

## Disaster Avoidance

Disaster Avoidance involves proactive behavior to circumvent an impending storage outage. Even if a partial site failure occurs, disasters tend to affect an entire site. Disaster avoidance technologies allow for configuration of a host, cluster or site in a fashion that keeps systems running with minimal interruption. There may be a brief outage at one location followed by a restart at the recovery site, but a minimum outage sustained under controlled circumstances is considered to be an acceptable alternative to an extended one.

## Downtime Avoidance

Downtime Avoidance is similar to Disaster Avoidance. The main difference is that with Downtime Avoidance, virtualization technologies can move virtual machines or virtual storage with no interruption to service.

## Disaster Recovery

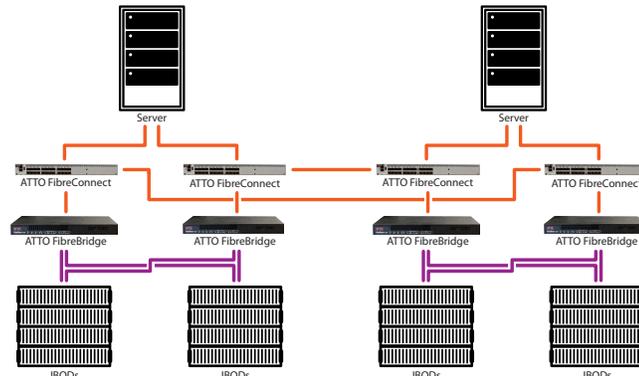
Disaster Recovery helps to rapidly restore services when there is an unexpected outage and the recovery time is unknown. In these environments, the goal is to rapidly return to full operation, usually in a different data center.

## High Availability and Fault Recovery

High availability technology reduces the length of an outage sustained by a failure and allows for rapid recovery of system services. High availability clusters provide automated fault recovery in a reactive fashion, with virtual machines restarted as required to recover from unplanned outages.

## Stretch Cluster: A Multi-Data Center Solution

A Stretch Cluster is a cluster configured with host systems located at multiple sites. These may be on different floors of a data center, different buildings on a campus or at multiple metropolitan sites located hundreds of kilometers apart. The high availability and data mobility that stretch clusters provide make them one of the most reliable and flexible solutions that IT administrators can implement to shuttle data between multiple sites—usually using an application such as Storage vMotion. Other benefits of stretch clusters include disaster recovery, downtime avoidance and an increase in on-site data availability, though at the cost of added complexity.



*Highly redundant stretch cluster using multiple ATTO FibreBridge 6500 or 7500 storage controllers*

## High Availability, Zero Downtime

Stretch clusters are often used when there is a need to load balance on-site or between two sites. If a failure occurs at one site, there is continued workload availability and disaster recovery can be carried out from the second. It is important to have reliable, predictable, low latency links between sites in a stretch cluster. Fibre Channel products such as ATTO's FibreBridge Storage Controller family, a proven solution in stretch cluster environments, provide that connectivity.

## Lower TCO and Decrease Latency with ATTO Storage Controllers

When Fibre Channel disk storage was prevalent, native vendor-specific Fibre Channel storage enclosures with built-in Fibre Channel-to-SAS bridges were typically used for stretch clusters. But a problem with that approach was that TCO ended up being relatively high compared with solutions that use modular, off-the-shelf components. ATTO's FibreBridge Storage Controllers are building blocks that add Enterprise Fibre Channel connectivity to up to 10 shelves of low cost SAS/SATA drives while introducing up to only 4 microseconds of latency. When paired with standard JBOD enclosures, the FibreBridge represents a foundational data center component—one that companies can use to architect stretch cluster solutions that enable active site balancing, downtime avoidance and disaster recovery.

## Building out a Stretch Cluster

The requirements for building out a stretch cluster will depend on an organization's needs when it comes to reliability, capacity and performance. For a high availability solution, Software Defined Storage software can identify multiple controllers and communicate between multiple sites. For situations where availability is not the top priority, a single controller will suffice—as long as a second one is used for redundancy at the remote site. While performance at the remote location will be dictated by the link connecting the sites, the local site can benefit from a high performance storage controller like ATTO's FibreBridge 7500. The FibreBridge family provides options for all performance and price needs: a pair of 7500s can deliver up to 1.5M 4K IOPS, while a pair of FibreBridge 6500 controllers can achieve about 120K 4K IOPS. Scalability is another asset of the 6500 and 7500, with both supporting up to 240 disk drives while adding Enterprise Fibre Channel to SAS JBOD storage.