



# ActuateOne on VMware® vSphere™ 5.0 and vCloud Director 1.5

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DEPLOYMENT AND TECHNICAL CONSIDERATIONS GUIDE



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## Introduction

This document provides direction for those interested in running ActuateOne on VMware® vSphere™ 5.0 and VMware vCloud Director 1.5. It provides basic guidance on the architecture of ActuateOne, and the value of utilizing the VMware platform for private cloud deployment of ActuateOne behind a corporate firewall. This paper covers the results of recent testing done jointly by VMware and Actuate, and also describes performance and functionality of ActuateOne on VMware virtual infrastructure. In addition, it also outlines some best practices in utilizing the two product sets together for your private cloud deployment of ActuateOne .

## VMware and ActuateOne Overview

The ActuateOne Platform with VMware vSphere gives enterprises the ability to deploy their Business Intelligence (BI) applications in a unified cloud environment with built-in security and role-based access control. Together, the joint solution delivers three unique capabilities to the enterprise:

- An efficient and secure approach to using shared infrastructure for servicing highly frequent requests
- A standardized, portable, and extensible approach to enable workloads to be deployed without manual configuration and across multiple clouds
- Agile access to shared infrastructure for provisioning workloads when in demand.

## ActuateOne Overview

Recognizing the need for seamless, dynamic and accessible Business Information solutions, Actuate – the co-founder and co-leader of the premier BIRT open source development project – presents ActuateOne. This innovative suite of integrated BI products and services features a common architecture for development and deployment that meets the dynamically changing needs of information consumers. ActuateOne enables any organization to build and deploy mission-critical Business Intelligence and rich information applications. These applications can be built for any user, anywhere, with a variety of tools based on one user experience, supported by one server and built with one design using BIRT. Using value-add design tools:

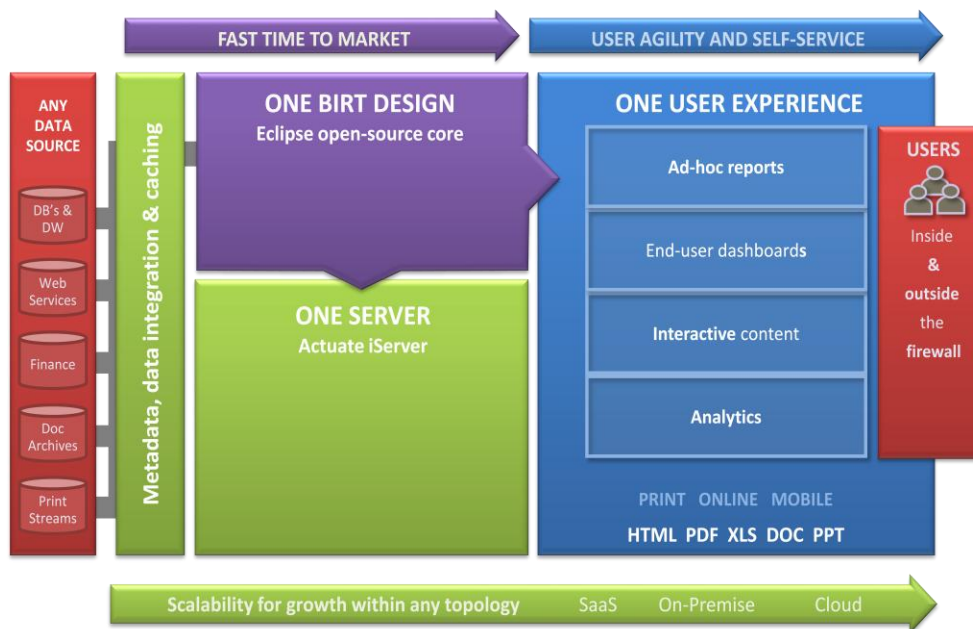
- End users can modify their views of data to suit their needs
- Business users can develop their own data visualizations, based on templates created by IT and/or developers
- IT and developers can create templates and data visualizations that can be used by business and end users

Users can customize the BIRT content received in any format, including rich visualizations and dashboards, to meet their own needs.

Using value-add deployment options, depending on project size, requirements and budget:

- Deployments can scale to support any number of employees, customers or partners, using a pre-built platform
- Deployments can be set up and running in less than an hour
- Deployments can be cloud ready, providing clustering and elastic provisioning with support for a stateless image that allows administrators to make changes at runtime without service interruptions.

Figure 1: ActuateOne Suite

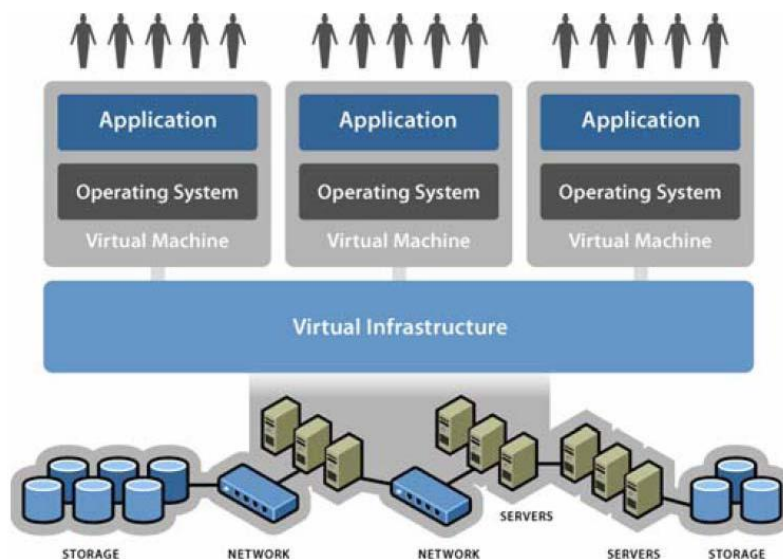


## VMware vSphere

VMware's leading virtualization solutions based on our flagship product, VMware vSphere provide multiple benefits to IT administrators and users. VMware virtualization creates a layer of abstraction between the resources required by an application and operating system, and the underlying hardware that provides those resources. A summary of the value of this abstraction layer includes the following:

- **Consolidation:** VMware technology allows multiple application servers to be consolidated onto one physical server, with little or no decrease in overall performance.
- **Ease of Provisioning:** VMware virtualization encapsulates an application into an image that can be duplicated or moved, greatly reducing the cost of application provisioning and deployment.
- **Manageability:** Virtual machines may be moved from server to server with no downtime using VMware® VMotion™, which simplifies common operations like hardware maintenance and reduces planned downtime.
- **Availability:** Unplanned downtime can be reduced and higher service levels can be provided to an application. VMware® High Availability (HA) ensures that in the case of an unplanned hardware failure, any affected virtual machines are restarted on another host in a VMware cluster.

Figure 2: Applications in a Virtual Environment



## vCloud Director

VMware vCloud Director enables enterprises to build secure, multi-tenant private clouds by pooling infrastructure resources into virtual datacenters. vCloud Director enables users to access these resources through web based portals and programmatic interfaces as fully automated, catalog-based services. For more information on vCloud Director, see the Resources section later in this paper.

For ActuateOne, vCloud Director provides the management capability for importing the BIRT application as a virtual appliance also called a vApp. vCloud Director is also used to provision and de-provision the vApp in a manner that is very consistent and repeatable, which significantly reduces ActuateOne set-up time and simplifies deployment.

Additionally, ActuateOne deployment can be scaled by continually adding or removing iServer as a virtual machine (also known as - scaling unit) to a running vApp, which contains ActuateOne workload in a consistent and secure manner.

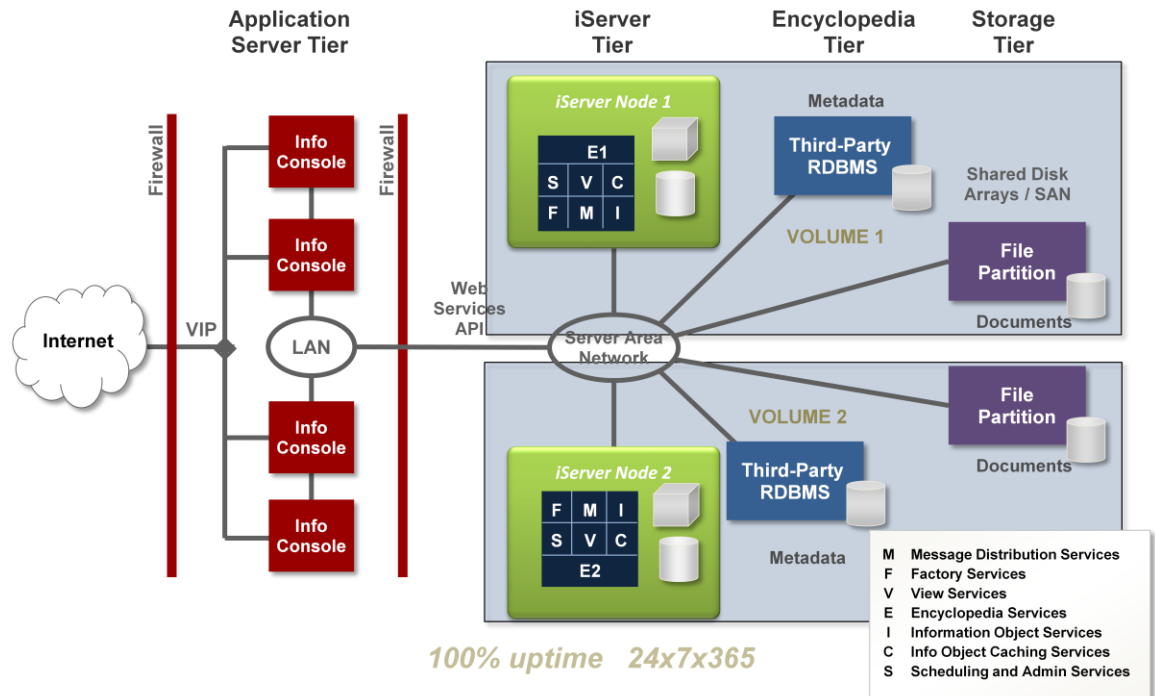
Figure 3: VMware vCloud Director



## ActuateOne Architecture and Deployment Strategy

Figure 4 illustrates a typical customer solution architecture deploying ActuateOne with multi-instance and multi-tenancy in a physical environment.

Figure 4: ActuateOne Architecture Design in a Physical Environment

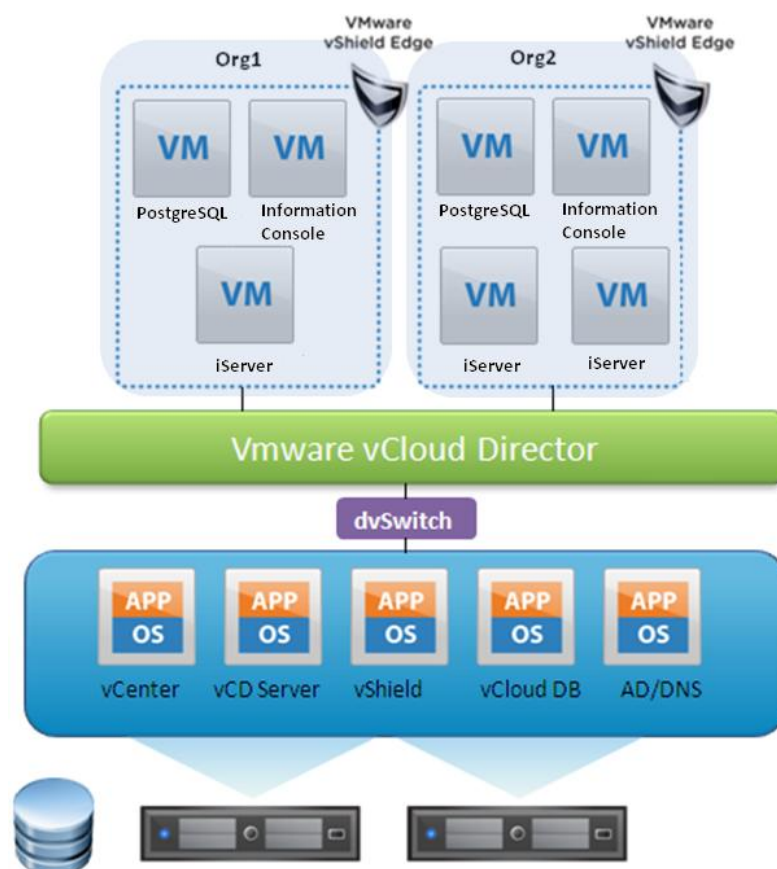


The architecture includes all components found in a real-world ActuateOne deployment, beyond the iServer:

- **Application Server Tier:** The ActuateOne Information Console, running on an application server, relays requests to the Actuate BIRT iServer.
- **iServer Tier:** For BI content generation requests, the Actuate iServer retrieves data from a database.
- **Encyclopedia Tier:** For BI content viewing requests, the Actuate iServer retrieves the report document from the iServer Encyclopedia and renders it in HTML. The Information Console then presents the results to the end user on the Internet.
- **Storage Tier:** SAN or shared disk arrays can be used to house the iServer Encyclopedia with 24x7 reliability.

If ActuateOne is deployed in a virtual environment using vCloud Director, the architecture remains the same. The main difference is that the physical servers would be virtualized in a cloud environment. This offers more agility and flexibility to ActuateOne workloads as they can be easily scaled out and scaled back on demand. Figure 5 illustrates the ActuateOne architecture in a virtual environment.

Figure 5: ActuateOne Architecture Design in a Virtual Environment



## Testing Process and Results

To characterize the performance of ActuateOne on VMware Infrastructure, performance tests were carried out jointly by VMware and Actuate. The configuration tested and the results are summarized below.

## Testing Methodology and Overview

The primary testing objective was to determine whether ActuateOne BIRT iServer and Information Console products could run more resiliently on VMware platform. ActuateOne was deployed in a virtual environment, and four tests were conducted to validate BI content generation and viewing during the vMotion, VMware DRS and VMware HA features.

## Hardware and Software Configuration

The following diagram provides details about the setup of ESX host servers and virtual machines used to perform the one-vCPU and two-vCPU tests described earlier.

## Hardware and System Host Configuration

The following table describes the configuration of ESX host servers and storage in the test configurations.

**Table 1: ESX Host Hardware**

HARDWARE	CONFIGURATION
Server	<ul style="list-style-type: none"> <li>• One HP Proliant DL980 G7 server equipped with:               <ul style="list-style-type: none"> <li>• Intel® Xeon® X7560 @ 2.26 GHz</li> <li>• Sockets: 8</li> <li>• Number of Cores per socket: 8</li> <li>• Hyperthreading: Enabled</li> <li>• 512 GB RAM</li> <li>• 6 x 1GBPS NICs</li> <li>• 2 x 10GBPS NICs</li> </ul> </li> <li>• Two HP Proliant DL380 G7 servers equipped with:               <ul style="list-style-type: none"> <li>• Intel® Xeon® X5680 @ 3,332 GHz</li> <li>• Sockets: 2</li> <li>• Number of Cores per socket: 6</li> <li>• Hyperthreading : Enabled</li> <li>• 98 GB RAM</li> <li>• 6 x 1GBPS NICs</li> <li>• 2 x 10GBPS NICs</li> </ul> </li> </ul>
Storage	<ul style="list-style-type: none"> <li>• HP P4600 iSCSI SAN</li> <li>• Storage RAID 10</li> <li>• Network RAID 10</li> </ul>

## Installed Software

The following table lists the software used in the Actuate solution.

**Table 2: Installed Software**

INSTALLED SOFTWARE	
VMware	<ul style="list-style-type: none"> <li>• ESX 5.0</li> <li>• vCenter 5.0</li> <li>• vCloud Director 1.5</li> <li>• vShield 1.5</li> </ul>
Actuate	<ul style="list-style-type: none"> <li>• ActuateOne BIRT iServer 11 SP2</li> <li>• ActuateOne Information Console 11 SP2</li> </ul>
Database	<ul style="list-style-type: none"> <li>• Postgres SQL 8.4</li> </ul>

## Virtual Machine Configuration

The following table describes the configuration of virtual machines running on ESX host servers in the Actuate test configurations.

**Table 3: Virtual Machine Configuration**

VIRTUAL MACHINE	HARDWARE CONFIGURATION
ActuateOne BIRT iServer	<ul style="list-style-type: none"> <li>• 4 vCPUs</li> <li>• 16 GB RAM</li> </ul>
ActuateOne Information Console	<ul style="list-style-type: none"> <li>• 2 vCPU</li> <li>• 4GB RAM</li> </ul>
PostgreSQL	<ul style="list-style-type: none"> <li>• 2 vCPU</li> <li>• 4GB RAM</li> </ul>

## Workload Used

The viewing load test simulated multiple users simultaneously logging in and conducting different types of viewing requests on randomly selected pages of pre-generated BIRT designs. It is conducted with a constant load of user viewing requests to the ActuateOne Information Console and BIRT iServer. All systems were utilized with a steady operational workload pattern, where each system stayed at around 50 percent CPU utilization. With the load test in effect, a VMWare feature (vMotion, DRS, or HA) was activated and given enough time to complete within a predetermined length of time.

## Results Observed

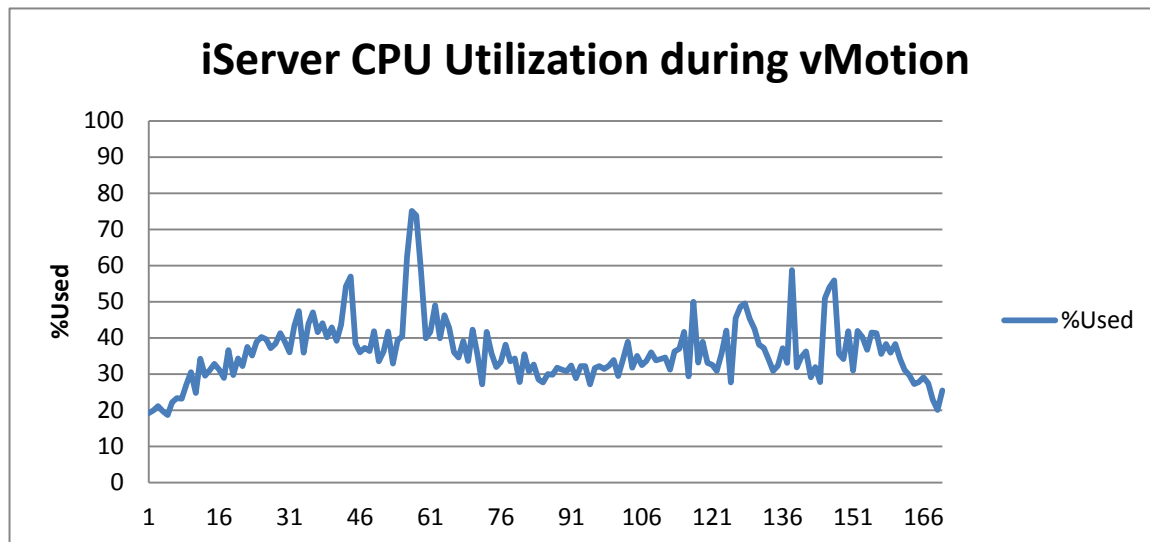
### Test 1: Load Test With vMotion Activation

A 15-minute load test was conducted with one ActuateOne BIRT iServer and one Information Console instance. At the five-minute mark of the load test, vMotion was activated to move the iServer VM to another ESXi host. For both configurations, the average response time and throughput remained within the expected timeframe.

**Table 4: Test 1**

TIME PERIOD	ACTION	AVERAGE RESPONSE TIME	THROUGHPUT
Minute 1-5	Load without vMotion	0.1 seconds	50 requests/sec
Minute 6-9	vMotion being activated	4.7 seconds	39 requests/sec
Minute 10-12	Load with vMotion	0.1 seconds	49 requests/sec

Figure 6: Test 1

**Test 2: Load Test With VMWare DRS**

A 30-minute load test was conducted with two ActuateOne BIRT iServer and two Information Console instances. At the 20-minute mark of the load test, the DRS feature was activated. For both configurations, the average response time and throughput remained within the expected timeframe.

**Table 5: Test 2**

TIME PERIOD	ACTION	AVERAGE RESPONSE TIME	THROUGHPUT
Minute 1-17	Load without DRS	0.2 seconds	150 requests/sec
Minute 18-20	DRS being activated	7.7 seconds	75 requests/sec
Minute 21-30	Load with DRS	0.8 seconds	144 requests/sec

**Test 3: Load Test With VMWare HA**

A 15-minute load test was conducted with two ActuateOne BIRT iServer and two Information Console instances. Each iServer and Information Console pair ran on a different ESX host. At the five-minute mark of the load test, one ESX host was forcibly restarted to simulate a crash.

**Table 6: Test 3**

TIME PERIOD	ACTION	AVERAGE RESPONSE TIME	THROUGHPUT
Minute 1-5	Load without HA	0.2 seconds	150 requests/sec
Minute 6-10	HA being activated	8.7 seconds	42 requests/sec
Minute 11-15	Load with HA	0.2 seconds	150 requests/sec

**Test 4: BIRT Content Generation with vMotion**

The final test simulated BIRT content generation with and without the operation of vMotion. A long-running generation job was submitted and was expected to finish in approximately 30 minutes. At the five-minute

mark, the iServer executing this job was moved via vMotion. The job continued to run before, during and after vMotion was activated. The whole job finished successfully, without any issues, in 30 minutes. The generated BIRT document was complete without any issues.

## Deployment Best Practices

Actuate and VMware relentlessly worked closely together to determine how IT data centers can best meet service requirements when deploying ActuateOne in VMware virtualized environments. Results from the testing described earlier in this paper shows that running ActuateOne on VMware virtual machines can provide an effective production-ready platform. With added benefits such as management and administrative flexibility, strong isolation and higher availability, VMware platform can serve as an ideal platform for ActuateOne Server consolidation.

Specific recommendations include:

- Carefully design storage configurations and evaluate external storage choices, RAID levels, and latency of IO operations.
- High spindle count on LUNs to ensure I/O capacity available.
- Use Thick Eager Zeroed disks for better I/O performance.
- Consider Nehalems or Westmeres with EPT for maximum performance.
- Consider using server-class network interface cards (NICs) for the best performance and configure paravirtualized vmxnet3 adapters for better network throughput.
- Disconnect or disable unused or unnecessary physical hardware devices, such as:
  - COM ports
  - LPT ports
  - USB controllers
  - Floppy drives
  - Optical drives (that is, CD or DVD drives)

Disconnecting or disabling these devices will help free up interrupt resources, because traditionally some devices such as USB controllers operate using a polling scheme that consumes extra CPU resources. Lastly, some PCI devices reserve blocks of memory, making that memory unavailable to ESX.

- Install VMware tools on the virtual machines. The VMware Tools package provides support required for shared folders and for drag and drop operations. Other tools in the package support synchronization of time in the guest operating system with time on the host, automatic grabbing and releasing of the mouse cursor, copy and paste operation between guest and host, and improved mouse performance in some guest operating systems
- Use VMware vMotion with VMware DRS to balance the load.
- Scale out versus scale up: Determine what components of the architecture work well with more than one virtual machine, and how large each virtual machine should be.
- Adding capacity: Determine how you could extend the configuration tested by adding more virtual machines or increasing the size of virtual machines to allow a higher user count or larger batch jobs to be run.
- Availability: Plan use of VMware HA and VMware FT as well as other availability solutions (such as other clustering technologies). Consider use of other disaster recovery options such as VMware's Site

- Recovery Manager (SRM).
- For better performance, ensure that the vCloud Organization vDC is configured to Thick Provision the vApps while deploying from the Catalog.

## Licensing

Customers who want to run multiple instances of the Actuate software using VMware based virtual machines, can license with Per Instance Licensing (the default), Multi-Instance Licensing, or Work Unit Licensing.

Actuate Multi-Instance licensing allows customers to deploy an unlimited number of instances of the ActuateOne software on the licensed CPU Cores. Multi-Instance licensing is a cost effective option when multiple instances of the software are being used in a virtualized environment supporting multiple applications and/or large numbers of users.

ActuateOne Work Unit licensing model offers flexibility for multi-core, server farm and cloud environments. It enables organizations to effectively plan for the BIRT capacity required, with granular licensing options based upon partial CPU usage.

Work Unit licensing ensures that customers can enjoy "pay as you grow" agility, knowing that Actuate maintains a vested interest in the success of application development. Furthermore, the Work Unit licensing model facilitates iterative, spontaneous application development and test cycles, since it enables IT departments to conveniently budget and plan while responding efficiently to end user requirements.

## Technical Support

Actuate support website: <http://www.actuate.com/support/>

## Conclusions

Overall, testing results show that running ActuateOne on VMware Infrastructure performs well. Furthermore, it has the potential to reduce cost, increase service levels and simplify the manageability of the application.

## Resources

Customers can find more information about VMware and Actuate products using the links listed below.

### VMware Resources

- VMware official website:  
<http://www.vmware.com/>
- VMware Infrastructure Web site:  
[http://www.vmware.com/products/data\\_center.html](http://www.vmware.com/products/data_center.html)
- VMware download Web site:  
<https://www.vmware.com/download/>
- VMware support Web site:  
<http://www.vmware.com/vmtn/>
- vSphere Installation and Setup Guide  
<http://pubs.vmware.com/vsphere-50/topic/com.vmware.ICbase/PDF/vsphere-esxi-vcenter-server-50-installation-setup-guide.pdf>
- VMware vSphere 5 Performance Best Practices:  
[http://www.vmware.com/pdf/Perf\\_Best\\_Practices\\_vSphere5.0.pdf](http://www.vmware.com/pdf/Perf_Best_Practices_vSphere5.0.pdf)

### vCloud

- vCloud Director Installation and Configuration Guide:  
[https://www.vmware.com/pdf/vcd\\_15\\_install.pdf](https://www.vmware.com/pdf/vcd_15_install.pdf)
- vCloud Director Administrator's Guide:  
[https://www.vmware.com/pdf/vcd\\_15\\_admin\\_guide.pdf](https://www.vmware.com/pdf/vcd_15_admin_guide.pdf)
- VMware Performance Tuning Paper:  
[http://www.vmware.com/pdf/vi\\_performance\\_tuning.pdf](http://www.vmware.com/pdf/vi_performance_tuning.pdf)
- vCloud Director Performance and Best Practices:  
<http://www.vmware.com/files/pdf/techpaper/VMW-Performance-vCloud-Director-1-0.pdf>
- System Compatibility Guide for a complete list of compatible hardware:  
<http://www.vmware.com/resources/compatibility/search.php?storage/SAN>
- Compatibility Guide for a complete list of compatible storage devices:  
[http://www.vmware.com/pdf/vi35\\_san\\_guide.pdf](http://www.vmware.com/pdf/vi35_san_guide.pdf)
- I/O Compatibility Guide for a complete list of compatible networking devices:  
[http://www.vmware.com/pdf/vi35\\_io\\_guide.pdf](http://www.vmware.com/pdf/vi35_io_guide.pdf)

### Actuate Resources

- Actuate official website:  
<http://www.actuate.com>
- ActuateOne product website:  
<http://www.actuate.com/products/>
- BIRT Exchange download website:  
<http://www.birt-exchange.com/be/downloads/>
- Actuate support website:  
<http://www.actuate.com/support/>
- Actuate white papers:  
<http://www.actuate.com/resources/whitepapers/>
- BIRT developer website:  
<http://www.birtexchange.com>