



## Challenges with Current Products and Technologies

On one end of the spectrum, there are several products that perform daily incremental and weekly full backups. This approach is typically resource and I/O intensive on the guest VMs. These products are based on traditional backup methods causing end users to encounter problems with backup windows encroaching into business hours on production VMs. In some cases different products from single or multiple vendors have to be utilized in order to perform backup and replication and even then, these two tasks cannot be performed simultaneously.

On the other hand, users can automate site wide failover using array-based replication that has been qualified to work with VMware site recovery manager (SRM). Although a seemingly elegant solution, this can be an expensive endeavor due to the array based replication requirements. Additionally this is only possible within a very narrow set of storage platforms. This imposes undesirable restrictions including potentially migrating production to supported platforms, and foregoing cost optimizations in the storage hardware used for your secondary site. In addition, the protection and recovery options are not granular. You can only protect entire datastores not individual VMs, and have to make do without application consistent restore points on a per VM basis. Due to this, users often have to spend significant amount of time bringing up applications at the time of actual failover, thus significantly increasing the recovery times.

## Blazing Fast Backups with NO Backup Windows

InMage vContinuum tracks data changes right from memory, eliminating any backup or replication I/O impact on production VMs. The low impact data tap then transmits the changes in real-time to the server. With this approach, backup windows are entirely eliminated on production VMs. The vContinuum repository VM continuously backs up these changes, allowing for the ability

to restore protected virtual machines to any point in time. The solution can scale to handle large deployments seamlessly.

## Replication with Near Zero Data Loss and Push Button Site-Level Failover

InMage vContinuum provides one-to-many data protection capabilities to enable local backup and remote replication simultaneously and continuously. The vContinuum server offloads compression, encryption, WAN acceleration, bandwidth management, centralized monitoring and other tasks from the production VMs. The vContinuum wizard also provides a simple mechanism to perform DR tests through push-button failover and fallback operations. Production VMs can be recovered to the latest available data with near zero data loss, or even the last application consistent point to ensure extremely low recovery times. Pre-defined recovery sequencing policies allow for failing over multi-tier applications spanning several VMs in the correct order, while taking the shortest time possible. Further, vContinuum also automates retargeting the recovered VMs to DR networking scheme to further reduce overall RTO.

The wizard based GUI provides a quick and easy way to create protection policies. As part of this process the wizard auto-provisions failover VMs, performs push installation of all required software elements, and creates all required protection and application consistency policies. The wizard supports granular protection for selective VMs, disks and newly added disks of an already protected VM. The replication engine utilizes intelligent file system aware seeding for the initial copy to significantly reduce seeding time and bandwidth utilization. Additionally, the offline sync feature enables bandwidth-constrained environments to synchronize the VM disks to removable storage at a primary site first, and then ship them to secondary site. Subsequent synchronization only transmits changes over the WAN thereby conserving bandwidth

utilization even for the first copy.

## Instantaneous Application Consistent and Granular Recovery and Non-Impacting DR Rehearsals

Application consistency is enforced at scheduled intervals as part of the protection policy. For Microsoft Windows production VMs this is achieved through VSS integration for applications such as MS Exchange, MS SQL, SharePoint and Fileservers. For Linux production VMs and applications like MySQL and Oracle, application native mechanisms are supported. The target agent maintains the retention data, which contains CDP journal and application consistency bookmarks. This allows for any point-in-time recovery in the retention window, in addition to application consistent points. Sparse retention provides long-term data retention for disk backup, by keeping just the application consistency bookmarks at sparse intervals as time progresses. This significantly minimizes target storage requirements, while providing all the benefits of CDP based disk backup. Once the protection policy is created it can be monitored and managed from the server GUI.

The server GUI can be used to perform non-disruptive operational recovery through use of virtual or physical snapshots that are application consistent. Snapshots can be created to any point-in-time in the specified retention window, without affecting on-going replication. Virtual snapshots can be created instantaneously, and do not consume any additional target storage. They can even be leveraged to off-load reporting, testing and development from a production VM to the target. Any changes made are stored as temporary files that are deleted once the virtual snapshot is destroyed. Snapshots provide an easy and effective way to perform granular operational recovery at disk (VMDK), file and object levels. Support for object level recovery is available for Microsoft Exchange; it enables the restoring of individual user mailboxes or e-mail messages back to their original Exchange servers.

InMage vContinuum provides mechanisms to perform DR rehearsals without any impact to live production VMs. This is made possible by retargeting the VMs to an isolated network. Further, it can also perform rehearsals without impacting on-going replication by using a snapshot based approach. This workflow creates a second copy of the target VMs for recovery in an isolated network. Once testing and validation is complete, the snapshots are simply deleted to reclaim target storage.

### Recovery Points

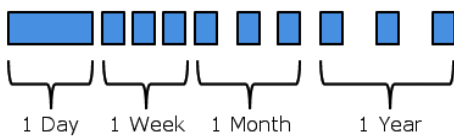


Figure 2. Recovery Points available with Sparse Retention while minimizing target storage requirements.

### Sparse Retention and Target Storage Capacity Optimization

Traditional backup products rely on post backup deduplication to minimize data redundancy and reduce target storage

requirements. However, depending on the production data, target storage utilization still increases linearly over time. InMage vContinuum provides a novel form of capacity optimization called sparse retention, to retain long term CDP information on disk while minimizing target storage utilization. As time progresses the application consistency bookmarks are maintained at less frequent intervals. For example, a sparse retention policy could be specified as: retain all changes for the last three days, one recovery point per hour for four days beyond that, and one recovery point per day for older data. This gives the ability to recover to application consistent points further back in time without consuming significantly more target storage beyond the first week. vContinuum also features thin provisioning and compression support, to further reduce disk capacity requirements for backup.

### Scalable Architecture and Seamless Upgrade to Protect Physical Servers

InMage vContinuum is based on a host-offload architecture due to which the

impact on production VMs is extremely low. Compute intensive tasks such as, compression and WAN acceleration are handled by the vContinuum server. This model can scale very easily to accommodate increased production VMs or storage capacities by pointing them to an existing vContinuum server or provisioning additional ones as required. Since replication takes place at the guest VM level, it can accommodate any underlying hardware, storage architecture (DAS, SAN, NAS) and storage technology (SCSI, iSCSI, FC). This provides users with the maximum flexibility in planning and provisioning a cost-effective secondary infrastructure for backup or replication. The product offers a common feature set across VMware versions from ESX/ESXi 3.5 to vSphere 5.0 and integrates with VMware vCenter to ease deployment and management tasks while enhancing security. In addition, InMage vContinuum can be seamlessly upgraded to protect, manage and recover physical servers, thus providing a single consistent approach to backup and replicate mixed virtual and physical environments.