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This white paper describes the new replication methods and technologies available with Microsoft Exchange Server 2007 and how they can be used with the Compellent Storage Center, and Replay Manager.

Please visit Microsoft Technet for more in depth information on each of the replication technologies and full Exchange 2007 documentation.

**Audience**

The target audience for this white paper is Exchange administrators, system administrators, storage administrators, and architects who analyze, design, and maintain robust storage systems. Readers should be familiar with Microsoft Exchange Server 2007, Microsoft Windows Server 2003, and Compellent Storage Center.

**Customer Support**

Compellent provides live support 1-866-EZSTORE (866.397.8673), 24 hours a day, 7 days a week, 365 days a year. For additional support, email Compellent at support@compellent.com. Compellent responds to emails during normal business hours.

**Disclaimers**

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General Syntax

<table>
<thead>
<tr>
<th>Item</th>
<th>Convention</th>
</tr>
</thead>
<tbody>
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<td>Menu items, dialog box titles, field names, keys</td>
<td><strong>Bold</strong></td>
</tr>
<tr>
<td>Mouse click required</td>
<td><strong>Click:</strong></td>
</tr>
<tr>
<td>User Input</td>
<td><strong>Monospace Font</strong></td>
</tr>
<tr>
<td>User typing required</td>
<td><strong>Type:</strong></td>
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<td>Website addresses</td>
<td><strong><a href="http://www.compellent.com">http://www.compellent.com</a></strong></td>
</tr>
<tr>
<td>Email addresses</td>
<td><strong><a href="mailto:info@compellent.com">info@compellent.com</a></strong></td>
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Document Revision

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<th>Revision</th>
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<td>6/10/2009</td>
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Exchange 2007 Replication

Local Continuous Replication (LCR)

Local Continuous Replication (LCR) is the simplest form of the new replication options. LCR is most common in Exchange deployments where direct-attached storage (DAS) or local disk is used. Storage resiliency is the primary goal with this type of replication, which essentially mirrors the Exchange database and transaction logs to separate physical volumes on the same server. In the event of a physical disk failure, a manual activation could be initiated allowing the LCR target to take over for the failed source.

Although not very common, LCR could be leveraged in a single Compellent Storage Center environment since the same physical disk pool would most likely be used for the source and target replication. If another Storage Center exists in the environment that the servers can access similarly, this could be used as a target for LCR replication by creating matching volumes form the secondary Storage Center and mapping those up to the production Exchange Server.
Cluster Continuous Replication (CCR)

In Exchange 2007, you can cluster your mailbox servers to be either active or passive. The concept of an active/active cluster that existed in Exchange 2003 is not supported in Exchange 2007. The only clustering option available in Exchange 2007 is for an active/passive configuration. With each Exchange cluster able to have as many as eight nodes, it is possible to have multiple active nodes, but each cluster must contain at least one passive node. The best practice for the Exchange 2007 cluster configuration is a 1:1 ratio; that is for each active node, there should also be a passive node. It should also be noted that CCR is supported only in a two-node configuration.

Using CCR requires a fundamental change in the way the cluster is designed. In a traditional Windows Failover Cluster, all disk resources were based on a shared storage model. In the shared storage model, a single disk resource existed and was mapped to all nodes in the cluster. Only the node that owned the resource at a given time could read and write to it. In many cases, this would leave the disk as a potential single point of failure.

With CCR, each node is a member of a Windows Failover Cluster, however, each has its own set of storage resources (volumes) for which the Exchange databases and transaction logs reside. In this configuration, CCR eliminates the single point of failure and removes the dependency on having shared storage for the cluster while delivering high availability.

During the initial configuration after the passive mailbox server has been added to the cluster, Exchange 2007 initiates the seeding process. During this process, the storage groups and databases from the active node are copied to the passive node. Once this is completed, Exchange continuously uses asynchronous log shipping to keep the passive node up to date.

CCR will most likely be the most widely adopted replication method for Exchange 2007. It provides the automated failover that most enterprise customers require and can leverage the Standby Continuous Replication (SCR) method to provide additional resiliency.
Standby Continuous Replication (SCR)

SCR extends the capabilities of the other Exchange replication technologies by adding the ability to have site resiliency. Environments that use a stand-alone mailbox server, a mailbox server that is clustered and using CCR, or a mailbox server that is a member of a single copy cluster can take advantage of SCR.

The SCR target must have the mailbox role installed but does not necessarily have to be hosting any mailboxes. Standby Continuous Replication differs from its LCR and CCR counterparts by having the ability to include multiple replication targets, as well as an administrator-configurable replay delay to prevent a scenario in which corruption scenario could be transferred from the source to the target.

SCR is a great solution for disaster recovery as it allows you to maintain your production site and leverage LCR, CCR, or SCC, which provide a certain level of redundancy while SCR adds the extra layer necessary in the event that a site and its resources are completely lost.

Single Copy Clusters (SCC)

Exchange 2007 still supports the traditional concept of a shared storage cluster. In this scenario, all nodes of the cluster are all connected to the same physical volumes, but only one node can own the resource at a time as only a single copy of the storage groups are maintained.

Traditional storage could possibly make itself the single point of failure in a single copy cluster, but the Compellent Storage Center with redundant controllers and built-in storage management and redundancy provides the robustness required to successfully implement a trusted and reliable Exchange 2007 single copy cluster.

With SCC, in the event of a node failure, the storage resources are shifted to another node in the cluster where that node can take over in servicing requests.
Replay Manager for Microsoft Servers

The newest version of Replay Manager offers support for helping to backup and recover Exchange 2007 storage groups. With Replay Manager, you can select the storage groups you wish to snapshot, specify additional options for the snapshot, and then take the snapshot immediately or schedule it to be taken at a regular interval customized to your specific requirements.

Replay Manager integrates with and leverages Microsoft’s Volume Shadow Copy Service (VSS) framework, which is standard on any Windows Server 2003 and Windows Server 2008 installation. VSS assists in making sure that Exchange is in a consistent state at which a snapshot of the current database and transaction logs can be obtained for backup purposes.
Backups of your storage groups can be initiated at regular intervals and you have the option to run a consistency check on the snapshots that are taken for your Exchange environment.

Replay Manager complements any of the Exchange 2007 replication methods by providing point-in-time snapshots of your Exchange database and transaction logs and allowing you to easily recover the data needed to perform individual mailbox recoveries or full environmental recovery if necessary.

**Replay Manager Services Recovery Scenarios**

There are a number of scenarios where Replay Manager could be used for recovery. Below are the most common that you could see in most Exchange implementations.

**Database Recovery**

A common scenario would be to perform a full database recovery in the event of logical corruption or a virus event. Replay Manager can be used to recall a previous snapshot before the point of the event and then automatically restore the required database and transaction logs to their original location. During this time, the database is dismounted while the replays are surfaced and the snapshot data is copied back to the volume(s). Once this operation is complete, the database is mounted, and service resumes.

Alternatively, Replay Manager can expose the necessary replay volumes, which contain the transaction logs, and database and the administrator can perform the required recovery procedures manually. This allows the administrator the flexibility to determine the preferred course of action. (Example: Replace infected database and log volumes with replay volumes so forensics can be performed on infected volumes)

**Individual Mailbox Recovery**

Replay Manager is most commonly used in the event that a mailbox has to be recovered for a user. With the ability to provide the necessary recovery points based on administrator configuration of the Replay Manager schedules, you can easily recover user mailbox data with Compellent replays and Exchange 2007 Recovery Storage Groups.

Similarly to database recovery, Replay Manager can be used to expose any available recovery point to drive letters or mount points, which can then be configured as the target database and logs volumes for a Recovery Storage Group in Exchange. Exchange 2007 has tools built-in to assist in the setup of a Recovery Storage Group and a wizard that helps to recover mailbox data from that Recovery Storage Group.

**Remote Instant Replay**

Remote Instant Replay is Compellent’s replication mechanism. RIR allows you to synchronously or asynchronously move data over Fibre Channel or iSCSI to one or many Compellent Storage Centers. Remote Instant Replay replicates continuous snapshots, called “Replays” between local and remote sites, ensuring business continuity at a fraction of the cost of other replication solutions.

Remote Instant Replay can be leveraged as an alternative to any of the Exchange 2007 replication methods. Although this is an option, the Exchange 2007 replication methods offer some attractive features like its full integration into the Exchange application and fully automated failover in a CCR configuration.
Which Replication Method Should Be Used?

Should you use Storage Center replication or the replication methods that are built in to Exchange 2007? This all depends upon the requirements of your business and things such as your recovery time objective (RTO) and recovery point objective (RPO).

Cluster Continuous Replication fully integrates into Exchange and provides automated failover in the event of a storage or server failure, however it does require twice as much storage since each cluster node has its own volume resources. Because of this, solutions like single copy cluster and standby continuous replication are more feasible for users with limited storage resources.

While Compellent Storage Center Remote Instant Replay is not part of the Exchange application, it does allow you to replicate cost-effectively over IP using existing networks, infrastructure and staff. You can also leverage efficient Thin Replication, which consumes less space and reduces cost. You can maximize your bandwidth utilization with replication link estimation and optimization while ensuring availability of data with an unlimited number of recovery points at multiple locations. With this solution, synchronous or asynchronous replication at multiple locations meets a wide range of enterprise disaster recovery requirements.

Recovery Limitations

Replay Manager provides the capability to manage volume snapshots of your Windows Servers and application specific data like SQL Server and Exchange Server. Although Replay Manager offers the ability to expose snapshots to drive letters or mounts, or automatically recover an entire Storage Group or SQL Database automatically, it does not offer a fully automated disaster recovery process.

Replay Manager can be leveraged to take snapshots of data at a production site and Storage Center can asynchronously replicate these snapshots to a secondary or disaster recovery site. However, once these snapshots are replicated to a different system, they have to be managed in a manual process directly from the Compellent Storage Center management console.

In a disaster recovery situation, replays replicated to the disaster recovery site will have to be mapped up manually by the administrator, as Replay Manager does not provide this functionality. Also, any recovery steps that are necessary from the application will also have to be completed by the administrator.
Additional Resources

Remote Instant Replay
http://www.compellent.com/Products/Software/Remote-Replication.aspx

Replay Manager Services for Microsoft Servers
http://www.compellent.com/Products/Software/Replay-Manager.aspx

Technet: Local Continuous Replication

Technet: Cluster Continuous Replication

Technet: Standby Continuous Replication

Technet: Single Copy Clusters

Microsoft Exchange Team Blog
http://msexchangeteam.com/

Microsoft Exchange Server 2007 Documentation