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Foreword by Wally Mead,
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System Center Configuration Manager Reporting

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Garth Jones
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System Center Configuration Manager Reporting

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800 East 96th Street, Indianapolis, Indiana 46240 USA

System Center Configuration Manager Reporting Unleashed

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About the Authors

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Dedication

*To our spouses for their patience, and to the team at Enhansoft
for their assistance.*

Acknowledgments

Writing a book is an all-encompassing and time-consuming project, and this book certainly meets that description. Configuration Manager is a massive topic, and this book benefited from the input of many individuals. The authors and contributors would like to offer their sincere appreciation to all those who helped with *System Center Configuration Manager Reporting Unleashed*, including Wally Mead and Steve Rachui.

We would also like to thank our spouses and significant others for their patience and understanding during the many hours spent on this book.

Thanks also to the staff at Pearson, in particular to Joan Murray and Cindy Teeters.

Foreword

Some people think that Configuration Manager is scary and complex—and it can be if you don't have a good, solid background in it before you attempt to tackle it for your enterprise. I think that training is essential to having a great background in Configuration Manager before you take on its challenges in a production environment. When you throw reporting into the picture, it is even scarier.

Reporting is a bit of a black box for most Configuration Manager admins: They don't deal with it much, other than running the default reports, and they certainly don't know how to create custom reports. Each of the various releases of Configuration Manager has had a great set of default reports (and that count is nearing 500 now) that cover all the various features and functions of the product. But what happens when management comes to you and says, "We need a report that shows x and y ?" Now you get nervous and wonder how you are going to accomplish that. Hopefully you have a SQL guru who can help you out, but not everyone is that fortunate.

If you don't have a SQL guru handy to help out, you search the web for content that others have created in an attempt to find something that will work to satisfy management's request. Often, customizations are needed, such as adding charts, logos, colors, drillthrough actions, and so on. That's where it really gets complicated for most of us. And there have not been a lot of great resources out there to help us novices really learn how to quickly and efficiently create custom reports that will not only satisfy the desires of management but really empower the admin to no longer be afraid, and maybe even welcome, the opportunity to create reports.

Now along comes this book, a treasure chest of gold for admins who need to create reports in Configuration Manager, who may not have a SQL background, and who have shied away from these types of requests in the past. Knowing some of the authors of the book, I have great confidence that you will really enjoy the product they have produced to assist you on your path to learning how to create Configuration Manager reports. For those of you who are already familiar with the process, I'm sure that you will find some nuggets here to help take your reports to an even more impressive level than they already are. And, knowing the brilliant mind of the book's technical reviewer, I know how accurate and detailed the final result will be. Steve won't let anything slip through that is not 100% correct.

With all that, I really do hope that you enjoy the book, and expect that you will be creating great reports in no time at all.

All the best,

Wally Mead, (former) Senior Program Manager
Configuration Manager Product Group
Microsoft Corporation
Now Principal Program Manager, Cireson

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Introduction

System Center Configuration Manager (ConfigMgr) stores a wealth of information about users, hardware, software inventory, software updates, applications, site status, and other Configuration Manager operations in a relational database. The trick is to know how to retrieve that data out of the SQL Server database and present it in meaningful, useful, and reusable reports.

Microsoft provides some out-of-the-box reports; however, these reports only scratch the surface of what is available for use by management, end users, and Configuration Manager administrators. This book is written based on the premise that ConfigMgr reporting is not very difficult if you use the concepts, tools, and techniques discussed throughout its chapters. It walks you through installing SQL Server Reporting Services (SSRS), understanding SQL views to find data in the Configuration Manager site database, writing SQL queries, designing and building basic reports, advanced reporting techniques, and using role-based administration to securely deliver reports to the individuals to whom they are intended. Here are the benefits *System Center Configuration Manager Reporting Unleashed* delivers:

- ▶ Enables an optimal installation of SSRS and Configuration Manager reporting
- ▶ Provides the tools to understand how to retrieve ConfigMgr data from its SQL Server database and to retrieve that data in the most efficient way
- ▶ Simplifies report design and creation
- ▶ Shows how to create reports that can be used with the role-based administration security feature of ConfigMgr and SSRS.

Part I: Installing and Configuring SSRS for Configuration Manager

System Center Configuration Manager Reporting Unleashed begins with a guide to installing and configuring SSRS and Configuration Manager reporting. Chapter 1, “Installing SQL Server Reporting Services,” walks you through the steps in installing and configuring SSRS, including configuring email and enabling remote errors to assist with any troubleshooting that might be necessary. Chapter 2, “Installing and Configuring Configuration Manager Reporting,” continues the installation discussion by showing you how to configure the reporting services point and use ConfigMgr security roles to control access to reports. It also provides information on how to change the report logo used in the reports to one specific to your own organization.

Part II: About Data and Retrieval

Before creating reports, you need to understand the data kept in the ConfigMgr site database, the tools Microsoft provides to access that data, and how to effectively and efficiently use Transact-SQL queries to retrieve that data. Chapter 3, “Understanding Configuration Manager Data,” discusses where ConfigMgr stores its inventory data and how to find that information. It also introduces you to SQL Server Management Studio, the tool you use to write your queries. Chapter 4, “Transact-SQL Primer,” provides a concise tutorial of the sections in a SQL query, the best ways to retrieve data, SQL functions, how to use different data types, and how to join data from multiple views.

Part III: Using SSRS for Configuration Manager Reporting

Part III of this book focuses on reporting, including report design, best practices for developing and designing reports, basic and more advanced reporting concepts, features of SSRS reporting, and implementing role-based administration in ConfigMgr reports. Chapter 5, “Basic Report Design,” discusses considerations for report designs and the types of reports you can use in a report series. Chapter 6, “Building a Basic Report,” introduces report projects, data sources and data sets, and elements you use in creating a report. The topic of building reports is continued in Chapter 7, “Intermediate Reporting Concepts,” which discusses creating report templates, using report parameters to customize the content of your reports, and the different types of charts you can include in SSRS reports. Chapter 8, “SSRS Reporting Features,” covers even more reporting concepts, including using drillthroughs, using custom color palettes, and adding reports into SSRS. Chapter 9, “Role-Based Administration and Reporting,” wraps up the discussion by showing you how to integrate ConfigMgr role-based administration into your SQL queries to provide an additional level of security in terms of who can access your reports.

Part IV: Appendixes

By this time, you should have at your disposal all the tools necessary to become a Configuration Manager reporting expert. The last part of the book includes three appendixes:

- ▶ Appendix A, “Glossary,” includes acronyms and terms useful to know when working with Configuration Manager and SQL Server Reporting Services.
- ▶ Appendix B, “Demonstration Outcomes,” contains the expected outcome from all chapter demonstrations throughout this book.
- ▶ Appendix C, “Available Online,” discusses value-added content available for download under the Downloads tab at Pearson’s InformIT website, at www.informit.com/title/9780672337789.

This book provides in-depth reference and technical information about System Center Configuration Manager reporting as well as information about other products and technologies on which its features and components depend.

Disclaimers and Fine Print

The authors want to offer several disclaimers. While the authors of *System Center Configuration Manager Reporting Unleashed* have made every attempt to present information that is accurate and current as known at the time, they are not infallible. In addition, screenshots were taken with version 1511, and it is certainly possible that Microsoft could slightly tweak the user interface in later versions.

Any updates and corrections will be provided as errata on the InformIT website.

Thank you for purchasing *System Center Configuration Manager Reporting Unleashed*. The authors hope it is worth your while.

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PART II

About Data and Retrieval

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CHAPTER 3

Understanding Configuration Manager Data

Before discussing how to write reports, let's take a few steps back and consider where Configuration Manager (ConfigMgr) stores its inventory data and how to find that information.

As you may know, ConfigMgr collects a large amount of data out-of-the-box. Understanding how data is collected and stored within the site database can help you produce SQL Server Reporting Services (SSRS) reports that expose this raw data. This chapter discusses the major ConfigMgr data classes and how those classes are used, and it outlines some sample SQL views and queries. It also introduces you to the SQL Server Management Studio tool.

Using Data Classes and SQL Views

Many SQL database administrators (DBAs) prefer to use SQL tables rather than views. The question arises: *Is it better to use a SQL table or a SQL view for queries in ConfigMgr reporting?* The short answer is that Microsoft only supports using SQL views to access ConfigMgr data. Here's a longer answer:

- ▶ Microsoft does not support creating queries against SQL tables because of the risk of table locking issues. If you are running a query directly against a SQL table at the same time ConfigMgr is trying to update or write to that table, there is a possibility that the table will be locked by your query and the ConfigMgr update will fail.
- ▶ It is also best to use SQL views for reporting because Microsoft does not guarantee that SQL tables will

IN THIS CHAPTER

- ▶ Using Data Classes and SQL Views
- ▶ Using Tools for Creating Reports
- ▶ Demonstrating SQL Server Management Studio

remain the same after you install updates, service packs, or major version upgrades. If a table name is changed, removed, or modified, your reports might return errors or cease to run as intended. By referencing the ConfigMgr SQL views, all the reports, queries, and view names used throughout this book are accurate and work in all versions of ConfigMgr 2007, 2012, 2012 R2, and 1511 environments.

While this chapter provides examples of SQL views, it is impractical to cover all the SQL views. To obtain additional information on views used in ConfigMgr, you can reference Microsoft's ConfigMgr SQL schema via the following links:

- ▶ **ConfigMgr:** At this writing, ConfigMgr 1511 had recently been released, and as such, no official SQL schema had yet been released.
- ▶ **ConfigMgr 2012:** The ConfigMgr 2012 SQL schema can be referenced at <http://technet.microsoft.com/en-us/library/dn581954.aspx>.
- ▶ **ConfigMgr 2007:** Information on the ConfigMgr 2007 SQL schema is available at <http://technet.microsoft.com/en-us/library/dd334611.aspx>.

Using Discovery Classes

Discovery data generally comes from the following ConfigMgr discovery options:

- ▶ Active Directory System Discovery
- ▶ Active Directory User Discovery
- ▶ Heartbeat Discovery
- ▶ Network Discovery

You can enable and configure these discovery options for your environment in your ConfigMgr site. ConfigMgr discovery then begins gathering data based on your configurations—for example, gathering all systems from a specific Active Directory organization unit (OU) or domain. As a general rule, the SQL view for each of the discovery options starts with either `v_R_*` or `v_RA_*`. Table 3.1 lists the commonly used SQL views related to discovery classes.

TABLE 3.1 Discovery Data Views

SQL View	Description
<code>v_R_System</code>	Lists all systems discovered by ConfigMgr.
<code>v_R_User</code>	Lists all users discovered by ConfigMgr.
<code>v_R_System_Valid</code>	Lists all active clients within ConfigMgr. This is a subset of <code>v_R_System</code> .

TIP: CHANGING THE HEARTBEAT DISCOVERY CYCLE TO DAILY

To increase the reliability of the data captured by ConfigMgr, you can change the heartbeat discovery cycle from 7 days (default) to daily. This change generally has no adverse effect.

The query shown in Listing 3.1 lists all computers and their last discovery times for heartbeat discovery. Figure 3.1 shows the results of Listing 3.1.

NOTE: SQL SOURCE FILES FOR THE LISTINGS IN THIS CHAPTER

The SQL queries included in this chapter are available as online content. See Appendix C, “Available Online,” for additional information.

LISTING 3.1 Discovery Data Sample Query

```
SELECT
    RV.Netbios_Name0 as 'Pc Name',
    RV.User_Name0 as 'User Name',
    AGD.Agenttime as 'Discovery Time'
FROM
    dbo.v_R_System_Valid RV
    INNER JOIN dbo.v_AgentDiscoveries AGD ON RV.ResourceID = AGD.ResourceId
WHERE
    AGD.AgentName = 'Heartbeat Discovery'
ORDER BY
    RV.Netbios_Name0
```

	Pc Name	User Name	Discovery Time
1	ACERASPIRE	JYedid	2015-12-09 16:03:34.000
2	AZUREAD	jyedid	2015-11-14 14:18:41.000
3	CM12R2-CM6	NULL	2015-12-09 20:38:03.000
4	DELLE6430	jyedid	2015-12-09 16:38:26.000
5	ELLEN-PC	ellen	2015-12-08 23:03:07.000
6	ES-06	garth	2015-12-09 20:37:53.000
7	ES-08	Garth	2015-12-09 20:35:11.000
8	ES-10	NULL	2015-12-09 20:09:34.000
9	ES-20	Garth	2015-12-09 20:36:45.000
10	FRAME	frame	2015-08-31 21:35:36.000
11	GARTEK-DC10	NULL	2015-12-09 20:16:51.000
12	GARTEK-DC21	NULL	2015-12-09 20:19:56.000
13	GARTEK-DC5	jyedid	2015-12-09 20:22:47.000
14	GARTEK-DC9	NULL	2015-12-09 19:44:34.000
15	garth_Android_7/29/2015_6:16 PM	NULL	2015-09-01 14:00:44.000
16	Garth's iPhone	NULL	2015-12-09 02:33:51.000
17	GJ5	jyedid	2015-10-23 12:00:03.000
18	M6	garth	2015-12-09 20:14:51.000
19	M8	garth	2015-09-18 12:32:41.000

Query executed successfully.

FIGURE 3.1 Discovery data sample results.

Using Hardware Inventory Classes

As the title of this section implies, data within the hardware inventory classes is obtained from hardware inventory. However, hardware inventory covers additional data, including all the data collected from Windows Management Instrumentation (WMI), the Windows Registry, and the actual hardware details for each ConfigMgr client. These inventory classes will be the main source of data for most of your reports. While it may seem counterintuitive, almost every query uses data from hardware classes.

These inventory classes also maintain history data that you can use in your reports. None of the other inventory classes maintain history data. As a general rule, there are two SQL view name identifiers for these items:

- ▶ The SQL view names that start with `v_GS_*` identify the latest and current hardware inventory data.
- ▶ The `v_HS_*` views identify history data for the hardware inventory.

Table 3.2 and Table 3.3 list hardware inventory data views.

TABLE 3.2 Current Hardware Inventory Data Views

SQL View	Description
<code>v_GS_COMPUTER_SYSTEM</code>	Lists basic details about a computer, such as manufacturer, model, and user name.
<code>v_GS_DISK</code>	Provides details about hard drives attached to a computer.
<code>v_GS_ADD_REMOVE_PROGRAMS</code>	Provides details about 32-bit Add/Remove Programs data for computers.
<code>v_GS_ADD_REMOVE_PROGRAMS_64</code>	Provides details about 64-bit Add/Remove Programs data for computers.

TABLE 3.3 History Hardware Inventory Data Views

SQL View	Description
<code>v_HS_COMPUTER_SYSTEM</code>	Provides history data for the basic details of a computer.
<code>v_HS_DISK</code>	Provides history data for the hard drives attached to a computer.
<code>v_HS_ADD_REMOVE_PROGRAMS</code>	Provides history data for the 32-bit Add/Remove Programs data for computers.
<code>v_HS_ADD_REMOVE_PROGRAMS_64</code>	Provides history data for the 64-bit Add/Remove Programs data for computers.

There is one very important exception to the SQL views listed in Table 3.2 and Table 3.3 that doesn't start with `v_GS_*` or `v_HS_*`—this is the `v_Add_Remove_Programs` view. This view provides exactly the same column information as `v_GS_ADD_REMOVE_PROGRAMS` and `v_GS_ADD_REMOVE_PROGRAMS_64`, with the data of both views combined. This view is extremely helpful for viewing both 32-bit and 64-bit Add/Remove Programs entries.

TIP: CHANGING HARDWARE INVENTORY CYCLE

To increase the reliability of the data captured by ConfigMgr, the authors recommend changing the hardware inventory cycle from 7 days (default) to daily. This change generally has no adverse effect on ConfigMgr server or client performance.

Although there are no hard-and-fast rules about setting the hardware inventory schedules, most ConfigMgr MVPs and senior consultants make the same recommendation for setting hardware inventory to daily. The authors estimate that there is 10% increase in database size and a minimal increase in CPU usage and disk input/output (I/O) when this change is made.

However, the value to an organization of having the most up-to-date inventory in most cases outweighs these minimal increases to database size, CPU usage, and disk I/O. As with any other changes to ConfigMgr, the authors recommend that you evaluate the value and impact to your company before making this change.

The query in Listing 3.2 lists all computers that have the software product Warranty Information Reporting v3 installed. To find a different software title, replace `Warranty Information Reporting v3` with the software title for which you are looking. Figure 3.2 shows the results of Listing 3.2.

LISTING 3.2 Hardware Inventory Sample Query

```
SELECT
    RV.Netbios_Name0 as 'Pc Name',
    RV.User_Name0 as 'User Name',
    ARP.DisplayName0 as 'Application Name',
    ARP.Version0 as 'Version',
    ARP.InstallDate0 as 'Install Date'
FROM
    dbo.v_R_System_Valid RV
    INNER JOIN dbo.v_Add_Remove_Programs ARP ON RV.ResourceID = ARP.ResourceID
WHERE
    ARP.DisplayName0 = 'Warranty Information Reporting v3'
ORDER BY
    RV.Netbios_Name0
```

	Pc Name	User Name	Application Name	Version	Install Date
1	ACERASPIRE	JYedid	Warranty Information Reporting v3	3.20	20150507
2	CM12R2-CM6	NULL	Warranty Information Reporting v3	3.22	20150708
3	CM12R2-CM6	NULL	Warranty Information Reporting v3	3.27	20151022
4	ES-20	Garth	Warranty Information Reporting v3	3.5.0.1	20150908
5	M8	garth	Warranty Information Reporting v3	3.11	20140813

FIGURE 3.2 Hardware inventory sample results.

Listing 3.3 shows a query that lists all computers where the hard drive size has changed from a previous inventory cycle. This query is a good example of how you can use the history SQL views and current hardware inventory views together in a single query. Figure 3.3 shows the results of Listing 3.3.

LISTING 3.3 Hardware Inventory History Sample Query

```

SELECT DISTINCT
    RV.Netbios_Name0 as 'Pc Name',
    RV.User_Domain0 as 'User Name',
    GD.DeviceID0 as 'Device ID',
    GD.Size0 as 'Current HD Size',
    HD.Size0 as 'Historic HD Size'
FROM
    dbo.v_R_System_Valid RV
    INNER JOIN v_GS_DISK GD ON RV.ResourceID = GD.ResourceID
    INNER JOIN v_HS_DISK HD ON RV.ResourceID = HD.ResourceID
WHERE
    GD.Size0 <> HD.Size0 and GD.DeviceID0 = HD.DeviceID0

```

	Pc Name	User Name	Device ID	Current HD Size	Historic HD Size
1	SM12DW	GARTEK	\\.\PHYSICALDRIVE0	204797	130041
2	WIN2K8	NT AUTHORITY	\\.\PHYSICALDRIVE1	262138	130041
3	win81-cm4	GARTEK	\\.\PHYSICALDRIVE0	262138	130041
4	win81-cm4	GARTEK	\\.\PHYSICALDRIVE1	51198	7161

FIGURE 3.3 Hardware inventory history sample results.

Using Software Inventory Classes

Data from software inventory classes comes from the software inventory action run by the ConfigMgr client on computers, which runs every seven days by default. This inventory gathers details from individual files. In the ConfigMgr software inventory settings, you define which file types will be inventoried (for example, *.exe from all hard drives). ConfigMgr stores details from the files inventoried, such as file name, version, size, path to the file, modified date, and so on. Table 3.4 lists the software inventory data views.

NOTE: IMPACT OF USING THE SOFTWARE INVENTORY DATA VIEWS

Try to avoid using the software inventory classes. You might think that based on their name, these would be the most popular set of SQL views, but this is not the case. There are many reasons, in the authors' opinion, why these views are not popular, but the most important is that the process of gathering the data to populate these SQL views is extremely slow, and clients will notice their hard drive being accessed for extended periods of time during the data-gathering process. Unlike the hardware inventory classes or the heartbeat discovery class, which take less than four minutes to run without clients even noticing that the inventory process is running on their computer, the software inventory classes can run for hours and hours.

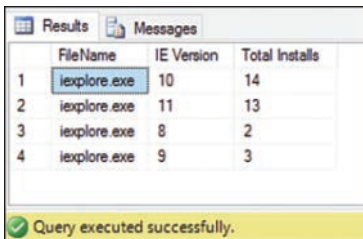
TABLE 3.4 Current Software Inventory Data Views

SQL View	Description
v_GS_LastSoftwareScan	Provides status details about the last software scan cycle.
v_GS_SoftwareFile	Provides details about all inventory files.

The query in Listing 3.4 provides a count of Internet Explorer versions. Figure 3.4 shows the results of Listing 3.4.

LISTING 3.4 Software Inventory Sample Query

```
SELECT
    SF.FileName,
    replace(left(SF.FileVersion,2), '.', '') as 'IE Version',
    Count (Distinct SF.ResourceID) as 'Total Installs'
FROM
    dbo.v_GS_SoftwareFile SF
    INNER JOIN dbo.v_FullCollectionMembership fcm ON SF.ResourceID=FCM.ResourceID
WHERE
    SF.FileName = 'iexplore.exe'
    and SF.FilePath like '%Internet Explorer%'
GROUP BY
    SF.FileName,
    replace(left(SF.FileVersion,2), '.', '')
ORDER BY
    'IE Version'
```



	FileName	IE Version	Total Installs
1	iexplore.exe	10	14
2	iexplore.exe	11	13
3	iexplore.exe	8	2
4	iexplore.exe	9	3

FIGURE 3.4 Software inventory sample results.

TIP: CHANGING THE SOFTWARE INVENTORY CYCLE

The authors recommend turning off the software inventory cycle due to its overhead. However, if you keep it on, change it from 7 days (default) to run every 14 to 21 days in order to improve performance.

Using Software Update Inventory Classes

Software update reports are among the hardest reports to write. Writing a single software update SSRS report could take from four hours to multiple weeks. The complexity of using these views is due to the way the data is stored in ConfigMgr. The data spans multiple views that are required to be joined before the information is useful to the report reader. The primary views for software updates are listed in Table 3.5.

TABLE 3.5 Software Update Data Views

SQL View	Description
v_UpdateComplianceStatus	Provides compliance status details for each PC's software update.
v_CategoryInfo	Provides details about software update categories.

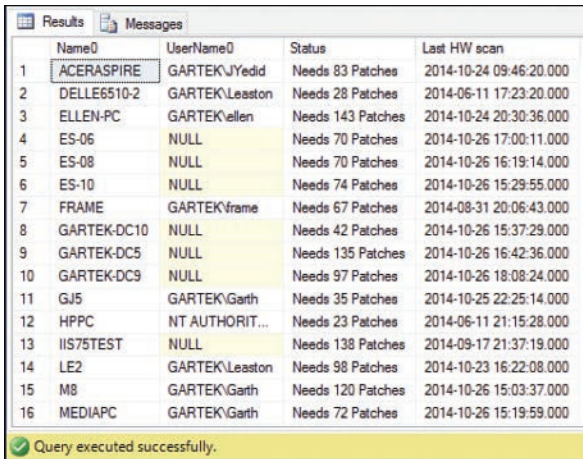
Listing 3.5 shows a query that provides a count of all missing software updates for each computer in the All Systems collection in ConfigMgr. Figure 3.5 shows the results of this query.

LISTING 3.5 Software Update Sample Query

```

SELECT DISTINCT
  CS.Name0,
  CS.UserName0,
  CASE
    when (sum(case when UCS.status=2 then 1 else 0 end))>0
      then ('Needs '+(cast(sum(case when UCS.status=2 then 1 else 0 end)
        as varchar(10))+ ' Patches'))
      else 'Good Client'
    end as 'Status',
  WS.lasthwscan as 'Last HW scan'
FROM
  dbo.v_UpdateComplianceStatus as UCS
LEFT OUTER JOIN dbo.v_GS_COMPUTER_SYSTEM as CS
  on CS.ResourceID = UCS.ResourceID
INNER JOIN v_CICategories_All as catall2
  on catall2.CI_ID = UCS.CI_ID
INNER JOIN v_CategoryInfo as catinfo2
  on catall2.CategoryInstance_UniqueID = catinfo2.CategoryInstance_UniqueID
  and catinfo2.CategoryTypeName = 'UpdateClassification'
LEFT OUTER JOIN v_GS_WORKSTATION_STATUS as WS
  on ws.resourceid = CS.ResourceID
LEFT OUTER JOIN dbo.v_FullCollectionMembership as FCM
  on FCM.ResourceID = CS.ResourceID
WHERE
  UCS.Status = '2'
  and FCM.CollectionID = 'SMS00001'
GROUP BY
  CS.Name0,
  CS.UserName0,
  WS.lasthwscan,
  FCM.CollectionID
ORDER BY
  CS.Name0,
  CS.UserName0

```



	Name0	UserName0	Status	Last HW scan
1	ACERASPIRE	GARTEK\JYedid	Needs 83 Patches	2014-10-24 09:46:20.000
2	DELLE6510-2	GARTEK\Leaston	Needs 28 Patches	2014-06-11 17:23:20.000
3	ELLEN-PC	GARTEK\ellen	Needs 143 Patches	2014-10-24 20:30:36.000
4	ES-06	NULL	Needs 70 Patches	2014-10-26 17:00:11.000
5	ES-08	NULL	Needs 70 Patches	2014-10-26 16:19:14.000
6	ES-10	NULL	Needs 74 Patches	2014-10-26 15:29:55.000
7	FRAME	GARTEK\frame	Needs 67 Patches	2014-08-31 20:06:43.000
8	GARTEK-DC10	NULL	Needs 42 Patches	2014-10-26 15:37:29.000
9	GARTEK-DC5	NULL	Needs 135 Patches	2014-10-26 16:42:36.000
10	GARTEK-DC9	NULL	Needs 97 Patches	2014-10-26 18:08:24.000
11	GJ5	GARTEK\Garth	Needs 35 Patches	2014-10-25 22:25:14.000
12	HPPC	NT AUTHORIT...	Needs 23 Patches	2014-06-11 21:15:28.000
13	IIS75TEST	NULL	Needs 138 Patches	2014-09-17 21:37:19.000
14	LE2	GARTEK\Leaston	Needs 98 Patches	2014-10-23 16:22:08.000
15	M8	GARTEK\Garth	Needs 120 Patches	2014-10-26 15:03:37.000
16	MEDIAPC	GARTEK\Garth	Needs 72 Patches	2014-10-26 15:19:59.000

Query executed successfully.

FIGURE 3.5 Software update sample results.

Using Software Metering Inventory Classes

Data collected during the software metering inventory cycle is based on the software metering rules you create in ConfigMgr. As such, until at least one rule is created, no data appears within these SQL views. Table 3.6 lists the software metering data views.

TABLE 3.6 Software Metering Data Views

SQL View	Description
v_MeterData	Lists all gathered software metering data.
v_MeteredProductRule	Lists all software metering rules.

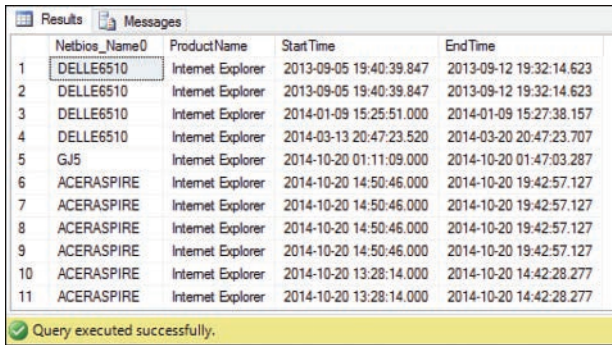
The query shown in Listing 3.6 displays the start and stop times for all software metering data beginning with a specific date, in this case February 16, 2013. Figure 3.6 displays an example of the results from executing this query.

LISTING 3.6 Software Metering Sample Query

```

SELECT
    RV.Netbios_Name0,
    MRIB.ProductName,
    MD.StartTime,
    MD.EndTime
FROM
    dbo.v_R_System_Valid RV
    INNER JOIN dbo.v_MeterData MD ON RV.ResourceID = MD.ResourceID
    INNER JOIN dbo.v_MeterRuleInstallBase MRIB ON MD.FileID = MRIB.MeteredFileID
WHERE
    MD.starttime > '2013-02-16'

```



	Netbios_Name0	ProductName	StartTime	EndTime
1	DELLE6510	Internet Explorer	2013-09-05 19:40:39.847	2013-09-12 19:32:14.623
2	DELLE6510	Internet Explorer	2013-09-05 19:40:39.847	2013-09-12 19:32:14.623
3	DELLE6510	Internet Explorer	2014-01-09 15:25:51.000	2014-01-09 15:27:38.157
4	DELLE6510	Internet Explorer	2014-03-13 20:47:23.520	2014-03-20 20:47:23.707
5	GJ5	Internet Explorer	2014-10-20 01:11:09.000	2014-10-20 01:47:03.287
6	ACERASPIRE	Internet Explorer	2014-10-20 14:50:46.000	2014-10-20 19:42:57.127
7	ACERASPIRE	Internet Explorer	2014-10-20 14:50:46.000	2014-10-20 19:42:57.127
8	ACERASPIRE	Internet Explorer	2014-10-20 14:50:46.000	2014-10-20 19:42:57.127
9	ACERASPIRE	Internet Explorer	2014-10-20 14:50:46.000	2014-10-20 19:42:57.127
10	ACERASPIRE	Internet Explorer	2014-10-20 13:28:14.000	2014-10-20 14:42:28.277
11	ACERASPIRE	Internet Explorer	2014-10-20 13:28:14.000	2014-10-20 14:42:28.277

Query executed successfully.

FIGURE 3.6 Software metering sample results.

TIP: CREATING SOFTWARE METERING RULES

The authors recommend creating software metering rules for any software that has a significant cost and is not installed in the base image of your computers. It is best to create these rules as early as possible, as it takes approximately 75 days to get useful data from software metering reports.

It is not necessary or ideal to create software metering rules for products installed on every computer in your environment, such as Microsoft Word, due to the amount of overhead and data collected by the software metering Inventory.

Using Status Message Classes

Although status messages are not gathered from inventory classes, they contain the details and results of ConfigMgr client actions. For example, when a deployment is sent to a ConfigMgr client, it sends a status message back the ConfigMgr server, saying that it has received the deployment notice. When the ConfigMgr client starts to download an application, the client sends a status message indicating that the download has started. Table 3.7 lists the status message data views.

TABLE 3.7 Status Message Data Views

SQL View	Description
v_StatusMessage	Provides status messages. This view is generally used in conjunction with v_StatMsgAttributes and v_StatMsgInsStrings to get the complete status message information.
v_StatMsgAttributes	Lists the attributes for a status message.
v_StatMsgInsStrings	Lists status messages.

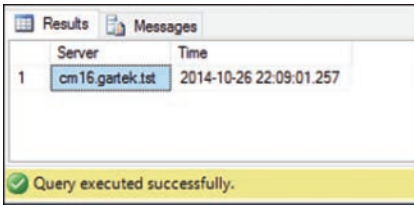
The query shown in Listing 3.7 returns the last ConfigMgr backup for each site server. Notice that the `stat.MessageID` is 5035. Figure 3.7 shows the results of this query.

LISTING 3.7 Status Message Sample Query

```

SELECT
    stat.MachineName as 'Server',
    max(Time) as Time
FROM
    dbo.v_StatusMessage as stat
WHERE
    stat.Component = 'SMS_SITE_BACKUP'
    AND stat.MessageID = 5035
GROUP BY
    stat.MachineName

```



Server	Time
cm16.gartek.tst	2014-10-26 22:09:01.257

Query executed successfully.

FIGURE 3.7 Status message sample results.

Using State Messages

Specific components of ConfigMgr clients use state messages to report details of a specific event, such as software updates, client health, and configuration items. State messages are broken into topic types, which identify the client component, and the `StateID`, which identifies a specific status for the component. Each topic type contains multiple `state IDs`. The `v_StateName` SQL view maps topic types and their respective `state IDs` to a descriptive state name. Popular views that use state messages are identified in Table 3.8.

TABLE 3.8 State Message Views

SQL View	Description
<code>v_StateName</code>	Maps topic types and their state IDs to descriptive names.
<code>v_ClientHealthState</code>	Provides the last client health state reported by ConfigMgr clients.
<code>V_CIAssignmentStatus</code>	Provides the evaluation state messages for assigned configuration items (CIs).
<code>V_UpdateComplianceStatus</code>	Provides the compliance state for software updates scanned by ConfigMgr clients.

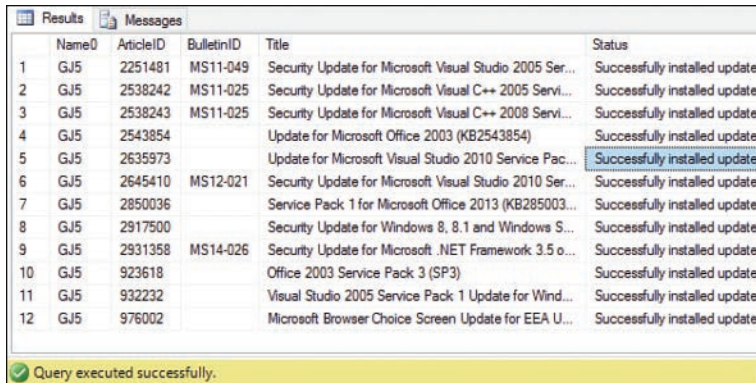
The query shown in Listing 3.8 returns the last enforcement message for software updates scanned by the system named `GJ5`. Sample results from this query are shown in Figure 3.8.

LISTING 3.8 Software Update State Message Sample Query

```

SELECT
    sys.Name0,
    UI.ArticleID,
    UI.BulletinID,
    UI.Title,
    sn.StateName as Status
FROM
    v_UpdateComplianceStatus UCS
JOIN v_UpdateInfo UI ON UCS.CI_ID = UI.CI_ID
JOIN v_R_System sys ON UCS.ResourceID=sys.ResourceID
JOIN v_StateNames sn ON UCS.LastEnforcementMessageID=sn.StateID
WHERE
    sys.Netbios_Name0 LIKE 'GJ5'
    AND sn.TopicType = '402'
ORDER BY
    ui.ArticleID,
    sn.StateName

```



	Name0	ArticleID	BulletinID	Title	Status
1	GJ5	2251481	MS11-049	Security Update for Microsoft Visual Studio 2005 Ser...	Successfully installed update
2	GJ5	2538242	MS11-025	Security Update for Microsoft Visual C++ 2005 Servi...	Successfully installed update
3	GJ5	2538243	MS11-025	Security Update for Microsoft Visual C++ 2008 Servi...	Successfully installed update
4	GJ5	2543854		Update for Microsoft Office 2003 (KB2543854)	Successfully installed update
5	GJ5	2635973		Update for Microsoft Visual Studio 2010 Service Pac...	Successfully installed update
6	GJ5	2645410	MS12-021	Security Update for Microsoft Visual Studio 2010 Ser...	Successfully installed update
7	GJ5	2850036		Service Pack 1 for Microsoft Office 2013 (KB285003...	Successfully installed update
8	GJ5	2917500		Security Update for Windows 8, 8.1 and Windows S...	Successfully installed update
9	GJ5	2931358	MS14-026	Security Update for Microsoft .NET Framework 3.5 o...	Successfully installed update
10	GJ5	923618		Office 2003 Service Pack 3 (SP3)	Successfully installed update
11	GJ5	932232		Visual Studio 2005 Service Pack 1 Update for Wind...	Successfully installed update
12	GJ5	976002		Microsoft Browser Choice Screen Update for EEA U...	Successfully installed update

Query executed successfully.

FIGURE 3.8 Software update state message sample results.

TIP: STATE MESSAGES

Refer to <https://technet.microsoft.com/en-us/library/bb932203.aspx> for a list of topic types and their state messages reported by ConfigMgr clients. Note that although the link is for ConfigMgr 2007, the information also applies to later versions of ConfigMgr.

Using Collection Data Classes

There are several SQL views for collection classes—one for each collection within your environment. From an administrator's perspective, however, there are only two SQL views you need to use, as shown in Table 3.9.

TABLE 3.9 Collection Data Views

SQL View	Description
v_Collection	Lists all collections and the CollectionID of each.
v_FullCollectionMembership	Lists the membership of each collection (user account, computer, and security group).

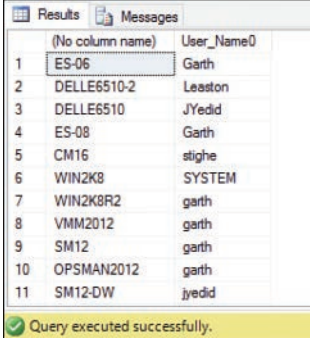
Running the query in Listing 3.9 provides a list of all computer names within the All Systems collection. Sample results are shown in Figure 3.9.

LISTING 3.9 Collection Data Sample Query

```

SELECT
    RV.Netbios_Name0,
    RV.User_Name0
FROM
    dbo.v_R_System_Valid RV
    INNER JOIN dbo.v_FullCollectionMembership FCM ON RV.ResourceID = FCM.ResourceID
    INNER JOIN dbo.v_Collection Coll ON FCM.CollectionID = Coll.CollectionID
WHERE
    Coll.Name = 'All Systems'

```



	(No column name)	User_Name0
1	ES-06	Garth
2	DELLE6510-2	Leaston
3	DELLE6510	JYedid
4	ES-08	Garth
5	CM16	stighe
6	WIN2K8	SYSTEM
7	WIN2K8R2	garth
8	VMM2012	garth
9	SM12	garth
10	OPSMAN2012	garth
11	SM12-DW	jyedid

Query executed successfully.

FIGURE 3.9 Collection data sample results.

Using Tools for Creating Reports

This section of the chapter explores the SQL Server Management Studio tool. This is the first of three major tools you can use to create reports for ConfigMgr. Chapter 1, “Installing SQL Server Reporting Services,” detailed the steps for installing SQL Server Management Studio 2014.

Chapter 6, “Building a Basic Report,” explains the two remaining tools:

- ▶ SQL Server Data Tools Business Intelligence (SSDT-BI) for Visual Studio 2013
- ▶ Report Builder

These tools are used to design SSRS reports for ConfigMgr as well as other System Center products, such as Operation Manager and Service Manager.

Introducing SQL Server Management Studio

Using the SQL Server Management Studio tool is the recommended way to create the queries required to build and design ConfigMgr reports. SQL Server Management Studio allows you to access, configure, manage, administer, and develop SQL Server components. It combines the features of Enterprise Manager, Query Analyzer, and Analysis Manager with script editors to provide access to SQL Server to administrators and developers of all skill levels. SQL Server Management Studio allows you to easily find SQL views and their columns in the ConfigMgr database. Using this tool, you can also write and execute queries as well as confirm results before creating a custom ConfigMgr report. Chapter 4, “Transact-SQL Primer,” can help you become familiar with this core tool as well as how to write proper SQL queries.

Connecting to the ConfigMgr Database Server

Once the SQL Server Management Studio tool is installed on your workstation, launch it and follow these steps:

1. Connect to the database server used for ConfigMgr by entering the server name and clicking **Connect** (see Figure 3.10).

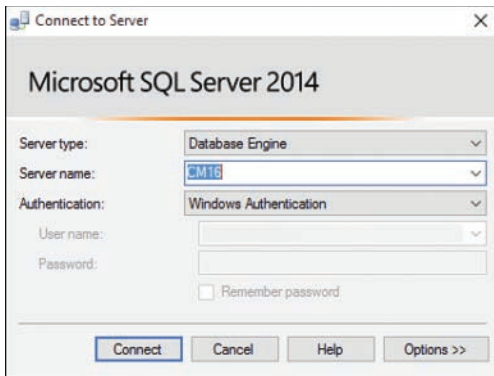


FIGURE 3.10 SQL Server Management Studio Connect to Server dialog.

TIP: PROBLEMS CONNECTING TO DATABASE

If you do not have the permissions required to connect to the database server, either run the SQL Server Management Studio tool using the `RUN AS` command and specify an account with the proper access or grant your user account the proper permissions on the SQL Server database.

2. Once connected, you see the main interface of SQL Server Management Studio, as shown in Figure 3.11.

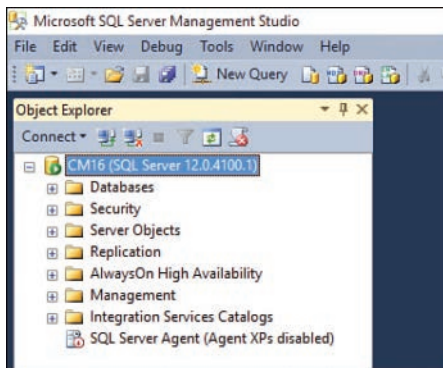


FIGURE 3.11 SQL Server Management Studio Object Explorer.

Executing a Query in SQL Server Management Studio

To create and execute a query, open a new query by clicking **New Query** in the SQL Server Management Studio menu bar. After the query page opens, it is important to make sure you change the database source to the ConfigMgr database. To do this, select the database from the dropdown menu, as shown in Figure 3.12.

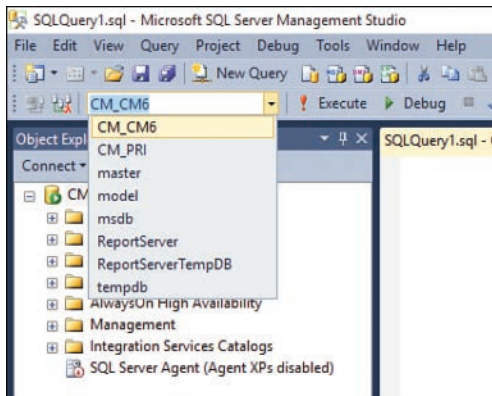


FIGURE 3.12 SQL Server Management Studio database dropdown menu.

Enter your query in the New Query page and click **Execute**. When you execute your query, the **Results** section appears at the bottom of your query page. Figure 3.13 shows an example of this section.

Using the Object Explorer

The Object Explorer, displayed on the left side of SQL Server Management Studio, provides the ability to drill down into the ConfigMgr database and get a list of all ConfigMgr views as well as the available columns that can be used within your queries. Notice that the expanded `dbo.v_R_System_Valid` view in Figure 3.14 contains many columns.

The screenshot shows a SQL query in the query editor of SQL Server Management Studio. The query is a SELECT statement with several joins and a CASE statement to determine the status of computers based on the number of patches. The results grid below the query shows 11 rows of data.

```

Select distinct
  CS.Name0,
  CS.UserName0,
  case
    when (sum(case when UCS.status=2 then 1 else 0 end))>0 then ('Needs '+
as varchar(10))+ ' Patches')
    else 'Good Client'
  end as 'Status',
  ws.lasthwscan as 'Last HW scan'
from
  dbo.v_UpdateComplianceStatus as UCS
left outer join dbo.v_GS_COMPUTER_SYSTEM as CS on CS.ResourceID = UCS.R
join v_Categories_All as catall2 on catall2.CI_ID = UCS.CI_ID
join v_CategoryInfo as catinfo2 on catall2.CategoryInstance_UniqueID = c
left join v_gs_workstation_status as ws on ws.resourceid = CS.ResourceID
left join dbo.v_FullCollectionMembership as FCM on FCM.ResourceID = CS.R
where

```

	Name0	UserName0	Status	Last HW scan
1	ACERASPIRE	GARTEK\Jyedid	Needs 83 Patches	2014-10-24 09:46:20.000
2	DELLE6510-2	GARTEK\Leaston	Needs 28 Patches	2014-06-11 17:23:20.000
3	ELLEN-PC	GARTEK\ellen	Needs 143 Patches	2014-10-24 20:30:36.000
4	ES-06	NULL	Needs 70 Patches	2014-10-26 17:00:11.000
5	ES-08	NULL	Needs 70 Patches	2014-10-26 16:19:14.000
6	ES-10	NULL	Needs 74 Patches	2014-10-26 15:29:55.000
7	FRAME	GARTEK\frame	Needs 67 Patches	2014-08-31 20:06:43.000
8	GARTEK-DC10	NULL	Needs 42 Patches	2014-10-26 15:37:29.000
9	GARTEK-DC5	NULL	Needs 135 Patches	2014-10-26 16:42:36.000
10	GARTEK-DC9	NULL	Needs 97 Patches	2014-10-26 18:08:24.000
11	GJ5	GARTEK\Garth	Needs 35 Patches	2014-10-25 22:25:14.000

Query executed successfully.

FIGURE 3.13 SQL Server Management Studio executed query with results.

TIP: INVALID OBJECT NAME ERROR MESSAGE

When executing a query, if you receive an “Invalid object name” error message (see Figure 3.15), it usually means that you forgot to change the target database to the ConfigMgr database (as shown in Figure 3.12).

TIP: CHANGING THE DEFAULT DATABASE IN SQL SERVER MANAGEMENT STUDIO

To permanently set the default SQL Server Management Studio database to be the ConfigMgr database, follow the instructions in the blog post at <http://www.enhansoft.com/blog/invalid-object-name-in-sql-server-management-studio-ssms>.

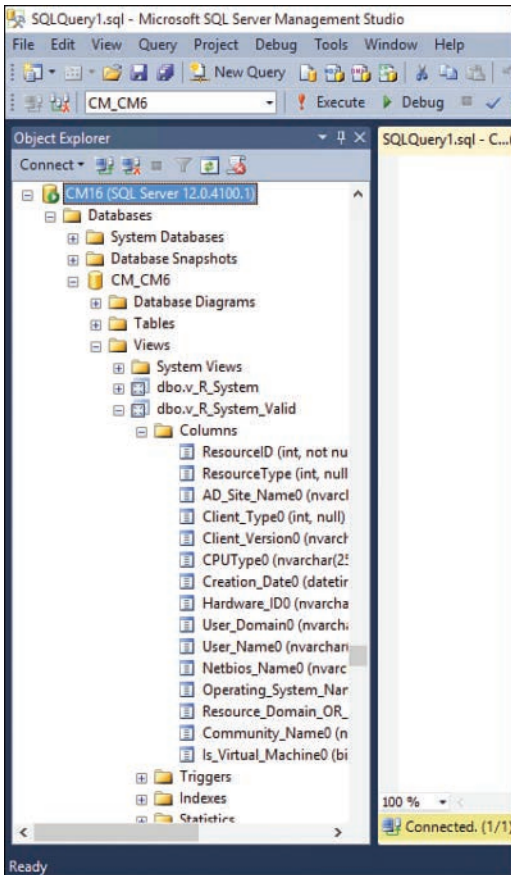


FIGURE 3.14 SQL Server Management Studio Object Explorer, showing columns.

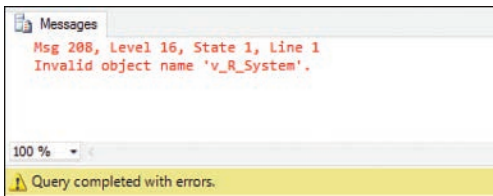


FIGURE 3.15 SQL Server Management Studio “invalid object name” error message.

Demonstrating SQL Server Management Studio

The purpose of this section is to help you become familiar with the SQL Server Management Studio tool discussed in this chapter. You will create and execute a query and look at views.

Creating and Executing a Query

Follow these steps to create and execute a query:

1. Open SQL Server Management Studio and connect to your ConfigMgr database server. See the “Connecting to the ConfigMgr Database Server” section of this chapter for detailed information on how to perform this step.
2. Using the dropdown list of available databases, change the database to your ConfigMgr site database.
3. Open a new query by clicking **New Query** in the SQL Server Management Studio menu bar.
4. Open the **PatchReport.txt** file provided in the online content for this book (see Appendix C for information) and then copy and paste the contents to the new query page.
5. Click **Execute** to execute the query.
6. Review the results.

Looking at Views

Follow these steps to look at a view:

1. Using the **Object Explorer**, expand the **Databases** folder and the ConfigMgr database.
2. Drill down into **Views** and note the available columns for the following table views:
 - ▶ `dbo.v_R_System`
 - ▶ `dbo.v_GS_Computer_System`
 - ▶ `dbo.v_Add_Remove_Programs`

Summary

ConfigMgr gathers and stores a large amount of data across many different tables in its database. This chapter has reviewed the most common and important data classes, as well as their corresponding SQL data views, which are also stored in the database. It has also discussed how to launch and connect to the ConfigMgr database as well as execute some sample queries, using the SQL Server Management Studio tool.

Many sample queries have been provided in this chapter. Some of these queries are fairly simple and others a bit more complex. Don't worry about trying to understand how to write them just yet! Detailed explanations and examples about how to write SQL queries will be given in later chapters.

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