



Critical Elements for Successful Business Continuity

Requirements for a Successful High Availability and Disaster Recovery Strategy

A White Paper from Maxava
www.maxava.com

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Preface

High availability (HA) and disaster recovery (DR) are part of a combined strategy for reducing or eliminating the impact of planned downtime and unplanned outages and for ensuring application availability and business continuity.

If your business currently relies on an IBM® i platform in combination with tape as its primary recovery option, you may be considering upgrading to a real-time solution that allows each transaction to be captured and instantly replicated to an onsite or offsite backup machine.

Selecting a solution that is effective and affordable is easy when you have a complete understanding of the most critical requirements for ensuring a successful HA/DR deployment. The goal of an HA/DR system is to help you avoid losing data and prevent damage to your business systems and marketplace reputation. Spend a few minutes with our paper, and we think you'll gain important insights into solution criteria that will enable you to choose the appropriate continuity solution.

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Finally, high availability and disaster recovery options are available for every business

Do you manage a business that relies on applications running on the IBM i platform? How would a system failure affect customer service, order processing, or workplace productivity? Would your business come to a standstill?

If your system crashed, would you lose data that might be difficult or impossible to recreate? Would an outage cause you to violate regulatory requirements for preserving records and risk triggering significant penalties?

If you're wrestling with similar questions, then you may be planning to upgrade your environment with a high availability (HA) and disaster recovery (DR) solution to ensure business continuity and data protection.

Availability and recovery should be top of mind

Key Point: Determine how availability is being defined for your environment.

Availability is the percentage of uptime a system is expected to deliver in a typical year. Recovery is the period of time required to restore a system or application after a planned or unplanned outage.

A system can be designed for 90 percent availability, which may sound impressive until you realize 10 percent downtime equates to 36.5 days a year. System operators often target availability at or above 99.9 percent (three nines). Three nines availability indicates that a system is designed for no more than 8.76 hours of unplanned downtime per year.

Note that availability percentages can be somewhat misleading. For example, if one important application experiences downtime but the rest of a system is unaffected, an IT organization might maintain that the overall system is available. As a decision maker, you must weigh the percentage of uptime/availability that is appropriate for your organization. Three nines may be adequate to meet your operational objectives. But if you are not comfortable with the thought of an entire day of downtime (even if it only happens once a year), then a greater level of availability should be at the top of your requirements list for your proposed HA/DR solution.

Striking a balance between level of availability and system cost is important, however. Ensuring greater levels of availability usually involves investing in more and more sophisticated technology. Achieving six nines availability (99.9999 percent) might be a nice goal in theory, but impractical because of the expense it involves.

Similarly, you must consider a solution's recovery time. The faster a system can be recovered after a planned or unplanned event, the easier it is to maintain a required level of availability.

Software enabled continuous data protection is an affordable option

Until recently only organizations with deep financial pockets and a low tolerance for system downtime could justify an HA/DR design that minimized data loss and operational downtime. Advances in technology have now made HA/DR affordable to own and simple to manage.

In fact, a software-based replication method in combination with an IBM Power Systems Platform and the IBM i operating system costs about a tenth of what a comparable configuration would have run to just 10 to 15 years ago. This combination of lower pricing and better performance is fueling a dramatic jump in HA/DR investment. ABI Research, a leading market-intelligence firm, projects that spending in this area will grow to \$39 billion by 2015, an increase of almost 38 percent over 2010 levels.

Aim for a high-performance architecture

Now there are more options available for creating a powerful and high-performance architecture. Affordable hardware, software, and communication bandwidth makes it relatively easy to replicate critical data in real-time from a primary location to one or more backups. These backups can be located on a logical partition (LPAR) within a single server, on another server within the same facility, or on another server maintained at a remote data center located some distance away – even in another State or Country.

Latency is the enemy of data recovery

A well designed HA architecture improves availability and promotes business continuity by preventing or minimizing planned or unplanned downtime. Any strategy, however, can be undermined by latency, which is the length of time required to replicate data from a primary to a backup location. Ideally, a high performance HA/DR solution should be able to replicate data with minimal or zero latency.

Latency is undesirable because it can cause critical data to be lost before it is saved on a backup system. Fast servers, ample bandwidth, and efficient HA/DR software can help you to overcome the disadvantages of latency by allowing data to be sent, received, and applied in real-time. If a problem occurs, the HA/DR solution that runs without any latency can limit downtime, minimize data loss and facilitate the restoration of normal operations.

Software replication offers advantages over hardware

There are basically two types of data-replication methods: software and hardware. Software replication uses software that runs on a host to replicate data to a storage destination. Hardware replication generally uses identical, proprietary hardware (sometimes in combination with software installed on the storage array as well as on the primary and backup servers).

Hardware solutions are often poorly suited to copying data over long distances. Software replication is not limited in this way as long as the network connection between the primary and backup locations has sufficient bandwidth for the volume of data being replicated. It helps minimize the number of links and overall complexity of the HA/DR solution. If you are considering hardware replication, the potential limitations of this type of solution should be evaluated carefully when developing your HA/DR strategy.

Advantages of remote journaling

Key Point: Look for an HA solution that leverages remote journaling.

Software developers use different methods to replicate data. For example, some applications may rely on a security audit journal, proprietary transport scheme, or remote journal entry to recognize new data and objects and then prompt replication to the backup server.

For solutions that use the security audit journal, it is possible for data and objects to arrive at the backup location at different times. This lack of synchronization can increase process cycles as the replication software attempts to create new objects and unpack, match, and merge incoming data.

In contrast to solutions that use the audit journal, some HA software uses only remote journaling. Journaling is technology that is built into the IBM i operating system. HA software that uses pure remote journaling is a very efficient approach since it requires less system overhead and can be running simultaneously with the production applications that are creating new data. Remote journaling is an effective option for small all the way to enterprise levels of data volume. For organizations that have existing investments in or are considering a transition to IBM technology, it is worth noting that IBM describes remote journaling as “better plumbing for getting data between boxes”.

Native remote journaling, which is supported on IBM's System i operating system, is widely used in HA environments. It tends to introduce minimal latency under most scenarios and includes remote journaling at the Licensed Internal Code layer. This feature is important because HA software that takes advantage of native journaling on IBM i operating system generally delivers better security and much better performance than applications which rely on proprietary data replication methods.

Data replication streams affect performance

Key Point: Look for an HA/DR solution that supports unlimited data streams.

The method in which data is streamed between the primary and backup locations also affects performance. HA/DR solutions use data streams to apply transactions to a backup database in an alternate location. Solutions that support multiple data streams provide more throughput and lower latency. Throughput is critical to performance since a server at the primary location may support a large number of mission-critical applications, files, and queries.

Many HA/DR solutions have limited data streams. In situations where there is a great deal of competition for these data streams, transaction data may begin to backlog in the apply process on the server at the backup location. If the primary server experiences downtime, the backup may not be ready to take-over as the primary.

If you have 25 critical files, for example, you could assign each one its own dedicated data stream. Unlimited streams facilitate the apply process for data on a backup server. The risk of congestion is much lower, as is the risk of losing critical time during downtime failover or role-swap. It is important to determine if any solutions you are considering limit the number of data streams between your primary and backup locations.

Data integrity is essential in any HA/DR strategy

During your HA/DR software evaluation, you should also test potential solutions to determine how well they handle data synchronization. Synchronization (“syncing”) is the process used to ensure that the data at your primary location matches the data at your backup location. If you need to failover to your backup location, knowing that the data on your backup system matches your primary system is critical.

When syncing is done well, it promotes data integrity. In HA/DR applications, data has integrity when it is identical on the primary and backup locations.

To ensure data integrity, HA/DR software developers rely on selfchecking features such as auditing and autonomies to keep data synchronized with minimal operator intervention.

Not all real-time data checks are the same

Key Point: Look for an HA/DR solution with a data audit tool that allows before and after images.

A data auditing process is designed to detect inconsistencies in records, fields, or objects, but many HA/DR solutions only run checks after the fact. It is much better for the solution to perform a real-time data check before it applies the data to the backup location.

Real-time data checks are performed by comparing images of the primary and backup databases. Some HA/DR software replicate data only as an “after” image (that is, an image stored after a change was applied on the primary database). More effective HA applications rely on “before” and “after” images during replication.

Real-time data checks that use an after image alone may introduce errors—and undermine data integrity. For example, assume that a field on your primary server is the address “100 River Road” and, at some point, the person associated with that address moves to “67 Silver Lane.”

How do you ensure this update is replicated correctly to your backup server and the new address replaces the old address? Some replication software relies on an after image only to catch potential errors.

An HA/DR solution that supports before and after image checking offers a much more reliable method for detecting when two databases are not synchronized. If it encountered an inconsistency (for example, the target field contained “101 River Road”), it would generate an alert that could be investigated by a human operator. It’s possible that an unauthorized user or program could be accessing the backup location and applying incorrect information or that the communication link is pointing to the wrong destination.

A solution that relies on after images alone would simply change the value at the target location to be “67 Silver Lane”. This doesn’t allow you to see that the original value was incorrect on the target system. When one record has been changed it is possible that others may have been also changed at the same time. You need a mechanism to know that the file needs to be audited. Without the before image checking you lose the ability to request an audit for the entire file at that time.

Autonomics helps with data management

Some HA/DR solutions also include a self-management feature known as autonomics. When used with data auditing, autonomics allows the HA application to automatically fix errors and continue operating without disrupting normal operations. In the previous example, the autonomic function would attempt to fix whatever error caused a “101 River Road” to appear in the backup field. If successful, it would allow the “67 Silver Lane” update to be applied and then send an alert so a human operator could validate the change. Autonomics in combination with auditing, self-healing, and reporting processes makes an HA/DR solution much more efficient to manage and maintains data integrity between the primary and backup databases.

Even so, you should not have to rely on autonomic features. Your solution should be able to accurately replicate data while preventing errors. More advanced HA products are also flexible enough that you can configure the autonomics function to match your operation’s data-integrity needs.

How to test data integrity

Key Point: Test HA/DR solutions to see how well they enforce data integrity.

Testing for the ability of a solution to perform real-time data checks is fairly simple—and highly recommended. During your HA/DR evaluation, delete some records from your backup server and then try to update the same records on the primary server. An effective HA/DR solution will detect this out-of-sync condition almost immediately and, using autonomics, correct the problem and alert you to the probable cause.

It’s also important to note that an effective HA/DR solution will not exact a significant performance penalty even though it is using before and after images to ensure data integrity.

Insist on a role-swap-ready solution

Key Point: Test the roleswapping capabilities of an HA/DR solution before you purchase.

Part of the appeal of HA/DR is that you can switch (or role swap) to a backup location in an emergency. If an application or server becomes unavailable, the solution allows you to switch with little or no loss of data or worker productivity.

Role swapping is often a critical capability for organizations. If you are evaluating different HA/DR options, consider testing the role-swap capabilities of each solution before you commit to a purchase. Individual user requirements vary, but most businesses can generally tolerate a few minutes of delay until the backup system is online and supporting users.

Software-based solutions are typically able to roll swap very quickly and with limited operator assistance. Just as important, role swapping can be performed while preserving data integrity.

If moving to your backup location is difficult or creates more delay than your organization can afford, continue shopping. Not all solutions are equally effective at handling the role-swap process, but intuitive and reliable HA/DR solutions are available. The ability to role-swap quickly and easily to the backup system, is after all the main benefit to you should an unplanned event occur.

After you implement the HA/DR solution, you should perform role swaps at least once or twice a year so that end-users and IT staff can become familiar with how the solution works. If you select an HA solution that is easy to role swap then performing regular role swap testing can become integrated into quarterly or monthly preventative routines. Practicing regular swaps allows your team to gain confidence in the application’s ability to support their needs during an outage. Practicing role swaps often can also alert you to any changes that impact role swap readiness such as new applications or network changes that need to be incorporated into the role swap testing procedures.

However you decide to approach HA/DR, role swaps should be frequent, planned, tested, and routine.

Pick a solution that is easy to live with

Key Point: Look for a no drama solution.

An effective HA/DR solution should improve the overall reliability of your infrastructure without creating any drama for your end-users or IT staff. Look for a solution that excels at “being easy”—easy to implement, easy to manage and maintain, easy to use, and easy to upgrade.

Implementation should be affordable and take hours or days – not weeks or months – to complete. Maintaining your solution should require minimal staff intervention. Ideally, it should run in the background with minimal effect on overall system performance.

IT staff should be able to gain proficiency in the software within a few hours of its implementation. Documentation and training should be thorough and readily available.

Real-time mobile and browser technology that allows your staff to monitor the readiness of the HA/DR environment while on the go is especially worthwhile as a productivity standpoint. Look for mobile technology that is optimized for popular browsers and operating systems.

Minor or major updates should have limited or no effect on system availability. Live support with 24/7 access is highly desirable.

Use care to select a vendor

Key Point: Partner with a certified vendor who can support you before, during, and after the sale.

Third-party vendors implement most HA/DR solutions. If you are considering an application that is optimized for IBM i, you should seek out an authorized IBM business partner with appropriate platform and solution certifications.

A good vendor will conduct an initial HA assessment to determine your overall needs and provide you with options for addressing those needs. It may be that other elements of your infrastructure need attention to meet your expectations for HA. For example, the infrastructure may need a server upgrade or a larger communication pipeline to realize your goals for performance and reliability.

A good vendor will support you during all phases of the project: assessment, implementation, and post-implementation support. The capability to deliver Level 1 support is critical—especially while your staff is gaining experience with the HA solution.

Next steps

If your organization is data-driven, an outage could seriously undermine your competitive position. Fortunately, you can minimize this risk by implementing an effective, software-based HA/DR strategy. HA/DR solutions are more affordable than ever and return strong value for relatively small investment.

Maxava offers a suite of highly reliable, affordable, and easy-to-implement HA solutions. We would welcome the opportunity to answer your questions about HA or to refer you to one of our authorized resellers.

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Critical elements checklist

- ✦ The vendor has assessed my existing infrastructure and delivered recommendations for optimizing HA performance.
- ✦ The HA solution takes advantage of IBM i remote journaling.
- ✦ The HA solution supports unlimited data streams.
- ✦ Testing confirms that the HA solution is role-swap ready.
- ✦ The HA solution includes data auditing.
- ✦ The HA solution incorporates real-time data integrity checking to ensure that the source matches the target.
- ✦ The HA solution generates alerts for out-of-sync data conditions.
- ✦ Conversations with current customers confirm that the HA solution is easy to install.
- ✦ Conversations with current customers confirm that the HA solution is easy to manage and maintain.
- ✦ Conversations with current customers confirm that the HA solution is intuitive to use.
- ✦ Conversations with current customers confirm that support is reliable, effective, and available 24/7.
- ✦ Conversations with current customers confirm that the HA solution is easy to upgrade.