



## Adaptive Infrastructure

Managing Resources in a Mixed Up World

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# Introduction

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Over the last forty years, the world of computing has gone through a series of important shifts to get us to where we are today.

**1970s:** The birth of personal computing, characterized by a focus on the device and what it could do.

**1980s:** The birth of local networking, characterized by a focus on linking devices and accessing shared resources.

**1990s:** The birth of the Internet for the masses, characterized by a focus on electronic communications and commerce.

**2000s:** The birth of mobile computing, characterized by whole new classes of devices, and a focus virtual identity and community.

Now we find ourselves in the second decade of the 21<sup>st</sup> century (the 2010s...two-thousand-teens?) and computing continues to evolve at a tremendous pace. So what is the focus now? With entire identities and relationships built in the ether, today's focus is increasingly on data access and protection.

It's no longer about the hardware, or the network, or the application. It's about data, and the ability to access that data...anytime...anywhere.

Today's computing infrastructure needs to support this paradigm, which brings us to the idea of Adaptive Infrastructure. *Adaptive Infrastructure* provides fast and reliable access to data and the applications that rely on that data. When a problem occurs, you better be able to get things running again in very short order.

To help put the importance of data, the National Archives & Records Administration reports that **93% of companies that lose access to their data for 10 days or more file for bankruptcy within one year; 50% filed for bankruptcy immediately.**

An Adaptive Infrastructure helps you avoid this fate by providing the following:

- Complete portability of data, server resources, and desktop resources.
- Agnostic to underlying platforms and technology. It shouldn't matter what physical hardware you use, what hypervisor you use, what data storage you use, or what your network looks like.
- Manage data so you can roll-back to a previous state quickly and easily.
- Ability to replicate any, or all, infrastructure components as needed.

## StorageCraft Solutions

StorageCraft® understands the needs of today’s connected organizations. Its robust yet simple product line of disaster recovery and migration products provides the infrastructure “intelligence” to enable Adaptive Infrastructure. Just as important, it offers these solutions at a price point accessible to the SMB market.

### ShadowProtect

StorageCraft ShadowProtect® provides robust and flexible disaster recovery by creating and managing backup image files. Each backup image file represents the exact state of your system at a given point-in-time.

StorageCraft licenses ShadowProtect by system. One license lets you back up one Windows operating system, regardless of the number of volumes.

ShadowProtect consists of the following components:

| Component             | Features   |
|-----------------------|--|
| ShadowProtect Console | <p>An easy-to-use console that lets you manage the disaster recovery configuration on one or more Windows systems. ShadowProtect console provides the following primary features:</p> <ul style="list-style-type: none"> <li>• Wizard-based back-up to any accessible storage, including local storage, network storage (SAN, NAS, iSCSI), and even optical media (CD, DVD, Blu-Ray).</li> <li>• Compressed and encrypted backup image files for efficiency and security.</li> <li>• Wizard-based recovery of files, folders, or a complete data volume, to an exact point-in-time.</li> <li>• Mount backup images for quick recovery of individual files and folders.</li> <li>• Remotely manage system backup and recovery operations.</li> <li>• VirtualBoot lets you immediately recover from a disaster by mounting a backup image file as a virtual disk in a VM.</li> </ul> |
| ShadowProtect Agent   | <p>The engine that creates and manages a system’s point-in-time backup images. The ShadowProtect Agent also handles mounting of backup image files. The ShadowProtect Agent provides the following primary features:</p> <ul style="list-style-type: none"> <li>• Microsoft VSS-based backup for guaranteed-reliable data snapshots.</li> <li>• Efficient, sector-level full, incremental, and differential backup images.</li> </ul> <p>You can configure and manage the ShadowProtect Agent from the ShadowProtect Console.</p>  |
| StorageCraft Recovery | <p>A bootable Windows PE-based environment for disaster recovery of system volumes without installing software.</p>  |

|             |   |
|-------------|---|
| Environment | <ul style="list-style-type: none"> <li>• Access all the features of the ShadowProtect Console from a standalone disaster recovery environment.</li> <li>• Hardware Independent Restore (HIR) lets you migrate resources to a different environment, whether physical or virtual. (P2P,P2V,V2P, V2V).</li> <li>• Network configuration tool to manage TCP/IP properties, domains and network resources.</li> </ul> |
|-------------|---|

## ShadowProtect ImageManager

ShadowProtect ImageManager™ lets you manage Incremental backup images and the storage space consumed by your backup image files.

StorageCraft includes base ShadowProtect ImageManager features with a valid ShadowProtect license. To enable enterprise features you must purchase a “job” license that enables that feature on a ShadowProtect system.

ShadowProtect ImageManager provides the following basic features:

| Feature              | Description  |
|----------------------|--|
| Verify               | Based on a frequency that you define, ShadowProtect ImageManager regularly verifies the integrity of your backup image files to ensure they will work in a recovery situation.   |
| Consolidate          | Based on a policy that you define, ShadowProtect ImageManager automatically consolidates Incremental backup image files. This limits the risk of having large backup image file chains where one bad file can render a whole backup image useless.   |
| Replicate (Local)    | Based on a profile that you define, ShadowProtect ImageManager automatically creates redundant copies of backup image files to locally-attached storage. Smart replication technology evaluates the consolidation policy to avoid transferring unnecessary or obsolete backup image files.   |
| Replicate (Network)  | (Requires ShadowProtect ImageManager Enterprise job license) Based on a profile that you define, ShadowProtect ImageManager automatically creates redundant copies of backup image files to network-attached storage (server, NAS, SAN, iSCSI). Smart replication technology reduces bandwidth usage by evaluating the consolidation policy and transferring only the required consolidated image files. |
| Replicate (Off-site) | (Requires ShadowProtect ImageManager Enterprise job license) Based on a profile that you define, ImageManager automatically creates redundant copies of backup image files to an FTP server. Smart replication technology reduces bandwidth usage by evaluating the consolidation policy and transferring only the required consolidated image files.  |

|                           |   |
|---------------------------|---|
| <b>HeadStart Restore®</b> | (Requires ShadowProtect ImageManager Enterprise job license) HeadStart Restore (HSR) lets you initiate a recovery operation while ShadowProtect continues to add Incremental backup images to the same backup image chain. HSR short circuits the restore process, greatly reducing the down-time associated with a hardware or software failure. |
|---------------------------|---|

## ShadowProtect Granular Recovery for Exchange

ShadowProtect Granular Recovery for Exchange™ (GRE) lets you quickly and easily recover data from Exchange Database (EDB) files. With it, you can restore or migrate mailboxes, messages or attachments from a backup image file that contains the EDB file to a production Exchange server or PST file for fast recovery and migration.

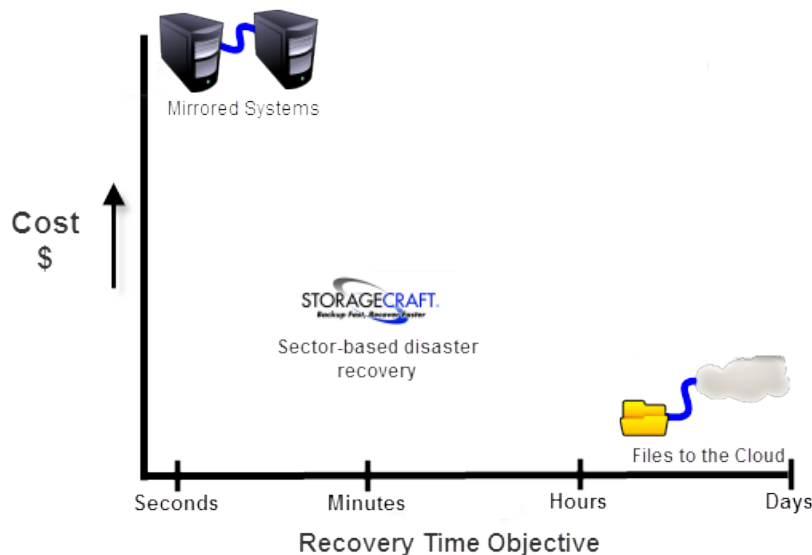
StorageCraft licenses ShadowProtect GRE based on the number of mailboxes you want to manage (1-250, and 251-500). Above 500, you can purchase licenses for individual mailboxes as needed.

ShadowProtect GRE provides the following basic features:

| Feature               | Description   |
|-----------------------|---|
| <b>Data Recovery</b>  | Recover mailboxes, email messages, and email attachments from EDB files contained in a ShadowProtect backup image file.   |
| <b>Data Migration</b> | Create a current ShadowProtect backup image file, then use ShadowProtect GRE to restore Exchange resources to a different system, either virtual or physical.<br><br>In the same way, you can easily migrate existing Exchange data to a new version of Exchange. |
| <b>Data Discovery</b> | As required for legal or regulatory purposes, search individual mailboxes or email messages for specific keywords. For an additional fee you can purchase an attachment search agent that lets you search the contents of email attachments.                      |
| <b>Report</b>         | Generate comprehensive reports to simplify Exchange management.   |

# Enabling Adaptive Infrastructure

Adaptive Infrastructure is all about creating an environment where resources can easily migrate and shift as needed to provide reliable access to data and applications. There are multiple solution architectures available to solve this problem.



Your best solution depends on the following:

**Budget:** It all comes down to money, right? How much do you have available to protect your data and systems? That information largely determines the degree to which you can implement an Adaptive Infrastructure.

**Recovery Time Objective (RTO):** Identifies how quickly you must get business systems back on-line after a failure or migration. RTO helps you determine the recovery/migration technology to use when implementing an Adaptive Infrastructure.

**Recovery Point Objective (RPO):** Identifies the level of acceptable data loss in the event of a system failure. RPO helps you determine the resources to commit data redundancy and protection.

StorageCraft offers a simple and affordable option for implementing an Adaptive Infrastructure. It leverages an efficient sector-level snapshot technology that accounts for desktops, servers, and their associated data. A StorageCraft Adaptive Infrastructure lets you quickly and easily roll-back any desktop, server, or data set to a specific point-in-time, while remaining agnostic toward the underlying infrastructure components. You can then replicate these point-in-time snapshots to secondary and remote locations.

Because of StorageCraft's holistic approach to Adaptive Infrastructure, its products and technologies comprise the foundation of business continuity and disaster recovery solutions for a broad array of

companies and industries. However, StorageCraft maintains a focus on serving the needs of the Small to Medium Business (SMB) market where budget constraints are a fact of life, but where its holistic approach to data protection is crucial to business operations.

StorageCraft products and technologies address the following characteristics of an Adaptive Infrastructure:

- Flexibility
- Integrity and Reliability
- Efficiency
- Security
- Administration

## Flexibility

Flexibility is the core of Adaptive Infrastructure. Other characteristics exist primarily to provide a foundation for infrastructure flexibility. Infrastructure flexibility makes it possible to quickly and easily recover from a disaster and migrate resources from one platform to another.

Through ShadowProtect and ShadowProtect ImageManager, StorageCraft offers unparalleled environment flexibility. Consider the following:

**Flexible Scheduling:** ShadowProtect supports multiple backup options so you can choose how best to protect your resources:

- **Weekly Schedule:** Create at least one Full backup image per week and Incremental backup images as often as every 15 minutes. Typically, this results in a complete backup image chain each week.
- **Monthly Schedule:** Create at least one Full backup image per month and Incremental backup images as often as every 15 minutes. Typically, this results in a complete backup image chain each month.
- **Continuous Incrementals:** Create only one Full backup image and Incremental backup images as often as every 15 minutes. In this case, use ShadowProtect ImageManager to manage the consolidation and retention of Incremental backup image files over time.

**Hardware Independent Restore (HIR):** From the StorageCraft Recovery Environment, HIR provides complete control over a restore operation; allowing you to change drivers and boot processes when moving a volume to different hardware, or to/from a virtual environment.

**Virtualization:** ShadowProtect provides robust support for virtualized environments:

- **Hypervisor Agnostic:** StorageCraft doesn't care what hypervisor you settle on, or whether you use multiple hypervisors. vSphere, Hyper-V, XenServer, Parallels...ShadowProtect can work with them all.
- **Native Snapshots:** ShadowProtect uses a native VSS Provider to collect all VM snapshots rather than relying on third-party APIs or hypervisor-based snapshots.

- **Pricing per VM:** ShadowProtect Virtual licenses are not tied to a specific host, so you can deploy them as you see fit. And StorageCraft doesn't attempt to deceive you with mythical "unlimited" pricing that ignores the hardware constraints of deploying virtual machines.

**HeadStart Restore (HSR):** ShadowProtect ImageManager offers HSR as a way to meet slim RTO windows of critical applications and their data in a cost effective manner. HSR lets you initiate a restore operation on a backup image while ShadowProtect continues to add Incremental backups to the same backup chain. If a problem occurs, simply apply the last few Incremental images, then finalize the disk for use. In a matter of minutes, you can recover from catastrophic failures.

**Note:** HSR "trickle charges" the fail-over environment, maintaining a time gap between the fail-over system and the production system. This delay lets you "roll-back" from a virus or other form of system corruption.

**VirtualBoot:** When a mission-critical application goes down, you need to get it back up as quickly as possible. VirtualBoot™ lets you bring up a Virtual Machine (VM) that uses a ShadowProtect backup image chain as its virtual disk. Think of a VirtualBoot VM as an emergency system to get resources back on-line while you repair the production system.

**ShadowProtect Converter:** ShadowProtect lets you convert backup image files in the following ways:

- **Convert to Virtual Disk:** You can convert any point-in-time backup image into a virtual disk (VMDK or VHD) that you can immediately reference from an existing VM.
- **Convert to Full:** You can combine any backup image chain (Full image + Incremental images) into a single Full image file (.spf).

**Mount Image:** ShadowProtect lets you mount any point-in-time backup image as a Windows drive letter or share. Once mounted, you can interact with it just as you would any other drive. ShadowProtect offers all the benefits of sector-based backup with recovery options down to a specific file or folder.

**GRE Restore:** ShadowProtect GRE does for Exchange environments what Image Mount does for Windows volumes. With GRE you can easily search and restore individual Exchange items (emails, mailboxes, calendar events, etc.)

**Note:** GRE search lets you search Exchange based on keyword, subject, date, and user. Optionally, you can include email attachments in the search.

## Integrity and Reliability

Integrity and reliability refers to the backup image files that form the foundation of StorageCraft data recovery and migration solutions. Consider the following:

**Complete VSS Integration:** StorageCraft ShadowProtect integrates tightly with Microsoft VSS, acting as both a VSS Requestor and a VSS Provider, to create completely reliable data snapshots. This integration provides unsurpassed data and transactional integrity when creating backup

image files. In fact, StorageCraft has licensed basic versions of this core technology to several partners that use it as the basis for their own disaster recovery products.

**Image Integrity:** ShadowProtect leverages MD5 checksum technology to verify backup image file integrity. Furthermore, ShadowProtect ImageManager lets you automate ongoing file verification so that you can rest assured that when needed, a backup image file will perform as expected.

**Notification and Reporting:** Both ShadowProtect and ShadowProtect ImageManager create detailed logs of its operations. These logs provide a comprehensive view of your ShadowProtect environment and extensive information for troubleshooting problems that might arise. Furthermore, you can configure email notification for both failed and successful operations to keep responsible parties' informed.

## Efficiency

StorageCraft uses sector-level backup, as opposed to file-level backup, to maximize efficiency throughout the Adaptive Infrastructure. Consider the following:

**Efficient Backup:** Sector-level backup lets ShadowProtect monitor resource changes in very small increments. Rather than having to re-copy the entire file, ShadowProtect can copy only those sectors that actually change. This makes Incremental backup images very small and greatly reduces system loads for ongoing backup operations.

**Note:** This architecture nearly eliminates the need for resource-intensive deduplication at the backup target. The minimal benefit of deduplication is simply not worth the high price paid in performance degradation on the server or desktop system.

**Efficient Replication:** The small size of ShadowProtect incremental image files translates into reduced network overhead when copying (replicating) backup image files for redundancy. Beyond that, ShadowProtect ImageManager lets you automate the replication process and supports multiple replication targets, including local storage, network storage, and off-site storage via FTP.

**Performance Throttling:** ShadowProtect provides performance throttling that limits the amount of I/O resources consumed by backup and restore operations.

## Security

A key requirement for Adaptive Infrastructure is that it must not increase security vulnerabilities. ShadowProtect provides a range of encryption technologies that can secure backup images from prying eyes. This becomes even more important when storing backup images off-site or in a location where you don't have overall control.

Supported encryption algorithms include:

**RC4 128-bit:** This encryption option is the fastest but least secure.

**AES 128-bit:** (Default) This encryption option strikes a balance between speed and security.

**AES 256-bit:** This encryption option is the most secure but slowest.

## Administration

Any Adaptive Infrastructure environment must include tools sufficient to manage ongoing backup and restore operations and the storage and maintenance of backup images. Beyond this, administrators need tools with the flexibility to address IT issues quickly and easily as they arise.

StorageCraft provides robust administrative support for your Adaptive Infrastructure. Consider the following:

**Centralized Management:** The ShadowProtect Console lets you manage ShadowProtect agents across your environment from a central location. You can manage and configure agent operation remotely, and even push install the agent as needed to extend your Adaptive Infrastructure.

**ShadowProtect ImageManager:** The whole point of ShadowProtect ImageManager is to provide centralized management of the backup images in your Adaptive Infrastructure. It lets you configure and automate a full range of backup image services, including:

- File verification
- File consolidation and retention
- File replication

**ShadowProtect IT Edition:** ShadowProtect IT Edition™ is the ultimate Adaptive Infrastructure administration tool. Licensed to a systems admin on a subscription basis, ShadowProtect IT Edition is a bootable ShadowProtect environment that lets an admin access its full range of services anytime, from anywhere, without leaving any software on the target system.

ShadowProtect IT Edition lets you do the following:

- Hot backup (Full only) and restore of a volume on any Windows 2003 or later environment, whether physical or virtual.
- Cold backup (Full only) of any x86-based volume, regardless of operating system.

# Conclusion

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Adaptive Infrastructure is a term coined to describe the data-centric world of the 21<sup>st</sup> century. It recognizes the value of data and the importance of being able to access it when needed, and protect it against disaster. It downplays the platform, operating well across both physical and virtual environments.

An Adaptive Infrastructure incorporates the following characteristics: Flexibility, Integrity and Reliability, Efficiency, Security, and Administration. With these characteristics, it's not surprising that StorageCraft is well equipped to help you implement an Adaptive Infrastructure. As a leading provider of disaster recovery solutions, StorageCraft has already developed solutions that leverage these same characteristics to help its customers quickly and efficiently recover from the unexpected.

StorageCraft ShadowProtect provides unsurpassed flexibility for your Windows environment; allowing you to transparently protect data while simultaneously providing a mechanism to easily migrate data and applications from one platform to another as needed.

ShadowProtect ImageManager delivers robust management features that ensure confidence in the underlying data protection and tools to help reduce data recovery and migration times from hours or days to mere minutes.

StorageCraft provides the foundation of an Adaptive Infrastructure; a foundation that you can leverage to take your organization to the next level of efficiency and customer responsiveness. For more information on how these solutions can benefit your specific organization, contact your StorageCraft partner or reseller.