PDM STANDARD DATABASE BACKUPS AND MAINTENANCE

Modern Server's tend to have a great deal of resilience built in to them to reduce the risk of data loss. However in the unlikely event of database corruption or complete hardware failure, it is your responsibility to ensure that you have a disaster recovery plan in place should you need to restore your Vault and recreate it from a backup onto replacement hardware.

PDM Standard comprises two key components. The Vault Database, which contains the vault definition, metadata, references and the history of all files, and the Archive, which contains all the files managed by PDM (and their previous versions).

When considering a Disaster recovery plan you should be backing up the Database, the Archives and Archive Server settings. Unless you have a specific SQL Agent for your Backup solution it is likely you will need to manually create the SQL Backups locally then back up externally along with the Archive folders / settings also being backed up at the same time.

PDM Standard uses SQL 2014 Express Edition, which does not support "Maintenance Plans" nor the SQL Server Agent service that we would use to automate these within SQL Server Standard Edition or above. What this means for you is that it is not possible to automatically schedule backups and maintenance tasks directly within the Management Studio via said Maintenance Plan.

One possible solution to this is documented below. This is based on two parts that create a backup solution for your PDM Standard Database but also allows for the creation of other tasks relating to the health of your Database.

Instead of the maintenance plans:

- Download and install the stored procedure, "expressmaint" into the Master Database

Instead of the SQL Server Agent:

- Create individual SQL Scripts for each task (Backup, Re-index, Re-organise etc)
- Use Windows Task Scheduler from your SQL Server to run the maintenance tasks at specified intervals

In this document we explain how to use these two parts to create your database backup and maintenance solution.

PLEASE NOTE: The 'expressmaint' stored procedure was not written by, nor validated by, Solid Solutions or SOLIDWORKS. Although all tests indicate that this is a valid, widely used and safe toolset we can accept no responsibility for any data loss or corruption resulting from its implementation. I would advise creating a dummy vault / vault database to test these tools in your own environment before implementing into your live Vault Database.

NOTE: In order to allow scripts to be ran via a Scheduled Task the following changes need to be made in the SQL Management Studio.

- Right Click over the Server name and click Facets
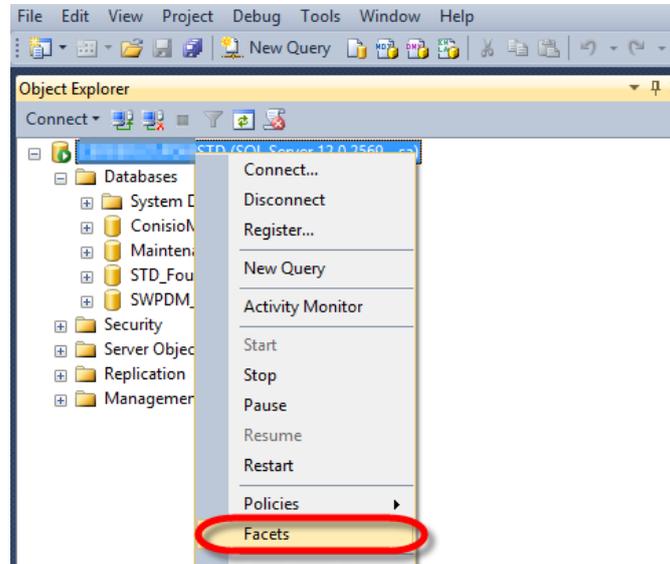
- Under 'Surface Area Configuration'

  - Set **OleAutomationEnabled** to True
  - Set **XPCmdShellEnabled** values to True
  - Click OK
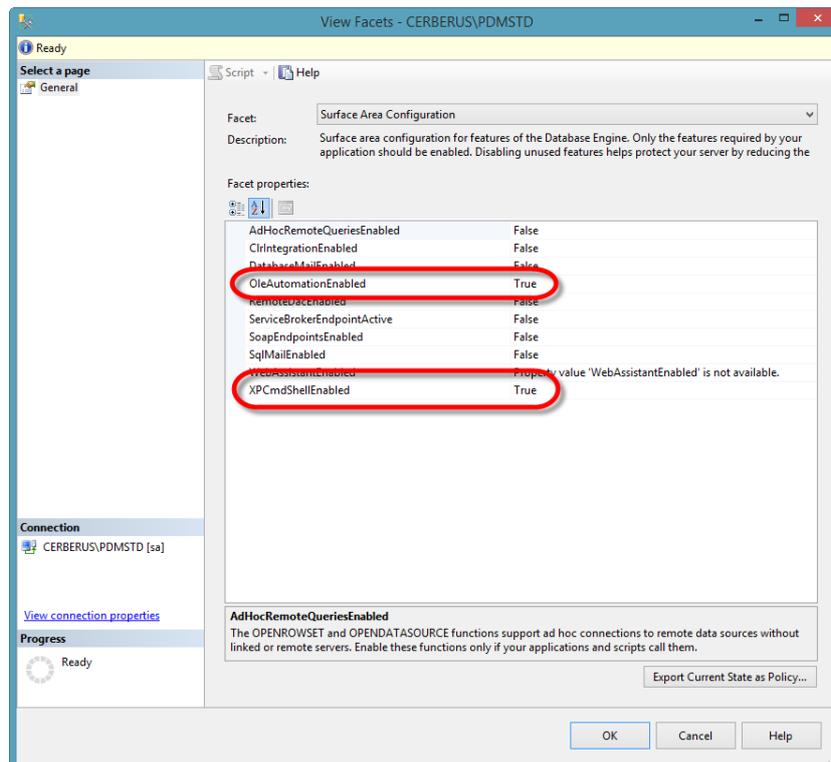
Further changes may also be required based on the success / failure of the Scheduled Task to execute. This step is discussed later as a troubleshooting exercise.

Installing the stored procedure

- Launch the SQL Management Studio and connect to your PDM Standard Instance using the System Administrator (sa) User account.
- Under System Databases, right click over Master and select 'New Query'
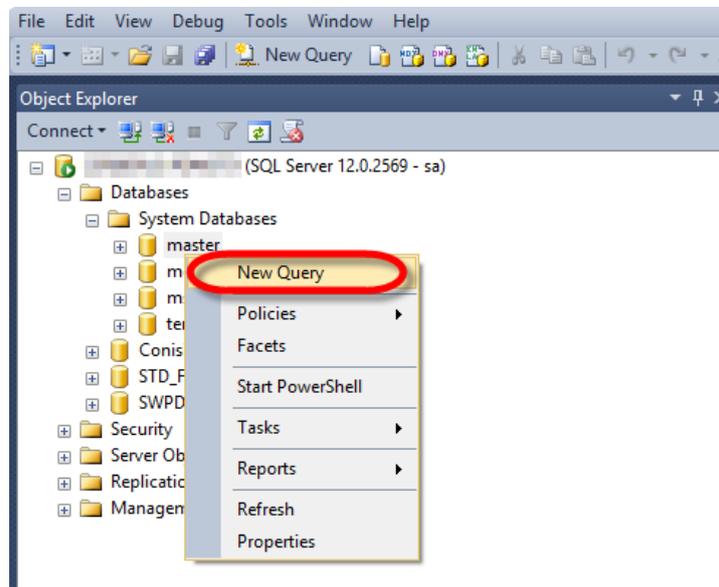
- Open the sql_express_Maintenance.sql file into a text editor.
- Select all the text (Ctrl + A) and copy / paste into the Query window.
- Click 'Execute' (F5)

- Verify that the Stored Procedure has been added to the Master Database by expanding Master/Programmability/Stored Procedures
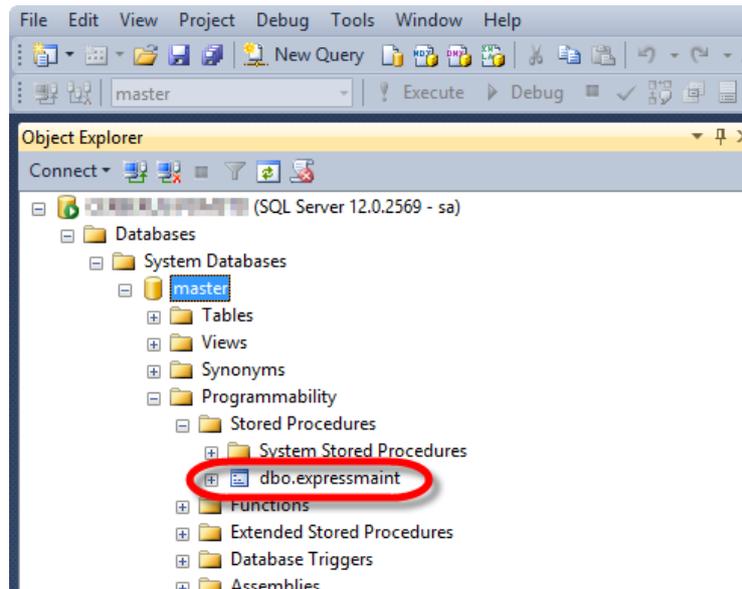
THE STORED PROCEDURE PROVIDES THE FOLLOWING FEATURES:

- Full Database Backup
- Differential Database Backup
- Log Backup
- Housekeeping of backup files
- Database Integrity Checks
- Database Index Rebuilds
- Database index Reorganization
- Report Creation

A complete set of parameters for each feature is included at the rear of this document.

With PDM Standard Databases set to 'Simple' Recovery mode by default, we are not concerned about the Differential Database Backup or Log Backups so will focus on the three scenarios typical to maintaining the health of a PDM Standard Database: Backup, Re-index and Re-organise

Before starting you should create a Folder on your SQL Server to contain the Scripts, the Backups and the Report files.
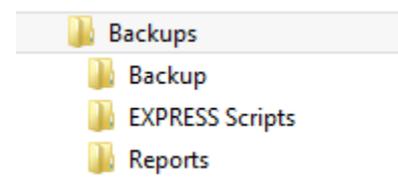
 Do not retain the backups on the PDM Server however. Ensure that your preferred Backup solution is taking these files offline to an external backup device / media as part of your standard backup procedures.

Configuration steps: recurring daily full database backup

To configuring a full database backup for you PDM Standard database in SQL Server 2014 Express Edition:

NOTE: You will need to know the name of your Vault Database prior to starting. If you do not know this then open the PDM Administration tool. Right Click over your Vault Name and choose Properties (You may be prompted to log in at this stage)
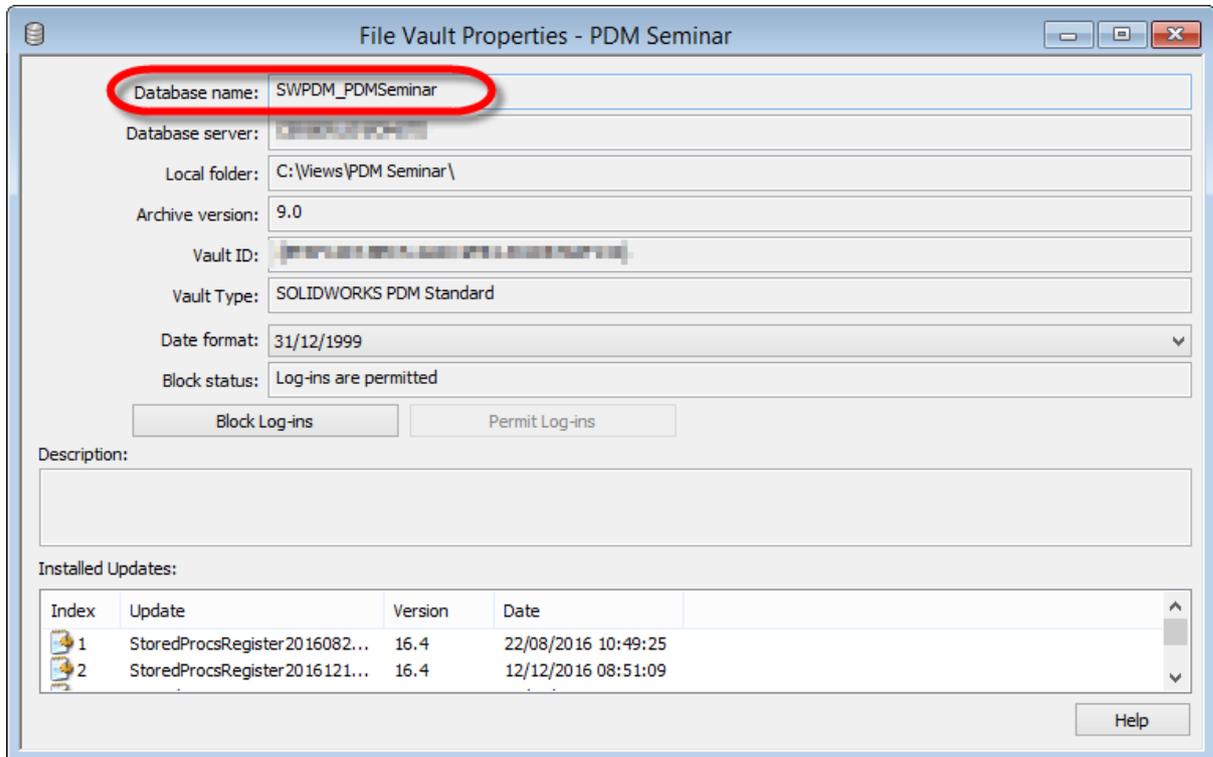
Step 1 Create the Script: Open a text editor and copy the following code into it. Change the Database name and the paths for the Backup and Report to the folder you just created, then save it to (e.g.) D:\Backups\EXPRESS scripts\Daily_Full_Backup.sql.

When executed, this will create a full database backup of a database called SWPDM_PDMSeminar to D:\Backups\Backup, verify the backup and write a report to D:\Backups\Reports. Backups are retained in this location for 4 days and reports for 1 week:

```
exec master.dbo.expressmaint
    @database      = 'SWPDM_PDMSeminar',
    @optype        = 'DB',
    @backupfldr    = 'D:\Backups\Backup',
    @reportfldr    = 'D:\Backups\Reports',
    @verify        = 1,
    @dbretainunit  = 'days',
    @dbretainval   = 4,
    @rptretainunit = 'weeks',
    @rptretainval  = 1,
    @report        = 1
```

Step 2 On the Server, locate and open the Task Scheduler by clicking on Start menu and typing 'Schedule Tasks'

Step 3 Click Create Basic Task to start the Scheduled Task Wizard.
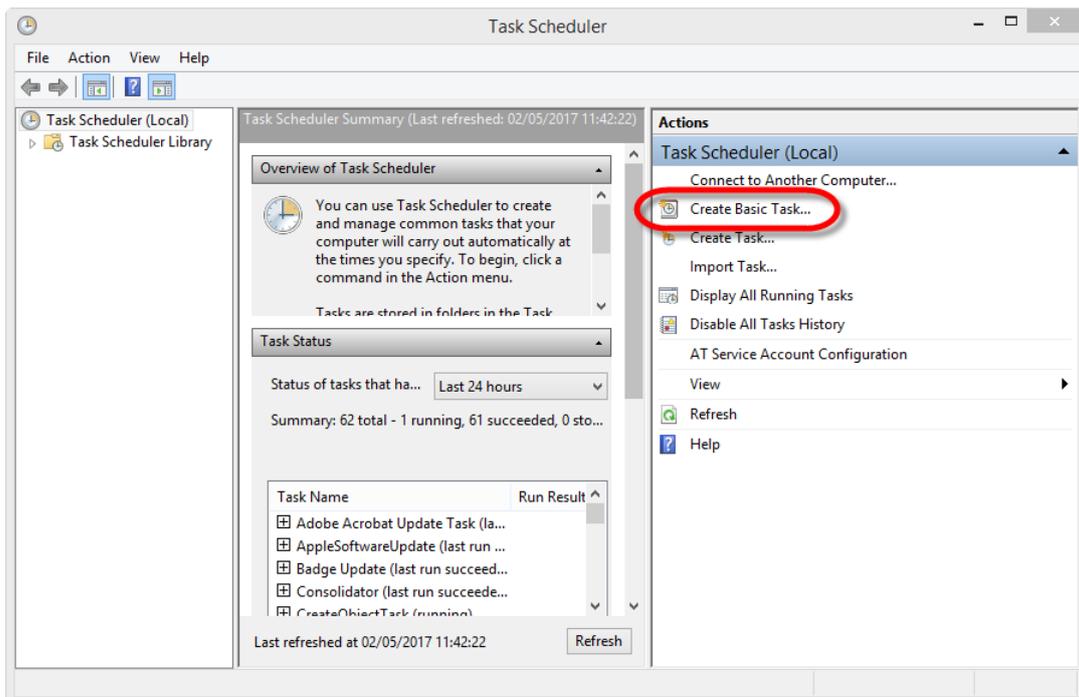
Step 4 Type a name for the task.
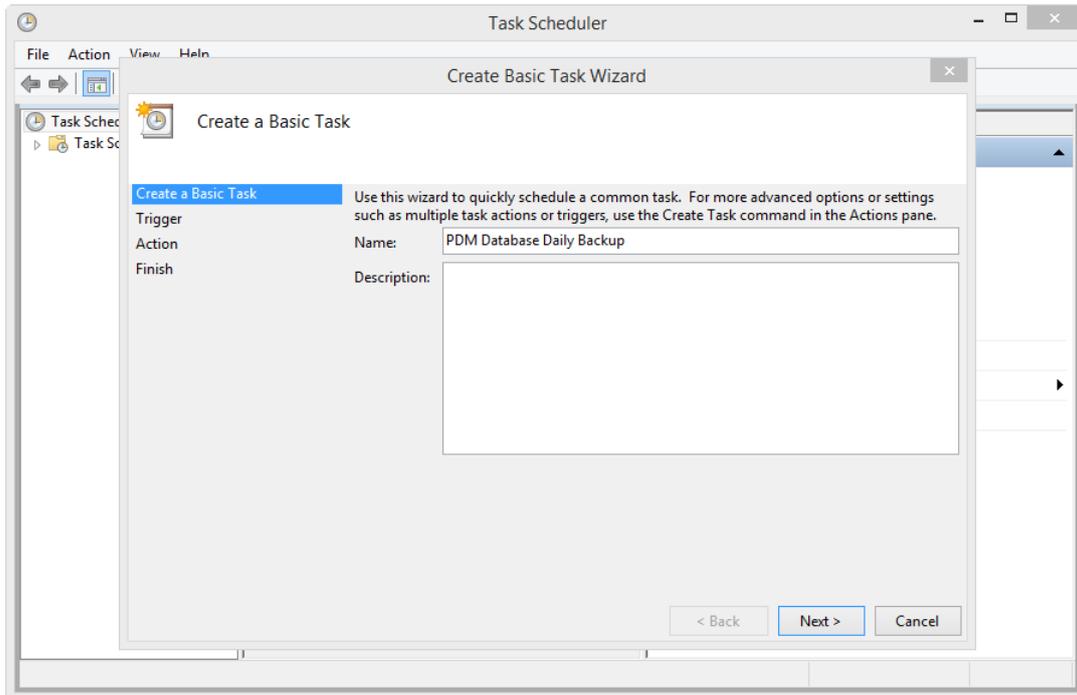
Step 5 Choose Daily from the scheduling options.
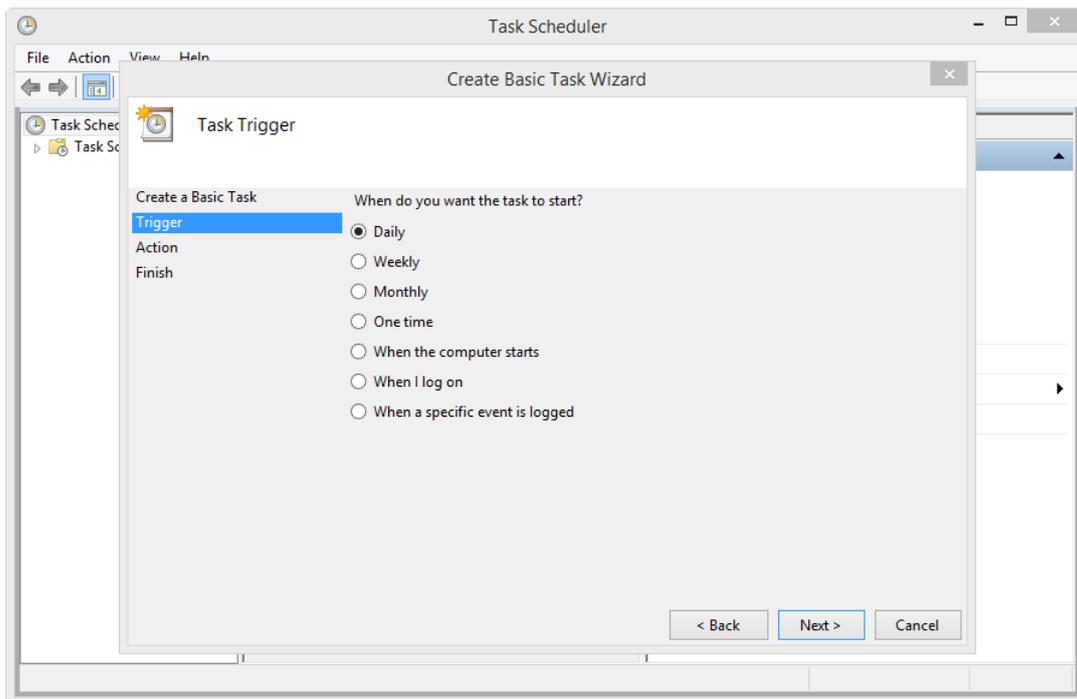
Step 6 Click Next, specify the information about the time to run the task. Set Start time to an appropriate value when the load on the PDM database is low, set the Recur every option to 1 day, and then click Next.
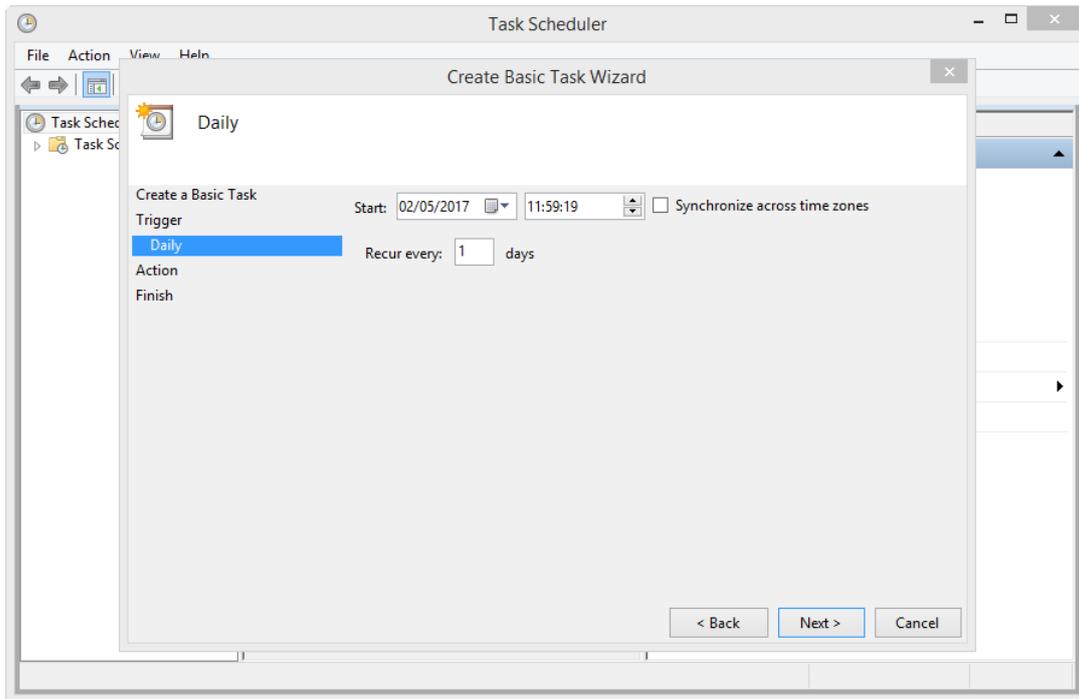
Step 7 Choose Start a program from the task to perform list, and then click Next.
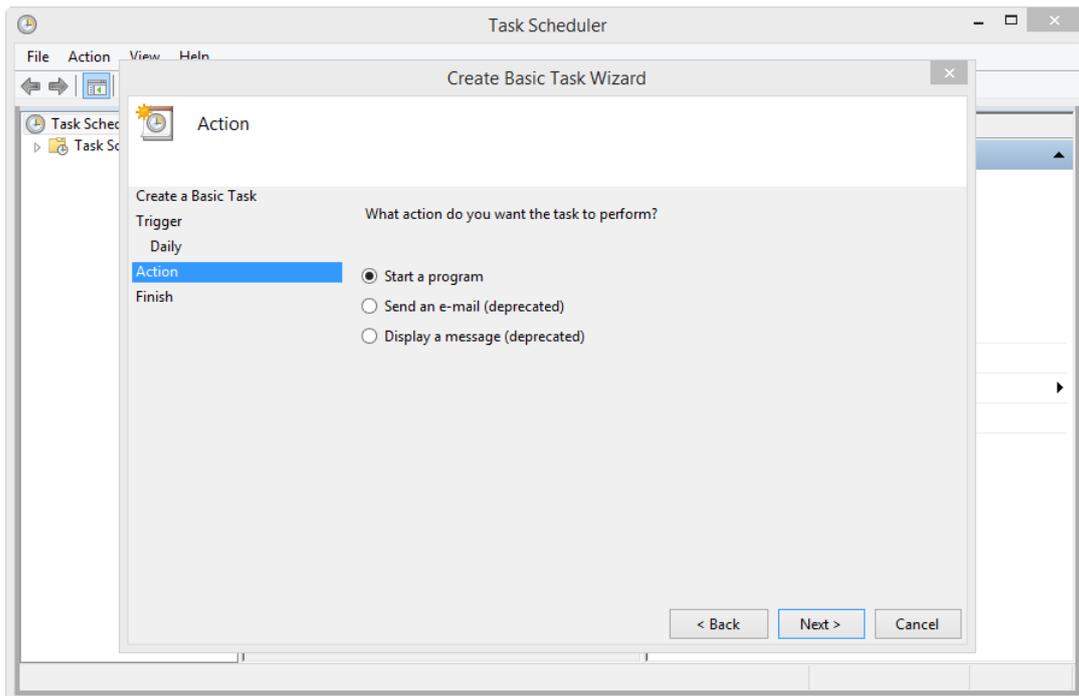
Step 8 Click Browse, browse to **SQLCMD.exe** (for SQL Express 2014 you can find it here - C:\Program Files\Microsoft SQL Server\Client SDK\ODBC\110\Tools\Binn\SQLCMD.EXE)
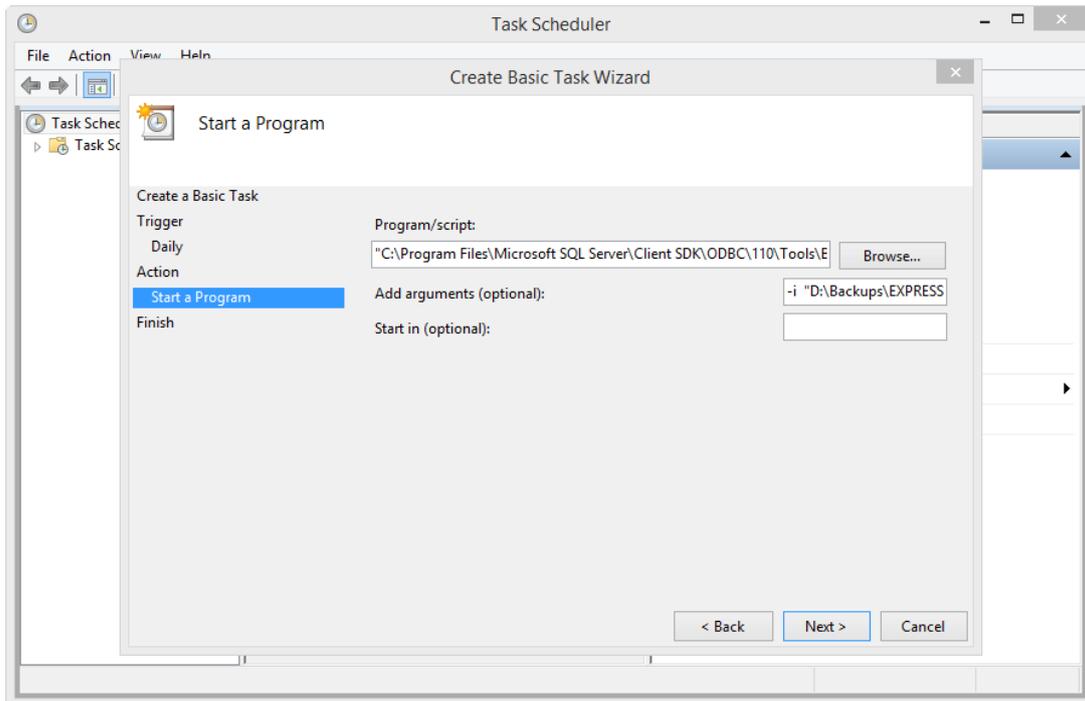
Step 9 Type the following content to the Add arguments text box (changing script path to what you created earlier and including your SQL Instance name (e.g PDMServer\PDMSTD), then click Next:

-S <SERVERNAME\INSTANCE> -i "D:\Backups\EXPRESS Scripts\Daily_Full_Backup.sql"

Step 10 Select the checkbox to Open the Advanced Properties for this task and then click Finish.
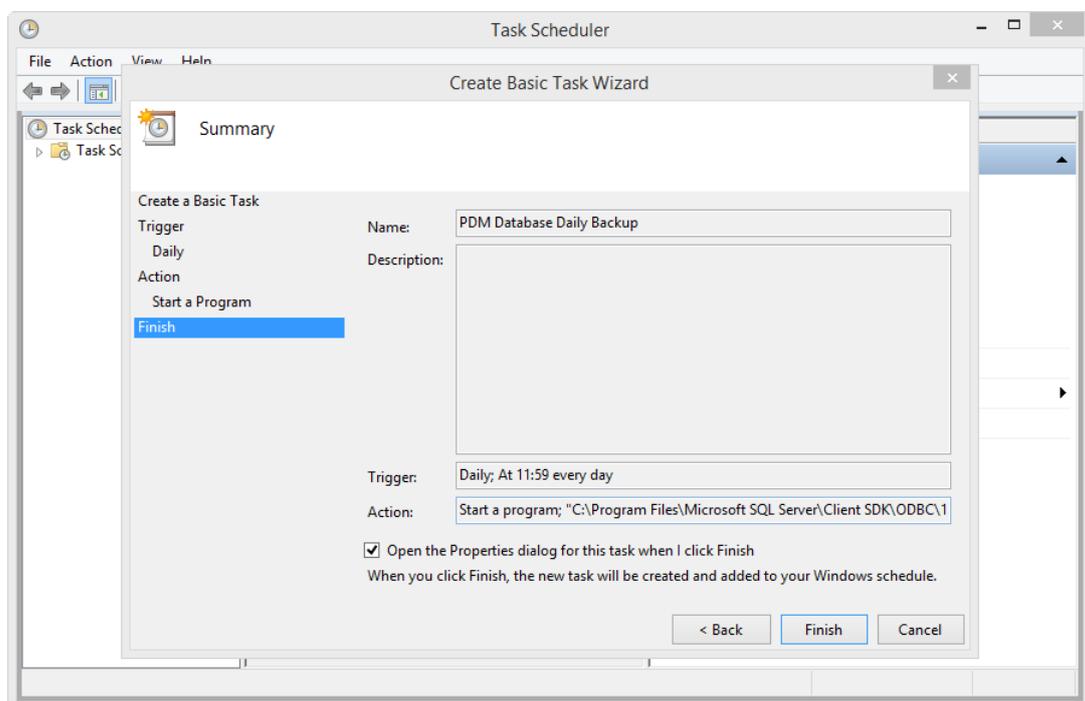
Step 11 Verify that he user account linked to the task is a Windows User account that is a SysAdmin for your Database. This should be the User who installed PDM / SQL Express as they will have been added as a SysAdmin automatically.
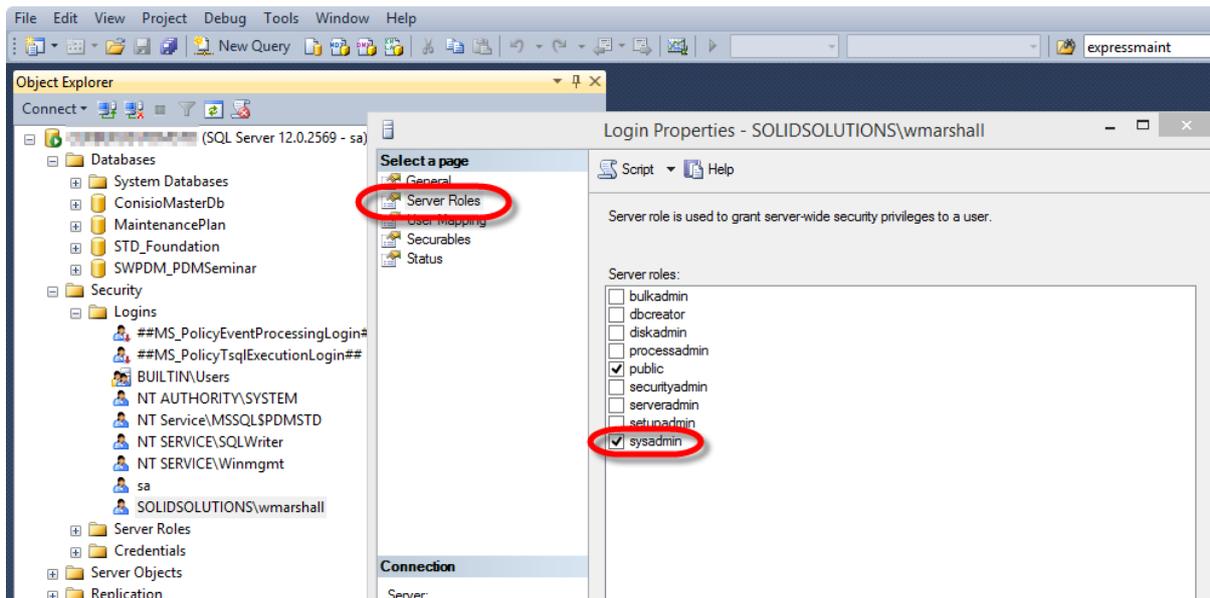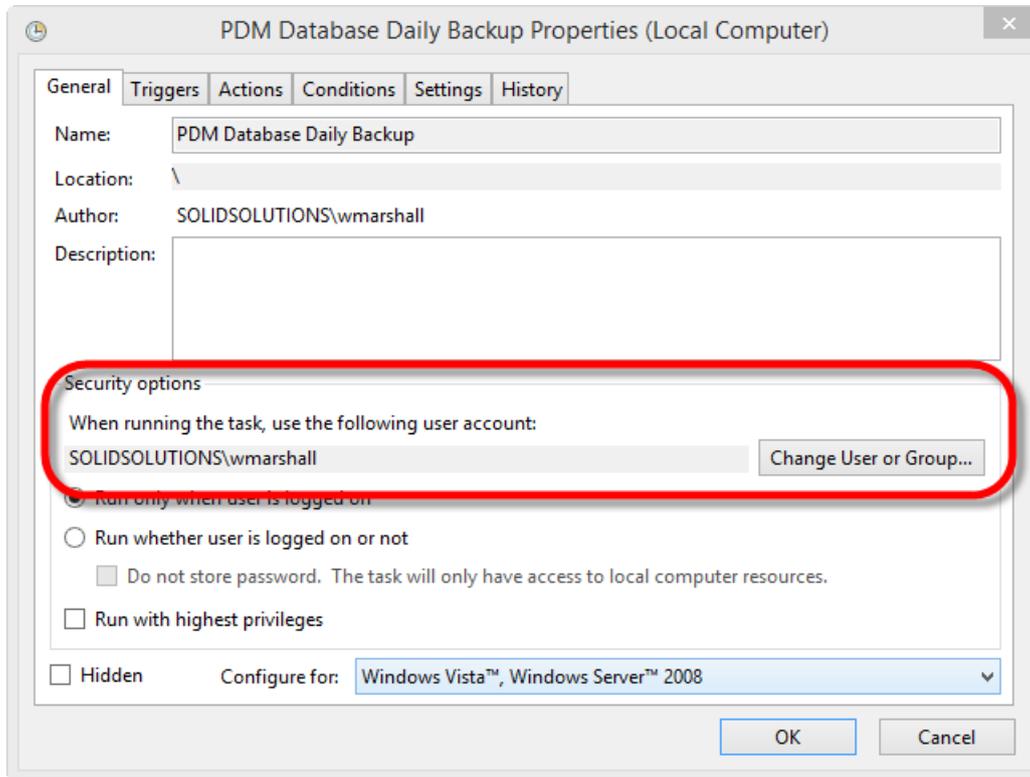
Step 12 Click OK. If prompted, supply the password for the account again.

Step 13 Test the created task by right-click on it and select Run. A command prompt windows named SQLCMD has to be opened while the task is running. Check the created backup file and the log files.

If the task fails, try to run the task command manually in a command prompt window. If you see a message like this

```
Msg 15281, Level 16, State 1, Server CERBERUS, Procedure sp_OACreate, Line 1
SQL Server blocked access to procedure 'sys.sp_OACreate' of component 'Ole Autom
ation Procedures' because this component is turned off as part of the security c
onfiguration for this server. A system administrator can enable the use of 'Ole
Automation Procedures' by using sp_configure. For more information about enablin
g 'Ole Automation Procedures', search for 'Ole Automation Procedures' in SQL Ser
ver Books Online.
Msg 50000, Level 16, State 1, Server CERBERUS, Procedure expressmaint, Line 113
Database SWPDM_PDMSeminar is invalid or database status is not ONLINE
Msg 15281, Level 16, State 1, Server CERBERUS, Procedure sp_OADestroy, Line 1
SQL Server blocked access to procedure 'sys.sp_OADestroy' of component 'Ole Auto
mation Procedures' because this component is turned off as part of the security
configuration for this server. A system administrator can enable the use of 'Ole
 Automation Procedures' by using sp_configure. For more information about enabli
ng 'Ole Automation Procedures', search for 'Ole Automation Procedures' in SQL Se
rver Books Online.
```

Then you will need use the SQL Management Studio to enable 'Ole Automation Procedures' using the following query

```
USE master
GO
sp_configure 'show advanced options', 1;
GO
RECONFIGURE;
GO
sp_configure 'Ole Automation Procedures', 1;
GO
RECONFIGURE WITH OVERRIDE
GO
EXEC sp_configure 'xp_cmdshell', 1
GO
RECONFIGURE WITH OVERRIDE
GO
EXEC sp_configure 'show advanced options', 0
GO
RECONFIGURE;
GO
```

Additional Maintenance tasks.

Many tables in the file SOLIDWORKS® PDM file vault database contain indexes – to ensure data is found efficiently when lookups are done by various database operations. Microsoft® SQL server automatically maintains these indexes whenever insert, update, or delete operations are made to the underlying data. Over time as you perform a lot of file operations in the vault - for example after an upgrade where a lot of records may have been modified, or performed a migration where many new records were added - the various database table indexes becomes scattered. This is similar to how a hard drive can become fragmented. Using variations of the Backup script we can schedule tasks to rebuild or reorganize the indexes. If the indexes are very fragmented, this operation may improve general performance with searching, browsing etc. in the file vault.

SOLIDWORKS recommends rebuilding the file vault database indexes at least once a month to improve overall performance. In cases of larger databases and more activity - more frequent rebuilds such as once per week may prove beneficial.

Rebuilding the indexes is a bit more database intensive (compared to reorganize) and could take longer to complete so it should not run as frequently. It's difficult to give an exact recommendation how often you should reorganize or rebuild the indexes because it depends on the vault usage, if a lot of data is added frequently, then you should reorganize more often. We will schedule the re-organise to be a weekly task with the Re-indexing done monthly.

Note that the time it takes to complete the operations depend on the size of the database and how fragmented the indexes currently are. It is possible to run it while the vault is in use, but the overall performance might be affected while the maintenance plan is running. You may wish to schedule the operation to run later in the day when less activity is done in the vault.

Configuration steps: recurring Weekly Re-Organise

Step 1 Create the Script: Open a text editor and copy the following code into it then save it to e.g. D:\Backups\EXPRESS scripts\REORGANISE_Indexes.sql and, as before, changing the Database name to match your own.

```
exec master.dbo.expressmaint
    @database      = 'SWPDM_PDMSeminar',
    @optype        = 'REORG',
    @reportfldr    = 'D:\Backups\Reports',
    @rptretainunit = 'weeks',
    @rptretainval  = 1,
    @report        = 1
```

This will run the reorg task and create a log file in the Reports directory which will be retained for one week.

Step 2 Create Scheduled Task as before, selecting this script instead and setting the schedule to be Weekly at a day / time of your preference. (I have selected midnight on a Saturday)

Configuration steps: recurring Monthly Re-Index

Step 1 Create the Script: Open a text editor and copy the following code into it then save it to e.g. D:\Backups\EXPRESS scripts\REINDEX_Indexes.sql and, as before, changing the Database name to match your own.

```
exec master.dbo.expressmaint
    @database      = 'SWPDM_PDMSeminar',
    @optype        = 'REINDEX',
    @reportfldr    = 'D:\Backups\Reports',
    @rptretainunit = 'weeks',
    @rptretainval  = 1,
    @report        = 1
```

This will run the reindex task and create a log file in the Reports directory which will be retained for one week.

Step 2 Create Scheduled Task as before, selecting this script instead and setting the schedule to be Weekly at a day / time of your preference. (I have selected every month on the last day of the month)

STORED PROCEDURE COMPLETE PARAMETERS

Parameter	Required	Default	Description
@database	Yes	None	The target database for the maintenance operation. Valid values are a single database name, ALL_USER which will process all user databases and ALL_SYSTEM which will process all system databases
@optype	Yes	None	The type of maintenance operation to be performed. Valid values are: • DB - Full Database Backup • DIFF - Differential Database Backup • LOG - Log Backup • CHECKDB - Database Integrity Check • REINDEX - Rebuild all indexes • REORG - Reorganize all indexes
@backupwith	No	Null	Specify additional backup options as documented in BOL for the BACKUP WITH command
@backupfldr	No	Null	The base folder to write the backups to. Sub folders will be created for each database
@verify	No	1	Indicates whether to verify the backup file. Valid values are 1 and 0 with 1 = TRUE and 0 = FALSE
@verifywith	No	Null	Specify additional verify options as documented in BOL for the VERIFY WITH command
@dbretainunit	No	Null	The unit of measure for the @dbretainval parameter. Valid values are minutes, hours, days, weeks, months and copies. The combination of these two parameters determines how long or how many copies of old backup files are kept
@dbretainval	No	1	The time period or number of copies of old backups to keep
@report	No	1	Indicates whether to produce a report of the maintenance carried out. Valid values are 1 and 0 with 1 = TRUE and 0 = FALSE
@reportfldr	No	Null	The folder where maintenance reports are written to if @report = 1
@rptretainunit	No	Null	The unit of measure for the @rptretainval parameter. Valid values are minutes, hours, days, weeks, months and copies. The combination of these two parameters determines how long or how many copies of old reports are kept
@rptretainval	No	1	The time period or number of copies of old reports to keep
@checkattrib	No	0	Indicates whether to check the archive bit on a backup file before deleting it. This is a safety check to prevent deletion of files that have not been backed up onto tape. Valid values are 1 and 0 with 1 = TRUE and 0 = FALSE
@delfirst	No	0	Indicates whether to delete old backups prior to doing the current backup. This is not advisable but can be useful if disk space is limited. Valid values are 1 and 0 with 1 = TRUE and 0 = FALSE