Euronet Software Solutions
A Division of Euronet Worldwide
Powerful Payment Solutions that Bring Currency to Life

A Euronet Software Solutions White Paper

High Availability

Options for Euronet Software Solutions

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Executive Summary

High Availability (HA) and Disaster Recovery (DR) in today's nonstop world are obvious prerequisites of a successful and uninterrupted information technology operation. Applications, hardware and supporting infrastructure must be continuously available and especially in the payments industry with global online networks, POS, ATM, Internet and Phone applications servicing transactions that are made anywhere and anytime.

Euronet Software Solutions' payments hub architecture plays its role in the reliance and stability of applications offering the modular and standalone systems that are imperative for today's payment processing needs. Duplicate modules and subsystems within Euronet's Integrated Transaction Management® (ITM) system – a single core interactive engine that moves payments across multiple interfaces and customer touch points – provide scalable throughput and play a pivotal role in the availability of the application.

High Availability and Disaster Recovery is necessary in payment processing solutions that must be able to exchange information with other systems, networks and devices to ensure that consumers can use their payment instruments, and that merchants can receive settlement for their goods and services.

To ensure that Euronet applications are highly available and that critical data and systems are accessible in the event of an unplanned disaster, there are a range of options from which to choose based upon an organization's specific needs. This paper explores several of those options from our partners.

High Availability with Reliable Software

Euronet's scalable and secure software is surrounded by a central layer of modules that handle transaction throughput, security and administration within a payments hub environment. Card data security, transaction speed, velocity checks and security key exchanges are just a few of the functions facilitated by these modules.

Satellite modules handle message formatting and communications to endpoints. For example, the TCP/IP communication module handles the connection of the ATM to the host. Depending on the type of ATM – NCR, Diebold, Wincor, etc. – a module translates the message from the ATM format into Euronet's payments hub internal format for further routing. The module works in partnership with the communication module to handle message traffic to and from the devices, and onward through the payments hub for processing and authorization. This same architectural design applies to all components of the Euronet payments hub, including host-to-host connections, interfaces to the various card organizations, or integration to back-office systems and other external payment channels.

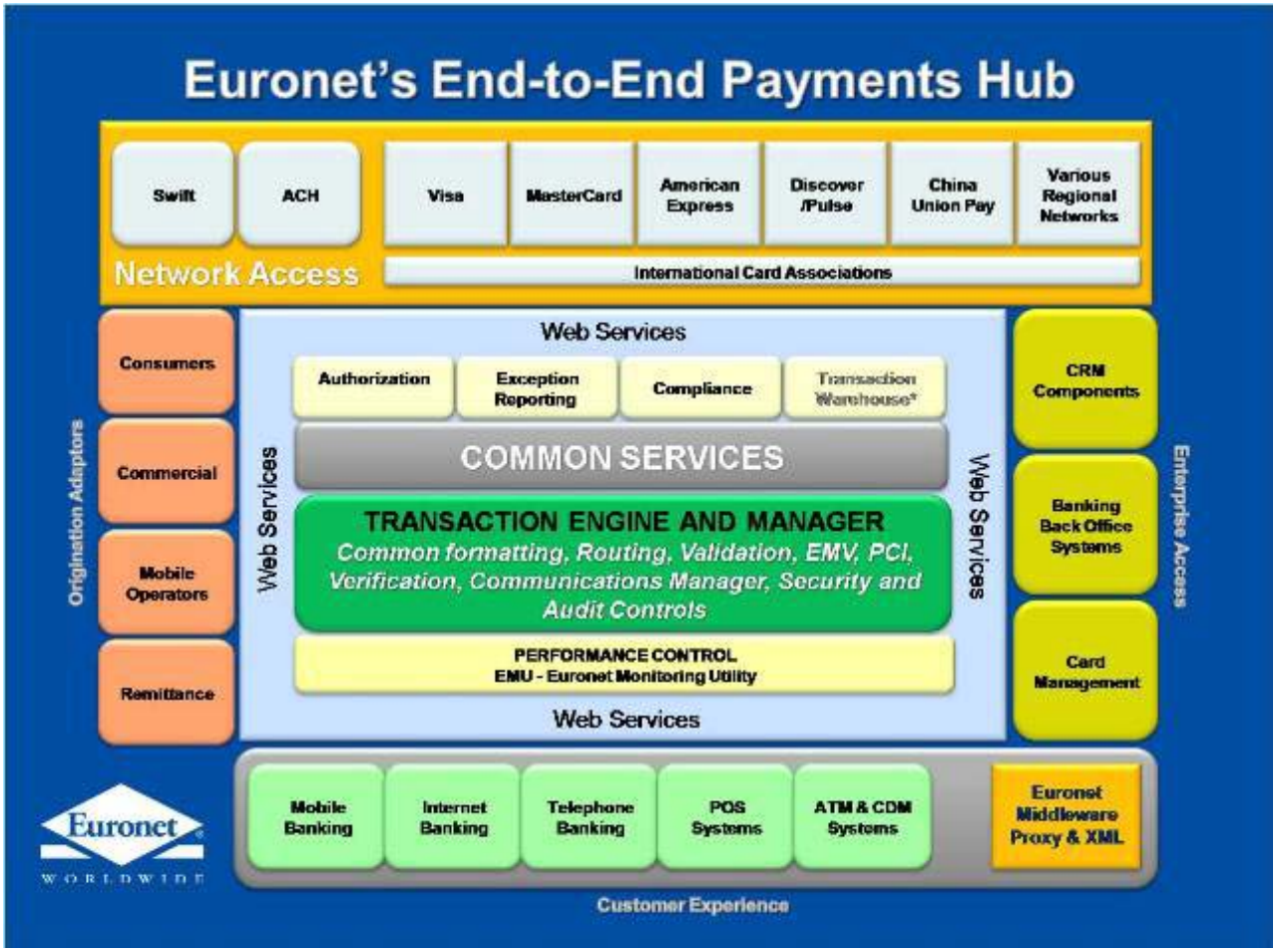
Euronet has extended ITM's modular service-oriented architecture (SOA) to support the customer's requirements for high availability at the individual component level. Every service module can be duplicated in the payments hub environment. The standard is for modules that can be replicated in virtually unlimited numbers. Payment transaction traffic is then routed through all of these service modules, using a "round-robin" approach, with transactions routing being rotated via alternate instances of the service modules. Should any

module fail, it is removed from circulation and transactions continue to process through the remaining instances of that service module. Euronet's ITM system then invokes recovery procedures to recover the failed service module and automatically places it back into service when recovery completes.

This ability to have redundant services, with automated fail-over and recovery is particularly important for external interfaces and devices. For example, fully automated redundancy of hardware security module (HSM) services is achieved with duplicate devices in full production use - without need for an inventory of spare equipment. Another example is that redundant data communication lines and ports can easily be configured in the system, and both lines will be fully utilized and active in the production environment. Should one of those lines fail, the system will automatically shift the load to the remaining line, and then reinsert that line into use once the connection has been restored.

This allows for full redundancy, as well as increased throughput and capacity through production utilization of the redundant services and hardware components.

The following diagram provides a view of Euronet's payments hub environment.



A Range of Options to Provide the Degree of Protection You Need

Euronet's longtime relationship with IBM, and IBM's commitment and dedication to the platform our solution runs on, allows Euronet to leverage the exceptional uptime performance of IBM Power System hardware. Other options to consider are software-based real-time replication solutions available from authorized IBM Business Partners such as Vision Solutions and Maxava. These, coupled with our Euronet's software solutions, provide a well-rounded approach to ensure high availability and disaster preparedness for Euronet applications. Whether the solution approach requires multiple partitions on the same machine or the use of multiple machines, software and hardware come together to provide the degree of protection you need for planned or unplanned outages.

High Availability and Disaster Recovery *Options from Vision Solutions*

VISION® SOLUTIONS

MIMIX HA for IBM i from Vision Solutions

Keeps Your Business Running No Matter What Happens
Built for the most demanding enterprises, MIMIX® HA for IBM i® from Vision Solutions virtually eliminates both planned and unplanned information technology (IT) downtime with innovative features that minimize high availability administration and ensure integrity. MIMIX HA easily integrates into advanced IT environments that require multiple replication/switching topologies and technologies in addition to advanced IT protocols. It keeps your applications and data continuously protected and available for a resilient and responsive business environment. MIMIX HA delivers all the functionality and flexibility required by large and/or demanding enterprises while still providing an easy-to-use, easy-to-switch solution.

Easy to Install, Use and Manage
MIMIX HA monitors and manages itself with only minutes a day of administration. Our innovative features do the work so you don't have to:

- IntelliStart™ is a first-of-its-kind HA innovation that plans, configures and deploys your MIMIX HA solution. *Set up and deploy in a snap without advanced IT skills.*
- AutoGuard™ technology automatically seeks out and eliminates any issue that can affect HA integrity. *Manage your HA solution in only minutes a day.*
- Dynamic Apply™ intelligently determines whether to use a multi-threaded apply process for some data and a direct apply process for other data. *Dramatically accelerate the speed, accuracy and efficiency of data replication.*

- CDP™ makes it possible for you to quickly and easily recover data from any point in time. *Protect your business against accidental or malicious data corruption.*

- MIMIX Switch Assistant™ is the comprehensive and easy-to-use system for performing successful switches. *Rely on automated HA best practices for worry-free switches every time.*

To learn more about the new generation of simplified operations management:
http://www.visionsolutions.com/Products/High-Availability-mimix.aspx

iTERA HA for IBM i from Vision Solutions

"iTERA HA allowed us to keep business-critical applications functioning in the aftermath of Hurricane Katrina."
Isle of Capri Casinos

"With iTERA HA, it's amazing how quickly mirrored objects get updated and how well the product keeps objects in sync."
C.R. England Trucking

Affordable Protection for Critical Business Data and Applications—Even for Smaller Companies
Vision Solutions' iTERA™ HA works very well in conjunction with Euronet's software to assure critical information and application availability. You can't allow a disaster to wipe out your data or indefinitely halt your business. Nor can you afford to shut down your operations to perform frequent, unavoidable data and system maintenance. iTERA HA is a highly autonomic, full-featured availability solution that is simple to use and easy on your budget, putting nonstop operations well within your grasp.

Maximize Availability without the Hassle
Downtime is inevitable. Disasters are rare, but they happen. Frequent system and data maintenance may impair your operations or even shut them down. The cost can be staggering. Fortunately, you can avoid it. iTERA HA maintains a real-time backup that can quickly take over as the production system when required. In addition, you can run tape backups on the secondary server, eliminating their impact on operations.

Surprisingly Cost-Effective, Complete High Availability
Using the most efficient replication method available for IBM i servers, remote journaling, iTERA HA works relentlessly to maintain a complete, accurate backup of your vital data and applications. It then stands ready to switch users to that backup whenever the primary system becomes unexpectedly unavailable or you need to perform system maintenance. Protect your systems. Protect your data. Protect your budget. Put iTERA HA to work for you.

Optimize IT Productivity
IT professionals are valuable. There are far more valuable uses for their skills than installing, monitoring and administering your high availability software. iTERA HA's self-configuring, self-monitoring and self-healing features free IT staff to do what they do best—design, build, maintain, manage and support your systems—while iTERA HA monitors and manages itself.

Leave Nothing Behind
iTERA HA replicates all essential objects on your production systems—programs, data areas, data queues, IFS, user profiles, device configurations, spool files, triggers, constraints, WebSphere MQ, and more—to ensure that the backup system is always ready to rapidly take over operations.

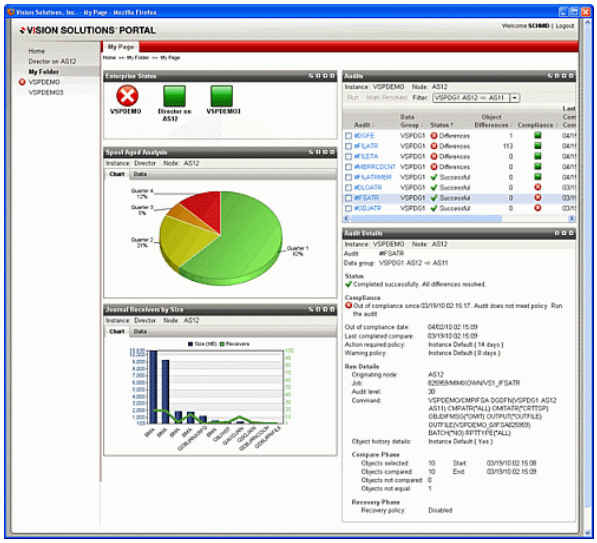
Ensure Accuracy
iTERA HA's advanced auditing technology automatically discovers and corrects data integrity problems at the record level in real-time, eliminating the need to resynchronize entire objects if an out-of-sync condition is detected. The result: most data integrity issues that arise are swiftly and automatically corrected. Isn't that what you demand from a high availability solution? After all, if your replicated data isn't accurate, it isn't available.

To learn more about iTera's exclusive Virtual Roll-Swap functionality:
http://www.visionsolutions.com/Products/High-Availability-iTERA-HA.aspx

Results Delivered by Vision Solutions
- Improved work processes and efficiency
- Improved responses to customers and branches
- Reduced recovery time from IT outages by nearly 90 percent
- Eliminated the need to re-key data in the event of a failure
- Increased speed and ease of system upgrades

Technologies Supported by Vision Solutions
- MIMIX® HA for i5/OS®
- Production Machine: IBM System i Model 830
- Remote Backup Machine: IBM System i Model 730
- A variety of core banking applications including retail banking, credit card, treasury and credit leasing

Benefits of Using Vision Solutions
- Vision Solutions Portal simplifies administration of the solution while ensuring data integrity in any environment, including those using intra-server, bidirectional and cascade replication.
- Allows multi-product, multi-instance monitoring and control from a single interface real time information in an easy to digest form
- Enables reusable portlets in other portal servers such as IBM Systems Director
- Allows user customizable views
- High performance - brings only data it needs to service request
- Enhanced usability and monitoring
    - o Switch control
    - o Audit control
    - o Operations control



To learn more about Vision Solutions, visit: www.visionsolutions.com

High Availability and Disaster Recovery
Options from Maxava

MAXAVA
MAXIMUM AVAILABILITY

Maxava HA Suite – Logical Replication Solution

IBM business partners such as Maxava provide logical replication solutions for IBM i High Availability and Disaster Recovery. As an operating system, IBM i has a host of functionality that is included with the operating system such as extensive virtualization services, security, and an integrated relational database with DB2. With this extensive set of functionality which is designed to support applications such as Euronet's, many IBM i customers have not implemented external storage with independent auxiliary storage pools (IASPs). Solutions such as Maxava HA Suite offer customers that do not need, or have chosen not to use IASPs, an effective alternative to support High Availability and Disaster Recovery.

Maxava is a Premier IBM Business Partner specializing in High Availability and Disaster Recovery for the IBM i platform. Maxava has been delivering HA/DR real-time replication solutions for the IBM i market for a decade, and Maxava HA is currently being used by organizations around the world and across industries to ensure that IBM i applications and business critical data is always available. Maxava provides enterprise strength HA software that is simple to use, high performance and always role-swap ready.

Key Benefits

IASP's not required to obtain HA/DR benefits
Latency is minimized with Remote Journaling and concurrent apply groups
HA supported on an LPAR on the existing server as well as another IBM server
Supports different versions of the OS on the source and target machines
Works equally well for Local HA as well as off-site DR
Minimal management required to maintain HA system

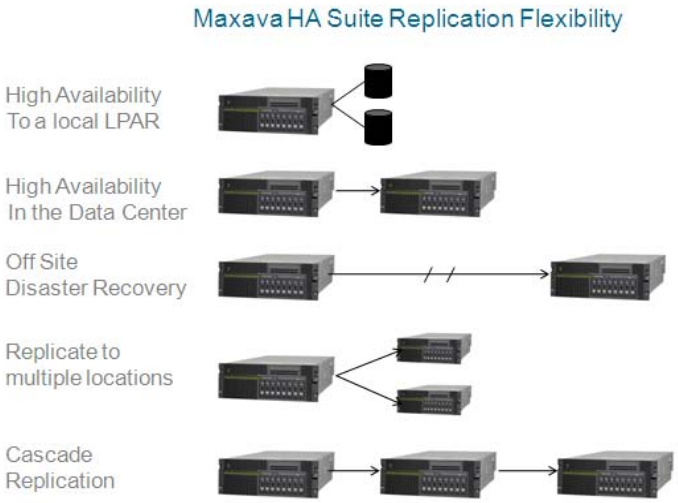
Key Considerations

IBM server hardware needed for off-site DR

Maxava HA Suite was designed to address the needs of clients where high transaction volumes are the norm. As a result, the software has a number of features which ensure scalability as well as robust performance. Maxava HA Suite uses IBM i's native Remote Journaling technology to provide real-time replication between the production and backup systems. With Maxava HA Suite, changes on the production system are captured and sent to the target machine via IBM i's remote journaling capability and then applied on the target machine.

Overhead for HA processing is primarily on the target machine and has minimal impact on the production system. Maxava HA Enterprise provides real-time pure, sequential remote journaling and replicates changes to data, objects and IFS and MQ-Series. Maxava can also be used to replicate to IASPs if these are already deployed. Maxava HA's unique technology includes unlimited concurrent apply process, advanced data integrity, a true GUI management environment and mobile monitoring via Blackberry, iPhone or other browser-based mobile interfaces using the maxView technology. To see an online demonstration of the mobile technology called maxView visit: http://www.imaxava.com/demo/maxviewlite/.

Maxava clients often cite a reduced total cost of ownership to implement the solution compared to other options. Ease-of-use is also a key consideration for selecting Maxava HA due to the intuitive GUI management interface which requires on average only minutes a day for HA management. Since Maxava HA replicates only the deltas and utilizes 100% remote journaling, bandwidth and distance considerations are typically supported with the customer's existing network configuration. Most importantly, since Maxava HA replicates all data, objects and IFS changes in real-time and data validation is integral to the process, the backup IBM machine stands ready at all times and is available to "role swap" or to switch between the production and backup machines. There is no need to vary on hardware such as IASPs to perform the switchover.



High Availability and Disaster Recovery can be easily accommodated with Maxava solutions. Maxava HA can be configured to support local HA to either another LPAR or to another system in the data center or on the local campus. Maxava HA can be configured to cascade the replication to a secondary or tertiary machine at a remote geographic location, thereby ensuring both local HA as well as off-site disaster recovery.
To learn more about Maxava HA visit: www.maxava.com.

High Availability and Disaster Recovery
Options from IBM

PowerHA SystemMirror for i from IBM

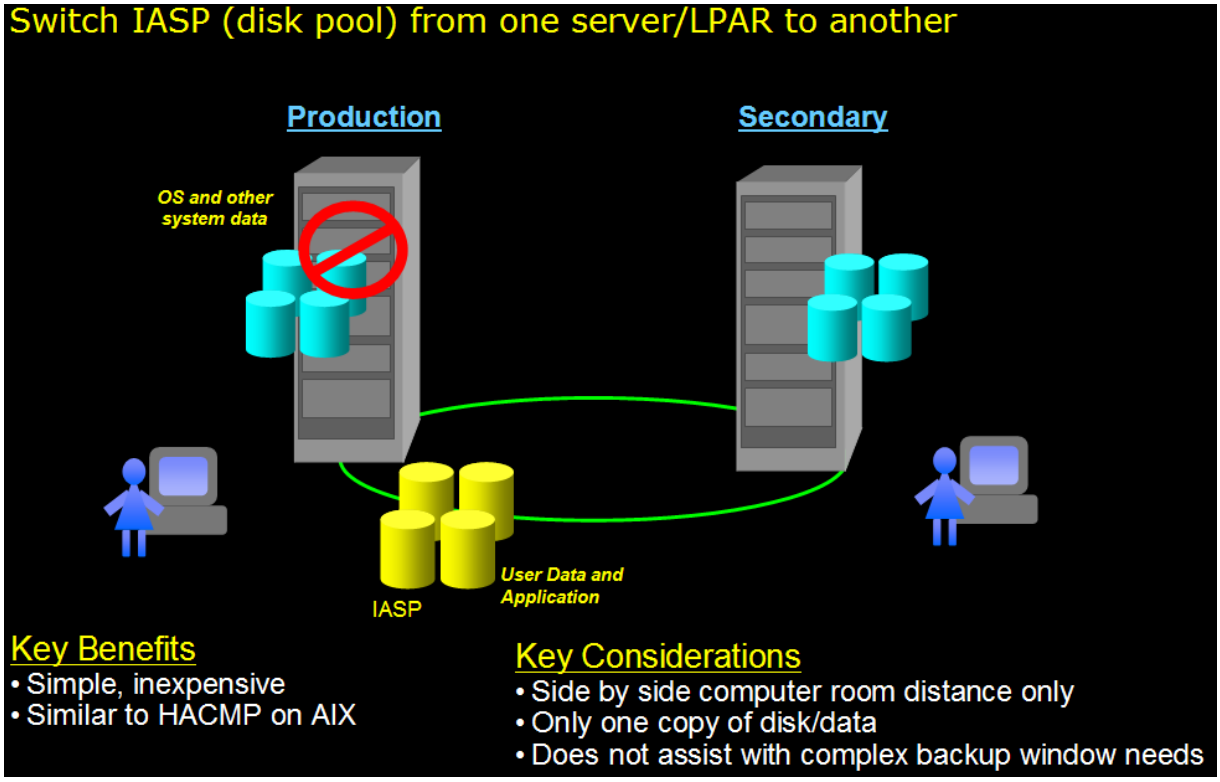
PowerHA SystemMirror for i™ is the IBM Power Systems' offering for High Availability and Disaster Recovery. It is an IBM storage-based clustering solution deployed by clients around the world. A dynamic infrastructure in a modern IT organization provides solutions that address cost, manage risk and improve service. One of the foundational elements for providing a dynamic infrastructure is business resiliency. Your customers expect access to business-critical applications and data 24X7 and your operating budgets demand the efficient use of capital, equipment and labor.

With PowerHA SystemMirror for i, you are able to deploy a solution that addresses both your storage requirements and high availability requirements with one integrated configuration that is both robust and easy to use. PowerHA SystemMirror for i is an IBM storage-based clustering solution for High Availability and Disaster Recovery. Data and applications are deployed into IASPs, which can be deployed using either internal or external

storage. At any time, the nodes in the cluster can switch roles and become either a primary or secondary node. PowerHA SystemMirror is designed for and intended to be used for on demand role swap operations. Some of our clients actually have their PowerHA cluster setup to role swap once a week automatically.

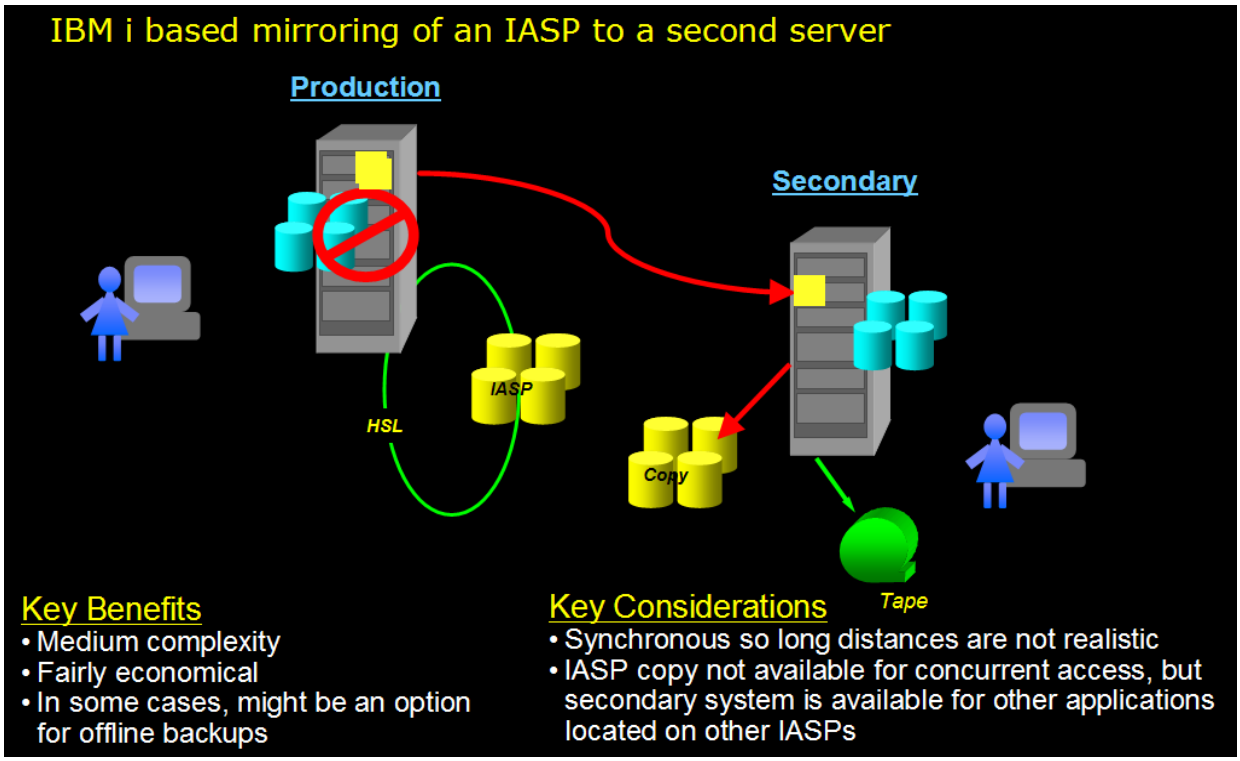
Simple Switched Disk Clustering

IASPs are the basic building block for PowerHA SystemMirror for i. In the simplest implementation – a switched disk cluster between 2 LPARs, a failure of the primary LPAR will be detected by IBM clustering and the IASP (complete with the Euronet application and data) can be quickly varied off the primary LPAR and varied on to the secondary LPAR in minutes.



Geographical Mirroring

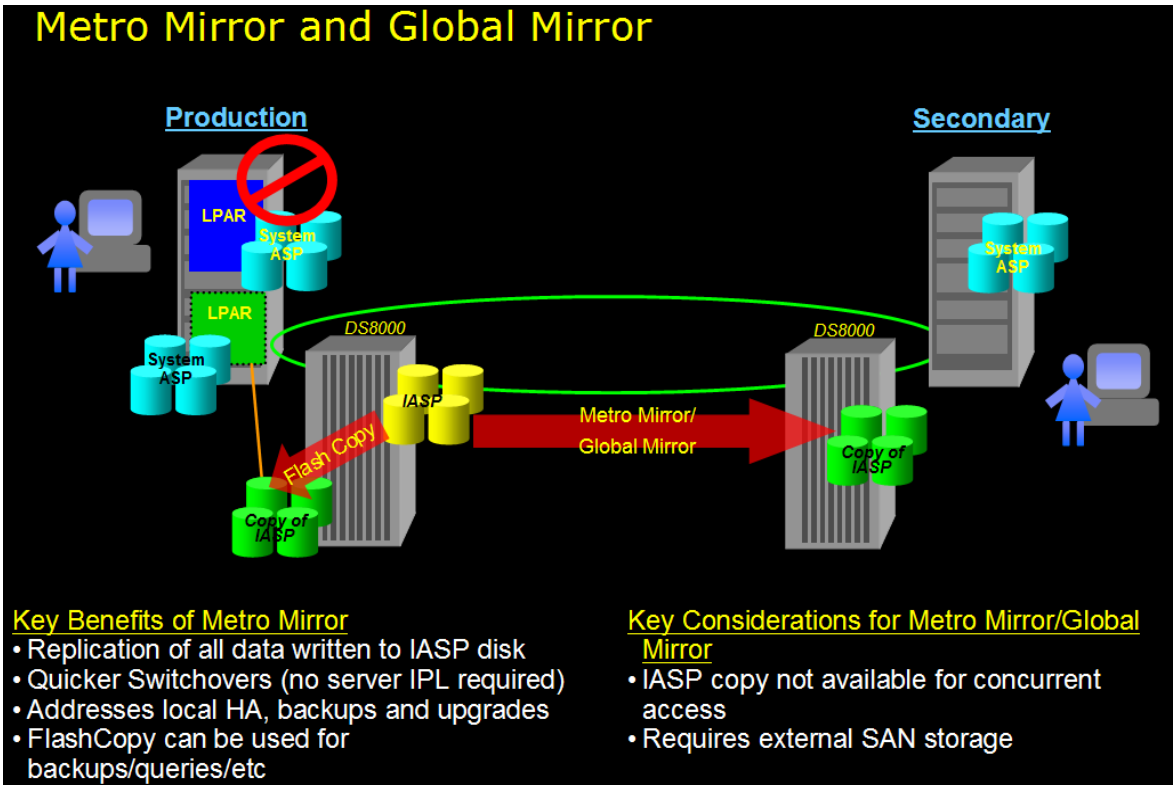
Data in an IASP is available to the systems in a cluster via LUN-level switching or it is mirrored real time via either host-based mirroring over IP or via storage server-based mirroring. The host-based mirroring solution for IBM i is called Geographic Mirroring. Geographic mirroring is available in either synchronous or asynchronous mode with IBM i 7.1. In either case, data is paged from mainstore to disk in an IASP and then mirrored (or switched) between nodes in the cluster.



The geographic mirroring solution can lower your total cost of ownership in comparison to software replication options in both cost of acquisition and operational management costs. The introduction of geomirror async mode support with PowerHA SystemMirror7.1 enables clients to extend the PowerHA SystemMirror cluster between sites with virtually unlimited distance.

Metro Mirror and Global Mirror

The IBM storage server-based mirroring solutions are Metro Mirror and Global Mirror. These solutions support Storage SystemDS6000™/DS8000® and replicate data within the storage system at the disk level. Metro-Mirror and Global-Mirror provide automatic failover of disks that are Metro-Mirror Global-Mirror pairs creating a powerful solution for clients using IBM storage subsystems. By automating the management of Metro-Mirror or Global-Mirror, recovery time is minimized after an outage, regardless of whether the clustered environment is local or geographically dispersed.

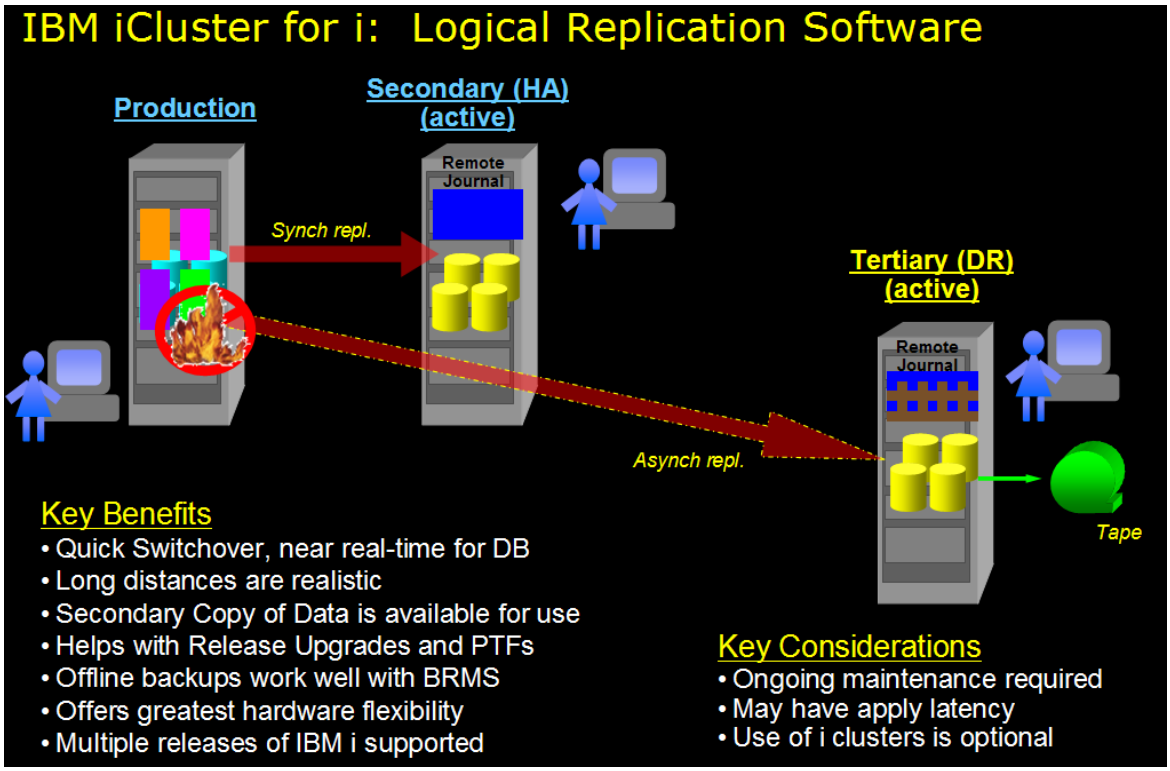


Summary of PowerHA SystemMirror for IBM i
PowerHA high availability solutions from IBM provide clients the confidence that comes from integrated design and testing. IBMPowerHA solutions are designed as part of the operating system environment. This reduces the risk of failures resulting from combining disparate components from multiple vendors and can be a critical factor for business environments. IBM PowerHA high availability solutions provide the advantage of IBM Power Systems, the IBM AIX® and IBM i operating systems, IBM System Storage™ offerings and the PowerHA SystemMirror offering.

For more information on PowerHA SystemMirror for IBM i please go to: http://www-03.ibm.com/systems/power/software/availability/

Other IBM HA Solutions Available to Power Systems running IBM i
Other IBM options are available to the financial services institutions targeting 100 percent availability of the application and hardware. In addition to PowerHA SystemMirror for IBM i discussed above, logical software replication solutions are another option.

IBM iCluster for i
IBM iCluster for i is an IBM LPP (Licensed Program Product) that uses IBM i journaling to provide High Availability and Disaster Recovery for applications like ITM running on Power Systems running IBM i. Journal transactions such as inserts, updates and deletes to physical files or IFS (Integrated File System) objects as well as creates, deletes and changes to almost all other IBM i objects are captured and replicated in near real-time to a second LPAR or system. When backups are required, these can be run on the backup system while production is up and running by ending the apply process on the Tertiary or Secondary system. Switching over users in case of a disaster or for planned maintenance can be done quickly either manually or automatically. The backup data is always available for queries or reporting.



These logical replication solutions have been used almost since the AS/400 was introduced and work very well but do require day-to-day administration. For more information about IBM iCluster for i please go to: http://www-03.ibm.com/systems/power/software/availability/icluster/index.html

Summary

Whether the outage is planned or unplanned, advance preparation to ensure integrated high availability with Euronet ITM is a compelling story for organizations seeking to minimize the impact of unplanned incidents, improve uptime and recover gracefully in the event of a disaster. High availability is necessary for today's global payments industry. With Euronet's suite of financial payment solutions and high availability partners managing the technology, financial institutions are able to focus on their core concern – profitability.

About Euronet

Euronet Software Solutions, a division of Euronet Worldwide, is recognized as a leading provider of software that powers electronic payment and transaction delivery systems around the world. Our solutions have reliably served the worldwide cards, payments and financial services markets for more than 35 years.

Ensuring quick time-to-market and delivering a quality experience, we enable our clients to provide secure electronic payment convenience to millions of people around the world. Whether your organization is a bank or a provider of processing services to financial services organizations, our proven solutions will support your critical business needs now and in the future.

We provide a fully integrated suite of solutions for issuing, acquiring, self-service, e-banking and card scheme connections. Utilizing our services-oriented payments hub architecture, our software offerings are designed to increase your revenue, reduce your expenses, improve your security and increase the value of your customer relationships.

For more information:

- **Visit us online at www.euronetsoftware.com**
- **Contact your Euronet sales representative**
- **Email us at euronetsoftwaresolutions@eeft.com**

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