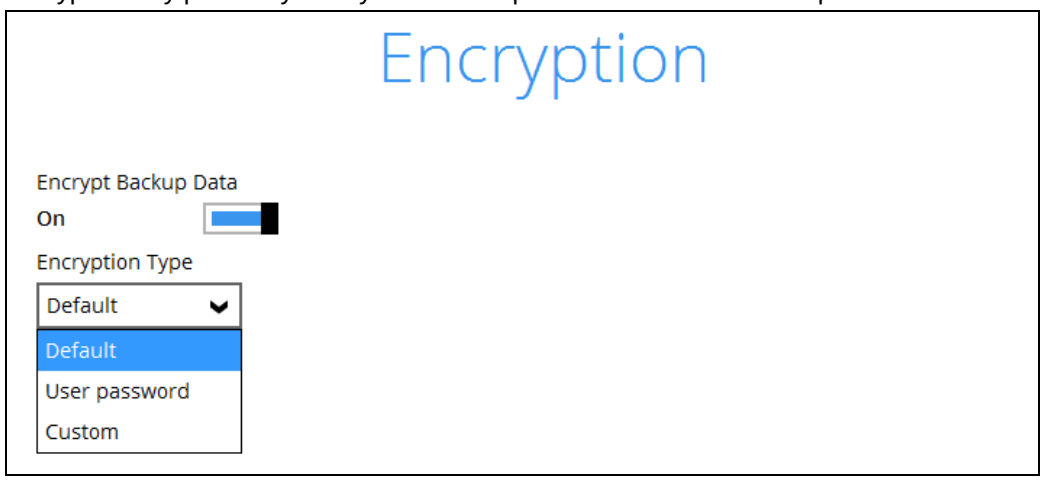


Notes

1. Once the Granular Restore feature is enabled and the backup set is saved, it is **NOT** possible to disable it afterwards, and vice versa. If you wish to change the Granular Restore settings, a new backup set will have to be created.
2. It is possible to enable both Granular Restore and Run Direct restore on the same backup set. However, Backup App will only allow either Granular Restore or Run Direct restore to run, but not both to run concurrently.
3. Granular Restore requires an additional OpenDirect / Granular restore add-on module license to work. Contact your backup service provider for further details.

8. **IMPORTANT:** If you have enabled the Granular restore or Run Direct restore feature, backup data will not be compressed and encrypted to optimize restore performance, therefore you can skip to step 10.

In the Encryption window, the default **Encrypt Backup Data** option is enabled with an encryption key preset by the system which provides the most secure protection.

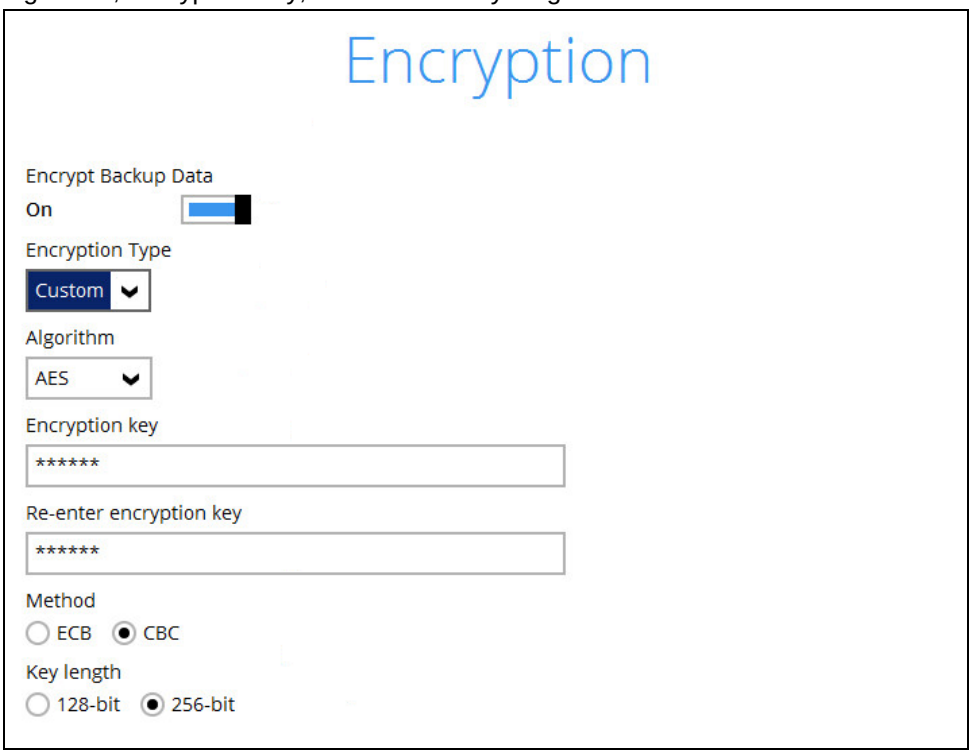


You can choose from one of the following three Encryption Type options:

- **Default** – an encryption key with 44 alpha numeric characters will be randomly generated by the system
- **User password** – the encryption key will be the same as the login password of your Backup App at the time when this backup set is created. Please be reminded that if

you change the Backup App login password later, the encryption keys of the backup sets previously created with this encryption type will remain unchanged.

- **Custom** – you can customize your encryption key, where you can set your own algorithm, encryption key, method and key length.

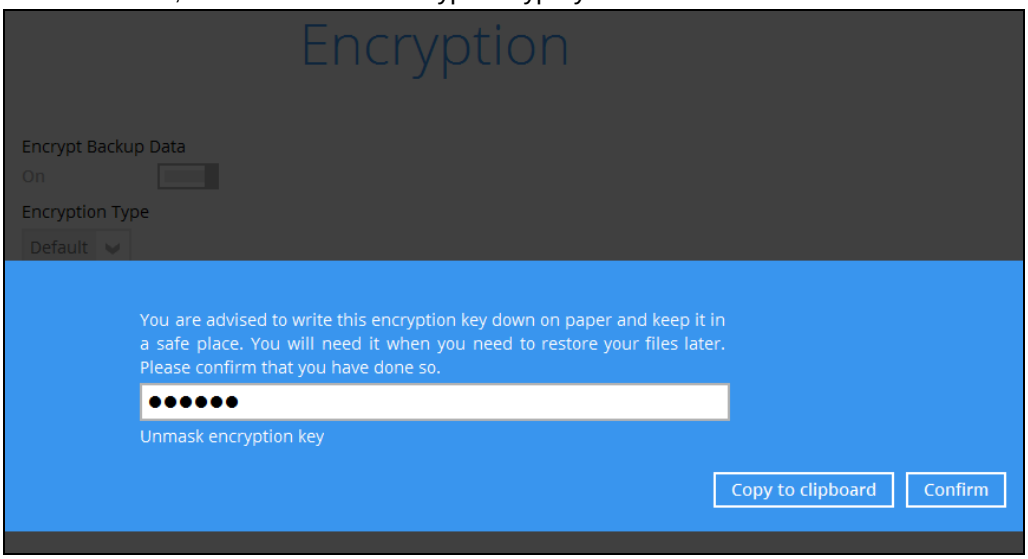


Notes:

i. *For local, mapped drive, or removable drive storage destinations with Run Direct enabled the compression type will always be set **No Compression** and data encryption is **disabled** to ensure optimal backup and restore performance. The backup set compression type and data encryption settings will only be applied to CBS, SFTP/FTP, or Cloud storage destinations for the backup set.*

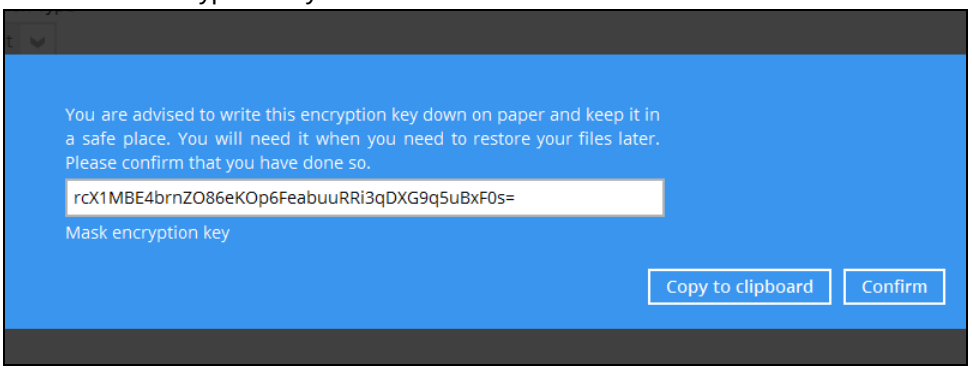
Click **Next** when you are done setting.

9. If you have enabled the Encryption Key feature in the previous step, the following pop-up window shows, no matter which encryption type you have selected.



The pop-up window has the following three options to choose from:

- **Unmask encryption key** – The encryption key is masked by default. Click this option to show the encryption key.



- **Copy to clipboard** – Click to copy the encryption key, then you can paste it in another location of your choice.

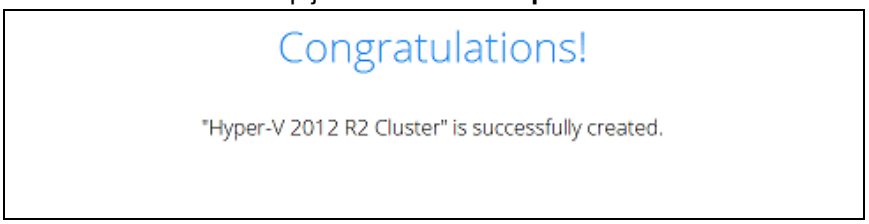
- **Confirm** – Click to exit this pop-up window and proceed to the next step.

10. Enter the Windows login credentials used by Backup App to authenticate the scheduled or continuous backup job.

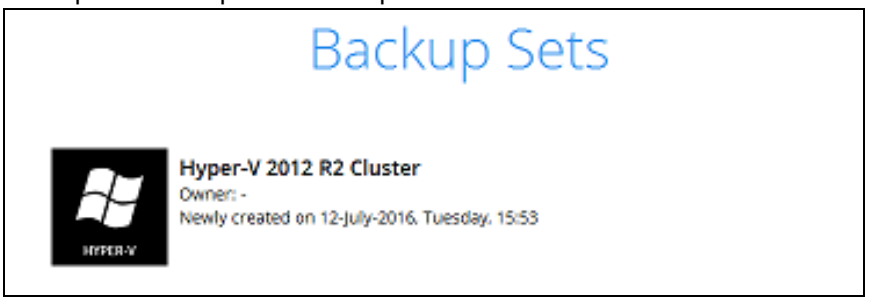
Note: *If the backup schedule is turned off for the backup set the Windows User Authentication screen will be automatically skipped. The Windows User Authentication login credentials can be added or update post backup set creation.*

11. **Backup set created.**

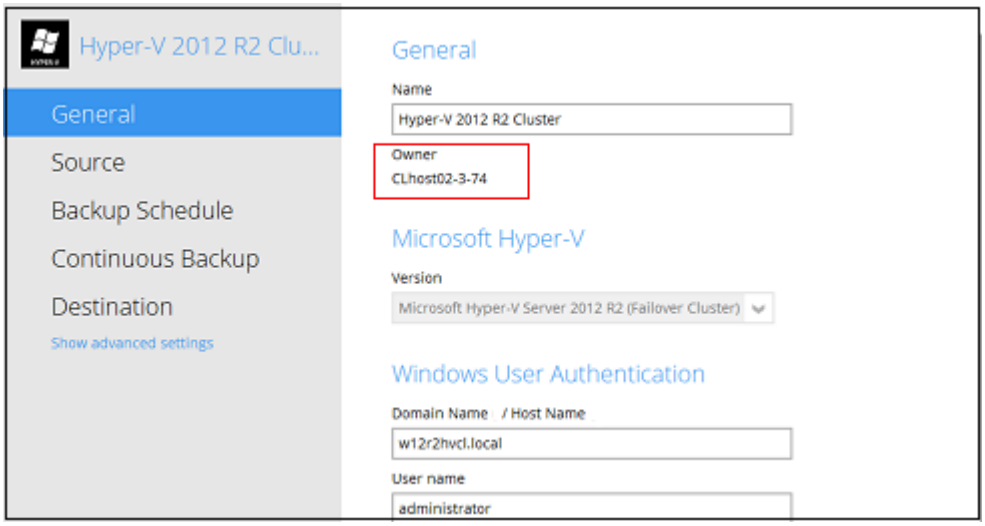
i. To start a manual backup job click on **Backup now.**



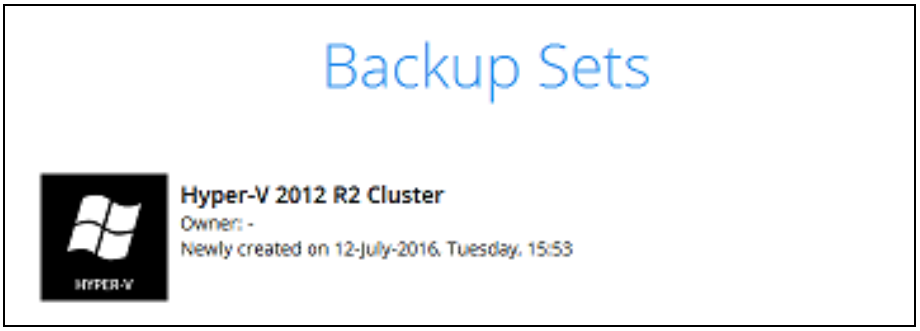
ii. To verify the backup set settings click on Close and then click on the Hyper-V backup set to complete the setup.



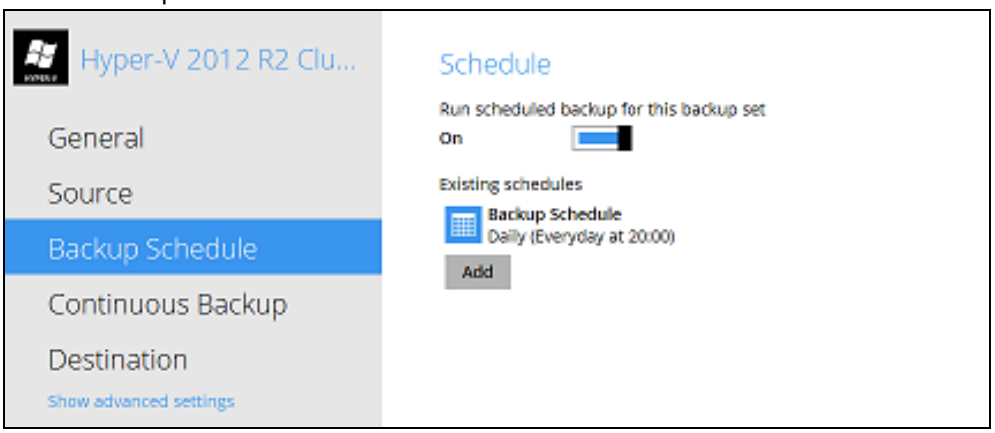
iii. Go to **General** and verify if the node has been added to the backup schedule.



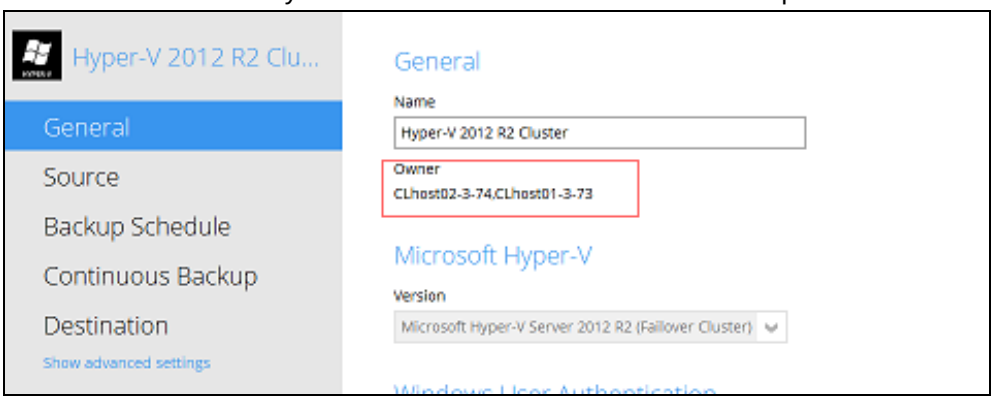
iv. On the next Hyper-V node startup Backup App and select the Hyper-V backup set.



12. Go to **Backup schedule** and enable the **Run schedule backup for this backup set** and set the backup schedule time and click on **Save** when finished.



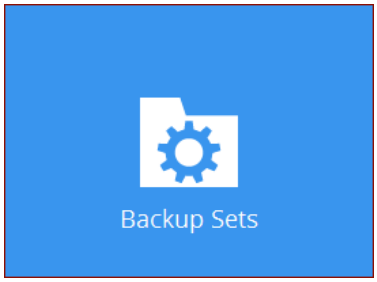
13. Go to **General** and verify if the node has been added to the backup schedule.



14. Repeat steps 11 to 12 for all Hyper-V Cluster nodes.

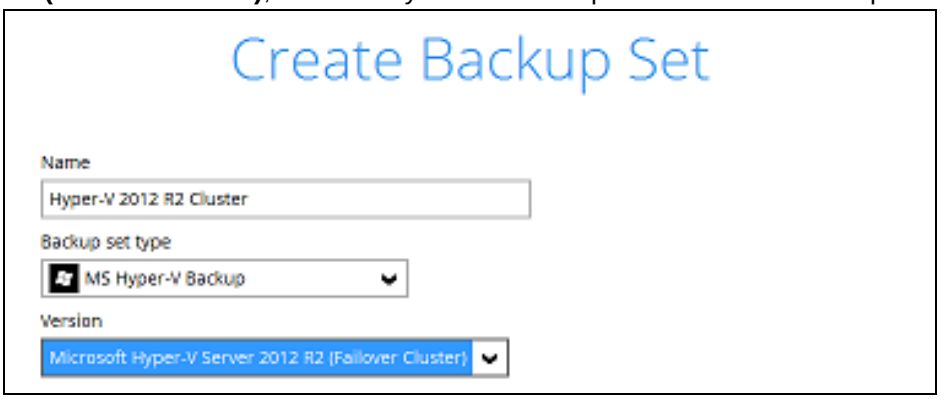
Non Run Direct Backup Set

1. Click the **Backup Sets** icon on the main interface of Backup App



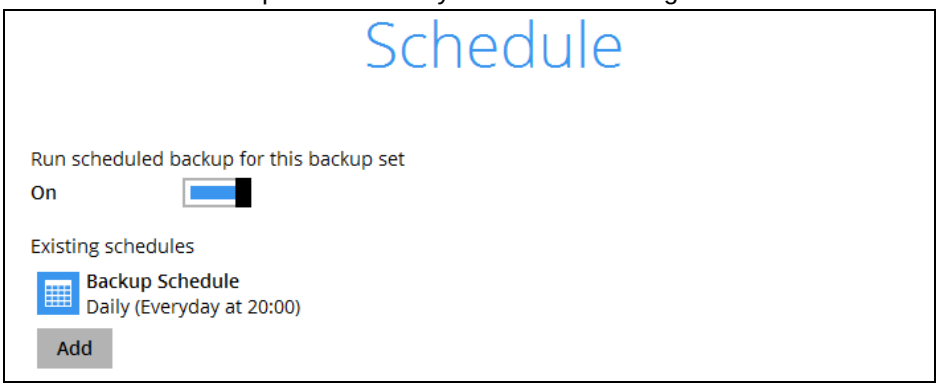
2. Create a new backup set by clicking the "**+**" icon or **Add** button to created new backup set.

3. Select the **Backup set type** MS Hyper-V Backup, Version **Microsoft Hyper-V Server 2012 R2 (Failover Cluster)**, and name your new backup set then click **Next** to proceed.

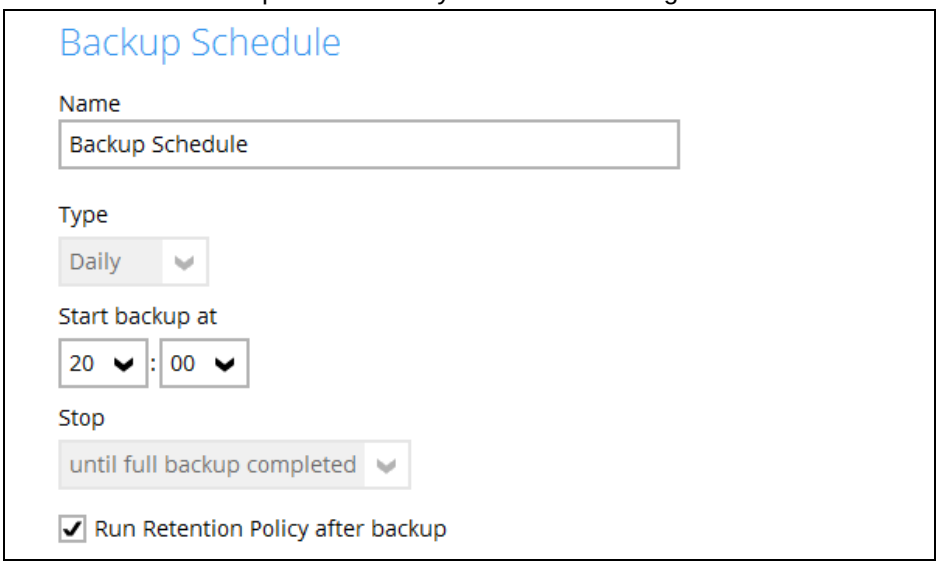


4. In the Backup Source menu, select the guest virtual machines you would like to backup. Click **Next** to proceed.

5. Click **Add** to add a new schedule or double click on the existing schedule to change the values. Click **Next** to proceed when you are done setting.



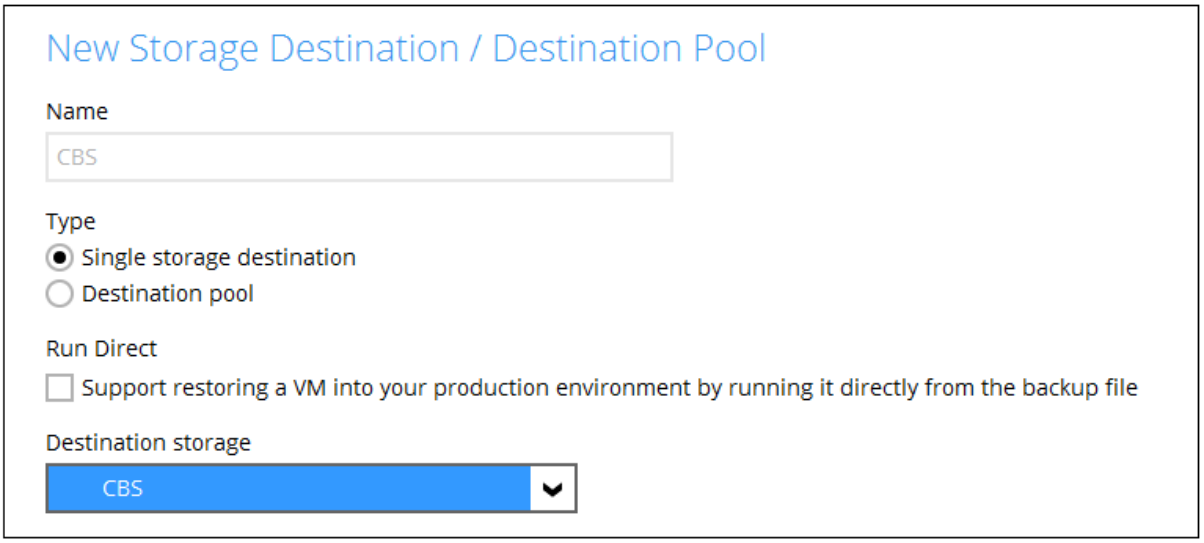
Click **Add** to add a new schedule or double click on the existing schedule to change the values. Click **Next** to proceed when you are done setting.



Note: *The default backup schedule is daily backup at 22:00 with the backup job will run until completion and the retention policy job will be run immediately after the backup job.*

6. Select the backup storage destination. To select a cloud, SFTP/FTP, or CBS as a storage destination un-select ***Run Direct*** *setting and select* your desired cloud, SFTP/FTP, or CBS

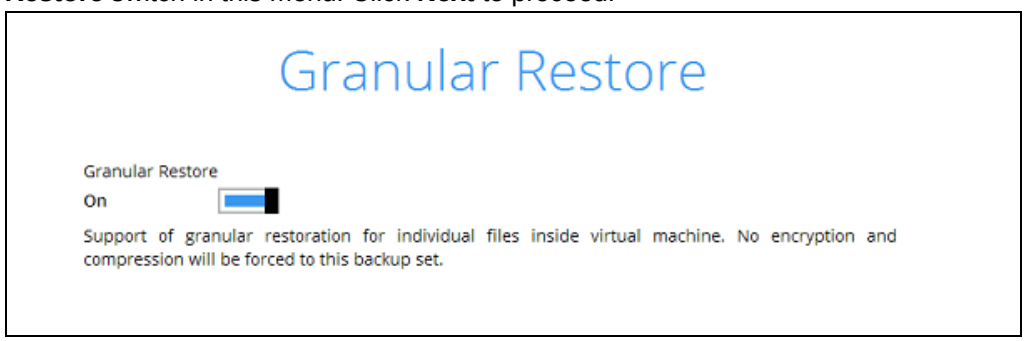
as a storage destination. Click **OK** to proceed when you are done.



Note: To utilize the CBT feature, the storage destination must be a Local, Mapped Drive, or Removable Drive.

7. Click **Add** to an additional storage destination or click **Next** to proceed when you are done.

8. If you wish to enable the Granular Restore feature, make sure you turn on the **Granular Restore** switch in this menu. Click **Next** to proceed.

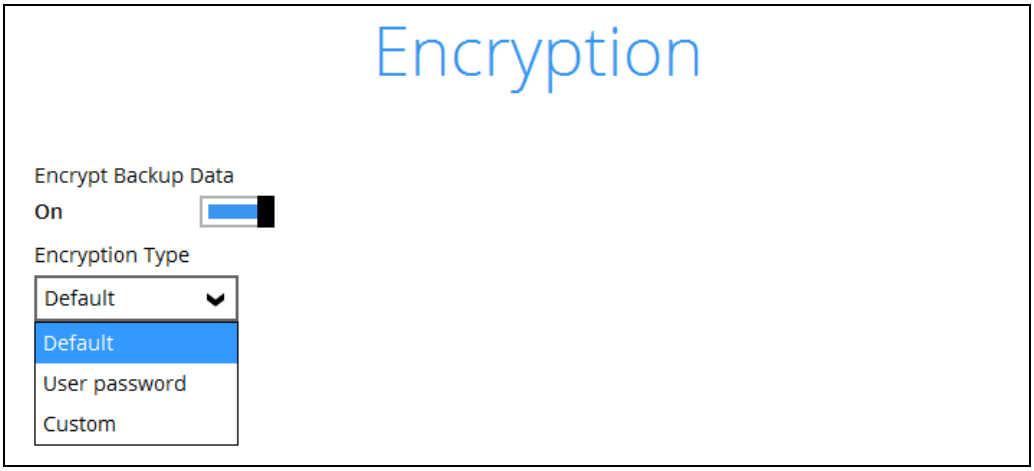


Notes

1. Once the Granular Restore feature is enabled and the backup set is saved, it is **NOT** possible to disable it afterwards, and vice versa. If you wish to change the Granular Restore settings, a new backup set will have to be created.
2. It is possible to enable both Granular Restore and Run Direct restore on the same backup set. However, Backup App will only allow either Granular Restore or Run Direct restore to run, but not both to run concurrently.
3. Granular Restore requires an additional OpenDirect / Granular restore add-on module license to work. Contact your backup service provider for further details.

9. **IMPORTANT:** If you have enabled the Granular Restore or Run Direct restore feature, backup data will not be compressed and encrypted to optimize restore performance, therefore you can skip to step 11.

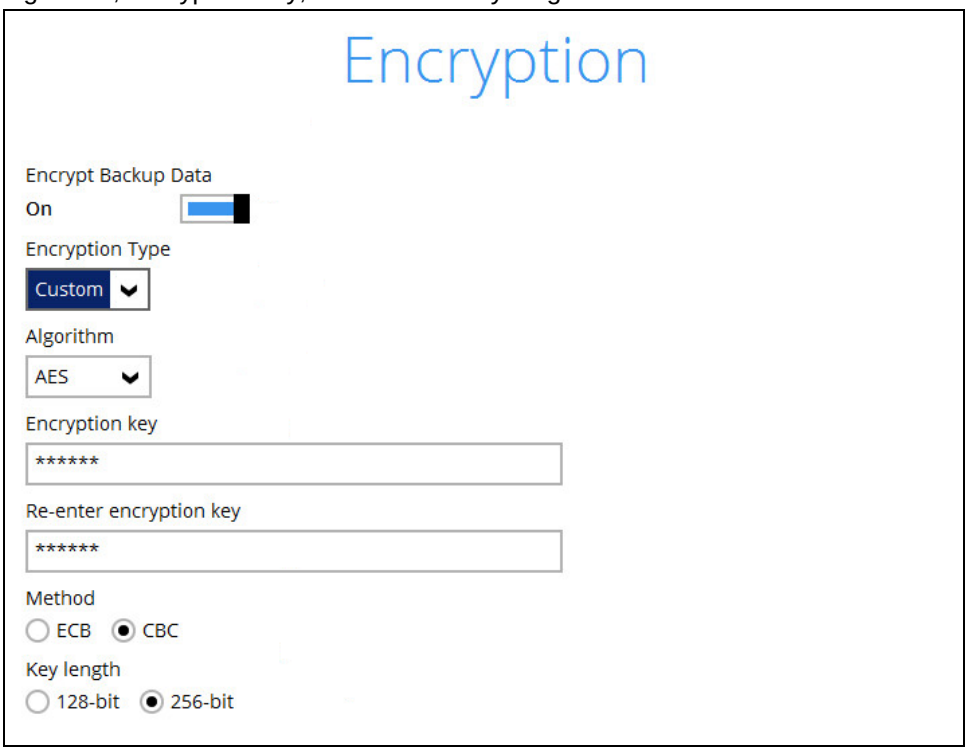
In the Encryption window, the default **Encrypt Backup Data** option is enabled with an encryption key preset by the system which provides the most secure protection.



You can choose from one of the following three Encryption Type options:

- **Default** – an encryption key with 44 alpha numeric characters will be randomly generated by the system
- **User password** – the encryption key will be the same as the login password of your Backup App at the time when this backup set is created. Please be reminded that if you change the Backup App login password later, the encryption keys of the backup sets previously created with this encryption type will remain unchanged.

- **Custom** – you can customize your encryption key, where you can set your own algorithm, encryption key, method and key length.

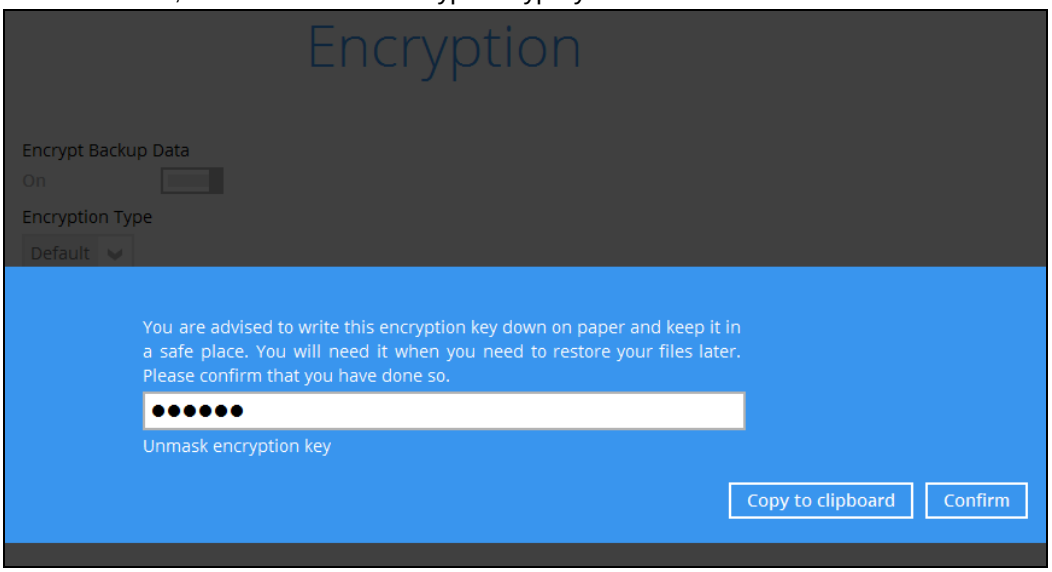


Notes:

*i. For local, mapped drive, or removable drive storage destinations with Run Direct enabled the compression type will always be set **No Compression** and data encryption is **disabled** to ensure optimal backup and restore performance. The backup set compression type and data encryption settings will only be applied to CBS, SFTP/FTP, or Cloud storage destinations for the backup set.*

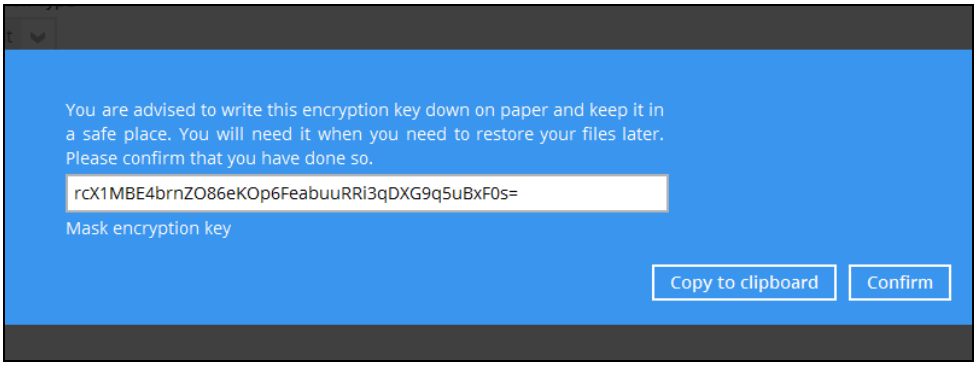
Click **Next** when you are done setting.

10. If you have enabled the Encryption Key feature in the previous step, the following pop-up window shows, no matter which encryption type you have selected.



The pop-up window has the following three options to choose from:

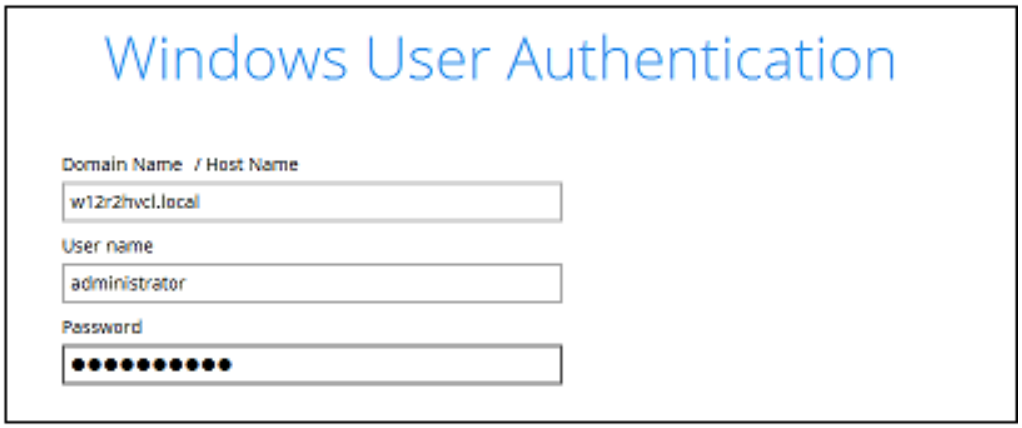
- **Unmask encryption key** – The encryption key is masked by default. Click this option to show the encryption key.



- **Copy to clipboard** – Click to copy the encryption key, then you can paste it in another location of your choice.

- **Confirm** – Click to exit this pop-up window and proceed to the next step.

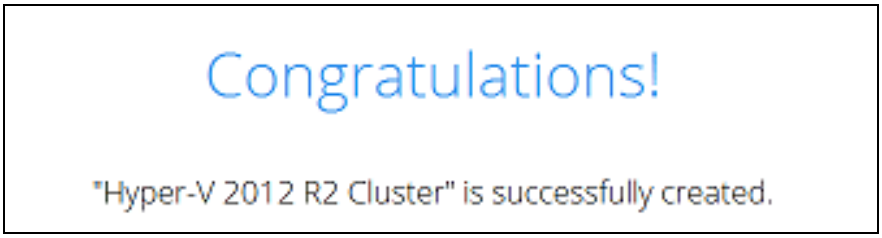
11. Enter the Windows login credentials used by Backup App to authenticate the scheduled backup job.



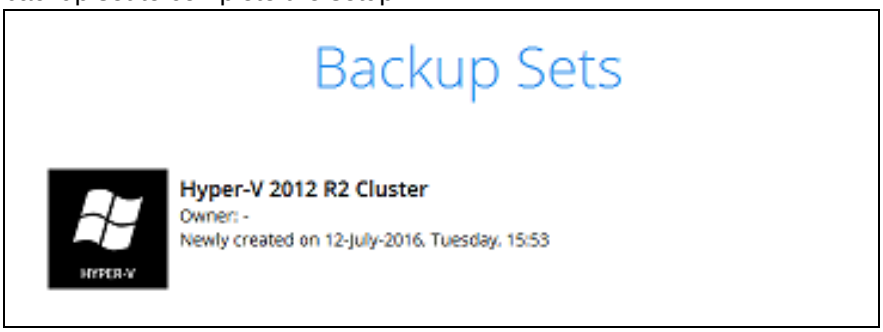
Note: *If the backup schedule is turned off for the backup set the Windows User Authentication screen will be automatically skipped. The Windows User Authentication login credentials can be added or update post backup set creation.*

12. **Backup set created.**

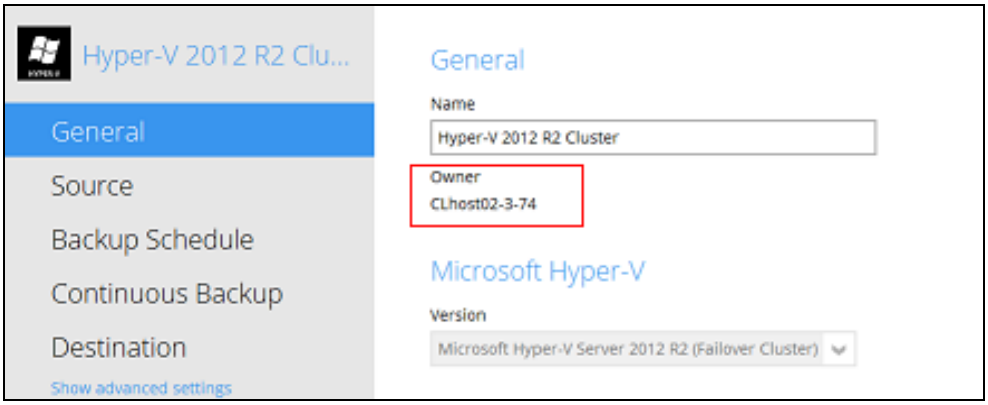
    i. To start a manual backup job click on **Backup now.**



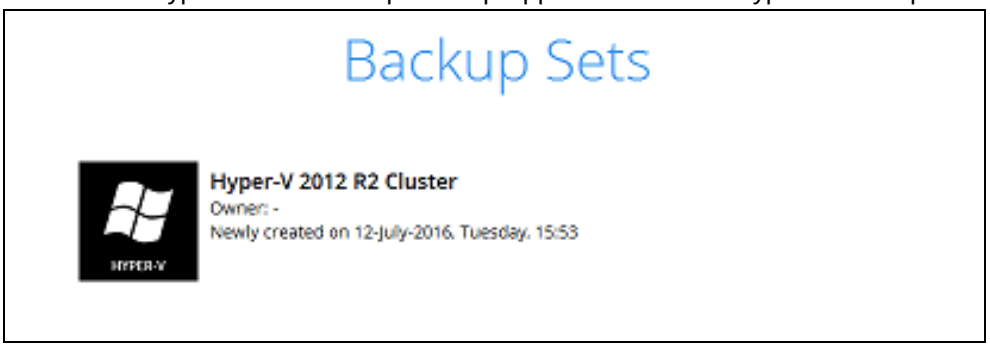
    ii. To verify the backup set settings click on Close and then click on the Hyper-V backup set to complete the setup.



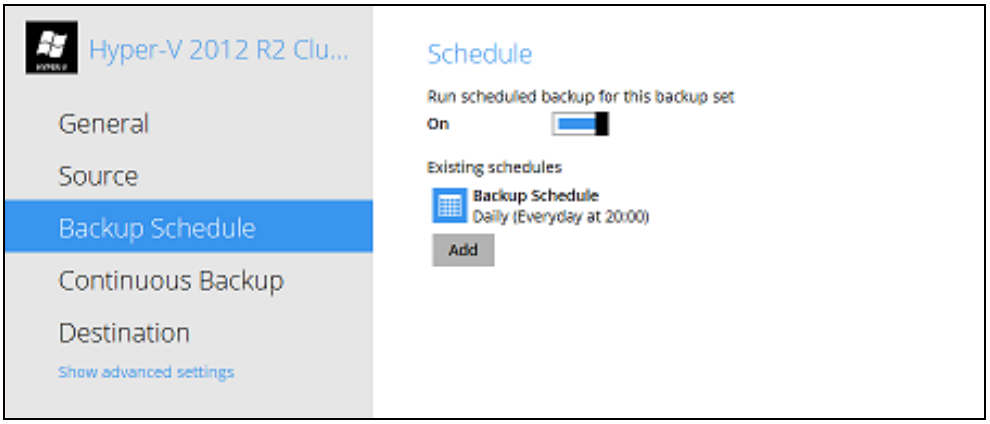
13. Go to **General** and verify if the node has been added to the backup schedule.



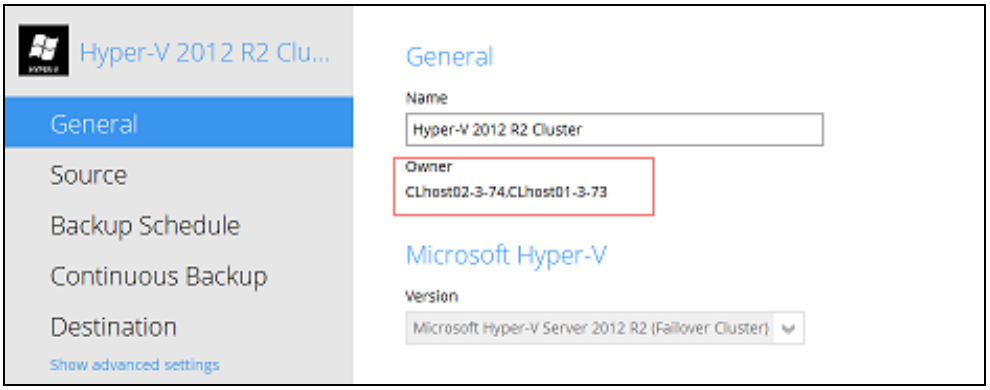
14. On the next Hyper-V node startup Backup App and select the Hyper-V backup set.



15. Go to **Backup schedule** and enable the **Run schedule backup for this backup set** and set the backup schedule time and click on **Save** when finished.

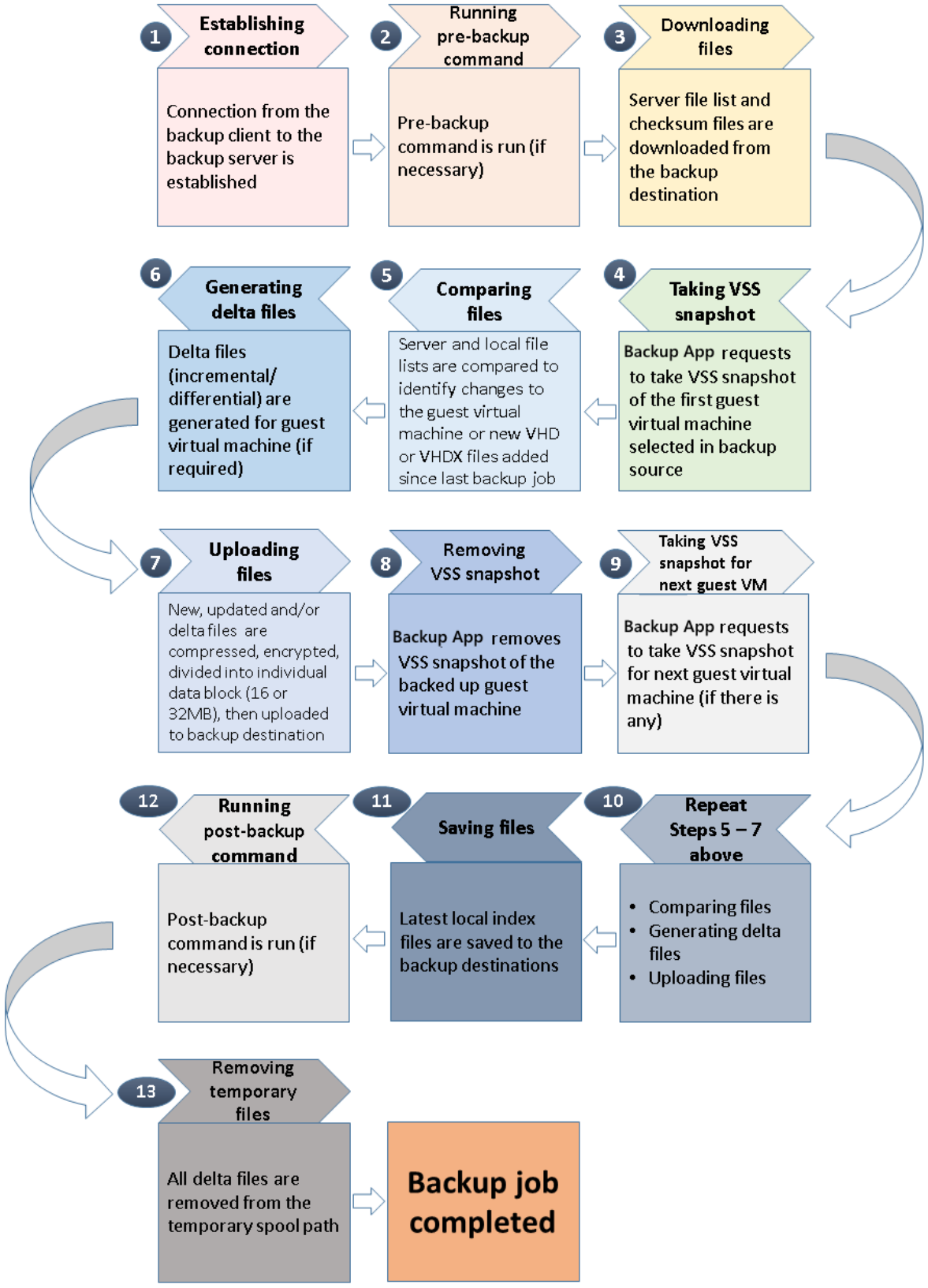


16. Go to **General** and verify if the node has been added to the backup schedule.



17. Repeat steps 13 to 15 for all Hyper-V Cluster nodes.

7 Overview on the Backup Process



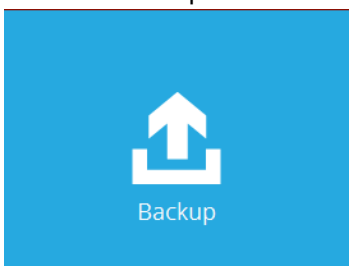
8 Running Backup Jobs

Login to Backup App

Login to the Backup App application according to the instructions in Chapter 3.1

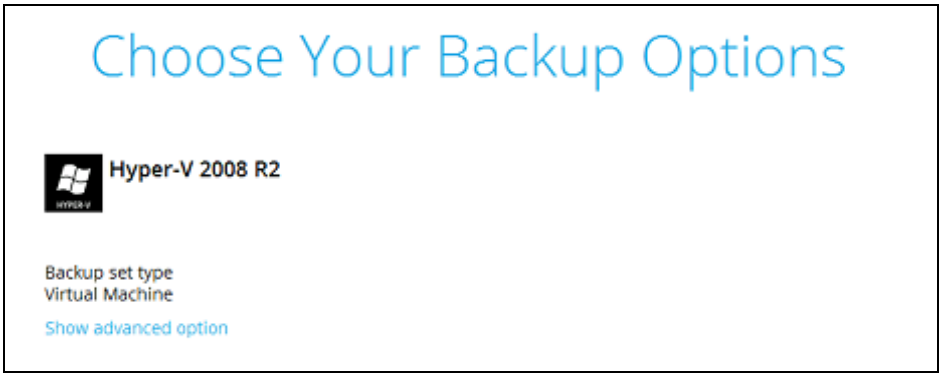
Start a Manual Backup

1. Click the Backup icon on the main interface of Backup App.

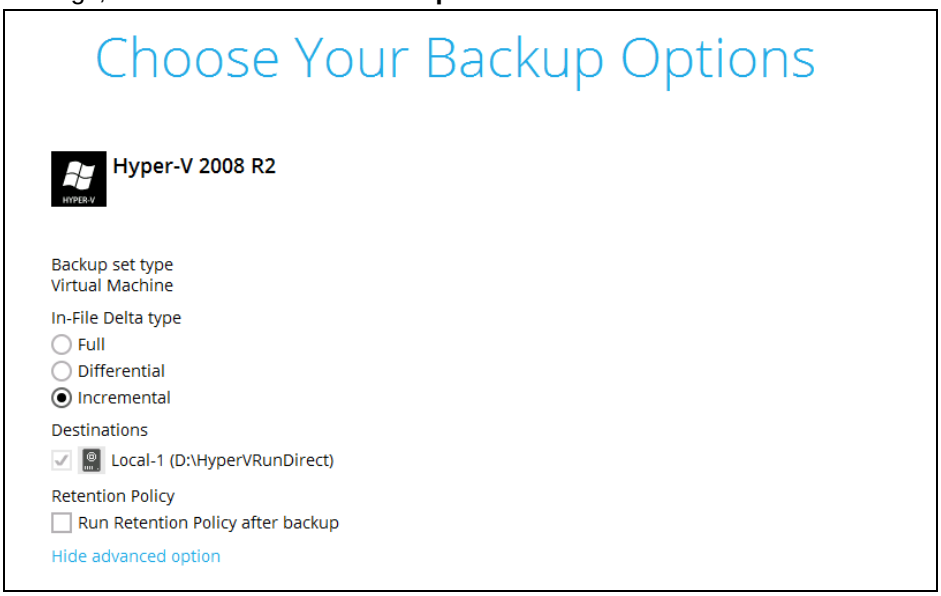


2. Select the Hyper-V backup set which you would like to start a manual backup.

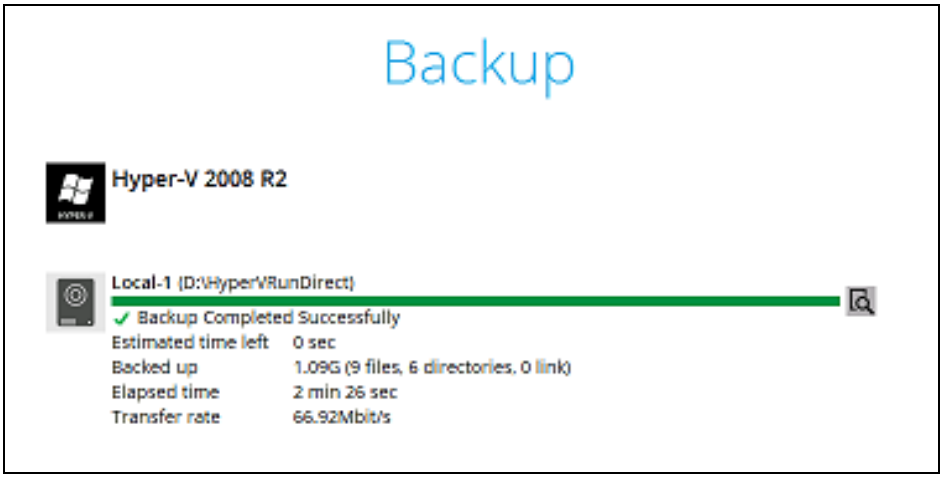
3. Click on **Backup** to start the backup job.



4. If you would like to modify the In-File Delta type, Destinations, or Run Retention Policy Settings, click on **Show advanced option**.

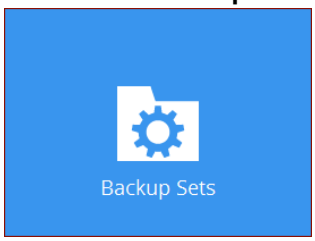


5. Backup job is completed.

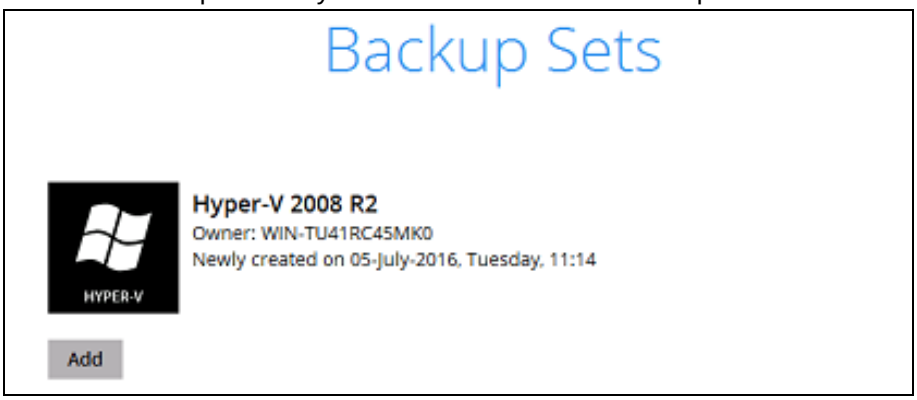


Configure Backup Schedule for Automated Backup

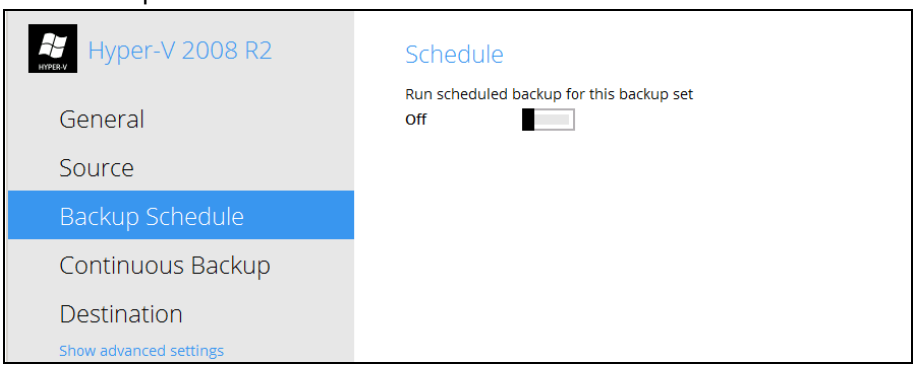
1. Click on the **Backup Sets** icon on the Backup App main interface.



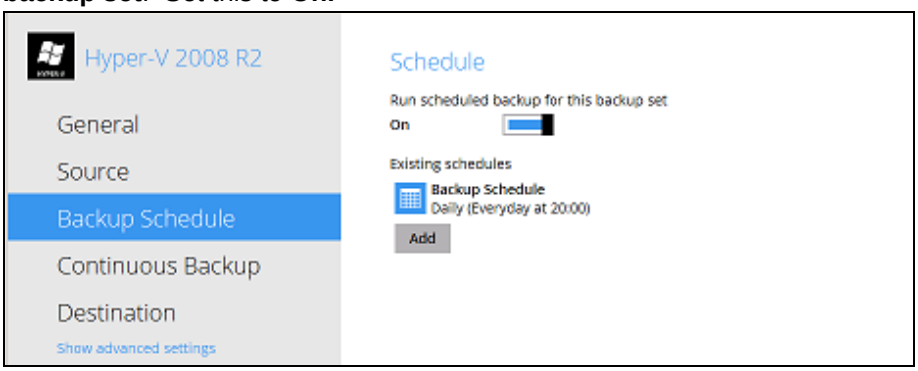
2. Select the backup set that you would like to create a backup schedule for.



3. Click Backup Schedule.



4. Then create a new backup schedule by clicking on the **Run scheduled backup for this backup set**. Set this to **On.**



Click **Add** to add a new schedule or double click on the existing schedule to change the existing values. Click **Save** to proceed when you are done setting.

Note: *The default backup schedule is daily backup at 22:00 with the backup job will run until completion and the retention policy job will be run immediately after the backup job*.

9 Restoring Hyper-V Guest Virtual Machines

Restore Options

There are two major types of restore options, namely Run Direct Restore and Non Run Direct Restore.

Run Direct Restore
Start up the guest virtual machine directly from the backup file without restoring the guest virtual machine to the Hyper-V server.
Type 1 – Start up a guest VM from Backup Destination without Auto Migration Enabled
The guest VM data will not migrate to the destination until you manually trigger this action by following the steps in Migrate Virtual Machine (Permanently Restore). If manual migration is not performed, any changes made during the Run Direct instance will NOT be committed to backup files.
Type 2 – Start up a guest VM from Backup Destination with Auto Migration Enabled
To start up the guest virtual machine directly from the backup file and then start restoring the guest virtual machine files to the Hyper-V server. VM data will start migrating without the need trigger a manual migration. Any changes made during the Run Direct instance will also be committed to the Hyper-V server as well.

Non Run Direct Restore
Conventional restore method where Backup App will restore the guest virtual machine files to the Hyper-V server
Type 1 – Restore to the same Hyper-V server
For this type of restore, you can choose from one of the following restore methods. ➢ Restore the entire guest VM to the original location ➢ Restore the entire guest VM to another drive or folder on the same Hyper-V server ➢ Restore individual virtual disk to original/different guest virtual machine
Type 2 – Restore backed up guest VM to another Hyper-V server on a different host

You need to have the same version of Hyper-V server together with Backup App installed on the machine where you wish to restore the guest virtual machine. Refer to the steps in Initiate Restore of VM to another Hyper-V Server on Different Host for details.

Granular Restore

Backup App makes use of granular restore technology to enable a file level restore from a virtual disk file (VHD) of guest VM backup possible. It is particularly useful if you only need to restore individual file(s) from a guest VM, which would normally a long time to restore and then boot up before you can gain access the files on the virtual disks. Granular restore gives you a fast and convenient way to recover individual files on a guest VM.

For more details about Granular Restore, refer to the Granular Restore section.

10 Run Direct Restore

Requirements and Limitations

1. Restored guest virtual machines using Run Direct containing a saved state will not automatically power on. The saved state must be manually deleted in Hyper-V Manager and the guest must be powered on manually.

2. For Run Direct enabled backup sets the storage destination is restricted to Local, Mapped Drive, or Removable Drive.

3. When a guest virtual machine is started in a Run Direct instance is stopped any changes made within the guest environment will be lost, if the guest virtual is not migrated to the Hyper-V Server using the “Auto migrate after Run Direct is running” option.

4. When a guest virtual machine is started using Run Direct Restore all backup jobs (manual, scheduled, and continuous) for the related backup set will be skipped.

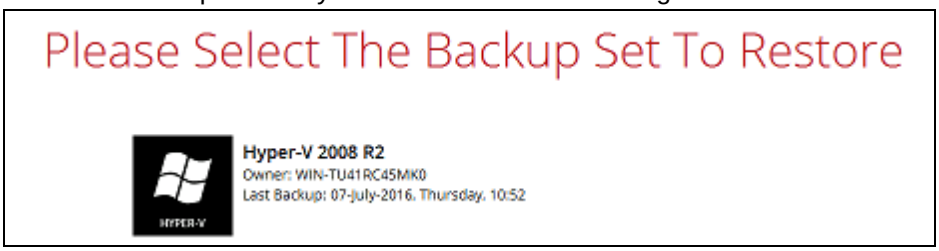
5. When a guest virtual machine is started using Run Direct Restore the following features are not available for the backup set; Data Integrity Check, Space Freeing Up, and Delete Backup Data.

Start up a guest VM from Backup Destination without Auto Migration Enabled

Follow the steps below to boot up the guest VM directly from the backup files.

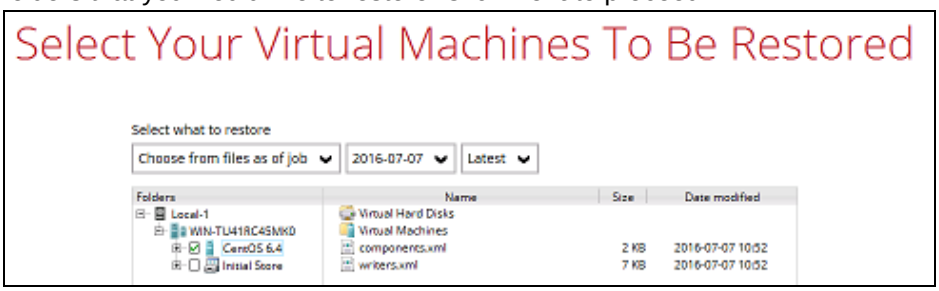
1. In the Backup App main interface, click the **Restore** icon.

2. Select the backup set that you would like to restore the guest virtual machine from.

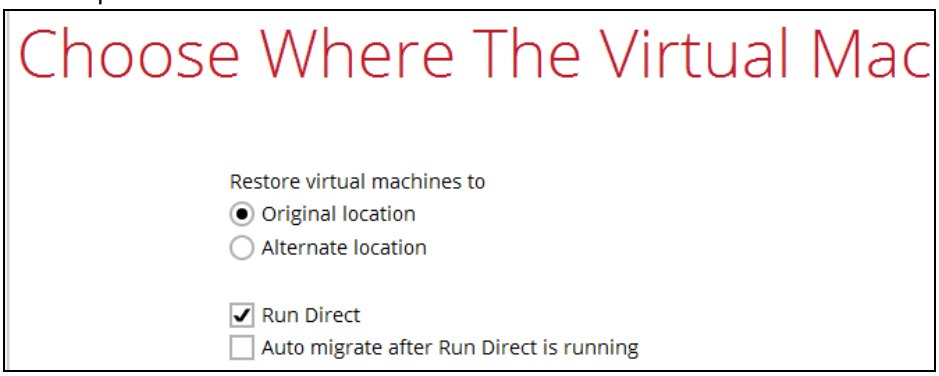


3. Select the local, mapped drive, or removable drive storage destination that contains Hyper-V guest virtual machine that you would like to restore.

4. Select to restore the Hyper-V guest from a specific backup job then select the files or folders that you would like to restore. Click **Next** to proceed.



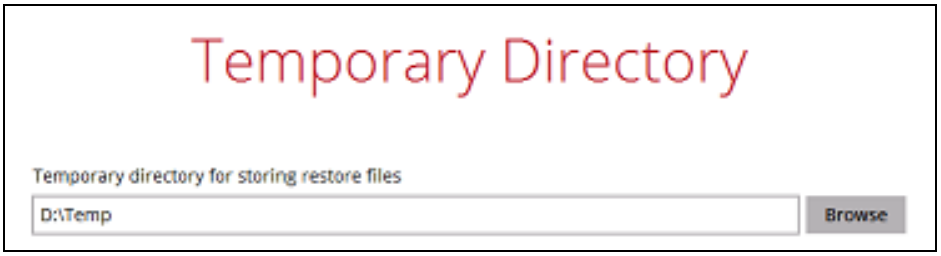
5. Select to restore the Hyper-V guest to the Original location and then select **Run Direct** click **Next** to proceed.



Note

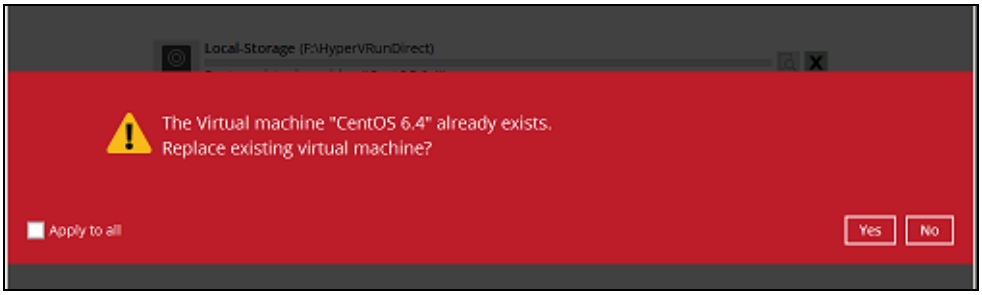
Restore to an Alternate location you can only be performed on one guest virtual machine at a time.

6. Confirm the temporary directory path is correct and then click **Restore** to proceed.

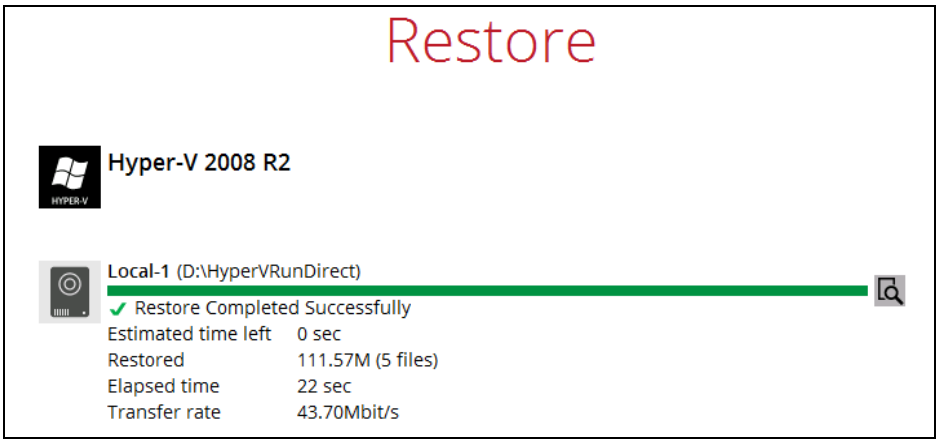


If the guest virtual machine selected to be restored already exists on the Hyper-V server Backup App will prompt to confirm overwriting of the existing guest.

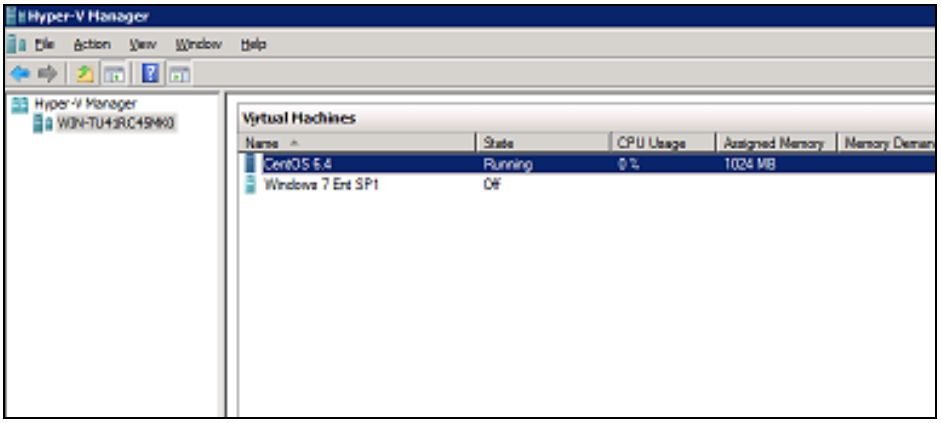
- **Yes** - the exiting guest virtual machine will be deleted from the Hyper-V server before the restore process starts.
- **No** – the restore of the current guest virtual machine will be skipped.



7. After the Hyper-V guest virtual machine has been restored, you will see the following screen.

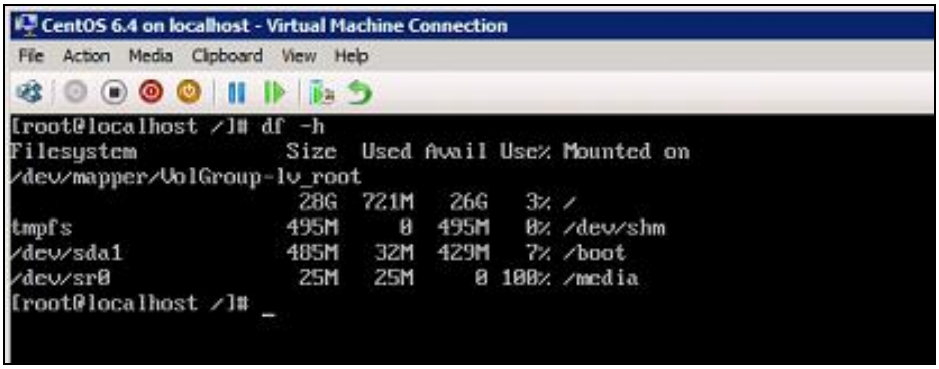


8. Go to the Hyper-V server and open the Hyper-V Manager to verify the guest VM has been restored and is powered on.



9. Connect to the guest virtual machine to verify if is running correctly.

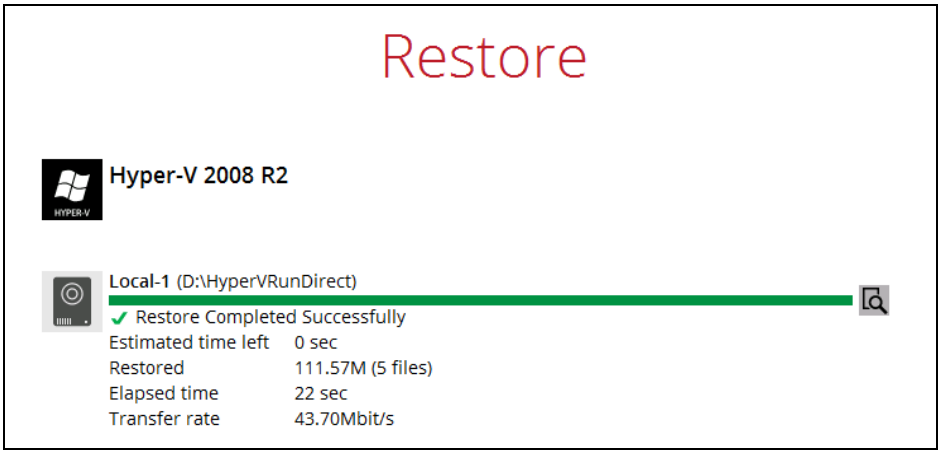
Example: Linux guest



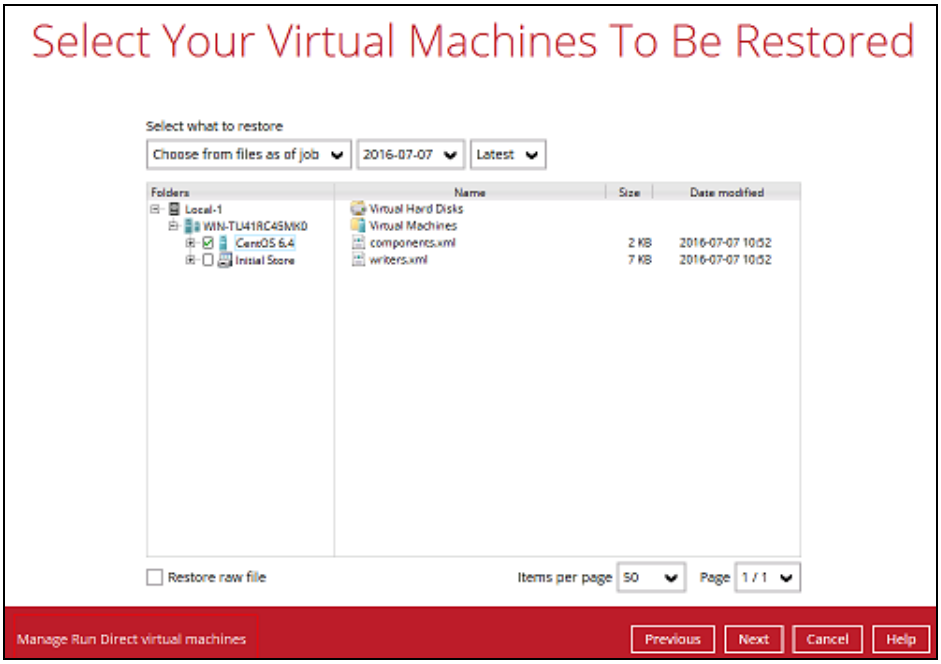
Migrate Virtual Machine (Permanently Restore)

To permanently restore the guest virtual machine after starting up using the **Run Direct** option, you will still need to migrate it to from the backup destination to the designated permanent location on the Hyper-V server using the **Migrate Virtual Machine** option. This process can be performed even when the guest machine is already running.

1. After starting up the guest machine from the backup destination. Click on **Close.**

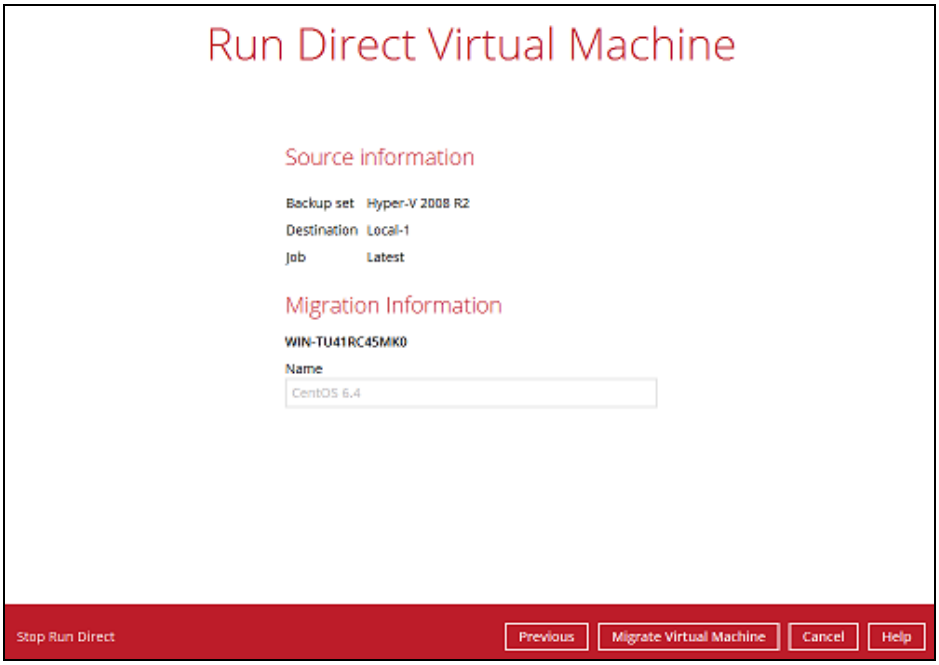


2. Click on **Manage Run Direct virtual machines**.



3. Click on the guest virtual machine.

4. To permanently restore the guest virtual machine, click on **Migrate Virtual Machine.**



Note

Backup App will begin migration of the guest virtual machine from the backup destination to the Hyper-V Server.

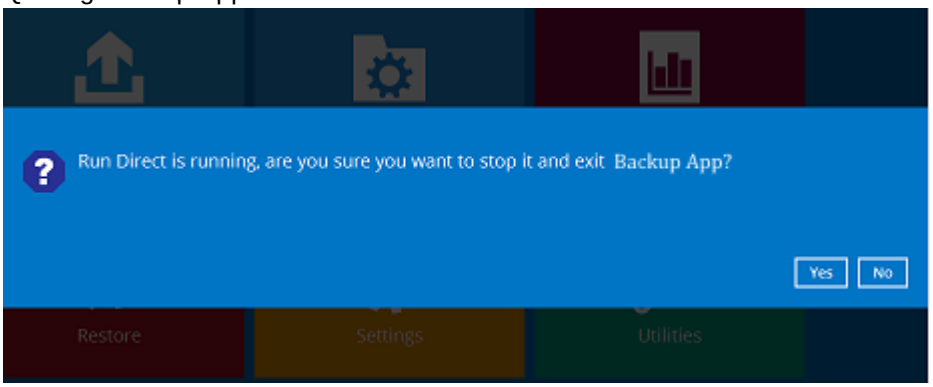
The guest virtual machine can be used during the migration process. Any changes made in the guest virtual machine environment is saved in transaction logs and will be applied when the migration process is completed.

When finalizing the restore, during the application of changes in transaction logs with the restored guest virtual machine, the guest virtual machine will be put into saved state temporarily. Once the changes have been applied the guest virtual machine resume.

Stop Run Direct Virtual Machines

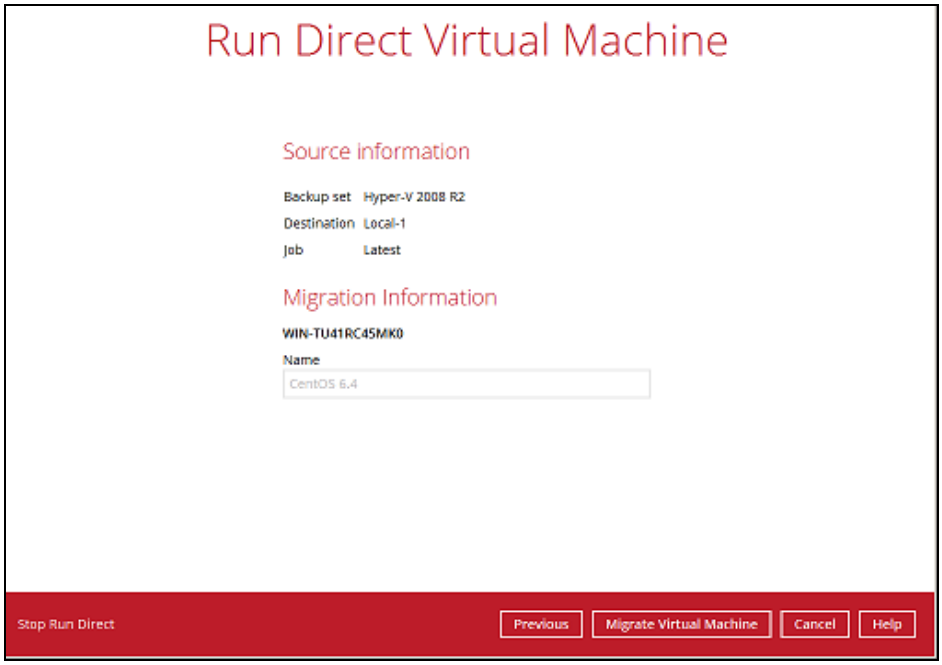
To stop running guest virtual machines started up using Run Direct can be done by either:

- Quitting Backup App

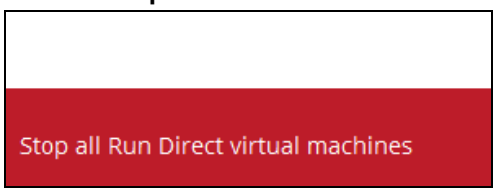


-OR-

- Click on the **Stop Run Direct** button at the left bottom corner.



Click on **Stop all Run Direct virtual machines.**



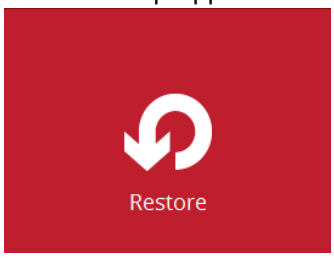
Note

When a guest virtual machine is started in a Run Direct instance is stopped any changes made within the guest environment will be lost, if the guest virtual is not migrated to the Hyper-V Server using the “Auto migrate after Run Direct is running” option.

Start up a guest VM from Backup Destination with Auto Migration Enabled

Start up the Run Direct Restore

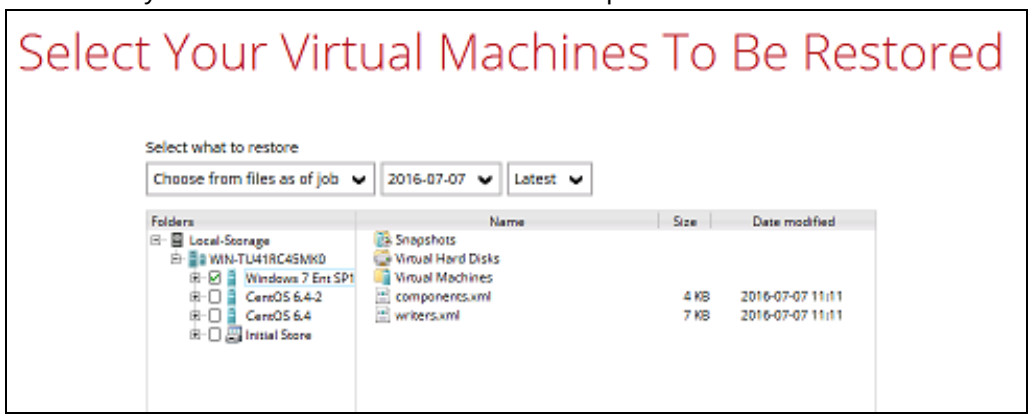
1. In the Backup App main interface, click the **Restore** icon.



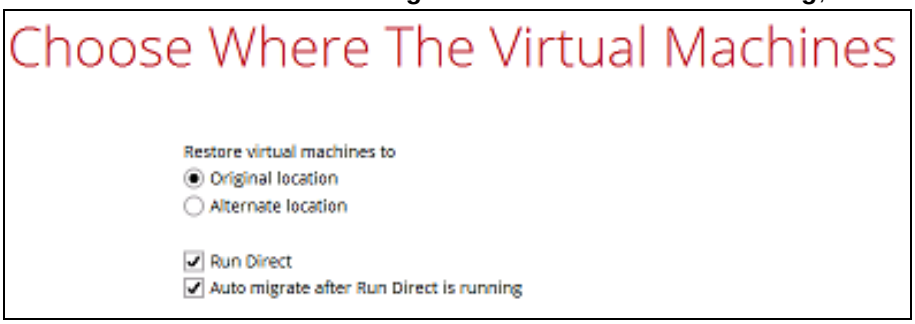
2. Select the backup set that you would like to restore the guest virtual machine from.

3. Select the local, mapped drive, or removable drive storage destination that contains Hyper-V guest virtual machine that you would like to restore.

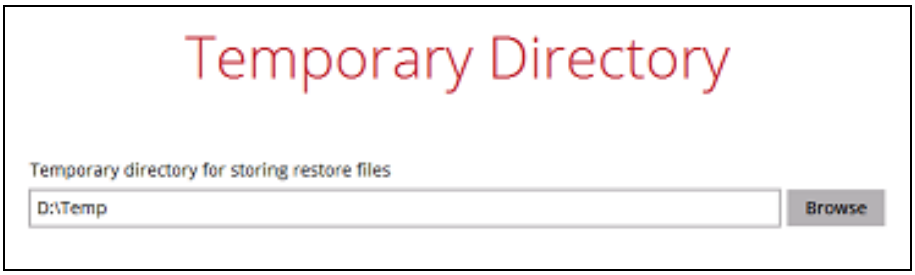
4. Select to restore the Hyper-V guest from a specific backup job then select the files or folders that you would like to restore. Click **Next** to proceed.



5. Select to restore the Hyper-v guest to the Original location, or to an Alternate location, then select **Run Direct** and or **Auto migrate after Run Direct is running**, click **Next** to proceed.

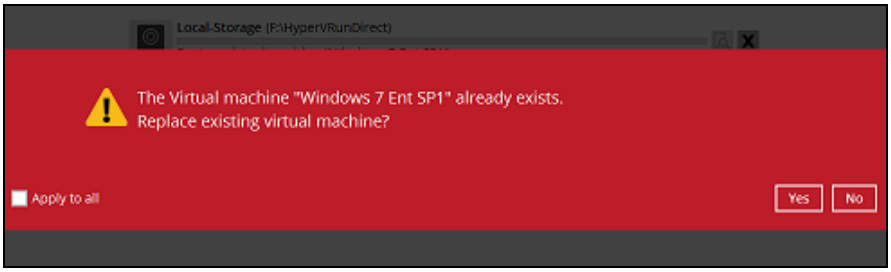


6. Confirm the temporary directory path is correct and then click **Restore** to proceed.

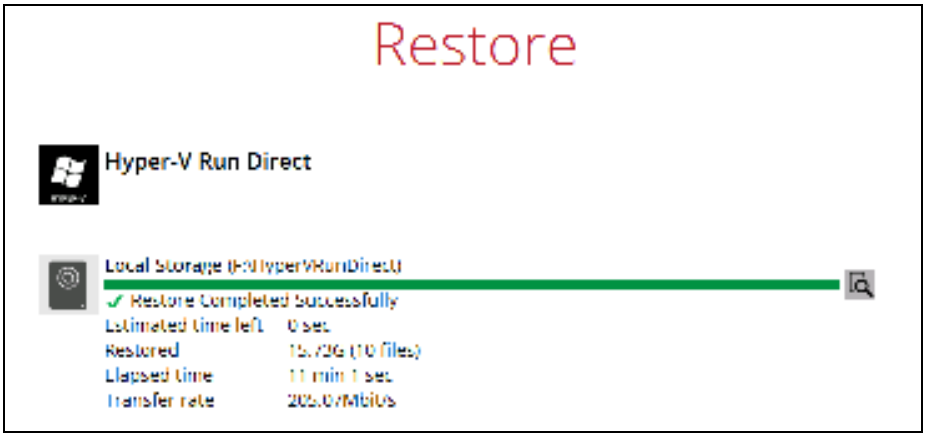


7. If the guest virtual machine selected to be restore already exists on the Hyper-V server Backup App will prompt to confirm overwriting of the existing guest.

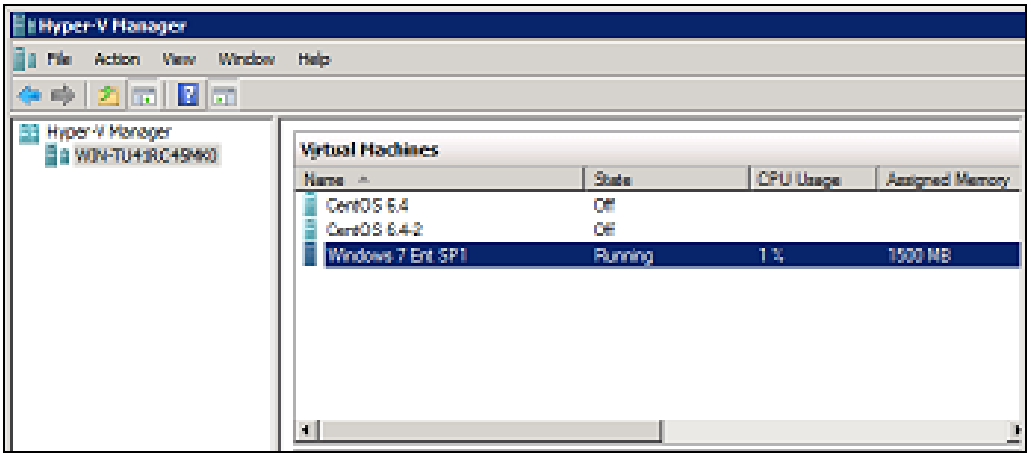
- **Yes** - the exiting guest virtual machine will be deleted from the Hyper-V server before the restore process starts.
- **No** – the restore of the current guest virtual machine will be skipped.



8. After the Hyper-V guest virtual machine has been restored, you will see the following screen.



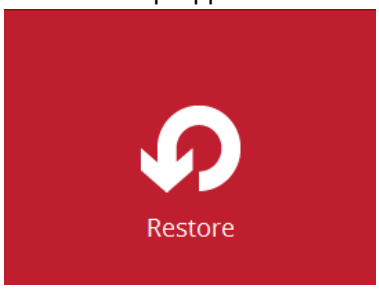
9. Go to the Hyper-V server and open the Hyper-V Manager to verify the guest has been restored and is powered on.



11 Non-Run Direct Restore

Initiate Restore of Guest Virtual Machine to the Original Hyper-V Server Location

1. In the Backup App main interface, click the **Restore** icon.



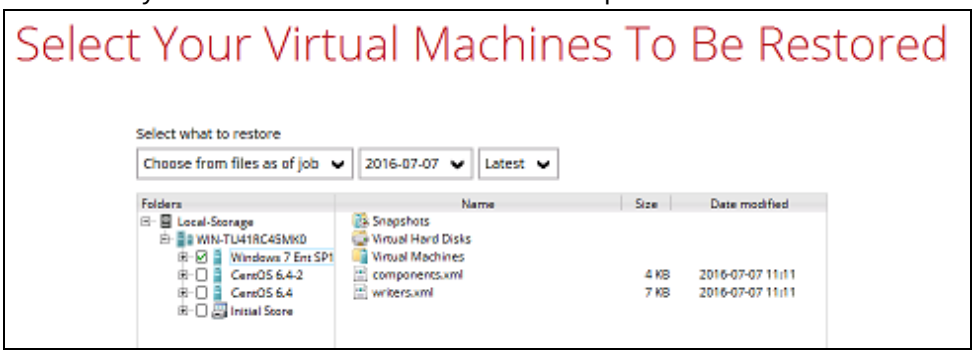
2. Select the backup set that you would like to restore the guest virtual machine from.

3. Select the drive storage destination that contains Hyper-V guest virtual machine that you would like to restore.

4. Select the CBS, cloud, SFTP/FTP storage destination that contains Hyper-V guest virtual machine that you would like to restore.

5. **Example: Restore from CBS**

6. Select to restore the Hyper-V guest from a specific backup job then select the files or folders that you would like to restore. Click **Next** to proceed.

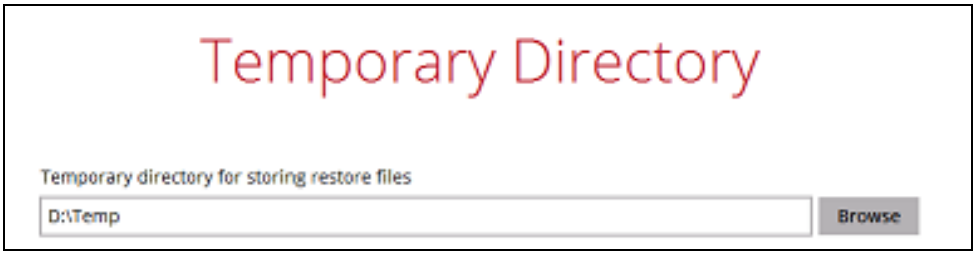


7. Select to restore the Hyper-v guest to the Original location, or to an Alternate location, then click **Next** to proceed.

Note

Restore to an Alternate location you can only be performed on one guest virtual machine at a time.

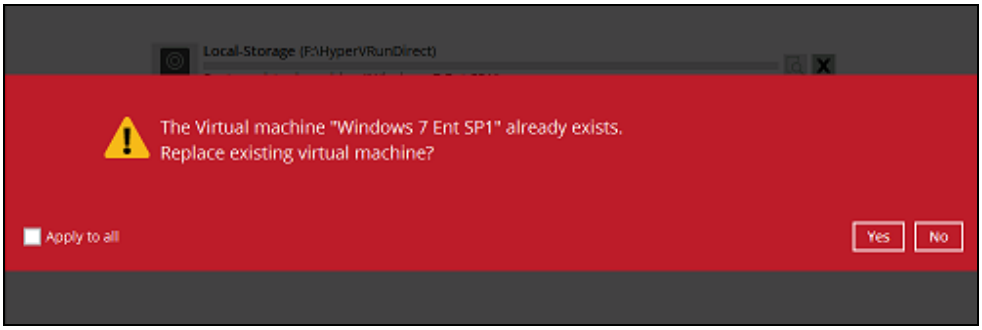
8. Confirm the temporary directory path is correct and then click **Restore** to proceed.



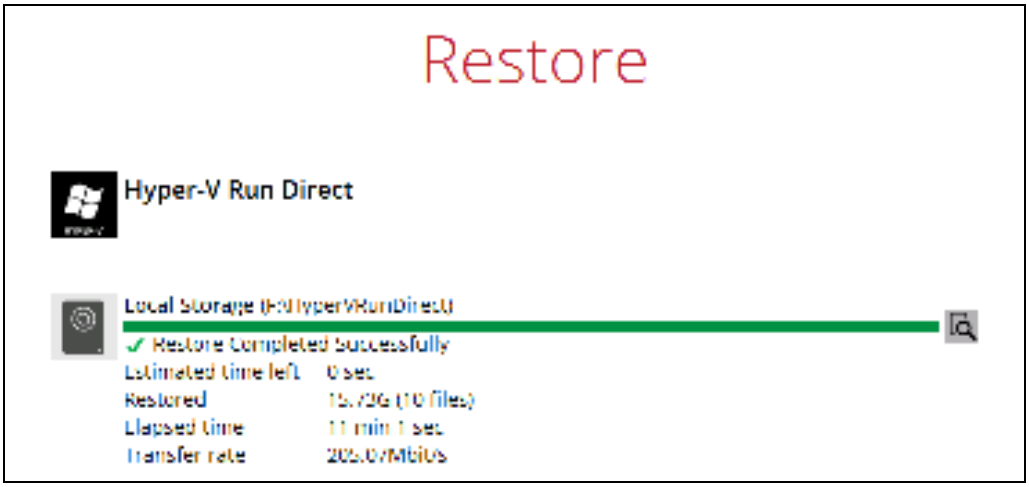
9. If the guest virtual machine selected to be restored already exists on the Hyper-V server Backup App will prompt to confirm overwriting of the existing guest.

- **Yes** - the exiting guest virtual machine will be deleted from the Hyper-V server before the restore process starts.

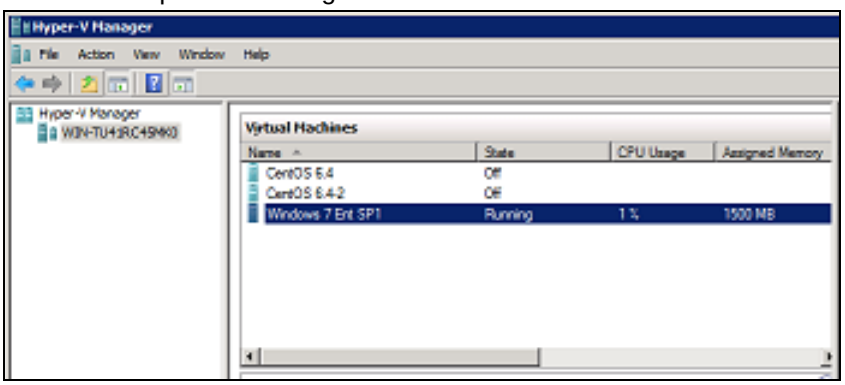
- **No** – the restore of the current guest virtual machine will be skipped.



10. After the Hyper-V guest virtual machine has been restored.



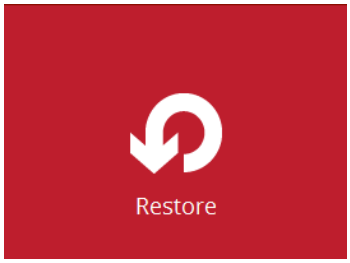
11. Go to the Hyper-V server and open the Hyper-V Manager to verify the guest has been restored and power on the guest virtual machine.



Initiate Restore of an Individual Virtual Disk to Original/Different Guest Virtual Machine

The **Restore raw file** feature is used to the restore of an individual virtual disk to the original or a different guest virtual machine.

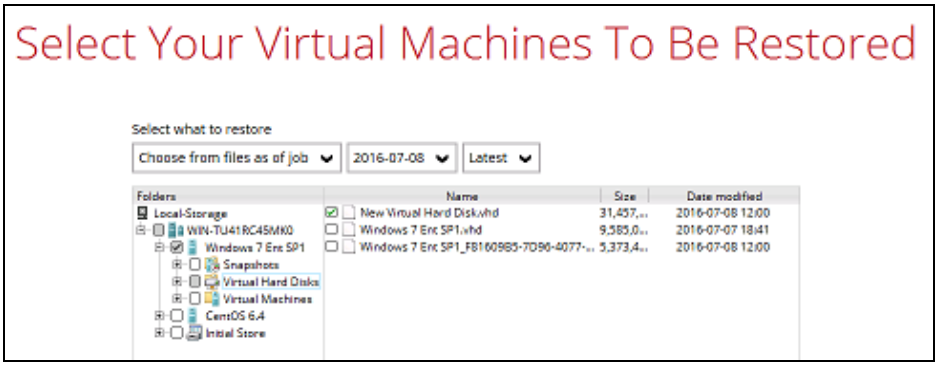
1. In the Backup App main interface, click the **Restore** icon.



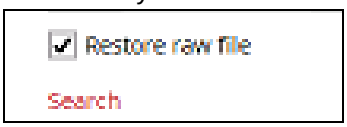
2. Select the backup set that you would like to restore the guest virtual machine from.

3. Select the drive storage destination that contains Hyper-V guest virtual machine that you would like to restore.

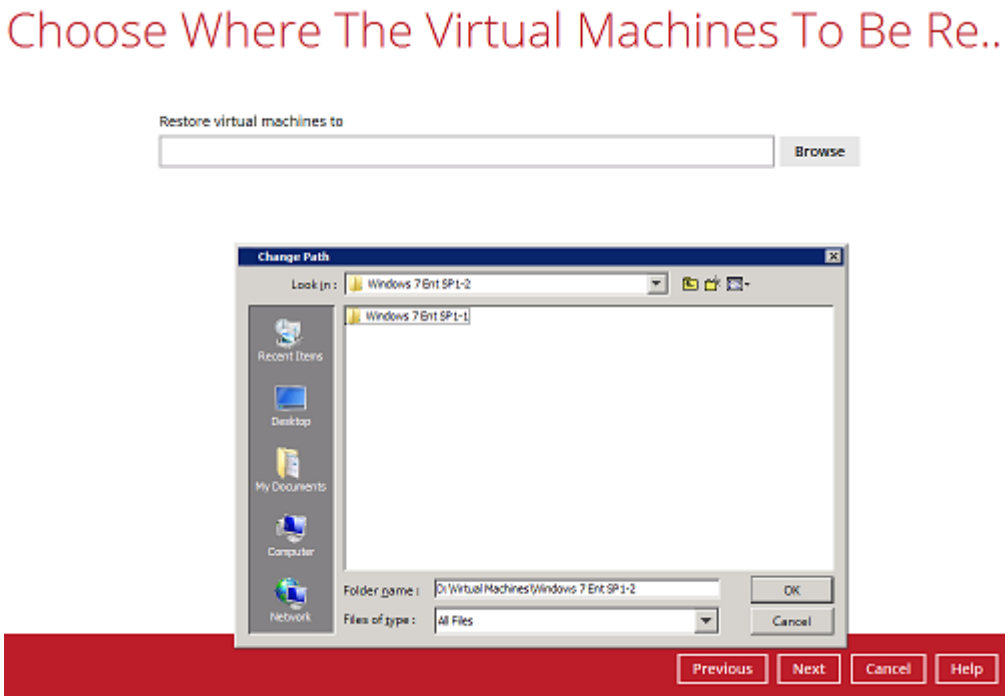
4. Select to restore the Hyper-V guest from a specific backup job then select the files or folders that you would like to restore.



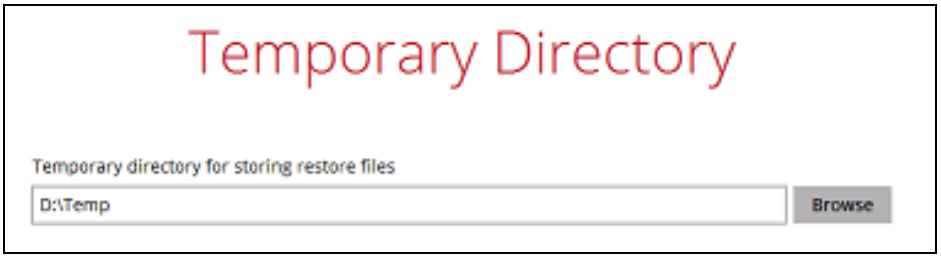
5. Then select the **Restore raw file** option and under the Virtual Hard Disks folder select the virtual disk you would like to restore. Click **Next** to proceed.



6. Select to location on the Hyper-V server you want to restore the virtual disk to. Click **Next** to proceed.

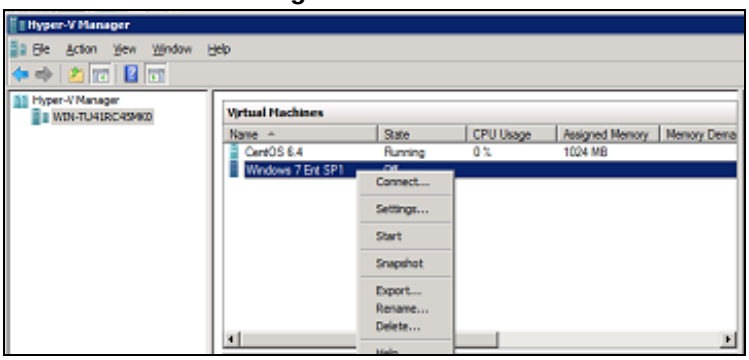


7. Confirm the temporary directory path is correct and then click **Restore** to proceed.

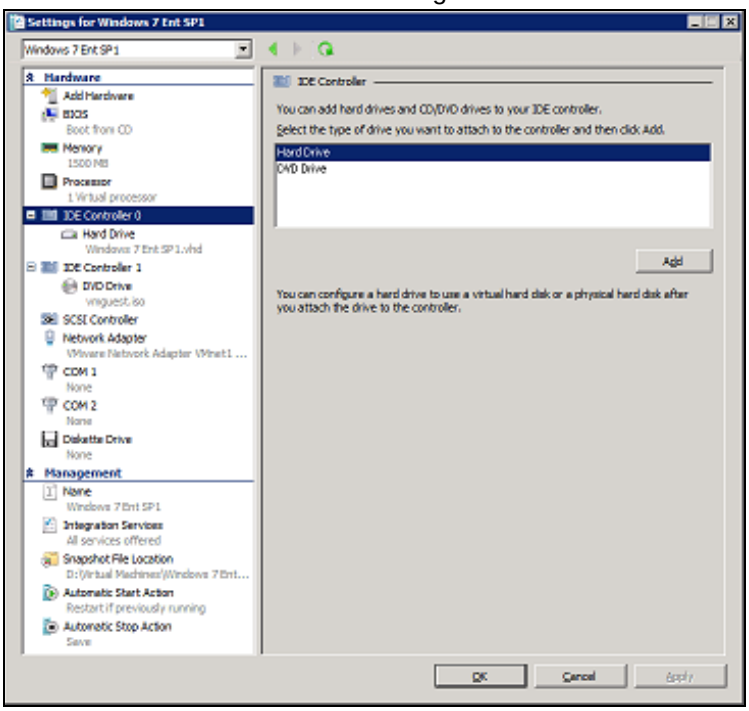


8. After the Hyper-V guest virtual machine has been restored.

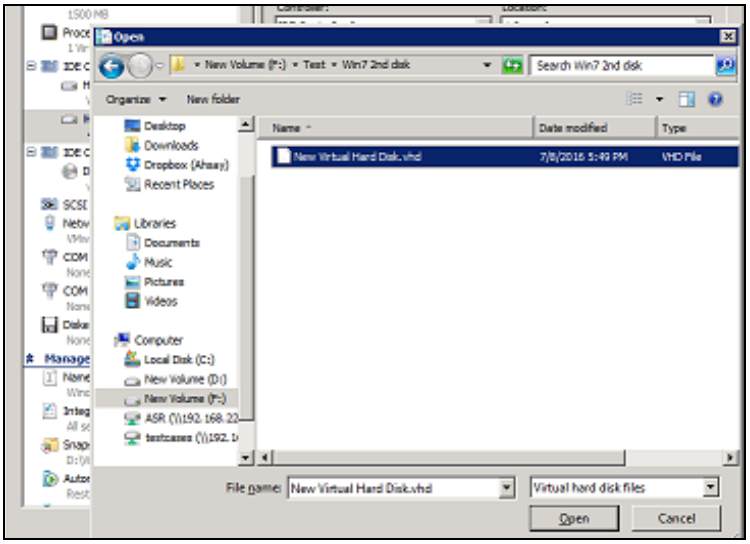
9. In Hyper-V Manager and right click on the guest virtual machine you wish to add the virtual disk to and select **Settings**.



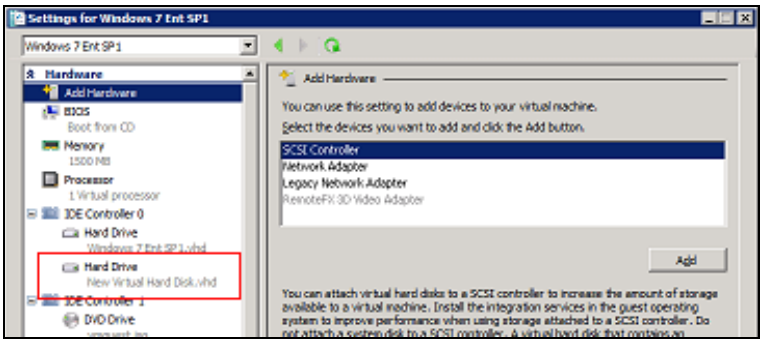
10. Select **Add** to add virtual disk to the guest virtual machine.



11. Select the folder where the restore virtual disk is located.



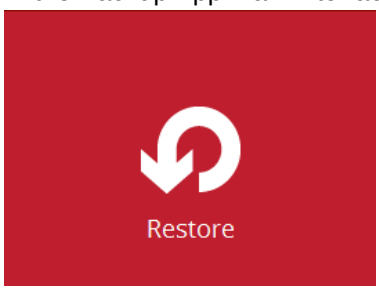
12. **After the virtual disk is added.** Start the guest virtual machine to confirm. Depending on the guest operating system there may be other configuration settings to be completed before the disk is available.



Initiate Restore of Guest Virtual Machine to an Alternate Location in the same Hyper-V Server Host

The restore to Alternate location is available for both Run Direct and Non-Run Direct backup sets, this feature will restore any guest virtual machine to another location (a different disk or folder) on the same Hyper-V server. The Restore to Alternate location can be used to restore only one guest virtual machine at any one time.

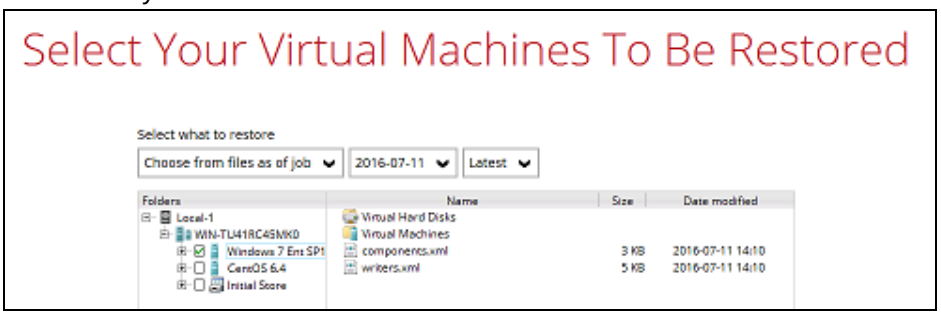
1. In the Backup App main interface, click the **Restore** icon.



2. Select the backup set that you would like to restore the guest virtual machine from.

3. Select the drive storage destination that contains Hyper-V guest virtual machine that you would like to restore.

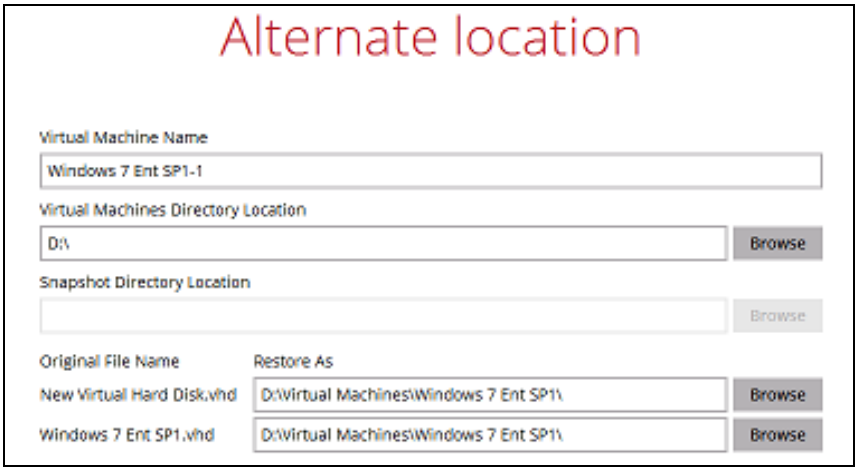
4. Select to restore the Hyper-V guest from a specific backup job then select the files or folders that you would like to restore.



5. Select **Alternate location** and click **Next** to proceed.

Example: Restore a guest from using Run Direct with Auto Migration to another location.

6. To restore the guest virtual machine to an Alternate location update the following values for:
   i. **Virtual Machine Name**
   ii. **Virtual Machines Directory Location (guest configuration files)**
   iii. **Restore As (new location for the guest VHD files)**

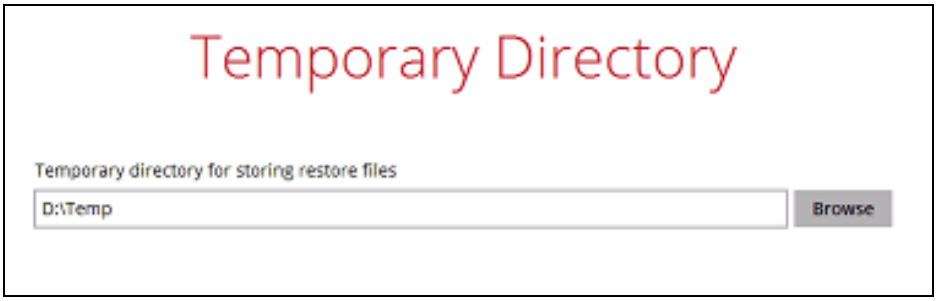


Example:

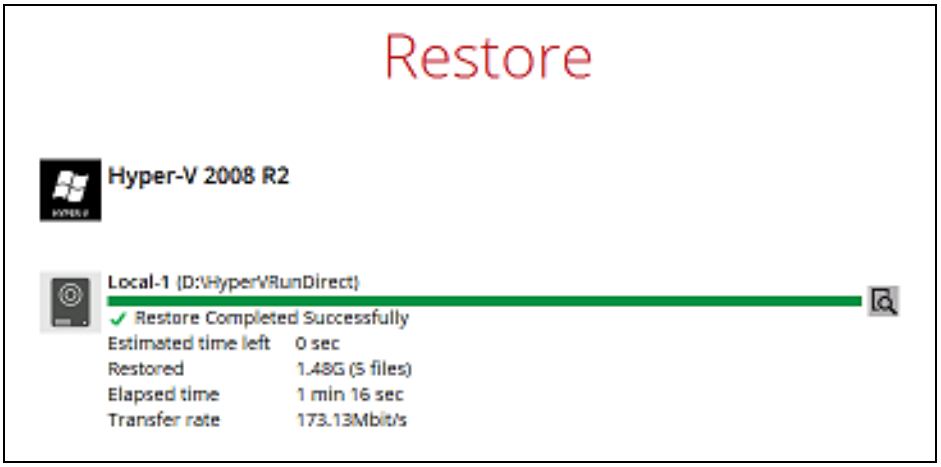
   i. Rename the restored guest virtual machine to **Windows 7 Ent SP1-Cloned**
   ii. Store the configuration files in the new location **F:\New VM Location**
   iii. Store the VHD files files in the new location **F:\New VM Location**

When the values have been updated click on **Next** to proceed.

7. Confirm the temporary directory path is correct and then click **Restore** to proceed.



8. After the Hyper-V guest virtual machine has been restored successfully



9. Open Windows File Explorer and verify the guest has been restored to the new location.

Initiate Restore of Guest Virtual Machine to another Hyper-V Server (Different Host)

This restore option allows you to restore your backed up guest VM to another Hyper-V host, for example if your original Hyper-V host is down and you need to restore your production guest VM's to a standby Hyper-V host.

Requirements and Limitations:

1. Backup App must be installed on the Hyper-V Host where you wish to restore the guest VM.
2. The same Backup App backup account must be used.
3. The correct encryption key is required if the backup set was created with the encryption key feature enabled.
4. A guest virtual machine can only be restored to another Hyper-V server with the same version, i.e. backup of a guest on Hyper-V 2012 R2 server cannot be restored to Hyper-V 2008 R2 host or vice versa.
5. A guest virtual machine backed up from a standalone Hyper-V host can only be restored to another standalone Hyper-V host. A guest virtual machine backed up from a Hyper-V Cluster can only be restored to another Hyper-V Cluster.
6. Guest VMs backed up to local drive / mapped drive / removable drive on the original Hyper-V host, can be restored to another Hyper-V host only if the new machine has access to the original drive(s).
7. The default Java heap size setting on Backup App is 1024MB, for Hyper-V restore it is highly recommended to increase the Java heap size setting to improve performance. Especially guest VM's with many incremental delta files. (The actual heap size is dependent on amount of free memory available on your Hyper-V host).
8. The temporary directory should be set to a local drive for best restore performance. Also, the temporary directory must have sufficient free disk space for the guest VM restore, for example, the restore of a 500GB guest VM with 30 incremental files of around 5GB each (500GB + 150GB (30 x 5GB)), the temporary directory will require at least 650GB of free space.
9. Restore guest VM's to original location is possible only if the disk setup on the new Hyper-V hosts is the same as the original Hyper-V host, for example if the original guest VM was backed up on G: drive. Then restore to "Original location" can be selected if G: drive is setup on the new Hyper-V host. Otherwise, select "Alternate location".

10. The Hyper-V management tools are installed on the new Hyper-V host. For Hyper-V Cluster environments Hyper-V management tools is installed on all Cluster nodes.

11. The Hyper-V services are started on the host. For Hyper-V Cluster environment, the Hyper-V services are started on all Cluster nodes.

12. The **Microsoft Hyper-V VSS Writer** is installed and running on the new Hyper-V host and the writer state is Stable. This can be verified by running the vssadmin list writers command.

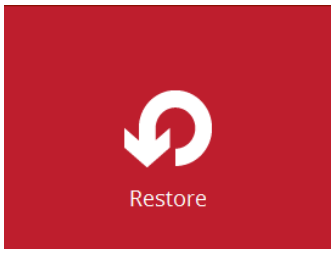
Example:

```
C:\Users\Administrator>vssadmin list writers
vssadmin 1.1 - Volume Shadow Copy Service administrative
command-line tool
(C) Copyright 2001-2005 Microsoft Corp.
Writer name: 'Task Scheduler Writer'
   Writer Id: {d61d61c8-d73a-4eee-8cdd-f6f9786b7124}
   Writer Instance Id: {1bddd48e-5052-49db-9b07-b96f96727e6b}
   State: [1] Stable
   Last error: No error

Writer name: 'VSS Metadata Store Writer'
   Writer Id: {75dfb225-e2e4-4d39-9ac9-ffaff65ddf06}
   Writer Instance Id: {088e7a7d-09a8-4cc6-a609-ad90e75ddc93}
   State: [1] Stable
   Last error: No error

Writer name: 'Performance Counters Writer'
   Writer Id: {0bada1de-01a9-4625-8278-69e735f39dd2}
   Writer Instance Id: {f0086dda-9efc-47c5-8eb6-a944c3d09381}
   State: [1] Stable
   Last error: No error

Writer name: 'System Writer'
   Writer Id: {e8132975-6f93-4464-a53e-1050253ae220}
   Writer Instance Id: {8de7ed2b-8d69-43dd-beec-5bfb79b9691c}
   State: [1] Stable
   Last error: No error

Writer name: 'SqlServerWriter'
   Writer Id: {a65faa63-5ea8-4ebc-9dbd-a0c4db26912a}
   Writer Instance Id: {1f668bf9-38d6-48e8-81c4-2df60a3fab57}
   State: [1] Stable
   Last error: No error

Writer name: 'ASR Writer'
   Writer Id: {be000cbe-11fe-4426-9c58-531aa6355fc4}
   Writer Instance Id: {01499d55-61da-45bc-9a1e-76161065630f}
   State: [1] Stable
   Last error: No error

Writer name: 'Microsoft Hyper-V VSS Writer'
   Writer Id: {66841cd4-6ded-4f4b-8f17-fd23f8ddc3de}
   Writer Instance Id: {a51919e3-0256-4ecf-8530-2f600de6ea68}
   State: [1] Stable
   Last error: No error

Writer name: 'COM+ REGDB Writer'
   Writer Id: {542da469-d3e1-473c-9f4f-7847f01fc64f}
   Writer Instance Id: {7303813b-b22e-4967-87a3-4c6a42f861c4}
```

```
    State: [1] Stable
    Last error: No error

Writer name: 'Shadow Copy Optimization Writer'
    Writer Id: {4dc3bdd4-ab48-4d07-adb0-3bee2926fd7f}
    Writer Instance Id: {d3199397-ec58-4e57-ad04-e0df345b5e68}
    State: [1] Stable
    Last error: No error

Writer name: 'Registry Writer'
    Writer Id: {afbab4a2-367d-4d15-a586-71dbb18f8485}
    Writer Instance Id: {25428453-2ded-4204-800f-e87204f2508a}
    State: [1] Stable
    Last error: No error

Writer name: 'BITS Writer'
    Writer Id: {4969d978-be47-48b0-b100-f328f07ac1e0}
    Writer Instance Id: {78fa3f1e-d706-4982-a826-32523ec9a305}
    State: [1] Stable
    Last error: No error

Writer name: 'WMI Writer'
    Writer Id: {a6ad56c2-b509-4e6c-bb19-49d8f43532f0}
    Writer Instance Id: {3efcf721-d590-4e50-9a37-845939ca51e0}
    State: [1] Stable
    Last error: No error
```

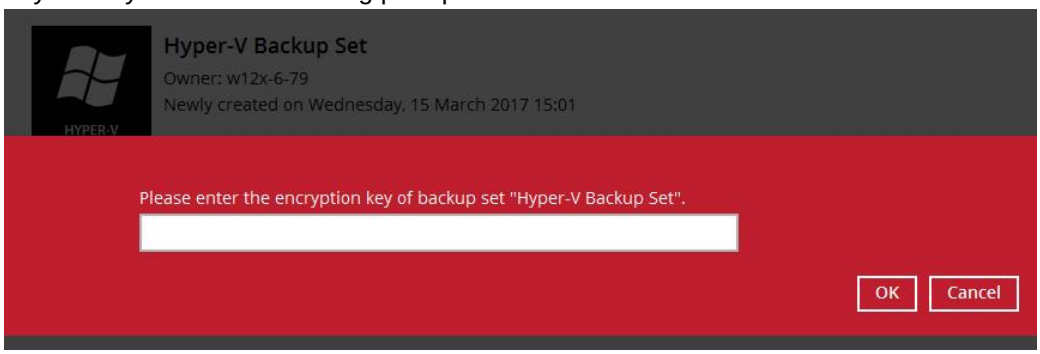
Steps

1. On the machine where you wish to restore the VM, launch Backup App and click the **Restore** icon on the main interface.



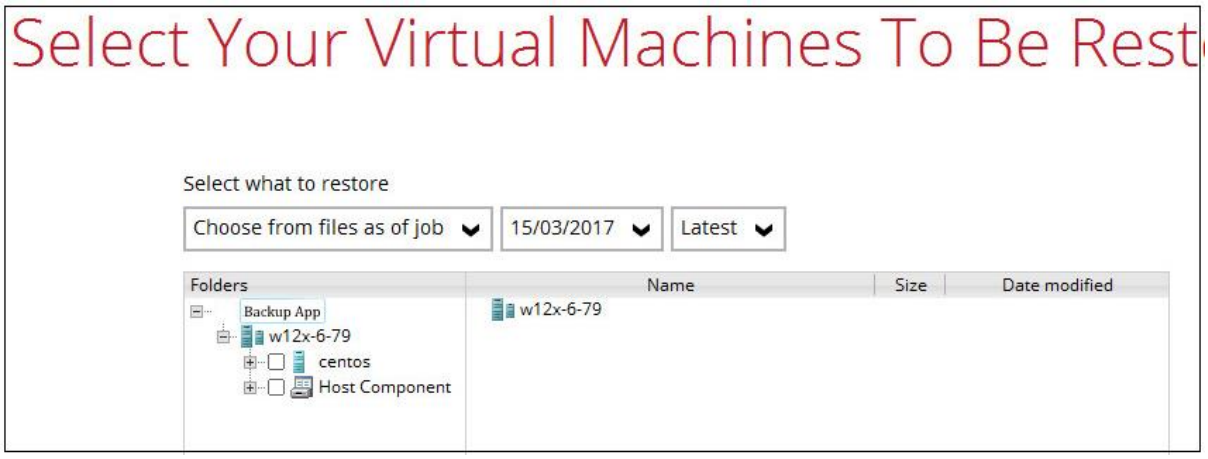
2. Select the backup set that you would like to restore the guest virtual machine from.

3. If encryption key was set at the time when the backup set was created, enter the encryption key when you see the following prompt.



4. Select the drive storage destination that contains Hyper-V guest virtual machine that you would like to restore.

5. Select to restore the Hyper-V guest from a specific backup job then select the files or folders that you would like to restore.

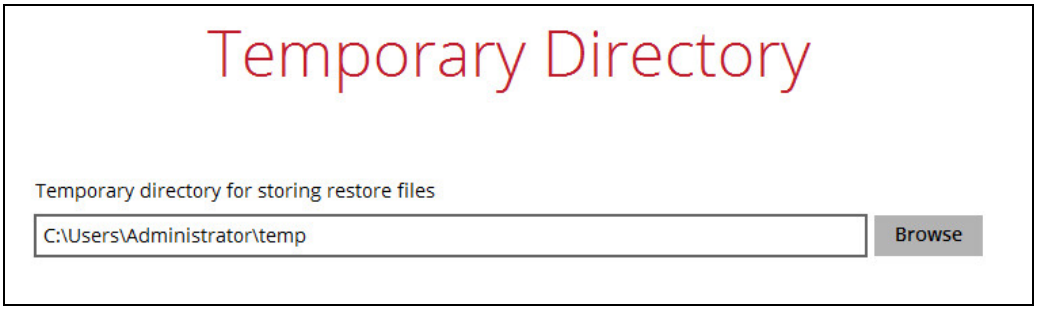


6. Select to restore the Hyper-V guest to the Original location, or to an Alternate location, then click **Next** to proceed.

Note

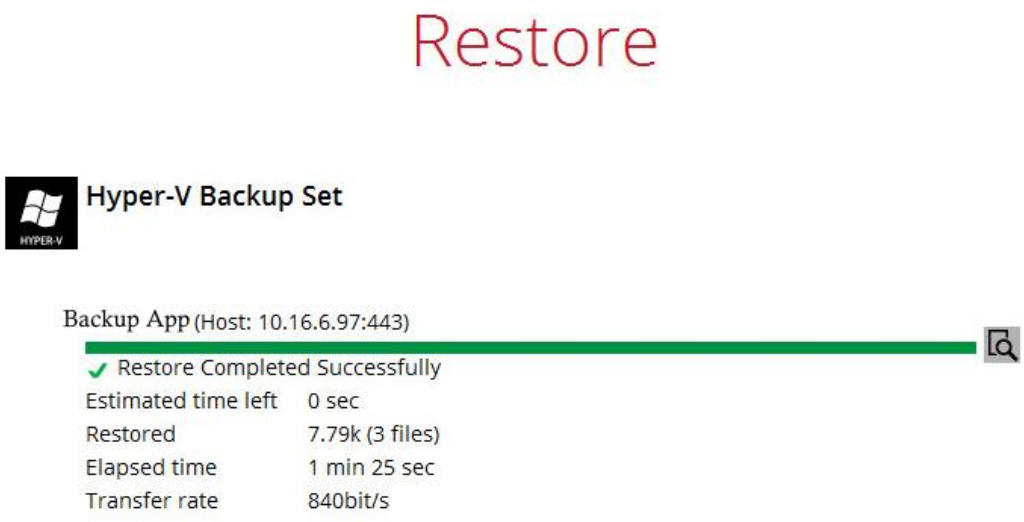
Restore to an Alternate location you can only be performed on one guest virtual machine at a time.

7. Confirm the temporary directory path is correct and then click **Restore** to proceed.

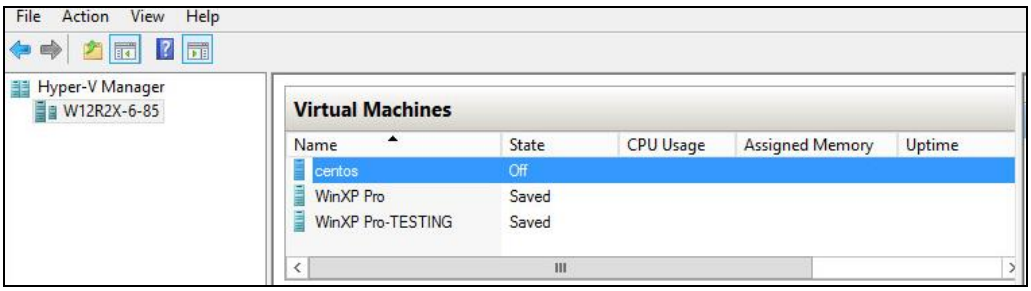


8. Click **Restore** to start the restore process.

9. The following screen shows when the restore is completed.



10. Go to the Hyper-V server and open the Hyper-V Manager to verify the guest has been restored.



12 Granular Restore

IMPORTANT

Before you proceed with the Granular Restore, make sure the following dependencies are fulfilled on the restore machine. Failure to do so may cause the granular restore to fail.

- Microsoft Visual C++ 2015 Redistributable (x86) / (x64)
  https://www.microsoft.com/en-us/download/details.aspx?id=48145
- Update for Universal C Runtime in Windows
  https://support.microsoft.com/en-us/help/2999226/update-for-universal-c-runtime-in-windows
- Microsoft Security Advisory 3033929 (for Windows Server 2008 R2)
  https://technet.microsoft.com/en-us/library/security/3033929.aspx

Requirements and Limitations

1. Granular restore does not support the mounting of virtual disks, if the disk itself is encrypted, for example using Windows Bitlocker or other third party security features.
2. If any folders or files on a virtual disk are encrypted these files/folder cannot be restored. For example, if the “Encrypt contents to secure data” is selected in Advanced attributes.
3. The mounting of Linux/Unix file systems from virtual disk file is currently not available due to limitations of the file system drivers.
4. Granular restore can only be performed on one guest VM at a time.

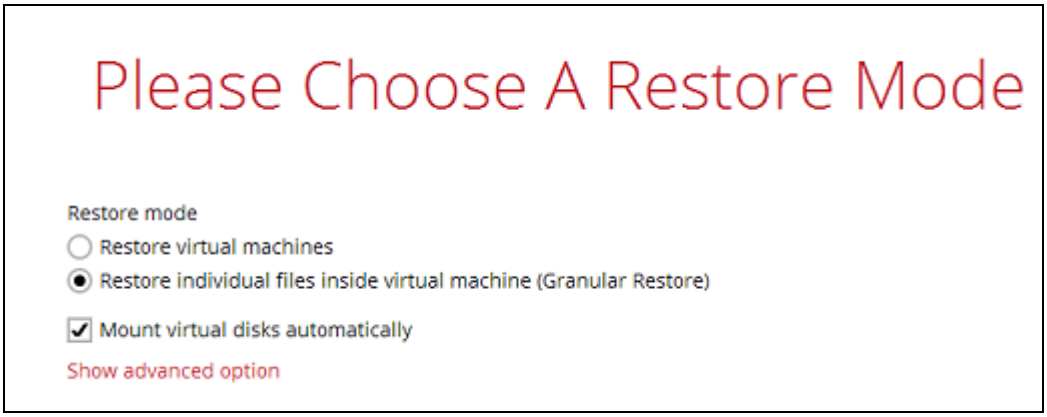
Start Granular Restore

1. Click the **Restore** icon on the main interface of Backup App.

2. Select the backup set that you would like to restore the individual files from.

3. Select the backup destination that contains the guest VM that you would like to restore.

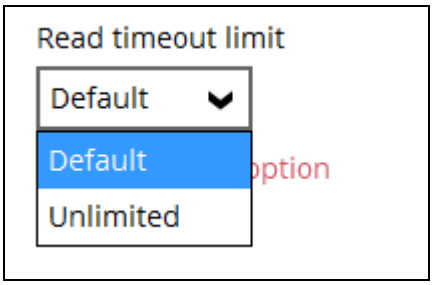
4. Select to the **Restore individual files in virtual machine (Granular Restore)** option.



Note

The **Mount virtual disks automatically option** is selected by default. If the guest VM contains a multiple virtual disks and you only require the restore of files from a single or certain virtual disk(s), then unselect this option to speed up the virtual disk mounting. Otherwise, granular restore will connect and mount all available virtual disks and this process could take longer.

You may select the **Read timeout limit** by clicking Show advanced option.



This selection defines the duration when the granular restore session will be disconnected if there is no response from the mounted virtual machine.

- **Default** – This setting should be suitable for guest VMs located on a local, removable, or network drive. The time out value is 15 seconds.
- **Unlimited** – the connection will not be time out when this is selected. This selection is recommended under the following usage:
  - Backup destination is a cloud stroage.
  - ACBS over the Internet.
  - A large guest VM or guest VM with large incremental delta chain.

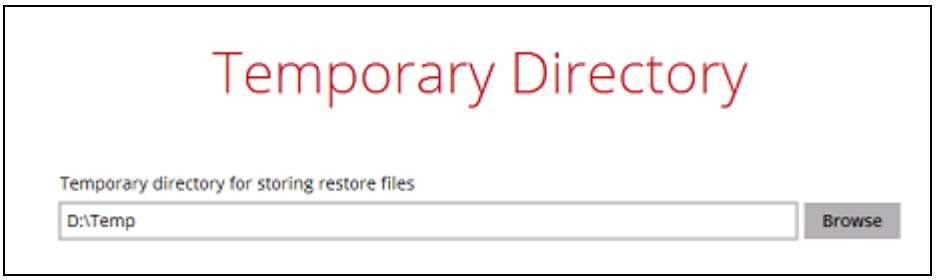
Note

If in doubt or unsure about the guest VM size or network stability, it is recommended to use **Unlimited**.

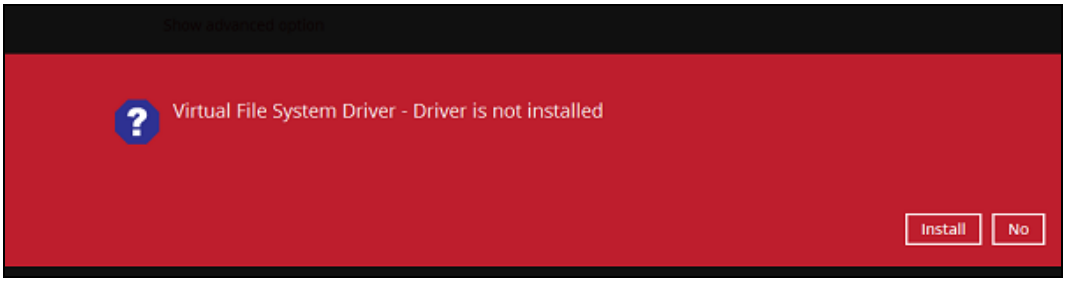
Click **Next** to proceed when you are done with the selection.

5. Select the virtual machine that you would like to perform Granular Restore for, then click **Next** to proceed.

6. Select a temporary directory for storing restore files, then click Restore to start the granular restore.



7. The following screens show when you perform granular restore for a backup set on a machine for the first time only. Make sure you click **Yes** to confirm mounting t of the virtual disk on this machine. Clicking **No** will exit the restore process.



8. When the virtual disk(s) are in the process of being prepared for mounting on the Backup App machine, you will see the following screen.

Please wait as the process could take some time depending on the size of the virtual disk, network bandwidth, and storage location.

9. If the **Mount virtual disks automatically** option is unselected then click on the disk icon to mount the virtual disk you wish to restore files from.

Otherwise, the virtual disks will be automatically mounted without manual selection.

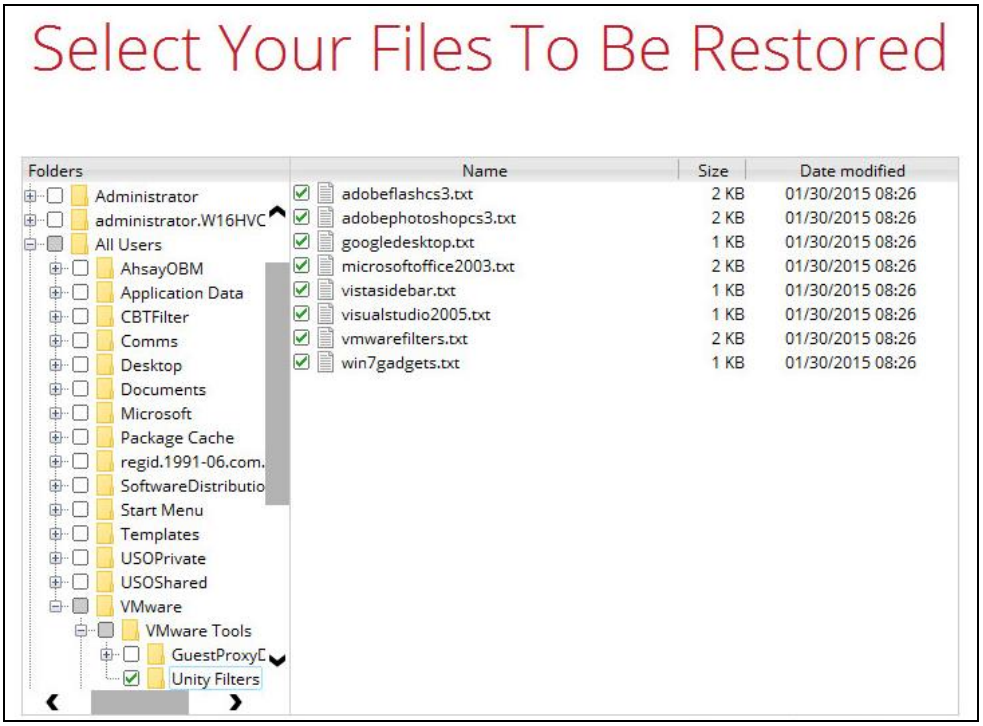
There are two options to restore individual files from here.

Option 1: Restore Using Backup App File Explorer

This method allows you to use the file explorer in Backup App to browse through the files from the backup up image mounted and select those you wish to restore.

i. Click  to browse the files in the mounted backup image. If there are multiple volumes in the guest VM, you can only select one volume to restore individual files at a time.

You will then see a file explorer menu as shown below. Select the file(s) you wish to restore, then click **Next** to proceed.

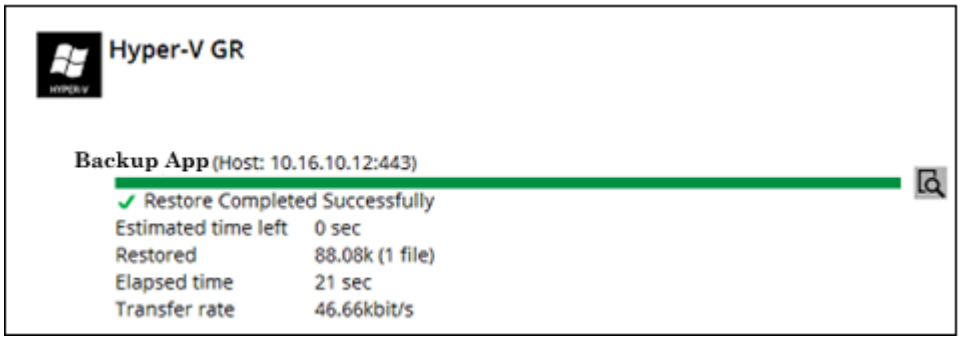


Note

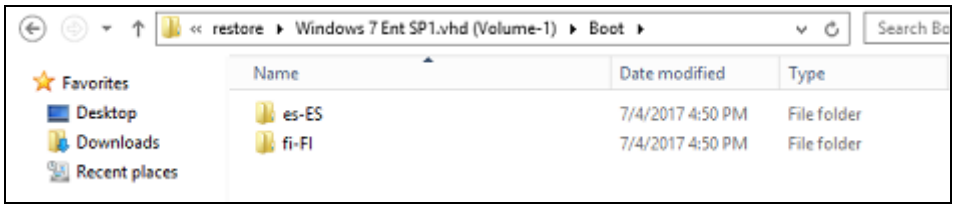
Some system folder(s) / file(s) generated (e.g. System Volume Information) are only shown in the Backup App File Explorer and will be not restored, therefore, those folder(s) / file(s) will not be shown in the mapped drive shown in step iv below.

ii. Select a path where you wish the files to be restored to, then click **Restore**.

iii. The following screen shows when the selected files have been restored to the defined destination.



iv. Open the defined restore path and you should be able to see the files being restored there.

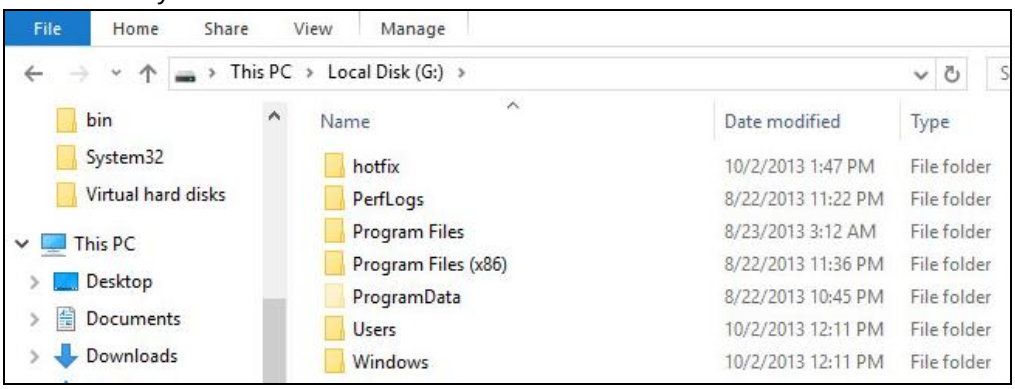


Option 2: Restore Using Windows File Explorer

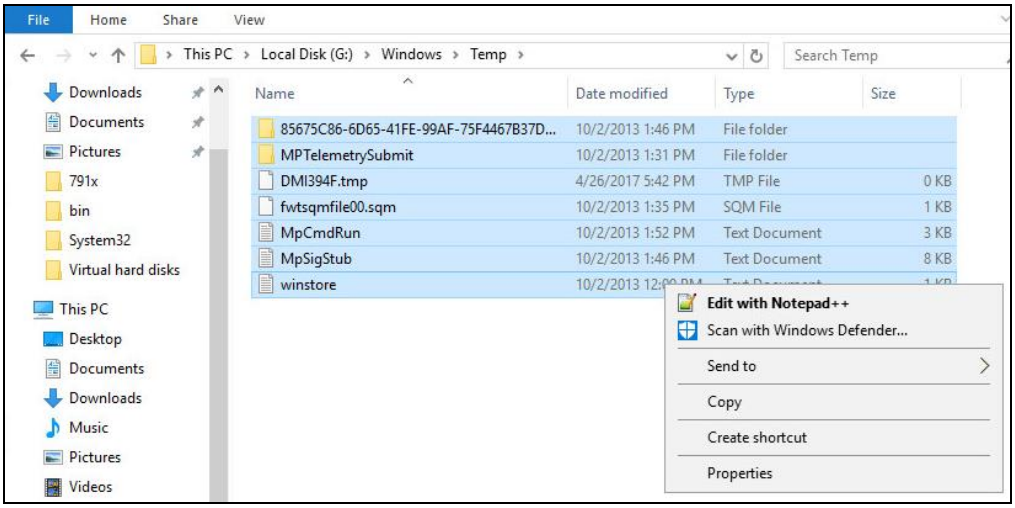
This method allows you to browse through the files from the mounted virtual disk through the file explorer on the machine where you have Backup App installed on.

i. Click  and then you will be prompted to select a driver letter where you wish the mounted image to be mapped on your machine, click **OK** when you have finished selection.

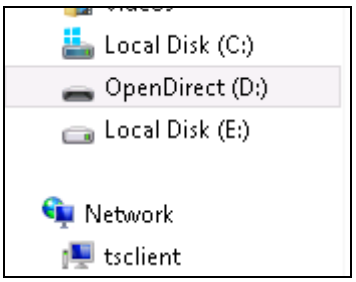
ii. The selected drive letter will be mapped and prompted in the Windows Files Explorer with the files you wish to restore shown.



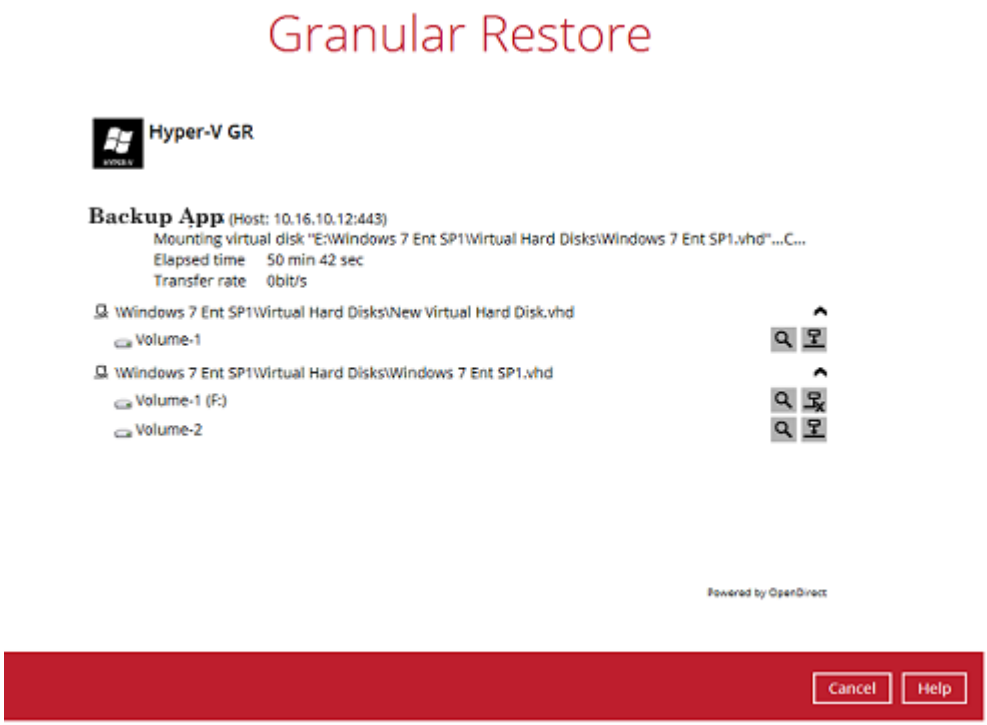
iii. You can now click on the files to view them directly from here, which will be in read-only mode, or copy them to your local machine.



iv. The mounted drive letter cannot be ejected from the Windows File Explorer, it will only be closed when you exit Backup App.



When you have finished restoring the necessary files, you can go back to Backup App and click on **Cancel**.



Then click on **Stop the granular restore** to unmount the virtual disk(s).

IMPORTANT

Due to the limitation of the virtual file system library, the mounted virtual disks will only be unmounted from your machine when you exit Backup App.