

COMPELLENT SERVER INSTANT REPLAY: A COMPLETE BOOT FROM SAN SOLUTION

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EXECUTIVE SUMMARY

For IT organizations with more than a few servers, deploying, provisioning and recovering servers are time- and resource-intensive tasks. Bringing a new server online or restoring a server can take several hours from start to finish. Administrators have to install the operating system (OS) and patches, install and test application software and install and test server specific settings. These labor-intensive server maintenance tasks pull IT administrators away from other more strategic projects, and perhaps most importantly, they jeopardize application availability since they require taking servers offline.

The storage space required to retain multiple, full boot images can be considerable. Storing independent Windows Server® images for each distinct server, for example, can quickly consume significant quantities of storage space. Moreover, the cost and complexity of storing and managing those OS images for a large number of servers can be a significant drain on an IT department.

Compellent® Server Instant Replay™ software works with the Compellent Storage Center™ storage area network (SAN) to provide a complete, integrated Boot from SAN solution that addresses the cost, complexity and storage space requirements involved with managing boot images for numerous servers. Server Instant Replay significantly enhances application availability by enabling administrators to rapidly deploy, provision and recover servers. Using an intuitive wizard, administrators can create boot images and provision a new server with just a few clicks. By maintaining an unlimited number of space-efficient boot images on the SAN, Server Instant Replay can dramatically reduce server hardware, infrastructure and service costs.

Booting from SAN Reduces Complexity, Lowers Costs and Accelerates Server Recovery

Booting servers from a SAN offers IT administrators numerous advantages compared with booting from direct-attached disks. By eliminating the need for servers with attached disks, administrators can deploy diskless or blade servers to consolidate their server infrastructure. Consolidation can help reduce the complexity of administration while also saving money on hardware, on-site service contracts and infrastructure costs.

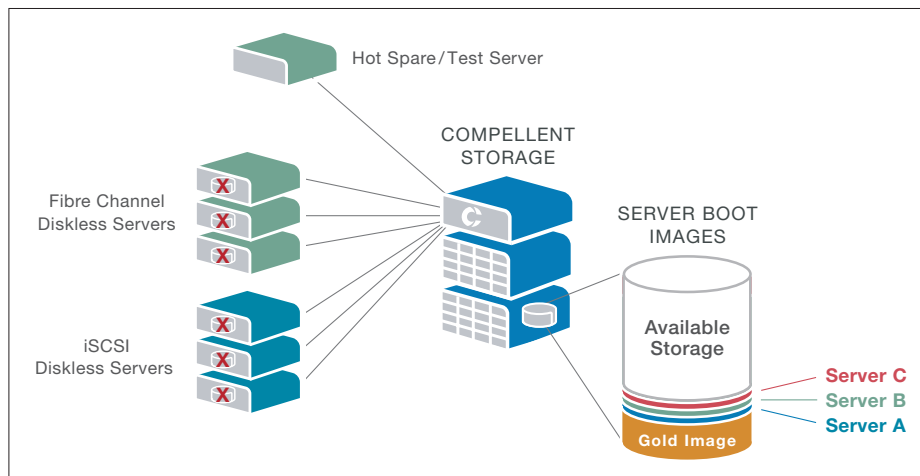


Figure 1: Compellent Server Instant Replay enables businesses to implement low-cost diskless or blade servers.

Booting from the SAN also provides opportunities for more centralized server management. When all data is stored on a centralized SAN, administrators can manage that data from a single console, greatly simplifying the processes of provisioning, reconfiguring and restoring server data.

In addition, booting from a SAN can improve disaster recovery. If a server using an internal boot disk fails, administrators might have to retrieve the boot and application data from tape or another backup source—a time-consuming process. With the boot image and application data on a SAN, administrators can simply replace the server with a hot-spare and boot it from the SAN. By booting from the SAN, administrators can cut server recovery times from hours to minutes.

Of course, not all SANs are created equal. Some SAN vendors that offer boot-from-SAN capabilities impose significant limitations on those functions. Some vendors limit the number of servers that can boot from the SAN or the number of logical unit numbers (LUNs) that can be created. Some SANs require a certain type of drive for the boot-from-SAN function or require server agents that interfere with the boot process. These limitations can make the implementation process complex and the solution difficult to manage.

Server Instant Replay Removes Obstacles for Booting from the SAN

Compellent Server Instant Replay removes typical boot-from-SAN limitations and leverages the unique architecture of the Compellent Storage Center storage area network to provide simple-but-powerful Boot from SAN functions. For example, Server Instant Replay capitalizes on Compellent's Thin Provisioning feature, called Dynamic Capacity™, to reduce the amount of storage needed to store multiple server boot images. An administrator might choose to allocate 30 GB for a boot volume in anticipation of future upgrades and patches, even if the boot data currently contains only 6 GB of data. Dynamic Capacity enables the administrator to create a 30 GB virtual volume while consuming only 6 GB of actual physical capacity. Although the volume can grow to consume all 30 GB of space, the unused capacity is part of a storage pool available for use by other servers.

Compellent Server Instant Replay can also help minimize the need for additional storage capacity as administrators deploy additional servers. Instead of storing the entire OS boot volume for each new server, Server Instant Replay creates pointers to the original boot volume along with the configuration information that is unique to the new server, such as its name and IP address. As a result, each Replay consumes only a few hundred megabytes of storage capacity—just a small fraction of the entire boot volume.

The significance of saving storage space becomes clear as more and more servers are added. With five servers, administrators might save more than 100 GB of space. Deploying 100 servers, administrators could easily save more than 2 TB.

Server Instant Replay also enables administrators to capture multiple Replays of server boot and application data over time. This feature is particularly useful in test environments. For example, administrators can add patches or upgrades, test them and then quickly roll the OS back to a prior state if necessary. Rather than rewriting the entire boot volume for each Replay, Server Instant Replay writes only the data that has changed since the most recent Replay. The small size of the Replays once again helps reduce storage requirements. In addition, Compellent Data Progression™ software ensures that those Replays are stored on the most cost-effective tier of storage by automatically migrating the data according to rules established by administrators.

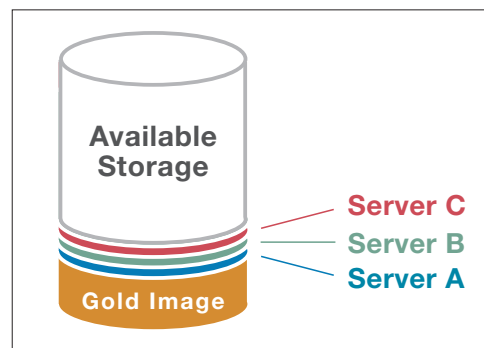


Figure 2: Server Instant Replay requires only small amounts of space for each additional server boot image.

Unlike SANs that limit the number of snapshots administrators can capture, Server Instant Replay enables administrators to take an unlimited number of boot image Replays and keep those Replays for unlimited periods of time. If they choose to, administrators can establish regularly scheduled Replays through a point-and-click interface. Thus, in the event of data corruption, administrators can quickly roll the boot volume back to a known good state instead of having to wait for a restore from tape.

Wizard Reduces SAN Management Time and Skill Requirements

Server Instant Replay provides an easy-to-use Boot from SAN wizard as part of the streamlined Storage Center Web interface. The wizard enables administrators to deploy new servers and restore servers in just a few clicks. Once the Gold boot image has been created, the wizard guides the administrator through the steps to create a Replay of the Gold image and then map it to the desired server. The first LUN is automatically set to 0 to accommodate the OS's that require boot volumes to be LUN 0. The administrator can then create an unlimited number of LUNs and enable an unlimited number of servers to boot from the SAN.

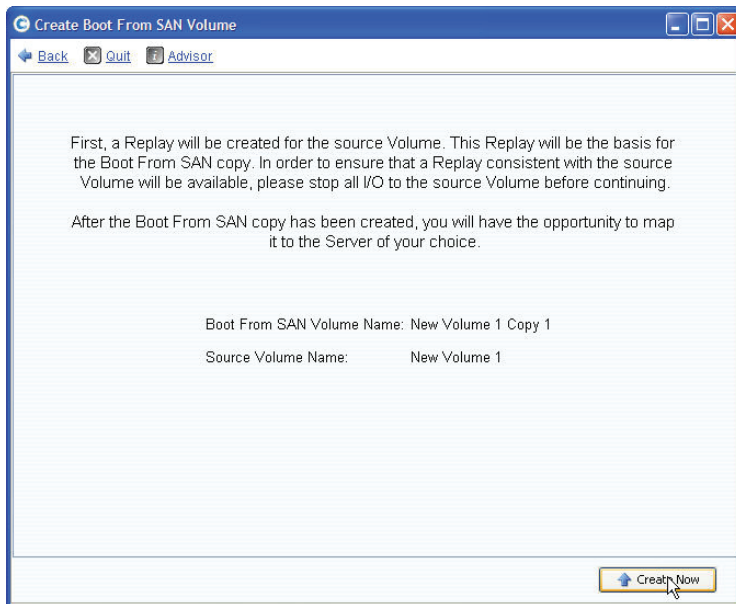


Figure 3: An intuitive wizard automates boot volume creation and recovery, guiding administrators through the necessary steps.

The Server Instant Replay wizard streamlines server provision and automates processes, eliminating the need for specialized IT skills or training. Experienced members of the storage team can focus on areas that require their skills instead of having to continually provision and restore servers. By offering a simple interface that helps prevent server provisioning errors, the wizard can dramatically reduce IT staff time and enhance application availability.

The wizard works in conjunction with Data Instant Replay to further reduce the time to deploy new servers. The process of deploying a new server involves creating only a pointer to a boot volume plus a small amount of unique configuration data. Creating a boot image clone might take 2 hours and making a full copy of data could take up to 30 minutes, but provisioning a new server or recovering a server with Server Instant Replay can take less than 15 minutes.

Server Instant Replay Simplifies the Setup of Test Environments

Server Instant Replay also makes it simple to set up and run test environments. The continual loading and reloading of operating systems and setup configurations on a limited number of test

servers can be tedious and time-consuming. With Server Instant Replay, administrators can boot test servers from one or more centralized images on the SAN. They can then test upgrades and patches on real data without risk.

Configuring a variety of operating systems and applications is as simple as pointing the server to a different boot image. An administrator could test a VMware® virtualized machine in the morning and a Linux® server upgrade in the afternoon all with the same server hardware. Without having to purchase and manage distinct test environments, IT organizations can increase administrator productivity and reduce equipment costs. When the testing is done, administrators can quickly roll back the boot image to an earlier state to put the server into production mode if needed.

Server Instant Replay Helps to Ensure Application Availability

By reducing the time to recover servers, Server Instant Replay can help administrators ensure high application availability. Without Server Instant Replay, an IT organization might replicate only application data to the disaster recovery site. If a server fails, administrators would need to recover the boot image for the server from tape or disk. If a complete server reinstallation is required, administrators would have to locate and reinstall the original OS; locate, reinstall and test patches; reinstall and test application software; and then reinstall and test server-specific settings.

In combination with Remote Instant Replay™, Server Instant Replay dramatically reduces the time to recover servers by creating and storing space-efficient Replays of the boot volume in addition to application data on the SAN at the disaster recovery site. In the event of a failure, administrators can power up a spare server, point the server to a boot image on the SAN and boot it up. This efficiency reduces the time to deploy, provision and recover servers from 8 hours to less than 15 minutes. With the application back up and running in minutes, users are protected from issues within the IT infrastructure.

TRADITIONAL STEPS	TIME	COMPELLENT STEPS	TIME
Power up server	1 min.	Power up server in rack	1 min.
Re-install OS	60 min.	Point server to boot image	1 min.
Reboot server	2 min.	Boot server	10 min.
Locate and install OS patches	120 min.		
Test OS and patches	60 min.		
Re-install application software	120 min.		
Test application software	60 min.		
Re-install server specific settings	30 min.		
Test server settings	30 min.		
Traditional Method: ~480 min.		Server Instant Replay: 12 min.	

Figure 4: Server Instant Replay reduces the number of steps required to recover a server or bring new servers online.

The ability to quickly boot a standby server as a temporary replacement can also help to reduce the costs of maintenance contracts. The IT group can select less-expensive next-business-day parts replacements instead of two- or four-hour response times.

Using Server Instant Replay to take Replays of boot volumes will also help to ensure that data is protected. If an OS becomes corrupted, the administrator can quickly roll it back to an earlier state. For additional security against data loss, administrators can quickly replicate boot images across multiple locations using Remote Instant Replay.

Server Instant Replay Can Help Reduce Infrastructure Costs

Server Instant Replay can help IT organizations realize significant cost savings by eliminating the need for server-attached disks. Although a 30 GB direct-attached disk might be all that is needed for the OS and associated data, many IT departments buy servers with much greater capacities to accommodate potential future needs. If the direct-attached disk is in a RAID configuration, even more storage is consumed. The use of a SAN for booting and data storage could easily save more than US\$800 per server.

Without the need for internal server storage, IT organizations can deploy dense blade servers or other diskless servers, minimizing real estate, power, cooling and cabling costs. The total savings from going diskless could easily reach US\$2,000 per server. Equivalent savings result from each additional server. *

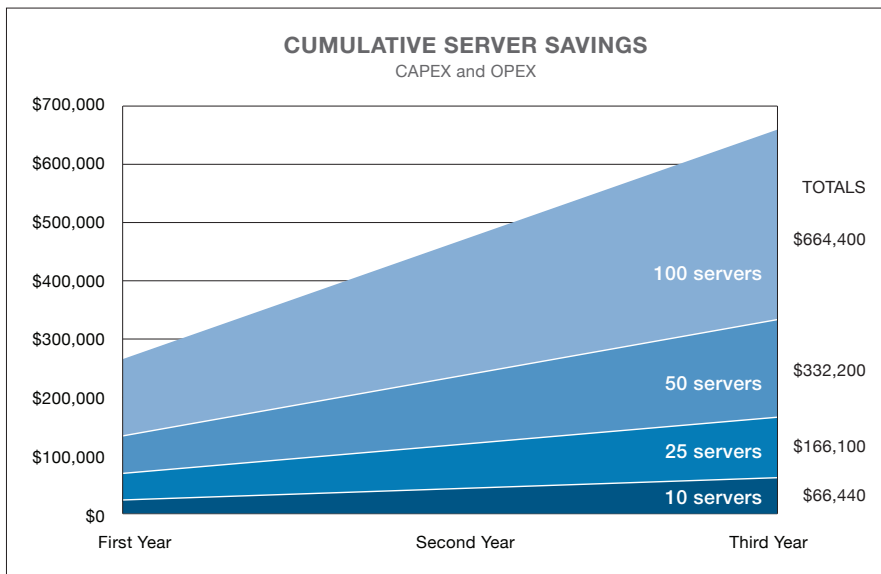


Figure 5: Server Instant Replay dramatically reduces the cost of owning, operating and managing every server attached to a Compellent Storage Center SAN.

Server Instant Replay Delivers on the Promise of Boot from SAN

Server Instant Replay extends the benefits of the Compellent Storage Center SAN by providing powerful Boot from SAN capabilities without the limitations imposed by other SAN vendors. By capitalizing on the Compellent Storage Center architecture, Server Instant Replay creates and maintains space-efficient Replays of OS and application data to help minimize costs and accelerate server provisioning and recovery. The powerful Web-based wizard enables administrators to create boot images, deploy servers, change server configurations and recover servers with just a few clicks.

Server Instant Replay is a free software included with Compellent Storage Center. No third-party software is required to create snapshots, and there are no per-server licensing fees. Thus, the savings grows with every server attached to the SAN. And because Storage Center is a complete, fully integrated SAN environment, adding Server Instant Replay builds off existing skills—there are no hidden costs of training.

*Calculated based on \$2,800 first-year savings for one server configured without hard drives (\$800 for two 146GB, 10K rpm SCSI drives), power and cooling for the drives (\$152), labor to configure the server (\$800), and purchase of next-business day instead of 4-hour onsite service plan (\$1,100).

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