Quick answers to common problems

Microsoft System Center Data Protection Manager 2012 R2 Cookbook

Over 100 recipes to build your own designs exploring the advanced functionality and features of System Center DPM 2012 R2

MVP Microsoft Most Valuable Professional

Robert Hedblom

[PACKT] PUBLISHING enterprise professional expertise distilled

Microsoft System Center Data Protection Manager 2012 R2 Cookbook

Over 100 recipes to build your own designs exploring the advanced functionality and features of System Center DPM 2012 R2

Robert Hedblom

[PACKT] PUBLISHING enterprise professional expertise distilled

BIRMINGHAM - MUMBAI

Microsoft System Center Data Protection Manager 2012 R2 Cookbook

Copyright © 2015 Packt Publishing

All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, without the prior written permission of the publisher, except in the case of brief quotations embedded in critical articles or reviews.

Every effort has been made in the preparation of this book to ensure the accuracy of the information presented. However, the information contained in this book is sold without warranty, either express or implied. Neither the author, nor Packt Publishing, and its dealers and distributors will be held liable for any damages caused or alleged to be caused directly or indirectly by this book.

Packt Publishing has endeavored to provide trademark information about all of the companies and products mentioned in this book by the appropriate use of capitals. However, Packt Publishing cannot guarantee the accuracy of this information.

First published: April 2015

Production reference: 1270415

Published by Packt Publishing Ltd.
Livery Place
35 Livery Street
Birmingham B3 2PB, UK.

ISBN 978-1-78217-271-0

www.packtpub.com

Credits

Author

Robert Hedblom

Reviewers

Steve Buchanan

Adrian Costea

John Joyner

Michael Seidl

Yegor Startsev

Commissioning Editor

Kevin Colaco

Acquisition Editor

Kevin Colaco

Content Development Editor

Neeshma Ramakrishnan

Technical Editors

Ruchi Desai

Shali Dheeraj

Nilesh Mangnakar

Edwin Moses

Copy Editors

Sonia Michelle Cheema

Sonia Mathur

Stuti Srivastava

Project Coordinator

Danuta Jones

Proofreaders

Safis Editing

Lesley Harrison

Paul Hindle

Chris Smith

Indexer

Mariammal Chettiyar

Production Coordinator

Komal Ramchandani

Cover Work

Komal Ramchandani

About the Author

Robert Hedblom has a well-known System Center and cloud MVP profile. He is often seen as a presenter or speaker at large global events, such as TechEd, Ignite, System Center, and Azure gatherings. Within his line of work at Lumagate, he delivers scenario-based solutions in complex environments, empowering the Cloud OS strategy from Microsoft.

Backup, restore, and disaster recovery have always been a part of Robert's work, and now, he is trying to make a point that it is not about the implementation of different products that matters anymore, it's all about building cost-effective, optimal, and well-designed services.

"All good designs come from knowing your data services' dependencies" is what Robert believes in.

Robert was a coauthor on *Microsoft System Center Data Protection Manager 2012 SP1*, *Packt Publishing*, and has also written other books and given training. His expertise is often utilized by Microsoft's MCS and PFE organizations in Europe, and he is an elected member of the development process of the System Center stack and Azure at Microsoft Redmond.

The most important part of my life is my family and I'm grateful for having their support all the way through the process of writing this book. Words cannot express my love and gratitude. I also want to send a big thank you to Mr. Shivam Garg, who is the lead program manager at Microsoft in India; thank you for your support and fun talks over messed-up time zones. Last but not least, I would like to say a sincere thank you to all the reviewers who helped out with the review of this book.

Most importantly, thank you Packt Publishing, especially Neeshma Ramakrishnan, for making this journey a constructive and rich experience.

About the Reviewers

Steve Buchanan is a regional solution lead with Concurrency, a three-time Microsoft System Center MVP, and the author of several technical books focused on the System Center platform.

He has been an IT professional for over 15 years and has held various positions, ranging from infrastructure architect to IT manager. Steve is focused on transforming IT departments through DevOps, service management, systems management, and cloud technologies.

He has authored the following books:

- *System Center 2012 Service Manager Unleashed*, published in 2014 by Sams Publishing
- *Microsoft System Center Data Protection Manager 2012 SP1*, published in 2013 by Packt Publishing
- *Microsoft Data Protection Manager 2010*, published in 2011 by Packt Publishing

Steve holds certifications in A +, Linux +, MCSA, MCITP: Server Administrator, and MCSE: Private Cloud.

Steve is active in the System Center community and enjoys blogging about his adventures in the world of IT at `www.buchatech.com`. You can also follow him on twitter at `@buchatech` for his latest blog posts.

Thank you, Robert, for including me on this project. Nice work on the project; DPM's future looks bright!

Adrian Costea is an information technology enthusiast, and his primary focus is datacenter infrastructure and virtualization projects across a number of industries, including government, healthcare, finance, gas, and oil. He likes to discover new things and also likes to write on his blog at `http://www.vkernel.ro`.

Working in the field of IT infrastructure for over 8 years now, he has developed expertise in VMware, Windows, Linux, Citrix, and other technologies. Currently, he holds a number of technical certifications, including MCTS, MCITP, MCSA, MCSE, VCP5-DCV, and CCA for XenApp 6.

Outside of work, Adrian enjoys sports, traveling, and meeting new people. You can contact him on twitter at `@vkernelRO` for questions or to just say hello.

John Joyner has been a Microsoft MVP for System Center Cloud and Datacenter Management for 8 years. He is the director of product development at ClearPointe, a provider of Management as a Service from their System Center-based Network Operations Center (NOC). He is a coauthor of a four-book reference series in *System Center 2012 Operations Manager: Unleashed*, *Sams Publishing*, and holds MCSE: Private Cloud, Azure Architecture, and Azure Infrastructure certifications.

Michael Seidl is a senior consultant who works for Base-IT, a Gold Partner in Systems Management, located in Austria. His experience as an IT consultant has been growing since 2001, and he is mainly focused on SCDPM, SCO, SCSM, and PowerShell. Working with some of the biggest companies in Austria gives him the opportunity to work on great projects with complex requirements. He regularly shares his experience on the TechNet Forum and on his blog at `www.techguy.at`.

Yegor Startsev is a former System Center Cloud and Datacenter Management MVP from Samara, Russia. He has worked in the IT industry for over 12 years, starting as a systems administrator and working up to his current role as a chief information officer. He is focused on managing IT departments and budgets and architecting and developing IT projects in a large group of construction companies. He is a regular speaker at regional Microsoft and IT Pro community events. He was a technical reviewer for *Microsoft System Center Data Protection Manager 2012 SP1*, *Packt Publishing*. He also runs the DPM blog titled *Recovery Point* (`http://ystartsev.wordpress.com`). He is married and is a proud father of triplets: two boys and a girl.

www.PacktPub.com

Support files, eBooks, discount offers, and more

For support files and downloads related to your book, please visit `www.PacktPub.com`.

Did you know that Packt offers eBook versions of every book published, with PDF and ePub files available? You can upgrade to the eBook version at `www.PacktPub.com` and as a print book customer, you are entitled to a discount on the eBook copy. Get in touch with us at `service@packtpub.com` for more details.

At `www.PacktPub.com`, you can also read a collection of free technical articles, sign up for a range of free newsletters and receive exclusive discounts and offers on Packt books and eBooks.

`https://www2.packtpub.com/books/subscription/packtlib`

Do you need instant solutions to your IT questions? PacktLib is Packt's online digital book library. Here, you can search, access, and read Packt's entire library of books.

Why subscribe?

- Fully searchable across every book published by Packt
- Copy and paste, print, and bookmark content
- On demand and accessible via a web browser

Free access for Packt account holders

If you have an account with Packt at `www.PacktPub.com`, you can use this to access PacktLib today and view 9 entirely free books. Simply use your login credentials for immediate access.

Instant updates on new Packt books

Get notified! Find out when new books are published by following `@PacktEnterprise` on Twitter or the *Packt Enterprise* Facebook page.

Table of Contents

Preface vii

Chapter 1: Pre-installation Tasks 1

Introduction 1
What is System Center Data Protection Manager 2012 R2 2
Change tracking process 8
Planning your DPM pre-installation tasks 9
Planning the DPM disk pool 12
Firewall configuration 15

Chapter 2: Installation and Upgrade 17

Introduction 17
Installing a SQL Server locally on the DPM server 18
Preparing a remote SQL Server for DPMDB 22
Installing SCDPM 2012 R2 24
Installing SCDPM 2012 R2 using a remote SQL Server or cluster 28
Understanding the supported upgrade scenarios 31

Chapter 3: Post-installation Tasks 33

Introduction 34
Understanding the DPM terminology 34
Configuring the DPM disk pool 34
Adding disk to the DPM disk pool 36
Growing volumes automatically in the DPM disk pool 37
Creating a replica manually 38
Installing the DPM agent via the DPM console 42
Installing the DPM agent manually 44
Upgrading the DPM agents 46
Configuring DPM agent throttling 47
Understanding DPM Protection Groups 49
Optimizing the Protection Group 51

DPMDB optimization 53
Report management 54
Configuring a dedicated backup network 55
Configuring e-mail notifications 57
Applying update rollups (UR) to the DPM server 58
Working with filters 60

Chapter 4: File Server Protection 63
Introduction 64
Understanding the prerequisites for supported file server protection 64
Protecting file shares, volumes, and catalogs 65
Restoring file data to its original location 78
Restoring file data to an alternative location 80
Copying protected data to tape 81
Restoring file data from tape 83
Restoring file data from Azure 85
Protecting file server clusters 87
Understanding file server maintenance and management tasks 89
Creating recovery points manually 90
Using Migrate-Datasource.ps1 93

Chapter 5: SQL Protection 97
Introduction 98
Understanding SQL Server protection considerations 98
Configuring your SQL Server 2012 for DPM protection 99
Understanding the SQL Server management tasks from a DPM perspective 104
Protecting SQL Server 2012 AlwaysOn 105
Protecting an availability group using SQL Server AlwaysOn configuration 107
Protecting your SQL Server databases 108
Enabling parallel backups 117
Configuring the auto-protection feature 118
Configuring online protection 120
Restoring a SQL Server database to its original location 124
Restoring a SQL Server database to an alternative location 130
Restoring a SQL Server database and renaming the database 138
Restoring a SQL database to a network location 140
Restoring a SQL database from Azure 145
Restoring a SQL Server database from tape 146
Restoring SQL databases using the Latest feature 148

Chapter 6: Hyper-V Protection 151
Introduction 151
Understanding the prerequisites for Hyper-V protection 152
Understanding the considerations for Hyper-V protection 152
Protecting large-scale Hyper-V environments 154
Protecting System Center Virtual Machine Manager 155
Integrating SCDPM with SCVMM 156
Restoring a Hyper-V virtual machine 158
Restoring a VHD or VHDX 160
Using ILR (Item Level Restore) 162
Understanding Hyper-V management tasks 163

Chapter 7: SharePoint Protection 165
Introduction 165
Understanding the prerequisites for supported SharePoint server protection 166
Configuring the SharePoint VSS 167
Protecting a SharePoint farm 168
Protecting a SharePoint search 178
Protecting a SharePoint farm that uses SQL aliases 178
Restoring a SharePoint farm 180
Restoring individual objects (Item-level recovery) 182
Understanding SharePoint maintenance tasks 187
Understanding SharePoint management tasks 188

Chapter 8: Exchange Server Protection 191
Introduction 191
Understanding the prerequisites for supported Exchange server protection 192
Configuring Exchange server protection 194
Understanding how to adapt DPM to Exchange server management tasks 195
Understanding how to adapt DPM to Exchange server maintenance tasks 197
Protecting a single Exchange mailbox database 198
Understanding how DPM protects DAG configurations 208
Understanding how DPM can verify data integrity using ESEUTIL 210
Restoring an Exchange mailbox database to its original location 212
Restoring an Exchange mailbox database to an alternative location 215
Restoring an Exchange mailbox database to an Exchange Recovery Database 217

Restoring an Exchange mailbox database to a network folder 219
Copying the Exchange mailbox database to tape 222

Chapter 9: Client Protection 225
Introduction 225
Finding and understanding Company Protection Policy 226
Understanding the prerequisites of client protection 230
Creating a Protection Group for client protection 231
Restoring client data via the DPM client 234
Restoring client data from the DPM server 235
Setting up the end user recovery feature 237
Setting up the DPM self service recovery for SQL 241

Chapter 10: Workgroup Protection and CBA 247
Introduction 247
Understanding workgroup protection 248
Understanding CBA protection 249
Setting up workgroup protection 251
Setting up certificate-based authentication 256

Chapter 11: Azure Integration 273
Introduction 273
Understanding the prerequisites for the Microsoft Azure backup service 274
Configuring your DPM server for online protection 275
Registering your DPM server 284
Configuring the protection groups to enable online protection 292
Manually creating online recovery points 297
Recovering production data from Azure 300
Troubleshooting Microsoft Azure Backup Agent 306

Chapter 12: Disaster Recovery 307
Introduction 307
Understanding the primary/secondary DPM server scenario 308
Enabling a DPM server to be a secondary DPM server 309
Enabling the chaining of DPM servers 320
Understanding the replication process from the primary to secondary DPM server 321
Switching from the primary to secondary DPM server 322
Restoring data from a secondary DPM server 326
Restoring a DPM server 329

Chapter 13: Tape Management 331
Introduction 331
Understanding the basics of tape backups 332
Installing tape libraries and stand-alone tape drives 333
Understanding the concept of VTL 335
Understanding how DPM manages tapes 336
Configuring tape optimization for DPM 337
Understanding tape reports in DPM 338
Configuring the short erase feature 339
Understanding tape management tasks 339

Chapter 14: Monitoring and Automation 341
Introduction 341
Understanding how the System Center family should be your base for service delivery 342
Understanding System Center Operations Manager 2012 R2 344
Understanding System Center Orchestrator 2012 R2 346
Understanding the DPM PowerShell Cmdlet 348
Installing System Center Operations Manager 350
Installing System Center Orchestrator 362
Installing the DPM Central Console 371
Understanding how to configure System Center Orchestrator for DPM automation 375

Index 379

Preface

This book will give you the information needed to get started with System Data Protection Manager 2012 R2. Also, it will cover the important facts regarding how to design, implement, and manage the solution that you set up from an optimal and supportive perspective.

What this book covers

Chapter 1, *Pre-installation Tasks*, gives you a good start in understanding what is needed for a successful DPM deployment.

Chapter 2, *Installation and Upgrade*, walks you through installing and updating DPM.

Chapter 3, *Post-installation Tasks*, gives you the facts regarding what it takes to get the solution up and running in a production environment.

Chapter 4, *File Server Protection*, explains how you should back up and restore your file workloads.

Chapter 5, *SQL Protection*, builds up on the concept of protecting and restoring the SQL server workload.

Chapter 6, *Hyper-V Protection*, provides the information needed to understand the protection and restoring of Hyper-V.

Chapter 7, *SharePoint Protection*, gives you a deeper understanding regarding SharePoint backups, most importantly, restore.

Chapter 8, *Exchange Server Protection*, covers the backup and restore scenarios for the Exchange server workload.

Chapter 9, *Client Protection*, teaches you how to build solid backup and restore scenarios for Windows clients.

Chapter 10, *Workgroup Protection and CBA*, covers how to protect servers that are not joined in the same domain. You will also understand workgroup protection and the Certificate-Based Authentication (CBA) mechanism.

Chapter 11, *Azure Integration*, deals with integration with Azure, which is a hot topic. In this chapter, you have recipes that explain how to integrate your DPM server solution with the Microsoft Azure Backup Vault services.

Chapter 12, *Disaster Recovery*, covers recipes on disaster recovery scenarios that you can use DPM for.

Chapter 13, *Tape Management*, has recipes that give you a deeper understanding when it comes to tape management from a DPM perspective.

Chapter 14, *Monitoring and Automation*, covers proactive monitoring and automation, which is crucial for any Backup-as-a-Service (BaaS) solution.

What you need for this book

You will need a running DPM server solution in a lab or production environment, which you want to manage in an optimal way.

Who this book is for

If you are a DPM administrator, this book will help you verify your knowledge and provide you with everything you need to know about the 2012 R2 release. No prior knowledge of System Center DPM is required; however, some experience of running backups will come in handy.

If you have some experience of running backups and are looking to expand your horizons with System Center DPM, then look no further, as this is the book for you. No prior knowledge about System Center DPM is required. If you have never worked with System Center Data Protection Manager, this book will be your travel companion in your learning journey, starting with the fundamentals and finishing off with advanced concepts.

Sections

In this book, you will find several headings that appear frequently (Getting ready, How to do it, How it works, There's more, and See also).

To give clear instructions on how to complete a recipe, we use these sections as follows:

Getting ready

This section tells you what to expect in the recipe, and describes how to set up any software or any preliminary settings required for the recipe.

How to do it...

This section contains the steps required to follow the recipe.

How it works...

This section usually consists of a detailed explanation of what happened in the previous section.

There's more...

This section consists of additional information about the recipe in order to make the reader more knowledgeable about the recipe.

See also

This section provides helpful links to other useful information for the recipe.

Conventions

In this book, you will find a number of text styles that distinguish between different kinds of information. Here are some examples of these styles and an explanation of their meaning.

Code words in text, database table names, folder names, filenames, file extensions, pathnames, dummy URLs, user input, and Twitter handles are shown as follows: "The DPM 2012 R2 software depends on both local security groups that are referred to when the `DCOM` object that controls the DPMRA service is used to initiate a VSS Request for the protected data source."

Any command-line input or output is written as follows:

```
Set-ReplicaCreationMethod –ProtectionGroup $newpg –Now
```

New terms and **important words** are shown in bold. Words that you see on the screen, for example, in menus or dialog boxes, appear in the text like this: "In the **Select protection group type** step, choose **Clients** and click on **Next >** to continue."

Warnings or important notes appear in a box like this.

Tips and tricks appear like this.

Reader feedback

Feedback from our readers is always welcome. Let us know what you think about this book—what you liked or disliked. Reader feedback is important for us as it helps us develop titles that you will really get the most out of.

To send us general feedback, simply e-mail `feedback@packtpub.com`, and mention the book's title in the subject of your message.

If there is a topic that you have expertise in and you are interested in either writing or contributing to a book, see our author guide at `www.packtpub.com/authors`.

Customer support

Now that you are the proud owner of a Packt book, we have a number of things to help you to get the most from your purchase.

Downloading the color images of this book

We also provide you with a PDF file that has color images of the screenshots/diagrams used in this book. The color images will help you better understand the changes in the output. You can download this file from `https://www.packtpub.com/sites/default/files/downloads/Microsoft_SystemCenter_DataProtectionManager_2012R2_Graphics.pdf`.

Errata

Although we have taken every care to ensure the accuracy of our content, mistakes do happen. If you find a mistake in one of our books—maybe a mistake in the text or the code—we would be grateful if you could report this to us. By doing so, you can save other readers from frustration and help us improve subsequent versions of this book. If you find any errata, please report them by visiting `http://www.packtpub.com/submit-errata`, selecting your book, clicking on the **Errata Submission Form** link, and entering the details of your errata. Once your errata are verified, your submission will be accepted and the errata will be uploaded to our website or added to any list of existing errata under the Errata section of that title.

To view the previously submitted errata, go to `https://www.packtpub.com/books/content/support` and enter the name of the book in the search field. The required information will appear under the **Errata** section.

Piracy

Piracy of copyrighted material on the Internet is an ongoing problem across all media. At Packt, we take the protection of our copyright and licenses very seriously. If you come across any illegal copies of our works in any form on the Internet, please provide us with the location address or website name immediately so that we can pursue a remedy.

Please contact us at `copyright@packtpub.com` with a link to the suspected pirated material.

We appreciate your help in protecting our authors and our ability to bring you valuable content.

Questions

If you have a problem with any aspect of this book, you can contact us at `questions@packtpub.com`, and we will do our best to address the problem.

1
Pre-installation Tasks

In this chapter, we will cover the following topics:

- Changing tracking process
- Planning DPM pre-installation tasks
- Planning the DPM disk pool
- Firewall configuration

Introduction

Within a modern data center there are new and interesting challenges that the IT department needs to address to adapt to the new way of thinking regarding building services instead of focusing on an explicit product. The most important fact is that there will never be a product in the market that will cover or solve all the needs of a company or organization. Today's IT department must change the way it looks at solutions; a single product will never be the answer but combining different technologies and building up services will provide a much higher value for the organization or company regarding both time consumption and cost.

The modern data center is all about building services that empower the possibilities the different products bring to the table. By combining your backup software with the monitoring software and using the concepts of automation, you can create something that will develop with time. There is no whitepaper that you can simply download that will let you in on all the secrets to build a flawless **Backup as a Service** (**BaaS**), **Restore as a Service** (**RaaS**) or **Disaster Recovery as a Service** (**DRaaS**) solution.

System Center Data Protection Manager 2012 R2 (**DPM**) is the latest release and with it comes a new product group team in India. The team has in the few past months provided high scale development and improvements to the product and they will strive even harder to optimize DPM and also bring new features and supported scenarios to the table.

In this chapter, we will cover the pre-installation tasks for DPM 2012 R2. We also will provide you with the information you need to understand how DPM 2012 R2 works and get started with a well-planned implementation of your backup, restore, and disaster recovery scenarios.

What is System Center Data Protection Manager 2012 R2

The recipe will cover an introduction to what DPM 2012 R2 is and explain the product.

For many years, the focus for protecting a data center has always been backup. There are many vendors and third-party solutions still claiming in the market that they are the best and most suitable backup solutions for your data center. If your purpose in performing the backup operation is being able to perform a restore, then the majority of the third-party software and vendors out in the market will not be able to help you. The most challenging part of providing a restore plan or a restore scenario for a service is that the third-party software and vendors are focusing on providing you just a backup, not the ability to restore. This is where DPM 2012 R2 comes in. It all started with the release of the Windows Server 2003, and with that release came the possibility of providing online snapshots using a new feature called **Volume Shadow Copy Services** (**VSS**). The APIs for the solutions were quickly adopted by third-party software and vendors but no one could, in the beginning, get it up and running in a fully optimal way. The idea regarding the VSS architecture was a great one and a big step forward regarding how to manage snapshots of different workloads like file, SQL, or Exchange in order to provide a consistent data snapshot.

Microsoft understood that if this architecture was to blossom in the way that they wanted it to, they needed to create backup and restore software themselves. In 2006, the first version of DPM was released with the focus only on protecting the file workload. A lot of companies tried it but few were adopting the new software since they still hosted and ran their data center with the traditional IT mindset.

During the past years Microsoft did not invest heavily in DPM, but under the new team that is driving the DPM solution from India, there have been a lot of investments, making DPM the primary choice for private cloud protection. Microsoft has invested in both developers and experts, pushing the product forward and making it a natural choice of the modern data center.

You may ask what is the thing that differentiates DPM from other backup software on the market. The answer is quite simple; restore based on supported and optimal scenarios with the power of easy integration building the BaaS, RaaS, and DRaaS for a modern data center. DPM knows the Microsoft stack architecture the best as it was written by Microsoft for the Microsoft technologies present in the data center. Combining DPM with the majority of the System Center family members and Azure technologies, you are able to provide an extremely high-end solution for your data center; it is all about design.

DPM only adapts to the current technology and solutions that Microsoft has developed for their workloads. DPM will never, for example, make any decisions on its own regarding SQL restore. The SQL team has clearly defined how a supported and optimal restore should occur and this is what DPM understands and adapts to; the same goes for all the Microsoft-branded workloads.

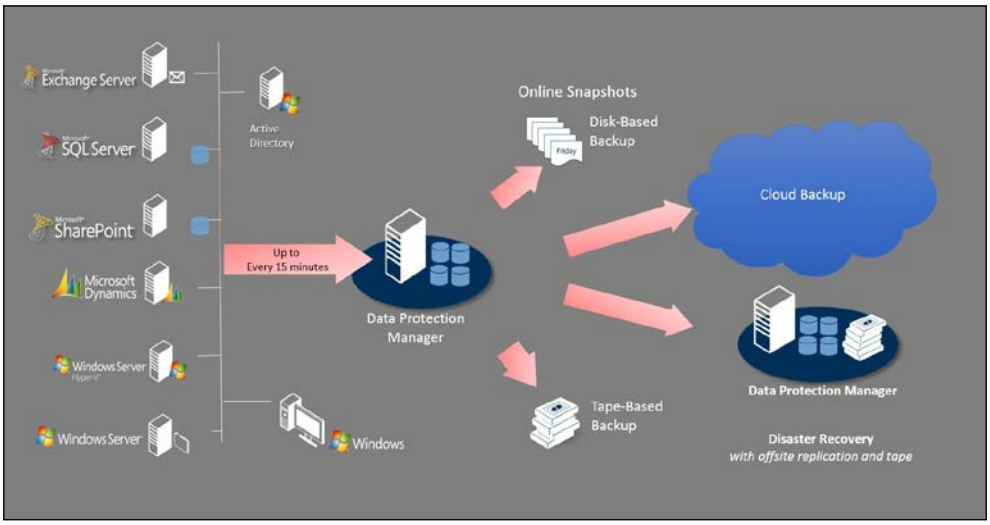
DPM always focuses on the restore scenario, since providing supported and optimal backup scenarios is not a challenge.

DPM 2012 R2 has the capability to back up production data sources to disk, tape, and Azure. For more detailed information regarding the DPM disk pool please read the *Planning the DPM disk pool* recipe. For more information regarding how DPM uses tapes, tape management, and Azure integration, please read *Chapter 11*, *Azure Integration*.

With DPM you are able to back up the most common workloads in a modern data center. The workloads that DPM will natively back up using the underlying VSS are:

- Exchange Server
- SQL Server
- SharePoint Server
- Microsoft Dynamics
- Windows Server
- Hyper-V
- System States and Active Directory
- Windows clients

The following figure shows the DPM back up process:



For detailed information regarding the different versions DPM 2012 R2 can protect, please read the support matrix `http://technet.microsoft.com/en-us/library/jj860400.aspx`.

The primary DPM server is the first line of protection that you deploy for your production workloads. For systems that use transactional log systems (Exchange and SQL), you are able to replicate the production data from the protected data source to the primary DPM server every 15 minutes. This is also applicable to the file workloads.

Regarding the DPM disk pool, DPM has only one demand: the disk that should be used for the DPM disk pool must be presented in the operating system that has the DPM software installed as a local disk. DPM is able to operate with pass-through disks, **Direct Attached Storage** (**DAS**), **Network Attached Storage** (**NAS**), or **Storage Area Network** (**SAN**) storage. It is also possible to communicate directly with a storage using the iSCSI initiator within the operating system of the DPM server. Please note that this is not a good, optimal, or in any way decent approach to a DPM disk pool; never use iSCSI.

When DPM 2012 R2 starts protecting a workload, it creates an initial copy of the production data source that it has to protect. This is stored in the DPM disk pool in a dedicated volume that uses the same GUID ID as the protected data source. This volume is called the **replica volume**. The replica volume will hold the only full back up that the DPM ever will do of the protected data source. All changes in data, also known as data churn, that occur after the replica has been created, will be synchronized to DPM disk pool. When creating a recovery point, the data is stored in the recovery point volume that also uses the GUID ID of the protected data source for identification.

The most important component of the DPM server architecture is the DPM database also known as the DPMDB. The DPMDB holds all the configurations made on the DPM server, protection groups, agents, backup schedules, and so on. It is of great importance that the DPMDB is protected via a secondary DPM server when you build the DPM-DPM-DR scenario, copied to file, or archived to tape.

DPM depends on its DPM agents that will perform a VSS request for the protected data sources and have that data replicated from the production environment to the DPM server.

For further information regarding DPM, there are numerous places you can visit online. There are both Microsoft websites and MVP blogs that provide you with good content and decent information:

- The DPM TechNet forum `http://social.technet.microsoft.com/Forums/en-us/home?forum=dataprotectionmanager`.
- DPM TechNet web pages `http://technet.microsoft.com/en-us/library/hh758173.aspx`.

- DPM survival guide `http://social.technet.microsoft.com/wiki/contents/articles/11867.system-center-2012-data-protection-manager-survival-guide.aspx`
- RobertandDPM `http://robertanddpm.blogspot.com`

What's new in the R2 release

This recipe will cover the news in the DPM 2012 R2 release.

As the market develops, Microsoft understands the new challenges that companies and organizations face and therefore constantly develops its product stack to be able to meet the new requirements.

Microsoft has made some improvements and added some more architectural functions to DPM 2012 R2 release. The following list presents and explains the enhancements made to the product:

- DPMDB cluster support: The database that stores all the configuration for DPM (DPMDB) can now be placed in a SQL cluster environment. This removes the standalone challenges that existed in the previous versions. With this enhancement comes reliability, consistency and most important, scalability.
- Backing up of virtual Linux servers: DPM 2012 R2 can now protect virtual Linux servers running on Hyper-V using the technique "Backup using child partition" or "online snapshot" in Hyper-V. Note that only file-level protection is supported, not application-based protection.
- Virtual deployment: It is now possible to deploy and manage DPM via **System Center Virtual Machine Manager** (**SCVMM**). You can install DPM on a virtual machine, and configure storage using `.vhdx` storage pool disks that are shared through the VMM library.
- Optimization for online protection using Azure: Microsoft has optimized the **express-full** technology used when synchronizing the protected data from the DPM server on-premises to Azure via the Windows Azure Backup Agent.
- SQL server media: For any new DPM 2012 R2 installation, the SQL server now needs to be pre-installed locally or remotely.

The new releases in the R2 version of the DPM software will make it possible for companies to meet some of the new challenges they are facing.

With the constant releases of **Update Roll-ups** (**UR**), Microsoft is meeting the new challenges that companies are struggling with.

The architecture of System Center Data Protection Manager 2012 R2

This recipe will cover the architecture of the DPM software and explain the local security groups like DCOM objects and others, to make your understanding of the product more clear.

There are some parts of DPM that are very important to have knowledge about. They are:

- Specific catalogs
- DCOM
- VSS interaction with mini drivers and the DPM filter
- Local security groups

The following are some catalogs under `%systemdrive%\Microsoft System Center 2012 R2\DPM\DPM` that are important to the DPM server functionality:

- End User Recovery
- Protection Agents
- Temp
- VMMHelperService
- Volumes
- XSD

The **End-User Recovery** catalog contains the MS file for the active directory schema extension and configures the DPM server to enable the feature **End-User Recovery**.

Protection Agents contains two catalogs, which are **AC** and **RA**. The **AC** catalog is used by the DPM agent coordinator when pushing new DPM agents to the server hosting the data sources that it needs protection for. The **RA** catalog holds the binaries for the DPM agent and can also be used as a remote repository when manually installing the DPM agent.

DPM provides a lot of logs that you can read to gain an understanding of what has happened and why. All logs that the DPM server software produces are stored in the **Temp** catalog.

For DPM to be able to continually provide data source protection, even if protected virtual machines are making an outer-cluster migration that also includes the migration of storage, DPM needs to integrate with SCVMM. The catalog **VMMHelperService** contains the binaries and DLL files for creating the integration between the DPM server and VMM server.

The catalog **Volumes** actually contains four catalogs, and three of them are important to know about. The **DiffArea** catalog contains shortcuts to the recovery point volumes in the DPM disk pool. The **Replica** catalog contains shortcuts to the replica volumes in the DPM disk pool. The **ShadowCopy** catalog contains the catalog **Database Backups**, which will hold the backed up DPMDB when you trigger a DB backup using the DPMBackup executable.

Last but not least is the **XDS** catalog, which contains all the XML schema files for the DPM software.

The DPM 2012 R2 software depends on both local security groups that are referred to when the `DCOM` object that controls the DPMRA service is used to initiate a VSS Request for the protected data source. If there is a problem with rights in the `DCOM` object, the DPMRA will not be able to provide a snapshot since the chain of configuration is broken.

Since the local security groups are critical, it is important that their purpose is explained. The local security groups are:

- Distributed COM Users
- DPMDRTrustedMachines
- DPMRADCOMTrustedMachines
- DPMRADmTrustedMachines
- DPMRATrustedDPMRAs
- DPMSCOM
- MSDPMTrustedMachines
- MSDPMTrustedUsers

The members of the **Distributed COM Users** group are the computer accounts that the current DPM server has access to. You will also find specific service accounts here regarding your SQL server hosting the DPMDB as well as user accounts.

DPMDRTrusedMachines members are the other DPM servers that provide a DPM-DPM-DR configuration and via the membership of this group, have access to listing the protected data sources on the primary DPM server and take usage of the DPM writer.

The group **DPMRADCOMTrustedMachines** contains the primary and the secondary DPM server computer accounts.

DPMRADmTrustedMachines contains the computer accounts that have an associated DPM agent with the DPM server.

The group **DPMSCOM** contains the computer account for the SCOM management server that is used for monitoring and management of the DPM server via SCOM and the Central Console feature.

MSDPMTrustedMachines contains the computer accounts that have an associated DPM agent for the DPM server.

The last group is **MSDPMTrusedUsers** and this group is used by the centralized management features.

Change tracking process

This recipe will explain how DPM will identify block-level changes.

Getting ready

With the introduction of VSS, the purpose of making a full copy of the production data is obsolete. Using the VSS as a starting point, DPM provides an extremely fast and reliable change identification process.

How to do it...

DPM 2012 R2 relies on the VSS architecture and provides advanced change tracking functionality based on the mini-filter driver stack along with a DPM file filter.

How it works...

The change identification process relies on VSS as the core component. Within the VSS architecture, there are three different snapshot technologies that you can use:

- Complete copy
- Copy-on-write
- Redirect-on-write

The Copy-on-write technique is the one that provides the possibility of making online snapshots during production hours. This technique identifies the block-level changes and "freezes" the blocks making them ready to be copied. If there are other blocks that were changed during that process, the VSS identifies those. Once the initial identification has finished, the VSS starts managing the changed blocks.

Describing the whole picture, there is more to it than just using the standard VSS architecture. Not only is Microsoft DPM dependent on the VSS functionality but it also uses parts from the mini-filter driver stack and a dedicated file filter named DPM file filter to make the change tracking process of block-level changes fully supported, as well as optimal and fast for a DPM protection scenario.

There's more...

For further and deeper information regarding how Volume Shadow Copy Service works, refer the MSDN website `http://msdn.microsoft.com/en-us/library/windows/desktop/bb968832(v=vs.85).aspx`.

When DPM creates a recovery point, there are a number of underlying technologies that make it possible. As mentioned earlier in this chapter, the DPM server can take advantage of a system that uses transactional logs and adapt to the change journal. Creating a recovery point in DPM is a part of what Microsoft calls Express-Full. The Express-Full operation is the function that is triggered when the backup job is initiated from the DPM sever.

When DPM backs up server workloads, the DPM server triggers the backup job. When the DPM server backs up Windows clients, the client triggers the backup job.

The Express-Full consists of the following:

- Block-level change tracking process
- Synchronization of changed data
- Creation of a recovery point

Planning your DPM pre-installation tasks

This recipe will enable you to plan your DPM server deployment and most importantly, make it possible for you to provide a starting point for your BaaS, RaaS, and DRaaS. The recipe will also cover network consumption and archiving possibilities.

Getting ready

There are a lot of questions that must be sorted out before you start planning your DPM server deployment. First is the classification process of the data sources that you would like to protect. A very common strategy that many companies that are still providing traditional IT to the company or organization are using is to back up everything they can backup once a day. However, this is not a good approach. There are, of course, several servers within your data center that need a high frequency of backups but not all the servers are equally important. It is essential that you adapt your business continuity plan before you have any implementation done. Start by identifying your services and then break down the services into components to clearly see how or why they are of importance to your business.

Use the different classes and sort the components that build up the service into these three categories:

- Gold
- Silver
- Bronze

As you may realize, the Gold class is more important than the Silver and the Bronze ones. Use these classes to differentiate your data and services so you get a clearer view.

How to do it...

From a more technical perspective, there are some considerations that need to be addressed:

- The total amount of data that should be protected
- Untrusted domains
- Internet access to remote sites and cloud services
- SQL Server installation
- Virtual or physical deployment of the DPM server
- Archive management

To be able to understand the number of DPM servers that you need to deploy, you must first know:

- How much data to protect
- Untrusted domains
- Network limitations between different remote sites
- The need for building up disaster recovery scenarios

Every DPM server can manage 120 TB of storage for its disk pool. For example, 40 TB of those could be addressed to the file workload or 25 TB could be addressed to the SharePoint workload. In the scenario where you are managing multiple domains that you need to provide protection for, you can create a two-way transitive trust between the domains. In that case, the DPM server will operate in both domains without any limitations. This, however, comes with a security risk and if you have not created a two-way transitive trust between the untrusted domains you should think twice before you go for it. If you are able to set up a two-way transitive trust without causing any security risk, follow this blogpost to learn how to do it: `http://robertanddpm.blogspot.se/2011/09/backing-up-cross-domains.html`.

For the other scenario, to provide restore capabilities for untrusted domains, refer to *Chapter 10, Workgroup Protection and CBA*.

DPM can be deployed and provide a global restore capability strategy for your company or organization. If your bandwidth is greater than 512 kb then DPM will be able to provide its services. However, you should always include the restore scenarios when you are building up your backup strategies that reflect your business continuity plan. In many cases, you should deploy a DPM server on-site or build up your BaaS service using Windows Server Backup feature and have that integrated with Azure for archiving purposes, if you don't have the funding. Nevertheless, you are able to both throttle the DPM agents that are installed in the remote office protecting data sources and enable the **on-the-wire compression** for optimizing network consumption.

The SQL Server is no longer a part of the installation media for DPM 2012 R2, which is a good thing. Now you need to think before you act. A majority of the consultant companies needs to understand SQL more and also realize that if you have a poorly set up SQL, you will have a bad experience with the product hosting its database on that SQL server. Remember to set up your SQL server using service accounts, dedicate a RADI 1+0 for the DPM and monitor the SQL performance using System Center Operations Manager with a proactive monitoring approach.

With the release of the UR3, DPM 2012 R2 can be completely virtualized in all thinkable scenarios. You have the ability to use Synthetic Fiber Channel for accessing and using a physical tape library and also the ability to provide deduplication of the DPM disk pool using the SOFS architecture. When building a BaaS, RaaS, or DRaaS for a modern data center or a data center that still adopts the traditional IT approach, it is crucial that the DPM server is running on Hyper-V and is of instances that build up the service. Since a service in a modern data center is highly resilient and highly automated, you will benefit in many ways by building your BaaS, RaaS, and DRaaS using virtual DPM servers.

When it comes to archiving possibilities, there are currently three different solutions:

- Physical tape library
- **Virtual Tape Library** (**VTL**)
- Azure

You should not just consider one of these three as an option. Focus instead on the requirements of the BaaS, RaaS, and DRaaS. Some protected data sources should be provided as archiving possibilities but maybe only once per month, go with Azure. Where protected data sources need an archiving solution but should also be able to restore quickly, go with VTL. In case the data sources need an off-site secure solution, go with physical tapes.

How it works...

Having all the information presented in an organized manner, you can now start designing the structure of the BaaS service. A piece of advice here—take small steps towards your goal and never rush an implementation. You will probably bump into a challenge or two, so it is of key importance to work using a well-defined structure.

There's more...

For more information regarding the setting up of SQL as a part of the prerequisites, please read *Chapter 2*, *Installation and Upgrade*, which also provides you a walk-through guide of the steps for DPM 2012 R2 installation.

Planning the DPM disk pool

This recipe will cover the information needed for planning the DPM disk pool.

Getting ready

The best way to start the planning phase for the DPM disk pool is to have the initial amount of data that you would like to protect and also a theoretical data churn. With these two components, you can easily determine the exact storage needed for your DPM disk pool.

How to do it...

System Center Data Protection Manger is able to use any type of disk that is presented as local attached storage in Disk Management.

It does not support the use of USB/1394 disk for the DPM disk pool.

From the UR3 release, you can now build a total virtual solution for the DPM server technology using Hyper-V. This also comes with the great possibility of building a virtual disk pool with VHDX files that could be stored on a **Scale Out File Server** (**SOSF**) and enabled for deduplication. With the approach of making a virtual solution you can save and optimize disk consumption very easily.

DPM 2012 R2 is able to use:

- Direct Attached Storage
- Fiber Channel Storage Area Network (FC SAN)
- iSCSI

A very important fact is that iSCSI should not be considered your primary choice due to some challenges that often occur when leveraging that technology. The most common challenge is that the initiation of the iSCSI target fails and therefore the entire DPM disk pool fails. iSCSI will work in smaller deployments with DPM but if your ambition is to provide a more stable solution, you should consider SOFS. If your company does not provide an SOFS, you should use a DAS and provision VHDX files to the virtual DPM servers. As you can clearly see, the recommendation is to build as much virtually as possible.

It is not advised to use any virtual RAID controllers that are hosting the DPM disk pool.

Keeping track of the storage performance is also of key importance. Providing a decent proactive monitoring and performance approach is something that you will benefit from in the long run. Build up a proactive monitoring concept using System Center Operations Manager and see how the impact of the performance will change according to the number of backup jobs, workloads and synchronization frequency of the DPM servers.

How it works...

Microsoft recommendations regarding how to determine the actual size of the DPM disk pool are from a minimal perspective. Multiply the total amount of protected data size by 1.5. For instance, if you want to protect 10 TB of data you need 15 TB of storage from a minimal perspective. The recommended approach is to multiply the total amount of the protected data size by three. So if you want to protect 10 TB of data, you need 30 TB of storage. These calculations will, of course, generate a lot of overhead in the DPM disk pool since there are several factors that are not presented in the equation.

If you want to determine a more exact number for the size of the disk pool, you can use the following formulas.

Replica volumes:

- Exchange data = Data source size x (1 + log change) / (alert threshold - .05)
- SQL Server data = Data source size x (1 + log change) / (alert threshold - .05)
- Windows SharePoint Services data = Total size of all databases/ (alert threshold - .05)
- Virtual Server data = Data source size x 1.5
- For Windows Server system state = (Data source size x 3) / 2
- For file data = (Data source size x 3) / 2

Recovery Point volumes:

- Exchange data = 4.0 x retention range in days x log change x data source size + 1600 MB
- SQL Server data = (2.5 x retention range in days x log change x data source size) + 1600 MB
- Windows SharePoint Services data = (1.5 x retention range in days x log change x total size of all databases) + 1600 MB
- Virtual Server data = (Data source size x retention range in days x 0.02) + 1600 MB
- For system state = (Data source size x retention range in days x 2) / 100 + 1600 MB
- For files = (Data source size x retention range in days x 2) / 100 + 1600 MB

The log change is:

- 6% for Exchange
- 6% for SQL
- 10% for SharePoint

As you can understand, you will get a nearly exact estimation but the downside is that it will take a long time to calculate.

If you are protecting just Exchange, Hyper-V, and SharePoint you should use the storage calculators that are available for download at this site: `http://www.microsoft.com/en-us/download/details.aspx?id=24375`.

There's more...

Providing decent hardware that hosts the DPM disk pool is very important. You don't need premium disk solutions for the DPM disk pool but can use decent hardware that can easily scale out.

Adding the DPM disk pool could be done via the DPM console or via PowerShell. For more information regarding the subject, please read the *Adding disks to the DPM disk pool* recipe in *Chapter 3*, *Post-installation Tasks*.

It's important to know the limitations of the Windows Server operating system. DPM 2012 R2 has the following limitations that you should keep in mind while designing BaaS, RaaS, and DRaaS:

- 600 volumes in the DPM disk pool
- 32 spanned disks in Disk Management

- The disk that should be used for the DPM disk pool must be a Dynamic disk in Disk Management
- The DPM disk pool can store 9000 snapshots

If you collocate the Hyper-V, SQL, and client workload, you can protect a larger number of data sources. Please refer to *Chapter 5, SQL* and *Chapter 6, Hyper-V* for more details.

Firewall configuration

This recipe will cover the firewall configuration that is needed to establish a successful communication between DPM 2012 R2 and the data source that should be included in the DPM protection.

Getting ready

Opening just the right amount of firewall ports with the right direction of communication will provide you a more high-end security approach. DPM uses Microsoft standard communication ports, but for some features, there are a few other TCP ports that need to be opened.

Protocol	Port
DCOM	135 / TCP
DPM specific ports	5718 / TCP 5719 / TCP
DNS	53 / UDP
Kerberos	88 / UDP 88 / TCP
LDAP	389 / UDP 389 / TCP
NetBIOS	137 / UDP 138 / UDP 139 / UDP 445 / TCP

Protocol	Port
Centralized Console	6075 / TCP
	1433 / TCP
	1434 / UDP
	80 / TCP
	443 / TCP
	50000 – 65000 / TCP
	4022 / TCP
	5723 / TCP

How to do it...

Having the Windows firewall enabled would be considered the most natural thing. However, many companies rely on a physical firewall as their first line of defense meaning that their Windows firewalls are disabled.

An easy approach is to create a **Group Policy Object** (**GPO**) that holds the configuration for the Windows firewalls. Use the **Advanced** mode for firewall configurations so you can easily provide the necessary configurations.

How it works...

One important thing regarding the direction of communication is to understand who is initiating the communication. When DPM is protecting server workloads, the DPM server will call for the DPM agent to start its VSS request, but when DPM is protecting clients, the DPM server will wait for the DPM agent present on the client to call in.

There's more...

You could also limit the actual port range for the high-end ports to a specific port range. For instructions on how to do this, you can refer to this article: `http://blogs.technet.com/b/dpm/archive/2011/06/28/how-to-limit-dynamic-rpc-ports-used-by-dpm-and-protected-servers.aspx`.

2
Installation and Upgrade

In this chapter, we will cover the installation and upgrade for System Center Data Protection Manager 2012 R2. We will also understand the prerequisites to start your upgrade process.

You will learn how to:

- Install a SQL Server locally on the DPM server
- Prepare a remote SQL Server for DPMDB
- Install SCDPM 2012 R2
- Install SCDPM 2012 R2 using a remote SQL Server or cluster
- Install SCDPM 2012 R2 in optional scenarios
- Understand the supported upgrade scenarios

Introduction

The final result of an installation will never be better than the dependent application design and implementation. A common mistake discovered frequently is the misconfiguration of the SQL configurations that the System Center applications depend on. If you provide System Center a poorly configured SQL Server or insufficient resources, you will end up with quite a bad installation of the application that could be part of the services you would like to provision within your modern data center. In the end, a System Center application can never work faster than what the underlying dependent architecture or technology allows.

By proper planning and decent design, you can also provide a scalable scenario for your installation that will make your System Center application applicable for future scenarios.

One important note regarding the upgrade scenario for the System Center Data Protection Manager software is the fact that there is no rollback feature built in. If your upgrade fails, you will not be able to provide an easy approach for restoring your DPM server to its former running state. Always remember to provide supported scenarios for your solution. Never take any shortcuts because there aren't any.

Installing a SQL Server locally on the DPM server

This recipe will cover the installation process of a local SQL Server that is collocated with the DPM server on the same operating system.

Getting ready

SQL Server is a core component for System Center Data Protection Manager. It is of major importance that the installation and design of SQL Server is well planned and implemented. If you have an undersized installation of SQL Server, it will provide you with a negative experience while operating the System Center Data Protection Manager.

Before continuing the installation of SQL, please read the *Planning DPM pre-installation tasks* recipe in *Chapter 1*, *Pre-installation Tasks*.

How to do it...

Make sure that your operating system is fully patched and rebooted before you start the installation of SQL Server 2012 and that the DPM Admins group is a member of the local administrators group. Now take the following steps:

Insert the SQL server media and start the SQL server setup. In the **SQL Server Installation Center**, click on **New SQL Server stand-alone installation...**

The **Setup Support Rules** will start and will identify any problems that might occur during the SQL server installation. When the Operation is complete, click on **OK** to continue.

In the **Product Key** step, Enter the product key and click on **Next >** to continue.

The next is the License Terms step where you check the **I accept the license terms** checkbox if you agree with the license terms. Click on **Next >** to continue.

The SQL server installation will verify if there are any product updates available from the Microsoft update service. Check the **Include SQL Server product updates** checkbox and click on **Next >** to continue.

Next is the **Install Setup Files** step that initializes the actual installation. When the tasks have finished, click on **Install** to continue.

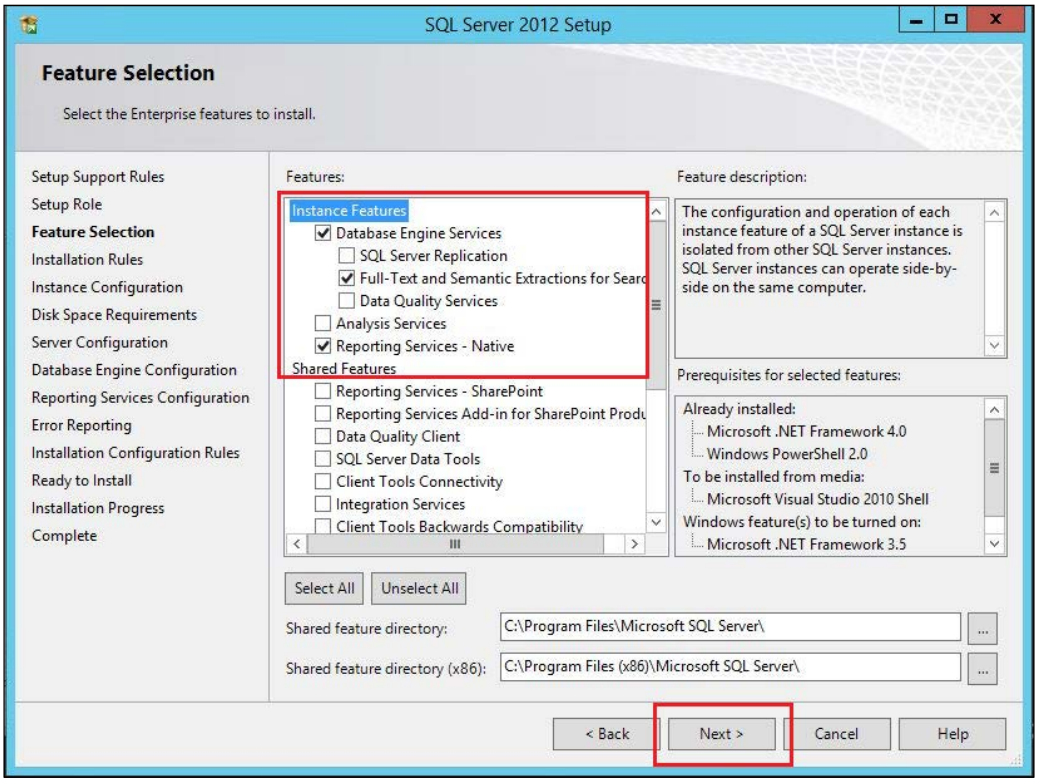
Verify that all the rules have passed in the **Setup Support Rule** step of the SQL server installation process. Resolve any warnings or errors and click the **Re-run** button to run the verification again. If all the rules have passed, click on **Next >** to continue.

In the **Setup Role** step, select **SQL Server Feature Installation** and click on **Next >**.

In the **Feature Selection**, choose the SQL server features that you would like to install. System Center Data Protection Manager requires:

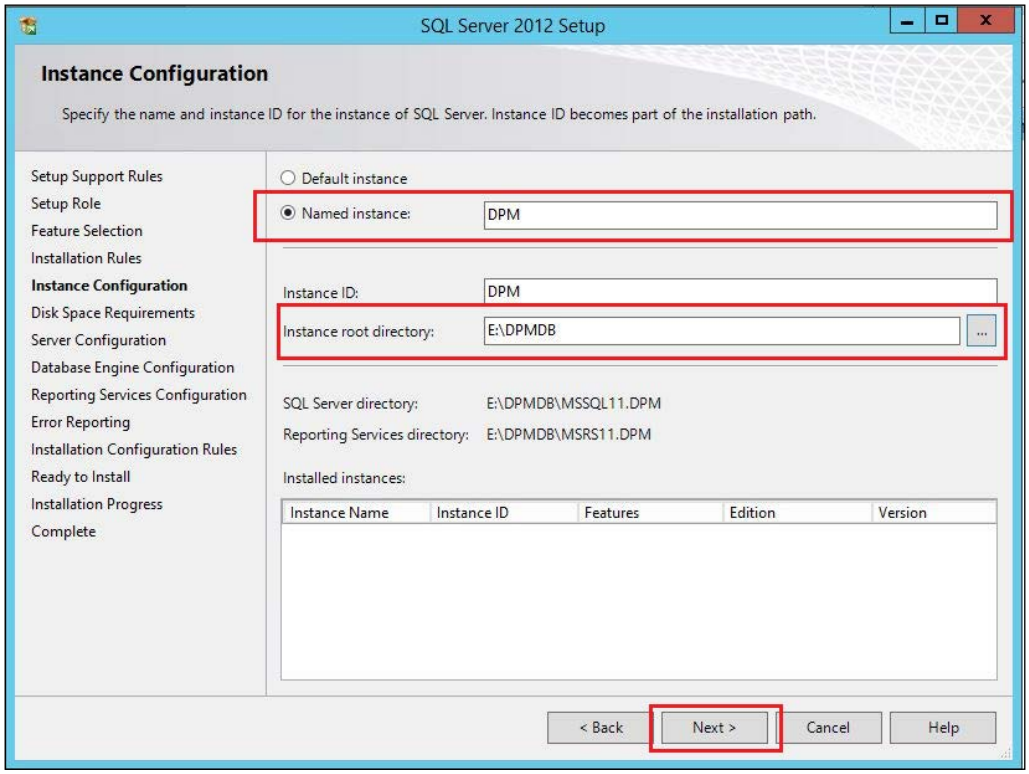
- **Database Engine Service**
- **Full-Text and Semantic Extractions for Search**
- **Reporting Services – Native**

As an option, you can also install the SQL Server Management Studio on the same operating system as the DPM sever. Those components are found under **Management Tools**, check both **Basic** and **Complete**. Click on **Next >** to continue.



Verify the **Installation Rules** step, resolve any errors, and click on **Next >** to continue.

In the **Instance Configuration** step, select **Named instance** and type in a suitable name for your SQL server instance. Click on the button next to the **Instance root directory** and select the volume that should host the DPMDB.



Click on **Next >** to continue

Verify that there are no problems in the **Disk Space Requirement** step, resolve any issues, and click on **Next >** to continue.

In the **Server Configuration** step, type in the credentials for the dedicated service account you would like to use for this SQL server. Switch the **Startup Type** to **Automatic** for the **SQL Server Agent**. When all the credentials are filled in, click on the **Collation** tab.