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System Center Orchestrator 2012

UNLEASHED



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System Center 2012 Orchestrator

UNLEASHED



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System Center 2012 Orchestrator Unleashed

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Foreword

I have seen automation defined as the use of machines, controls, and information technologies to optimize the productivity in the production of goods and delivery of services.

In today's modern data centers, this statement is both true and a requirement that allows your IT people the assets to work on strategic initiatives and spend less time on repetitive, mundane tasks that can be susceptible to human error. On the other hand, automation will not achieve these gains in and of itself, as data centers across the globe are built, managed, and sustained using a multitude of workloads that provide a service to users and customers. Enter *integration*—when automation and integration intersect, IT departments are provided the tools necessary to reach into disparate systems and essentially get them to “talk” to one another using well-defined workflows or *runbooks* as we sometimes call them. These runbooks allow IT staff to compose highly available, flexible automation and integration touch-points across business processes that span a multitude of workloads on various platforms.

Designing, publishing, and executing these workflows is simple using System Center 2012 SP 1 Orchestrator, a System Center 2012 SP 1 component. Orchestrator allows IT staff to deploy *integration packs* for all the System Center components as well as third-party workloads such as HP, IBM, VMware, and also other Microsoft workloads outside System Center such as Active Directory, Exchange, FTP, REST, and Windows Azure. Composing these workflows is easy using the Orchestrator Runbook Designer, which provides the user with a simple WYSIWYG graphical interface for dragging and dropping activities into a sequence that makes sense to your defined business process. Once enabled, these workflows can be manually triggered from the designer or invoked from another system such as System Center Service Manager. Users also have the ability to execute these workflows from our RESTful web service without requiring the Runbook Designer. Combine this designer with a highly available SQL Server backend and runbook servers that are able to scale out, and you have an enterprise-ready automation and integration tool that is simple to use and powerful enough to automate away business processes within your organization.

The demand for automation and integration has been quickly trending upward in IT. No matter whom you talk to, from large to small, automating business processes is becoming more prevalent in organizations around the world. This book intends to instruct IT administrators on how to use System Center 2012 Orchestrator to integrate and automate their existing business processes using a friendly, easy-to-use WYSIWYG designer with ready-to-import integration packs that cover a multitude of workloads essential to your business. The authors asked me to provide the Foreword for the book; and I can't think of a better-suited group of individuals who are able to produce this type of documentation, examples, and real-world scenarios to help you take advantage of this powerful System Center 2012 component.

Justin Incarnato, Senior Program Manager
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About the Authors

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Marcus Oh, System Center Cloud and Datacenter Management MVP, is a senior technical manager for a large telecommunications provider, running directory services and management infrastructure for ~30,000 systems. He has been an MVP since 2004 in System Center, specializing in Configuration Manager, Operations Manager, and Orchestrator. Marcus has written numerous articles for technology websites and blogs on Orchestrator and other System Center components at <http://marcusoh.blogspot.com>. He coauthored *Professional SMS 2003*, *MOM 2005*, and *WSUS* (Wrox, 2006), was a contributing author to *System Center Opalis Integration Server 6.3 Unleashed* (2011), and coauthored *System Center 2012 Configuration Manager Unleashed* (2012). Marcus is also the president of the Atlanta Systems Management User Group (<http://www.atlsmug.com>) and a board member of the Deskside Management Forum.

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Dedication

To those IT professionals worldwide interested in automation and using System Center, and the System Center Cloud and Data Center Management MVPs.

Acknowledgments

Writing a book is an all-encompassing and time-consuming project, and this book certainly meets that description. The authors and contributors would like to offer appreciation to those who helped with *System Center 2012 Orchestrator Unleashed*.

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We Want to Hear from You!

As the reader of this book, *you* are our most important critic and commentator. We value your opinion and want to know what we're doing right, what we could do better, what areas you'd like to see us publish in, and any other words of wisdom you're willing to pass our way.

We welcome your comments. You can email or write to let us know what you did or didn't like about this book—as well as what we can do to make our books better.

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Introduction

In December 2009, Opalis Software, Inc. became a wholly owned subsidiary of Microsoft Corporation. Opalis, a leader in information technology process automation (ITPA) and run book automation (RBA), was best known for its Opalis Integration Server (OIS) software. As Brad Anderson said at the time, the acquisition was a pivotal piece for delivering on Microsoft's dynamic data center initiative, as it brought together Opalis Software's deep data center automation expertise with the integrated physical and virtualized data center management capabilities provided by Microsoft System Center (<http://blogs.technet.com/b/systemcenter/archive/2009/12/11/microsoft-acquires-opalis-software.aspx>).

As part of the acquisition, Opalis Software released OIS 6.2.2, a remediated version of 6.2.1. In November 2010, Microsoft released OIS 6.3, which became the "last OIS." Microsoft then further integrated OIS into System Center 2012 and rebranded it as System Center Orchestrator. Orchestrator enables Microsoft to integrate process automation into its vision of the data center.

ITPA is a powerful capability that can assist in streamlining IT operations by removing much of the overhead associated with manual responses to IT problems, whereas BPA concentrates on automating processes linked to the core business of an enterprise; these are often linked to data management. System Center Orchestrator, which incorporates an easy-to-use, drag-and-drop user interface, enables you to capture and document processes that encompass an entire IT organization. This is a core building block for the future of IT and is the foundation for the automation necessary to deliver cloud computing—self-adjusting tools of computing resources that can be tuned based on real-time events.

This book is divided into four sections:

Part I, "Orchestrator Overview and Concepts," includes an introduction to Orchestrator and discusses its history, internals, architectural concepts, and design concepts. These topics are discussed in Chapter 1, "Orchestration, Integration, and Automation," Chapter 2, "What's New in System Center 2012 Orchestrator," Chapter 3, "Looking Inside System Center 2012 Orchestrator," and Chapter 4, "Architectural Design."

Part II, "Installation and Implementation," steps through the installation process and discusses implementing Orchestrator:

- ▶ Chapter 5, “Installing System Center 2012 Orchestrator,” covers installation and OIS 6.3 migration.
- ▶ Chapter 6, “Using System Center 2012 Orchestrator,” provides an overview of how to use this System Center component.
- ▶ Chapter 7, “Runbook Basics,” covers the anatomy of a runbook and introduces the different types of activities included with Orchestrator 2012.
- ▶ Chapter 8, “Advanced Runbook Concepts,” goes deeper into runbook concepts, including scheduling, invoking child runbooks, looping, junctions, working with data, error handling, computer groups, variables, and counters.
- ▶ Chapter 9, “Standard Activities,” provides additional depth on the Orchestrator standard activities.
- ▶ Chapter 10, “Runbook and Configuration Best Practices,” covers best practices for runbooks and configuration.
- ▶ Chapter 11, “Security and Administration,” discusses the Orchestrator security model, and user roles and security.

Part III, “Integration Packs and the OIT,” focuses on integrating System Center Orchestrator into the data center through integration packs. IPs are software components that plug into the larger Orchestrator framework, and are designed around a series of atomic tasks targeted to a specific application. Orchestrator IPs are discussed in Chapter 12, “Orchestrator Integration Packs.” The System Center IPs are discussed in greater depth in the following chapters:

- ▶ Chapter 13, “Integration with System Center Operations Manager”
- ▶ Chapter 14, “Integration with System Center Service Manager”
- ▶ Chapter 15, “Integration with System Center Configuration Manager”
- ▶ Chapter 16, “Integration with System Center Virtual Machine Manager”
- ▶ Chapter 17, “Integration with System Center Data Protection Manager”

Chapter 18, “Integration with Windows Azure,” goes into depth on the Windows Azure IP, introduced with System Center 2012 Service Pack 1.

Chapter 19, “Runbook Automation in the Data Center and the Cloud,” takes the Azure and System Center IPs to the next level by presenting examples that integrate objects from these IPs together in workflows and also incorporate PowerShell to achieve true end-to-end automation. Just in case you still don’t have all the objects you need to accomplish your own integrations, Chapter 20, “The Orchestrator Integration Toolkit,” gives you the tools to create your own IPs using the Orchestrator Integration Toolkit, also known as the OIT.

By this time, you should have all the tools necessary to become an Orchestrator expert. The last section of the book includes three appendices. Appendix A, “Community

Solutions and Tools,” includes resources developed by the community, Appendix B, “Reference URLs,” incorporates useful references you can use for further information, and Appendix C, “Available Online,” is a guide to supplementary resources offered with the book that you can download from Pearson’s website at <http://www.informit.com/store/product.aspx?isbn=9780672336102>.

This book provides in-depth reference and technical information about System Center 2012 Orchestrator SP 1, as well as information on orchestrating with System Center and third-party products through integration packs. The material will be of interest to those shops using System Center, Orchestrator, and anyone interested in ITPA.

Microsoft announced System Center 2012 R2 at TechEd in early June 2013. This release, slated for general availability by the end of the year, provides parity between Microsoft’s data center software and its public cloud portfolio. As such, there are minimal changes planned to Orchestrator 2012 beyond updates to the Azure and VMM IPs, a new IP for SharePoint, support for Windows Server 2012 R2, and updates to the Orchestrator installation program for installing the new Service Management Automation (SMA) web service and runbook workers. The SMA feature is also interesting in that it provides a glimpse to where Microsoft may go with cloud-based automation.

Disclaimers and Fine Print

There are several disclaimers. Microsoft is continually improving and enhancing its products. This means the information provided is probably outdated the moment the book goes to print.

In addition, the moment Microsoft considers code development on any product complete, they begin working on a cumulative update, service pack, or future release; as the authors continue to work with the product, it is likely yet another one or two wrinkles will be discovered! The authors and contributors of *System Center 2012 Orchestrator Unleashed* have made every attempt to present information that is accurate and current as known at the time. Updates and corrections will be provided as errata on the InformIT website at <http://www.informit.com/store/system-center-2012-orchestrator-unleashed-9780672336102>.

Thank you for purchasing *System Center 2012 Orchestrator Unleashed*. The authors hope it is worth your while!

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CHAPTER 2

What's New in System Center 2012 Orchestrator

IN THIS CHAPTER

- The History of Orchestrator
- OIS 6.3 Versus Orchestrator 2012

In its second major release since its acquisition by Microsoft, Orchestrator (previously known as Opalis Integration Server, or OIS) has completed its assimilation into System Center. Chapter 1, “Orchestration, Integration, and Automation,” introduced the concepts behind run book automation (RBA), business process automation (BPA), IT process automation (ITPA), and Orchestrator. This chapter focuses on changes to Orchestrator in System Center 2012. If you have an OIS 6.3 background, reading this chapter can provide a smooth transition to understanding this System Center component. The chapter covers technology changes and discusses how Microsoft’s rebranding affects Orchestrator’s position in System Center. This chapter also provides a brief overview of the history of Orchestrator.

As the first version developed entirely by Microsoft, System Center 2012 Orchestrator has the benefit of the rigorous testing and code standards placed on all Microsoft products. In addition, it has the benefit of several years of experience with customers implementing OIS into their data centers; Microsoft has taken that feedback and fed it into product development. Although the user interfaces for Orchestrator are similar to the previous version, they have received a facelift along the lines of the rest of the System Center components, providing a consistent look and feel across the product.

The underlying theme is that even though Orchestrator appears different and has a new name, the technologies, concepts, and processes underneath essentially remain

the same. In fact, this version further emphasizes the features and benefits of OIS 6.3. Integration is still what Orchestrator is about, and it continues to offer the same robust workflow engine. If you used the last release of OIS, System Center 2012 Orchestrator will be a familiar experience. With that said, you will encounter some key terminology changes, new software and hardware prerequisites, several dropped features, and a brand-new Orchestration console.

The History of Orchestrator

Orchestrator has had a relatively short life in the hands of Microsoft, but its predecessors by Opalis Software, Inc., hit the shelves more than a decade ago. Opalis Software enjoyed a successful run, and its history includes a number of milestone developments that helped shape what Orchestrator is today. Even in the first release of the OpalisRobot product, the company approached automation differently from the rest of the world. Simply scheduling jobs was not enough; the real value was in being able to monitor for certain events and use those to trigger an action. By combining low-level task automation with the capability to integrate heterogeneous tools, people, and processes, Opalis enabled much more consistent and reliable automation. This concept came to be known more formally as IT process automation. The following sections look at how Orchestrator came to be and examine the advancements Microsoft has made since the 2009 acquisition.

The Beginnings of Orchestrator: OpalisRobot

Orchestrator started life in 1995 as a program called OpalisRobot; Figure 2.1 shows the Opalis logo. As OpalisRobot evolved over the next decade, it became clear it had an important differentiating feature over its competitors: Whereas other products were essentially task schedulers, OpalisRobot incorporated monitors and triggers. The idea was not only to schedule automated tasks, but also to dynamically identify and respond to specific events in your environment. This enabled administrators to build truly self-healing systems and applications. This concept was a precursor to runbook automation, and it is still very much at the core of Orchestrator today.



FIGURE 2.1 Opalis logo.

OpalisRendezVous

OpalisRobot was not the only product Opalis Software developed and produced. The company also sold OpalisRendezVous, which provided a graphical user interface (GUI) for transferring files over FTP, file shares, and databases. This product offered a unique “when,

what, where” configuration that enabled administrators to control the flow of file distribution, ultimately allowing a company to move quickly from a manual to an automated process. Again, simplicity of use was an underlying principle that made OpalisRendezVous such a useful and popular product. Figure 2.2 shows the OpalisRendezVous interface.

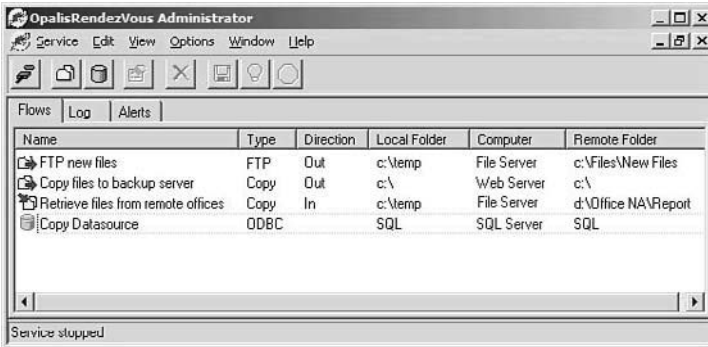


FIGURE 2.2 OpalisRendezVous user interface.

Opalis Innovates

OpalisRobot 3.0 was released in 1997, bringing one of the most important innovations to the product line with the world’s first drag-and-drop design interface for workflows. This was an important development because it marked a key concept that exists in current System Center products: simplicity. Ease of operation and administration has been an important theme throughout all System Center components.

A year later, Opalis released a set of add-ons for email and computer telephony integration. These add-ons, today called *integration packs* (IPs), facilitated the addition of activities to the set of out-of-the-box activities shipping with the product. Over the years, Opalis fostered a community of independent developers to create open source IPs that enable the product to automate tasks within many other systems. These IPs changed the perception of OIS from an ITPA tool separate from the rest of the data center to that of a platform resting beneath all the tools and processes in the data center.

This important distinction led to what is now known as the Orchestrator Integration Toolkit. It enables developers to integrate Orchestrator with virtually every other application, regardless of manufacturer, through those other applications’ exposed integration surfaces, such as application programming interfaces (APIs), command-line interfaces (CLIs), and databases.

Microsoft currently offers more than a dozen supported IPs for both Microsoft and other vendor applications, such as VMware vSphere and HP Service Manager. Dozens more are available through open source community developers.

OpalisRobot 4.0, released in 2002, was the last release under the OpalisRobot brand. This final release brought a new user interface (see Figure 2.3), some bug fixes, and additional

standard automation objects. This release was also the first with support on Linux and Solaris; however, support on non-Microsoft platforms ceased with 4.0 and did not carry forward to later versions of the product.

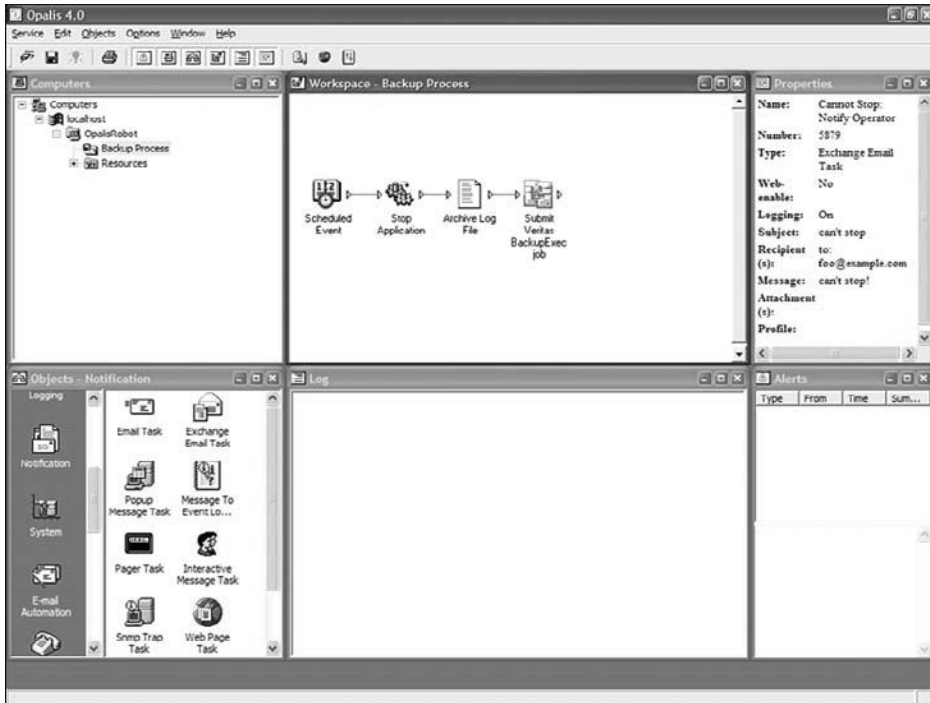


FIGURE 2.3 OpalisRobot 4.0 interface.

Goodbye Robot, Hello OIS

By the early 2000s, it became clear that although Opalis Software clearly understood where it needed to fit into runbook automation and ITPA, OpalisRobot had outgrown its architecture; it was time for a major rewrite of the underlying technology. Opalis retired its RendezVous and Robot product lines and planted its position firmly in the ITPA space. Fundamentally, this was a shift in focus, from developing better runbook activities to providing a better integration platform. New integration packs (then called connector access packs) were released to support this positioning, which included integration into Microsoft Operations Manager.

As part of this new positioning, Opalis rebranded its new automation software as Opalis Integration Server and released OIS 5.0 in 2005. OIS 5.0 brought a round of significant improvements, including the use of an industry-standard relational database management system on the back end, dashboards, improved scalability, and Active Directory integration. The marriage of the administrator-friendly interface, the IP approach, and the new

architecture allowed OIS to take its seat as a true ITPA tool, allowing automation of activities to occur across systems and processes.

Issues with the redesigned architecture became evident over the following months, as often occurs with newly released software. Opalis made several incremental improvements to the 5.x release, and those ultimately led to the development of a new workflow engine, called *pipeline mode*. Pipeline mode changed how data was passed between objects, facilitating new capabilities such as embedded looping and the capability to flatten published data. The old workflow engine, referred to as *legacy mode*, remained available until the System Center 2012 Orchestrator release. A final round of minor changes brought about the last major release of OIS with version 6.0.

Microsoft's Acquisition of Opalis Software

Microsoft, having identified a requirement to bolster its line of data center management tools with an ITPA solution, acquired Opalis Software in December 2009. The terms of the acquisition included a final release of OIS for Microsoft that removed any unacceptable features, such as the Java-based prerequisite of the OIS Operator Console displayed in Figure 2.4. For legal reasons, Microsoft would not distribute the open source software required for the Operator Console. However, the console itself was still available and supported until Orchestrator was released as part of System Center 2012 in April 2013.

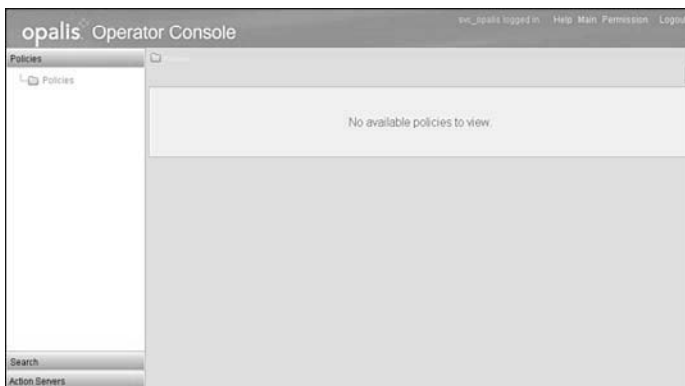


FIGURE 2.4 OIS Operator console.

NOTE: EXISTING CUSTOMER CONSIDERATIONS POST-ACQUISITION

When Microsoft incorporated OIS into its existing System Center licensing, it offered a grant of Server Management Suite Datacenter (SMSD) licenses to existing customers to the monetary equivalent of their lifetime purchases with Opalis Software, as long as they purchased a two-year Software Assurance contract. Opalis Integration Server was the only product Opalis Software offered at the time of the acquisition, so Microsoft continued development of all Opalis software products. The Opalis Dashboard, sold by Opalis Software but developed by Altosoft, was available directly from Altosoft for a period of time, but it has since been discontinued.

Microsoft positioned the Opalis software under System Center. Version 6.3, which was the final update to OIS, included support for OIS on Windows Server 2008 and the OIS Client on Windows 7, and a set of IPs for System Center. Figure 2.5 shows the OIS 6.3 Client.

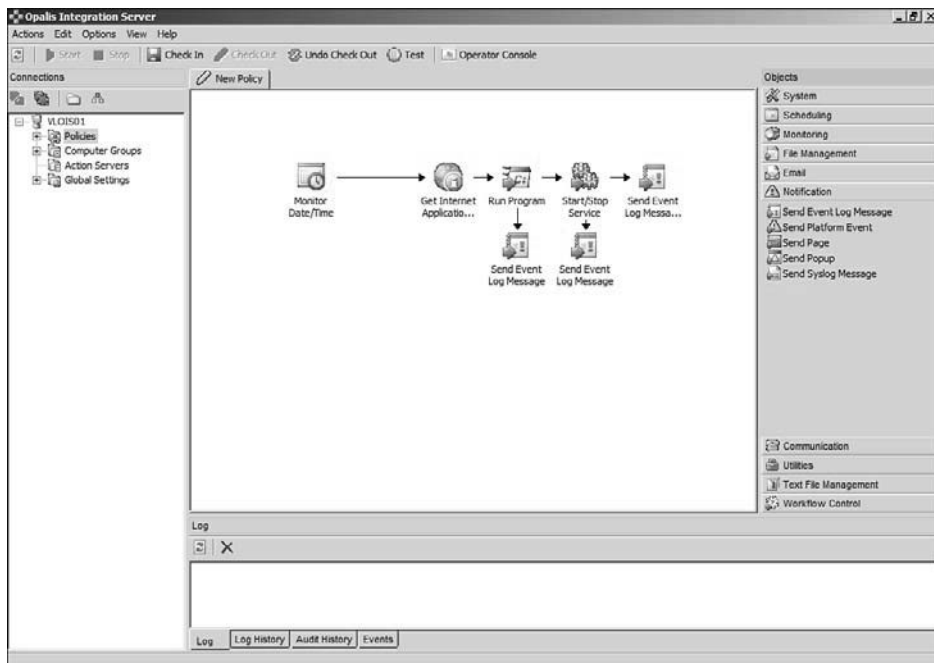


FIGURE 2.5 OIS 6.3 Client.

OIS to Orchestrator

Microsoft announced the rebranding of Orchestrator in March 2011 at the Microsoft Management Summit in Las Vegas. Officially called System Center 2012 Orchestrator, this is the first major release developed wholly by Microsoft. As such, the functionality is migrated into a Microsoft codebase. This means that Orchestrator is now subject to the same rigorous design and testing cycles as the rest of the Microsoft products.

With the System Center 2012 release, OIS 6.3 was no longer available as a standalone download, but Microsoft provided support of the product for an additional 12 months. The company also honored existing support agreements with customers.

Orchestrator brings a series of improvements, including these:

- ▶ Bug fixes
- ▶ Terminology changes
- ▶ A new Orchestration console
- ▶ Updated integration packs
- ▶ A new installer

NOTE: NEW WITH ORCHESTRATOR 2012 SERVICE PACK 1 AND R2

System Center 2012 Service Pack 1 changes to Orchestrator include:

- ▶ New integration packs (Exchange Administrator, Exchange Users, FTP, and Representational State Transfer, or REST)
- ▶ Updates to the Active Directory, HP Service Manager, VMware vSphere, System Center 2012 Operations Manager, and System Center Virtual Machine Manager 2012 integration packs
- ▶ Support for the Windows Server 2012 and SQL Server 2012 platforms

See <http://technet.microsoft.com/en-us/library/jj614522.aspx> for information.

Changes to Orchestrator in System Center 2012 R2, in pre-release when this book was printed and documented at <http://technet.microsoft.com/en-us/library/dn251064.aspx>, include:

- ▶ Support for Windows Server 2012 R2
- ▶ Changes to the installation program to install the Service Management Automation web service and up to three runbook workers
- ▶ A SharePoint integration pack
- ▶ Updates to the Windows Azure and Virtual Machine Manager 2012 IPs

OIS Migration to Orchestrator

You cannot upgrade OIS to Orchestrator, but you can migrate existing OIS 6.3 policies to Orchestrator 2012. Some of the standard activities have changed, so you might need to adjust your runbooks after migrating them from OIS 6.3. Chapter 5, “Installing System Center 2012 Orchestrator,” covers Opalis migration in detail.

Where Orchestrator Fits into System Center

Microsoft has positioned System Center 2012 as a single product with multiple components rather than individual applications, which is representative of the way the tools interact with each other. The components have a high level of integration, and Orchestrator is key to that integration. This integration also reflects the license options: System Center 2012 has a single SKU with an option to purchase either licenses per virtual machine (VM) or an unlimited VM enterprise license. Figure 2.6 illustrates the relationships among the different System Center components.

Microsoft built System Center 2012 to manage on-premise, private cloud, and public cloud data centers. Each component provides a platform; on top is a set of solutions that fulfill those management needs. Here is a description of each component—see <http://technet.microsoft.com/en-us/library/hh546785.aspx> for additional information:

- ▶ **App Controller:** Enables template-based deployment of services and virtual machines to private clouds via Virtual Machine Manager and public clouds using Windows Azure.

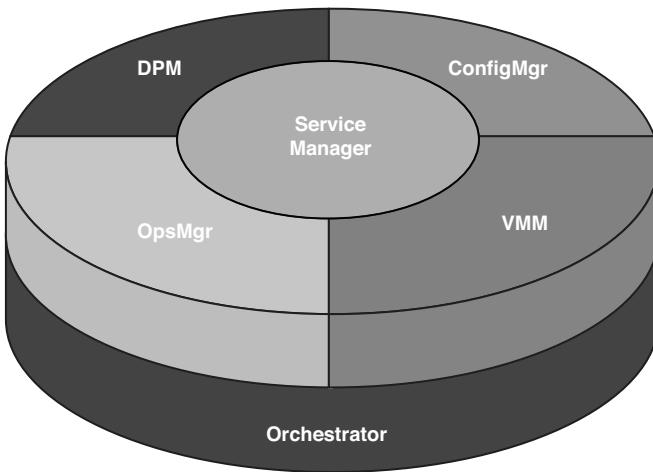


FIGURE 2.6 IT management as a platform.

- ▶ **Configuration Manager:** Provides a comprehensive configuration management solution for the Microsoft platform. This component features application delivery, operating system deployment, desktop virtualization, device management, compliance monitoring and remediation, hardware monitoring, and software inventory capability.
- ▶ **Endpoint Protection:** Endpoint Protection is built on the Configuration Manager platform and provides antimalware and security solutions. Because it shares its infrastructure with Configuration Manager, you can consolidate endpoint protection and management.
- ▶ **Data Protection Manager (DPM):** DPM is a centralized backup solution that features near-continuous backup. It enables rapid and reliable recovery of a Windows environment, including Windows servers and desktops, SQL Server, Exchange Server, and SharePoint.
- ▶ **Operations Manager:** Provides an infrastructure management solution that delivers comprehensive health and performance monitoring and alerting to drive performance and availability for data center and cloud-based applications.
- ▶ **Orchestrator:** Enables the automated delivery of IT services through a simple user interface that is built for information technology (IT) administrators. Orchestrator enables automation across a heterogeneous datacenter.
- ▶ **Service Manager:** Provides a platform for managing Microsoft Operations Framework (MOF) and IT Information Library (ITIL)–based service management processes. These include incident management, request fulfillment, problem management, change management, and release management. Those processes are automated through integration with companion System Center 2012 components.

- **Virtual Machine Manager (VMM):** VMM is a virtual infrastructure management solution for provisioning and centrally managing host, network, and storage resources that support datacenter, private, and public cloud environments.

Orchestrator is unique, in that it does not provide a solution to any problem; it provides a platform and set of activities to enable administrators to generate their own solutions to unlimited problems. Often the question with Orchestrator is not whether you *can* automate something, but whether you *should* automate it. Automation clearly has many benefits, but a certain level of planning must go into the design and creation of runbooks. The good news is that Orchestrator simplifies this process with its user-friendly Runbook Designer.

Orchestrator shines particularly well in the following areas:

- Automation in the data center
- Service delivery and automation
- Creation of self-healing systems

The best way to think of Orchestrator is not as an additional component hanging off the end of the rest of System Center, but one sitting beneath the rest of the components that can read, interact with, and pass data among the various APIs to act as a point of integration. In this way, Orchestrator doesn't necessarily need to action all the automation, but it can act as a puppet master that enables other applications to execute the automation.

OIS 6.3 Versus Orchestrator 2012

On the surface, certain areas of Orchestrator 2012 appear to differ greatly from the OIS 6.3 release, but the underlying concepts and processes remain relatively the same. All user interfaces have had facelifts, and the OIS Operator Console has been completely rebuilt from scratch.

The next sections discuss these changes and include a brief overview of the features that were improved or rebuilt. Additional detail about each of these features and their uses and configuration options is available in Chapter 3, "Looking Inside System Center 2012 Orchestrator," and Chapter 4, "Architectural Design."

Terminology Changes

Thanks to rebranding and the Microsoft acquisition, several terms have changed between OIS 6.3 and Orchestrator, but much parity exists between the legacy and the new Orchestrator features. Some pieces, such as the License Manager, were removed altogether; others, such as the Orchestration console, were rebuilt from the ground up. In general, however, the interfaces and features in Orchestrator should be familiar if you have used OIS 6.3. Table 2.1 lists the terminology changes within the architecture features.

TABLE 2.1 Feature Terminology Changes

OIS 6.3	Orchestrator 2012
SQL Data Store	Orchestrator Database
Opalis Management Server	Orchestrator Management Server
Opalis Action Server	Orchestrator Runbook Server
OIS Client (Authoring Console)	Runbook Designer
Policy Testing Console	Runbook Tester
OIS Operator Console	Orchestration Console
Deployment Manager	Deployment Manager
OIS Web Service (WSDL)	Orchestrator Web Service
Database Configuration Utility	Data Store Configuration
License Manager	—

Orchestrator Database

A Microsoft SQL Server database stores all data and configurations. This database is a critical feature and should be configured for high availability. If the SQL Server goes down, runbook servers cannot execute any runbooks. Orchestrator uses one database with a default name of Orchestrator and a correlation of SQL_Latin1_General_CP1_CI_AS.

NOTE: ORACLE DATABASE SUPPORT

Support for Oracle as the relational database management system (RDBMS) is not included in Orchestrator, as it was in Opalis Integration Server.

Orchestrator Management Server

The management server exists primarily to establish communication between the design features and the SQL database. It is not a critical runtime feature and does not necessarily need to be highly available. This feature fills the same role as the OIS management server in the previous release.

Orchestrator Runbook Server

The Orchestrator runbook server is the feature that actually executes runbooks. You can deploy multiple runbook servers to allow for load balancing. This feature handles the same responsibilities as the action server in the previous release.

Runbook Designer

The Runbook Designer console is used to design, test, and implement all runbooks. This feature is not critical to the operation of existing runbooks and, therefore, does not necessarily need to be highly available. This feature is essentially the same as the OIS 6.3 Client.

Runbook Tester

The Runbook Tester, which is launched within the Runbook Designer, has a similar function and layout to the OIS 6.3 Policy Testing console. This tool is used to test runbooks before deployment and publishes runtime data about each activity as the runbook steps through from beginning to end.

CAUTION: RUNBOOK TESTER COMMITS CHANGES

Several times throughout this book, the authors state that the Runbook Tester actually executes and commits changes when testing a runbook. It does not display “what if” data or scenarios. Keep this in mind, and use a development environment whenever a runbook might affect existing IT services.

Orchestration Console

This console, displayed in Figure 2.7, provides IT operators with a thin-client interface into Orchestrator. The Orchestration console is not critical to the runtime of runbooks, but it enables users to view the state of runbook execution, start and stop jobs, view running and pending instances in real time, and review the execution history of runbook instances. The Orchestration console supersedes the OIS 6.3 Operator Console, and although the underlying technology has changed significantly, it serves the same purpose.

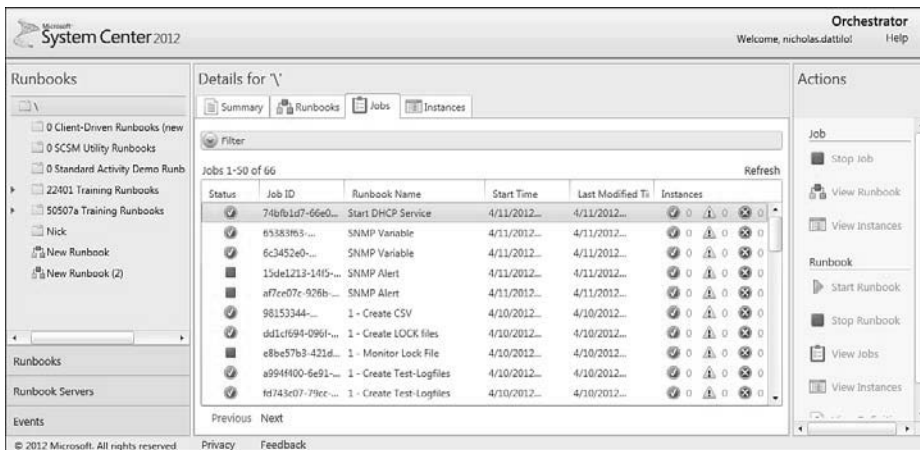


FIGURE 2.7 The Orchestration console.

Deployment Manager

The Deployment Manager is largely unchanged from OIS 6.3 and is used to deploy runbook servers, IPs, and runbook designers. Figure 2.8 shows the Deployment Manager managing integration packs.

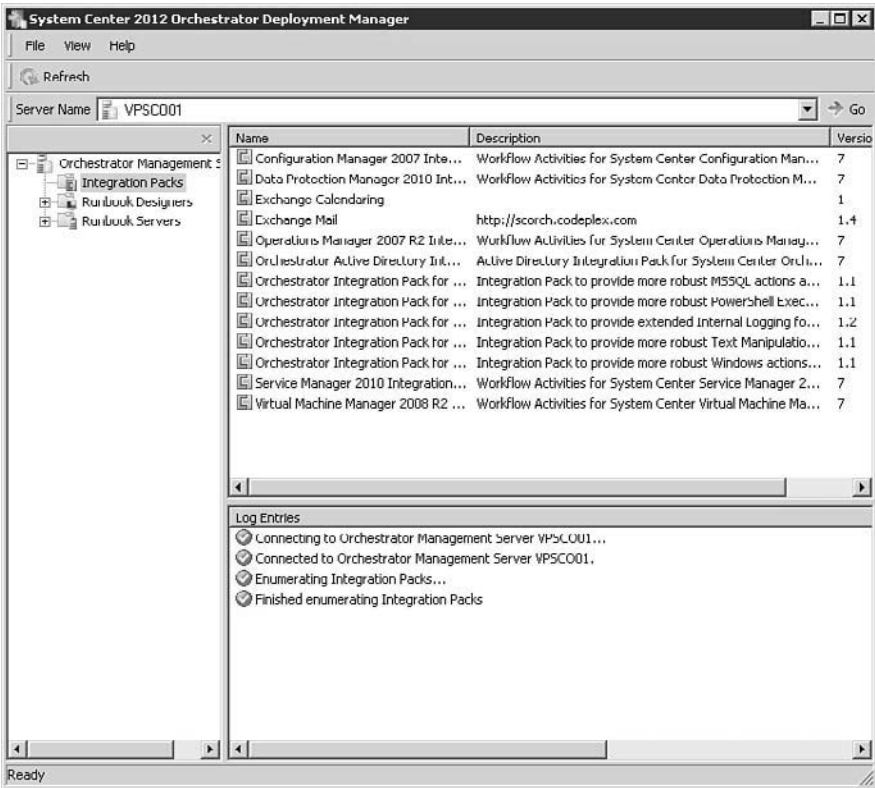


FIGURE 2.8 Orchestrator Deployment Manager.

Orchestrator Web Service

The Orchestrator web service allows for programmatic access to Orchestrator. In addition to providing access for the Orchestration console, this web service uses REST and ODATA standards to make it easier for developers to integrate their programs with Orchestrator.

Data Store Configuration

This utility supersedes the OIS 6.3 Database Configuration Utility and is used to configure the database server and the database itself (see Figure 2.9).

Services

Services have undergone a makeover as well. Table 2.2 lists these changes.

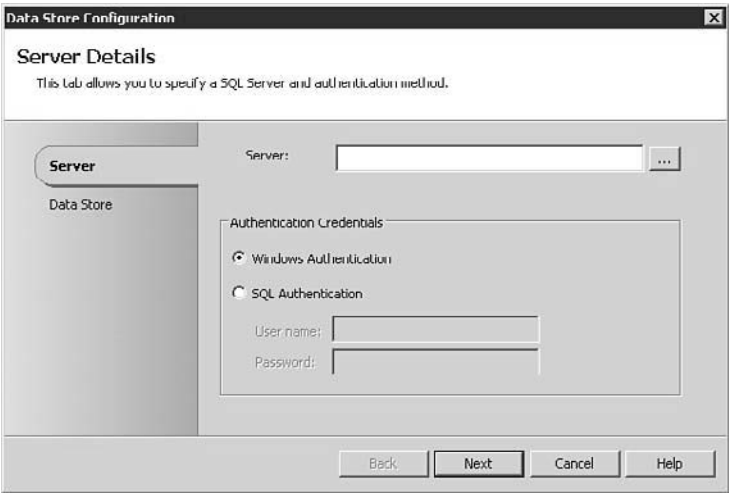


FIGURE 2.9 Orchestrator Data Store Configuration details.

TABLE 2.2 Services Terminology Changes

Opalis 6.3	Orchestrator 2012
Opalis Remote Execution Service	Orchestrator Run Program Service
OpalisActionServerWatchdog	Orchestrator Runbook Server Monitor
OpalisActionService	Orchestrator Runbook Service
Opalis Management Service	Orchestrator Management Service
OpalisRemotingService	Orchestrator Remoting Service

Other Terminology Changes

Other terminology changes relate to the user interface, detailed in Table 2.3. The following sections focus on these.

TABLE 2.3 User Interface Terminology Changes

OIS 6.3	Orchestrator 2012
Custom Start	Initialize Data
Foundation Object	Standard Activity
Object	Activity
Object Palette	Activities Pane
Policy	Runbook
Policy Folder	Runbook Folder

OIS 6.3	Orchestrator 2012
Policy Module	Job Process
Publish Policy Data	Published Data
Request	Job
Trigger Policy	Invoke Runbook
Workflow Control	Runbook Control

Activity

Activity is synonymous with *object* in OIS 6.3: It refers to the tasks dragged and dropped in the Runbook Designer to build runbooks.

Standard Activity

Standard activities are all activities that are available in an out-of-the-box installation; they exclude activities provided by integration packs. These standard activities are sorted into different categories, based on their function. An example of these categories is Runbook Control. Chapter 7, “Runbook Basics,” discusses categories for standard activities.

Initialize Data

The **Initialize Data** activity is just a name change from the OIS **Custom Start** object, and operates in a similar way. It allows a runbook to gather user-defined input parameters. This enables runtime values to be gathered via the Orchestration console or through an interface utilizing the web service, such as the Service Manager self-service portal.

Activities Pane

The Activities pane is the pane on the right side of the Runbook Designer that holds all the activities that can be used to build a runbook. Figure 2.10 shows the Activities pane, with some optional integration packs.

Runbook

A runbook is synonymous with a policy in OIS 6.3: It is the collection of activities that orchestrates actions.

Runbook Folder

Runbook Folder replaces the legacy term Policy Folder. These folders contain one or more runbooks and are used to organize runbooks in both the Orchestration console and the Runbook Designer.

Job

A job is a request to run a specific runbook that is waiting to be assigned to a runbook server for processing. These runbooks are assigned first come, first served.

Job Process

A job process is the actual process that executes on the runbook server that executes an instance of a job.



FIGURE 2.10 The Activities pane in the Runbook Designer.

Published Data

When activities run, data is collected. This includes the output of the activity, the time it ran, and whether it was successful. The information is placed in the pipeline data bus. This data can be referenced by another activity farther down the line in the runbook. Referred to as *published data*, this data was known as published policy data in OIS 6.3. Figure 2.11 shows some common published data from the **Compare Values** activity.

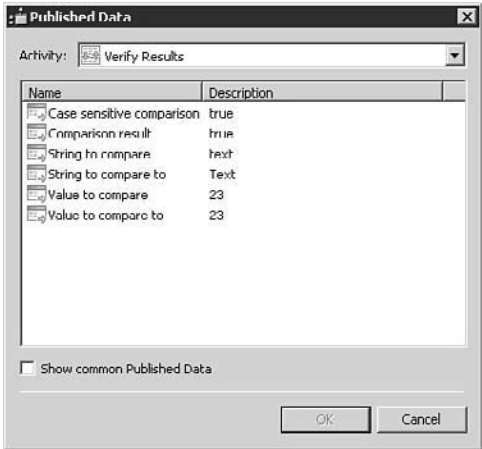


FIGURE 2.11 Viewing published data.

Job

A job is a request to deploy and run a runbook on a runbook server. You can monitor jobs in the Orchestration console, previously shown in Figure 2.7. A job identifies the runbook but does not uniquely identify each specific occurrence of that runbook's execution.

Jobs can deploy a runbook to multiple runbook servers or can run multiple occurrences of the same runbook on a single runbook server. These occurrences, referred to as instances, enable you to uniquely identify each specific occurrence. For example, a System Center Operations Manager alert can trigger an Orchestrator runbook. If Operations Manager sends three alerts that are the same, the job is the request to run a runbook each time that alert is generated. The instance uniquely identifies each execution of that runbook and enables you to view data about that specific occurrence, such as the time it started and what data it generated.

Invoke Runbook

This activity resides in the Runbook Control category and replaces the OIS legacy **Trigger Policy** object. It allows another runbook to be called from within a runbook. A related activity, **Return Data**, enables you to send back the data generated by the invoked runbook to the **Invoke Runbook** activity. This powerful pair of activities plays a big part in more complex multipart runbooks.

CAUTION: INVOKE RUNBOOK SECURITY CREDENTIALS

The **Invoke Runbook** activity can explicitly define security credentials that will be used by the target runbook. This is a seemingly minor change from the old **Trigger Policy** object, but the capability for an entire runbook job to be executed under specific user credentials is a significant new feature.

Runbook Control

This activity category replaces the old Workflow Control category and contains activities that are used to control the behavior of runbooks.

Concept Changes

Conceptually, Orchestrator has not changed much from OIS 6.3. General practices and ideas still apply, and your OIS policies largely still function in Orchestrator as runbooks. If anything, greater emphasis has been placed on the power of Orchestrator's integration with the other System Center components.

Microsoft provides updated IPs for the System Center 2012 components that leverage some of the new features and functionality in those other products. It is also worth noting that the IPs for the legacy System Center products have been updated to work with Orchestrator because the Opalis Integration Server IPs are not compatible with Orchestrator.

Previous versions required that you monitor an application for a certain event to occur in order to trigger a runbook, thus the monitor was a passive monitor. For this passive

monitoring system to work reliably, the data being monitored had to be consistent enough to trigger the correct runbooks at the right time. System Center 2012 Orchestrator does not need to monitor events in external applications to trigger runbooks. Runbooks can be triggered via the web service; using integration with other applications or the System Center 2012 Service Manager component can eliminate unnecessary development efforts and issues from data inconsistencies. Chapter 6 explains this integration in more detail.

Architecture and Feature Changes

The architecture for Orchestrator remains largely unchanged from OIS 6.3, aside from some new terminology and prerequisite changes (see Table 2.4). As Figure 2.12 shows and Chapter 3 explores further, the SQL database is still at the heart of Orchestrator. A familiar set of features operates around that SQL database.

Prerequisite/Sizing Changes

As is typical with newly released Microsoft software, hardware and software prerequisites have been updated.

These changes should not necessarily be considered upgrade prerequisites—as stated earlier in the “OIS Migration to Orchestrator” section, no upgrade path from OIS to Orchestrator exists. Chapter 5 discusses this further.

TABLE 2.4 Single Server Prerequisite Changes

Feature	Opalis 6.3	Orchestrator 2012
Processor	2.1 GHz dual-core Xeon 3000 series or equivalent	2.1 GHz dual-core Intel microprocessor or better
Memory	2GB	1GB
Hard Disk	381MB	200MB
Operating System Roles and Features	Windows Server 2003 SP2 or later	Windows Server 2008 R2 or Windows Server 2012 with System Center 2012 Service Pack (SP) 1, IIS, .NET Framework 3.5.1 and .NET Framework 4
Database Server	SQL Server 2005 or 2008	SQL Server 2008 R2 or SQL Server 2012 with System Center 2012 SP 1, using SQL_Latin1_General_CP1_CI_AS collation

Apart from these relatively minor changes, the Orchestration console has been rebuilt and thus has different requirements. The old Operator Console required JavaScript on the accessing browsers and Java parts on the web server hosting the console. The new Orchestration console requires Silverlight on accessing browsers.

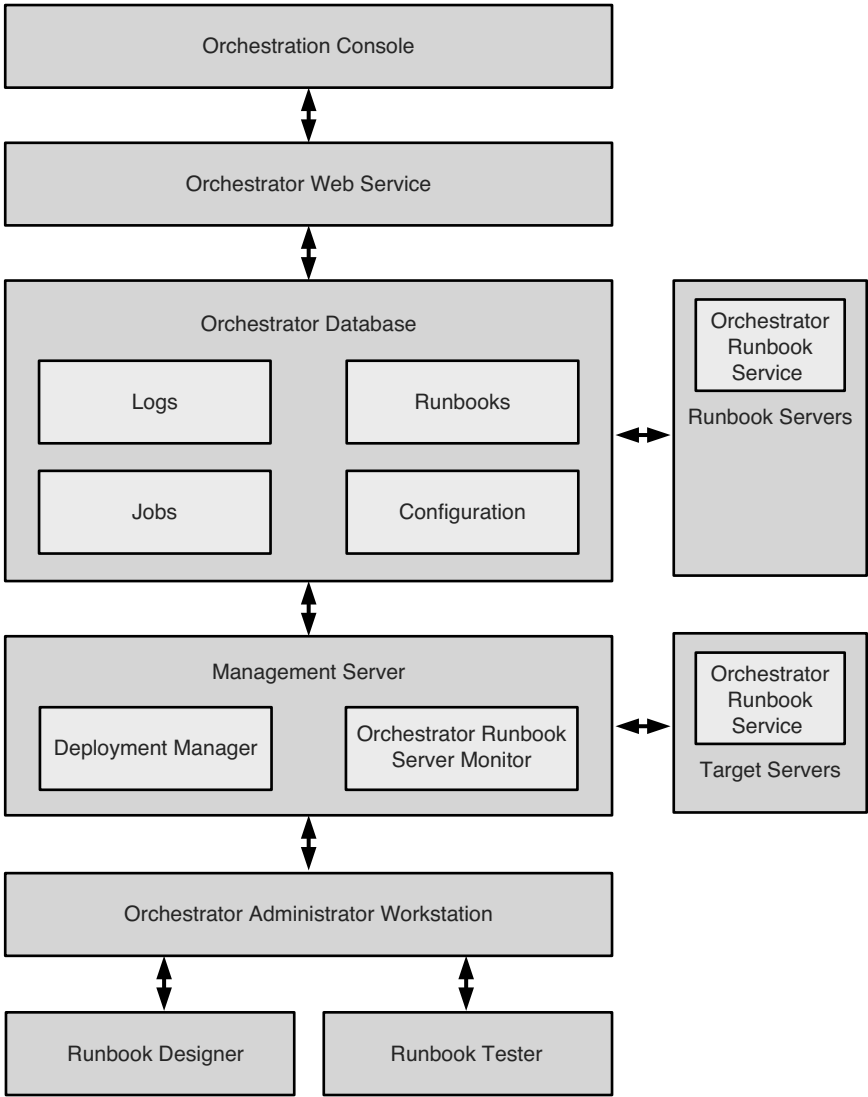


FIGURE 2.12 Architectural diagram.

Sizing and performance guidance has stayed consistent with this new release. The management server is still limited to one per environment, is needed only to connect the Runbook Designer, and does not need to be highly available. The database and runbook servers are the features required for runbooks to execute. Each runbook server is limited by default to 50 runbooks per runbook server. If you are using Service Manager with the Orchestrator connector, you will want the Orchestrator web service to be highly available as well.

Licensing Changes

Microsoft has done a considerable amount of work to simplify the license options for System Center 2012 into an easy-to-understand processor-based licensing model. All the components of System Center 2012 have been consolidated into a single SKU, so purchasing either license offering gives you access to every component. Two editions are available; the only difference between the two is in the number of managed OSEs allowed per license (see Table 2.5).

TABLE 2.5 Licensing Changes

License Offering	Components Included	Managed OSEs
System Center 2012 Datacenter Edition	App Controller Configuration Manager	Unlimited on premises, 8 in public cloud
System Center 2012 Standard Edition	Data Protection Manager Endpoint Protection Operations Manager Orchestrator Service Manager Virtual Machine Manager	2 per license on premises, 2 in public cloud

System Center Advisor, which offers configuration monitoring cloud services for Microsoft server products, is offered at no cost to users of those products. For information on Advisor, see <http://blogs.technet.com/b/momteam/archive/2013/03/06/system-center-advisor.aspx> and <https://www.systemcenteradvisor.com/>.

Summary

This chapter examined the evolution from OpalisRobot in 1995 to Microsoft's System Center 2012 Orchestrator. It took a close look at the differences in technology, terminology, and prerequisites. It also discussed where Orchestrator fits into System Center 2012.

The next chapter covers the Orchestrator architecture and deployment scenarios.

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