Enzo Cloud Backup

Overview

Herve Roggero

3/3/2015

Contents

General Technical Overview

Blue Syntax Consulting LLC created Enzo Cloud Backup to provide a cutting edge transactionally consistent backup and restore technology for SQL Database instances, Azure Tables and Azure Blobs. This paper provides information on the technology itself and how to best leverage it.

Enzo Cloud Backup comes with four components: the management interface (called **Enzo Studio**), a service agent (called the **Enzo Agent**), command line utilities and a .NET Backup API. The Enzo Studio is capable of performing backup and restore operations against SQL Database without the Enzo Agent, although the Enzo Agent can provide a better performance when deployed in the cloud. The Enzo Agent can run entirely in Windows Azure data centers (in a Virtual Machine) and needs to be deployed manually to be used.
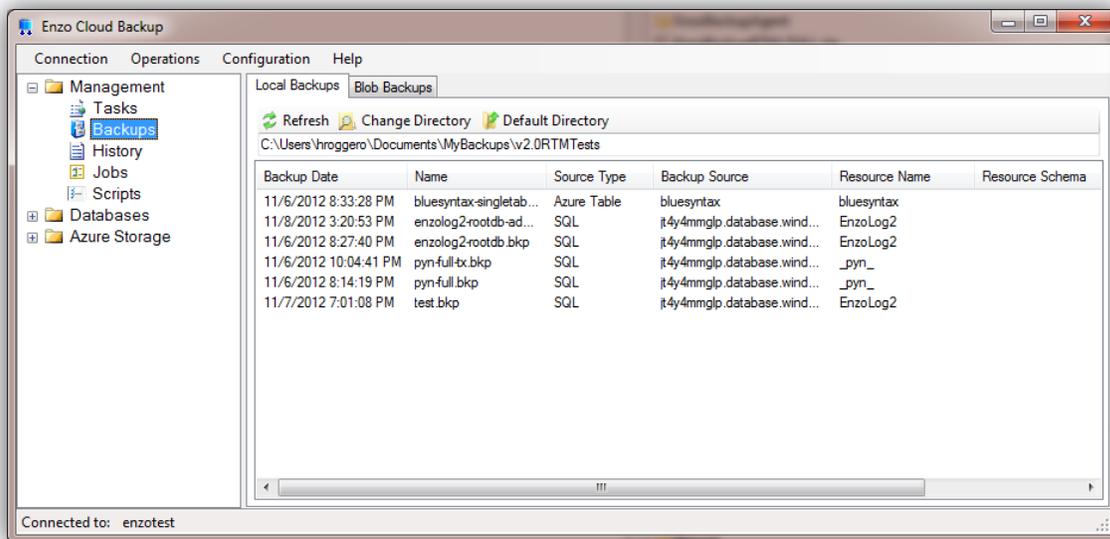
Backup devices can be stored as a local file on your systems (on-premise) or in the form of Blob Containers in the cloud (in your Azure storage account). The backup devices use a proprietary format; as a result you must use Enzo Backup to restore your backups.

Operation Modes

 Enzo Backup is designed to run entirely on premise, or in a hybrid configuration with the Enzo Agent deployed in Microsoft Azure. For very small databases it may be possible to use the on-premise deployment only; however for larger databases, or when scheduling jobs, an Enzo Agent is needed.
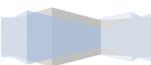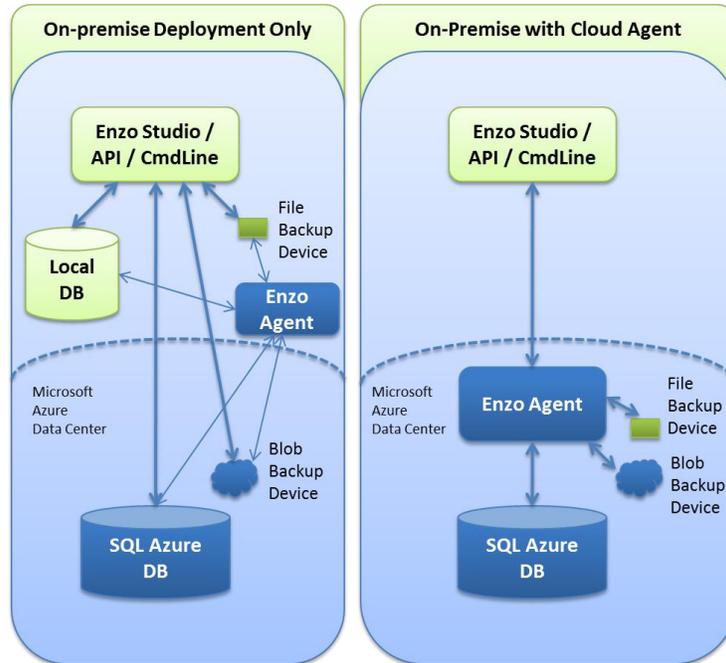
In the on-premise mode, Enzo Studio communicates with the database server directly and uses the backup file located locally (as a File Backup) or in the cloud (the Blob backup). An Enzo Agent can be deployed to a local machine and perform scheduled operations as well. This mode of operation may be cheaper for small SQL Database instances because the cost of moving data in and out of the Microsoft data centers may be lower than the cost of running a virtual machine for the Enzo Agent.

In cloud mode, the Enzo Agent performs the backup/restore operations in the cloud directly; as a result the operation will be faster because the data transfer remains inside the Microsoft data center. When using an agent in the cloud, it is also possible to point to backup devices on the local drives; however the drives are those local to the Virtual Machine.

Note that it is up to you to decide which mode to use when backing up a database. Specifying a cloud agent under "**Use a Cloud Agent**" will perform the backup in the Cloud mode described previously. If you use this option you will first need to deploy an Enzo Agent manually.

Enzo Agent

Running Multiple Enzo Agents
You may deploy multiple Enzo Agents in the cloud. Each agent can perform one backup or restore operation at a time. So deploying multiple Enzo Agents makes sense if you are performing backup or restore operations of multiple databases at the same time. However you can only deploy one Enzo Agent per machine.

How to deploy
To deploy the Enzo Agent, please refer to the online help accessible from the application.

4
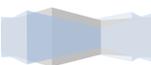
Job Scheduling

You can schedule backup jobs for SQL Databases instances, Azure Tables, Azure Blobs. To schedule a backup operation, select **Operations -> Backup** and check the Schedule checkbox.

The Job Scheduler is bundled as part of the Enzo Agent. As a result, if you plan to backup databases on a schedule with Enzo Backup, you will need to deploy an agent. Stopping the Enzo Agent could impact the ability of the Job Scheduler to perform its regular tasks.

Command-Line Utility

A command-line utility is available allowing you to start a backup operation using a command window. The command-line utility is available in the main application directory in which the Enzo Backup product is installed. To view the available command options, run the following command:

enzobkp.exe -?

The command-line utility can also function as an on-premise mode, or in cloud mode. By default, the utility runs in an on-premise mode. To specify that an Enzo Agent needs to be used to perform the backup operation, use the **-CLOUD** option.

Note that the command line utility is only available for SQL Database backup and restore operations.

Registering Databases

You can register database servers and storage accounts to reduce the steps needed to perform backup and restore operations. When you register a database server or a storage account, the credentials used are saved in an encrypted format. You can then explore the databases and storage accounts, right-click on the database or Azure Table to backup and the credentials to backup the resource will automatically be filled on the backup window.

Device Backups

Enzo Backup creates a backup device as a file on disk, or in Blob Container. When stored in a local file, a temporary directory is created in which temporary backup files are created. Upon completion, the files are combined into a single file.

When backing up to a Blob Device, a new blob container is created in your storage account. The blob container holds a schema blob and multiple blobs for the data. Each blob is roughly 1MB in size.

Performance

Throughput

Backup and restore throughput varies widely based on network bandwidth, the SQL Database or storage account performance at the time the backup starts and the type of data being backed up. Lab tests show that the Enzo Backup tool can backup roughly 1-3MB per second against most databases and storage accounts. The restore operation offers roughly the same throughput. In addition, data is automatically compressed and optionally encrypted, which can also impact performance.

Throttling

SQL Database and the Azure Storage are subject to bandwidth limitations and throttling to prevent consumption abuse. Due to the nature of backup and restore operations, throttling conditions are likely to happen. Enzo Backup is designed to sustain, retry, and back-off most throttling conditions in order to ensure completion.

Improving Backup Speed

One of the central backup operations relies on reading data. While this operation is highly optimized, tables with a CLUSTERED INDEX on an IDENTITY column will be backed up at a faster pace. In addition, fewer CPU cycles will be necessary to backup these tables, helping to minimize certain throttling conditions in SQL Database.


Azure Storage

In order to orchestrate backup and restore operations Enzo Backup uses multiple Azure storage items. This information is provided for reference; the content in those storage items should not be modified manually.

The enzobackuptasks Azure Table holds current running tasks and the history records for all previous tasks. You can truncate this table using Enzo Studio. Select **Configuration -> Purge History Table** to perform this operation, while no task is currently being executed.

The following Azure storage items are created in your Azure Storage account:

Storage Purpose	Storage Type	Storage Name
Blob Backup Devices	Azure Blobs	enzobackups-*
Backup/Restore Queue	Azure Queue	enzobackupqueue
Job Definitions	Azure Table	enzobackupjobdef
Schedule Definitions	Azure Table	enzobackupscheduledef
Running Operations	Azure Table	enzobackuptasks
Debug Information	Azure Table	enzodebug
Registered Database Servers	Azure Table	enzosqlconfig
Alerts	Azure Table	enzoalertconfig
Cloud Agent Details	Azure Table	enzocloudagents

6
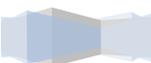
T-SQL Scripts

You can use Enzo Backup to store and execute database scripts against one or more databases; you can also schedule the execution of the scripts. Script templates are available online and accessible directly from the application. For example the following script checks for long running statements and raises an error if it fails.
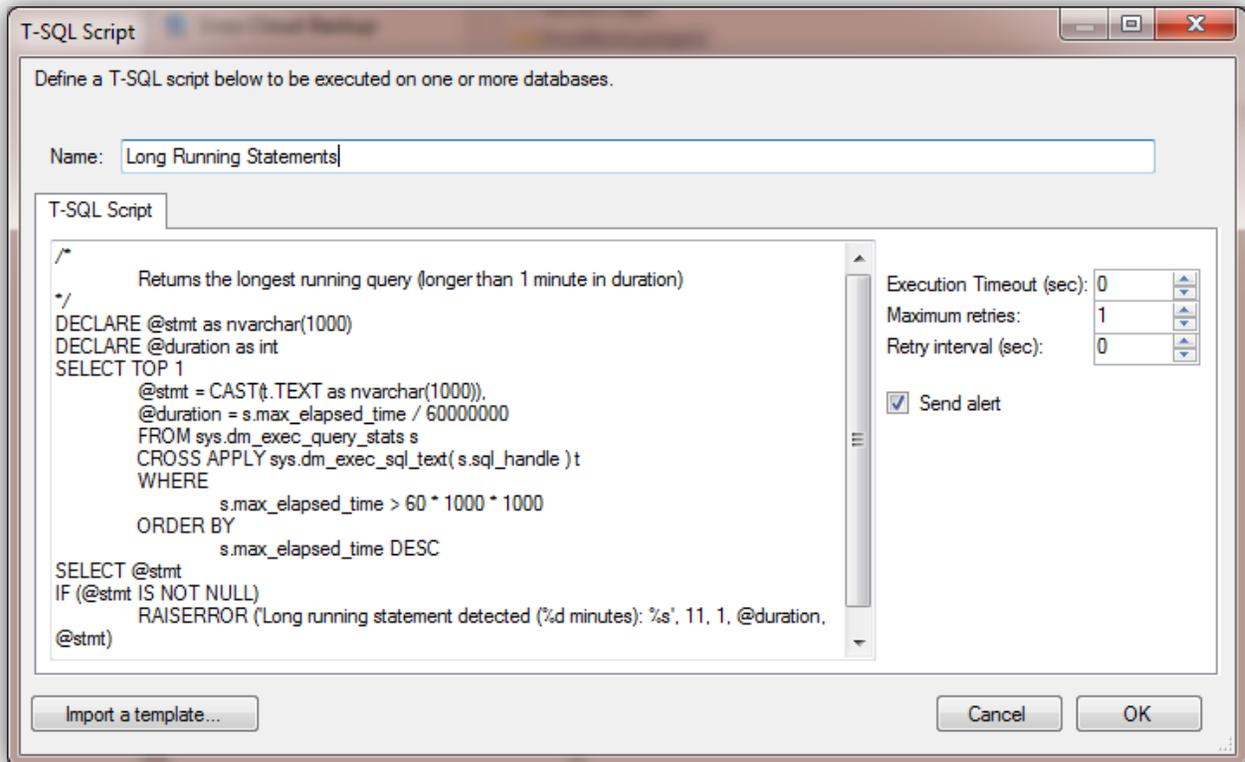
Advanced Backup Features

Transactional Consistency

You may enforce transactional consistency when backing up a SQL Database instance (except when backing up federation roots and federation members). To do so, you will need to check the "**Ensure Transactional Consistency**" on the Advanced Options of the backup window.

Note that using this feature will incur additional hosting costs from Microsoft since a new database is being created for some time.

Backup a Schema

You may also backup only a schema within the database. This may be useful for databases that store customer records on dedicated schemas in multitenant environments. You can type the desired schema, or click Refresh to fetch the available schemas.

Data Synch Services Objects

By default, the data synch services objects, if any, are not backed up. This option is not available when backing a federation root or a federation member.

Backup Azure Tables and Azure Blobs

You can also backup Azure Tables and Azure Blobs. For Azure Tables, you can specify backup strategies globally and per table to improve the speed of the backup operation. You can also specify which tables to backup (or ignore) and filter the entities per table. You can backup Azure Table entities into a backup device, or store them into a SQL Database or SQL Server database.

To avoid too much contention while backing up your storage account, you can use the RA-GEO account instead of the actual storage account name. Using the RA-GEO account requires you to configure your storage account for geographic redundancy with read-only access.

Use a Cloud Agent

This option allows the backup operation to use the cloud mode. In cloud mode, the Enzo Agent is used to perform the actual backup or restore operation. See the **Operation Modes** section to learn more about this feature.

Encrypt the Backup Device

You can optionally encrypt your backup device. You must first configure your encryption options by specifying an X.509 certificate from your local machine, and by typing a secret passphrase. To use Encryption with an Enzo Agent, you must deploy the certificate on the machine(s) running the agent; the certificate must contain the private key. Only machines with the certificate can restore encrypted devices.

Advanced Restore Features

You can restore an entire backup device or a few items only. When restoring a SQL database in its entirety, you should ensure the database is completely empty or the restore operation could fail.

When restoring specific tables, you need to choose one or more tables to restore. The tables selected will first be dropped from the destination database, then recreated and reloaded, along with their referential integrity. This provides a way to quickly reload a table that was accidentally truncated.

For example, the following screenshot shows how to recover three tables only from a SQL Database backup. You can also select specific tables when restoring Azure Tables.

8
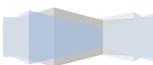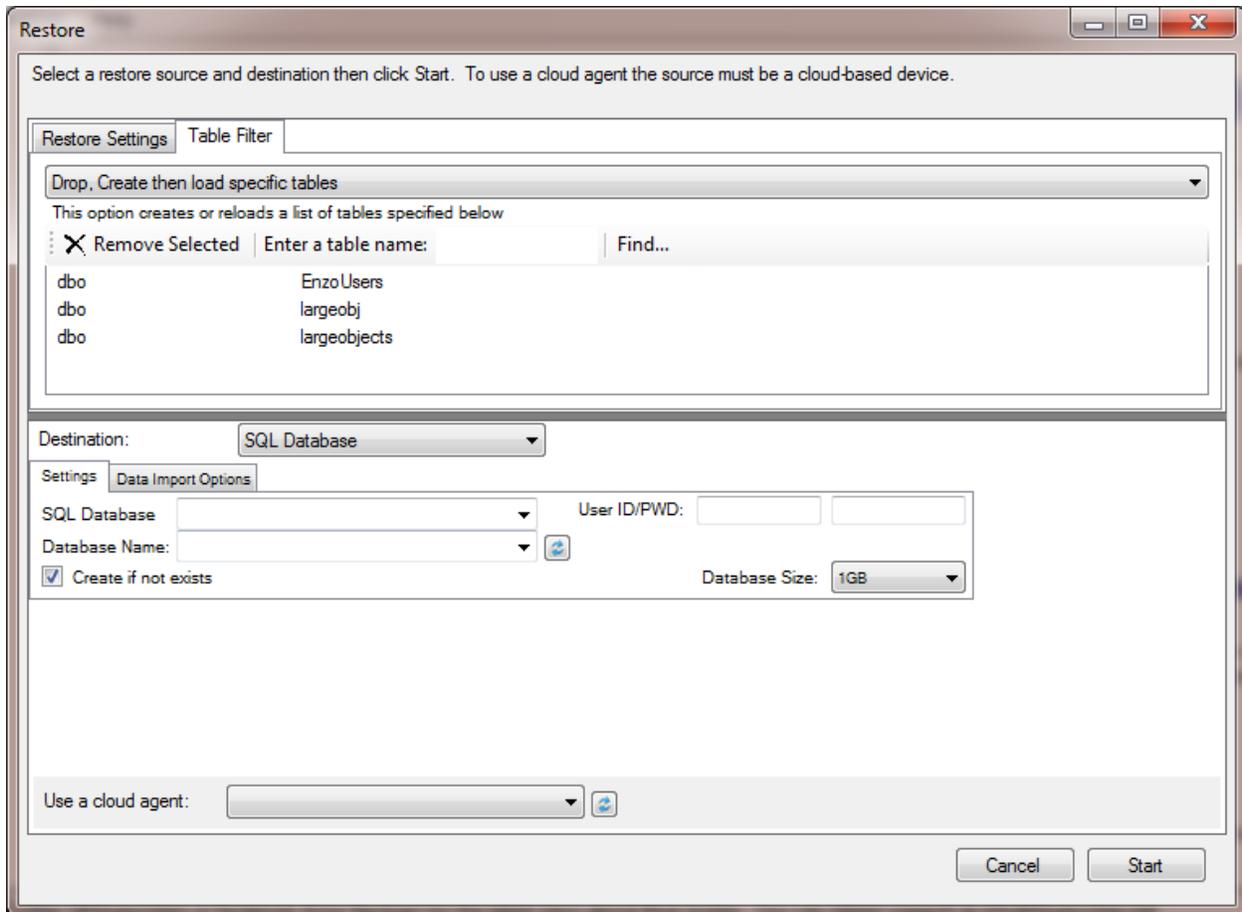
Limitations

The following limitations apply to this release of Enzo Backup:

- **SQL Server Backup**
  Backing a SQL Server database with Enzo Backup is not supported. Backing up SQL Database V12 is partially supported. You can however use Enzo Backup to restore a SQL Database instance to a local SQL Server database. If you make no schema changes to your recently restored SQL Database instance, or if the schema changes are compatible with SQL Database, you may attempt to backup the SQL Server database and restore it in a SQL Database instance.

- **Table-Type Constraints**
  Although user defined types are supported (using the CREATE TYPE clause), Enzo Backup does not support Table Types that also contain constraints. For the time being, SQL Server and SQL Database do not support the ALTER command on Table Type constraints; as a result if you database contains Table Type constraints, the table type will be restored without its constraints.

9

About Blue Syntax Consulting

Blue Syntax Consulting provides high value-added services to customers by offering high level executive guidance on how to best leverage Cloud Computing technologies with the Microsoft Azure platform and low-level implementation services, including architecture guidance, development and testing. Blue Syntax Consulting develops leading edge technologies allowing corporations to adopt cloud computing sooner, including Enzo Cloud Backup and other solutions.

For more information, visit **www.bluesyntaxconsulting.com** or contact **info@bluesyntaxconsulting.com**.