



IBM System i5

Business Resilience: High Availability

Steven Finnes
Business Resilience Product Manager
System i
Finnes@us.ibm.com

Simplify your IT.

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System i5 and Business Resilience & Compliance

- Make outages of any kind, planned or unplanned transparent to business operations
- Safeguard data by keeping hackers and viruses out
- Promote the highest levels of security, auditing and compliance management
- Deliver proven technology, backed by world-class service and support



The Availability Challenge

Key Drivers

- Real Time Operations*
- Ubiquitous Access (Internet)*
- Asset Utilization*
- Globalization*
- Customer Expectations*
- Business Dependencies*

Strategy and Vision

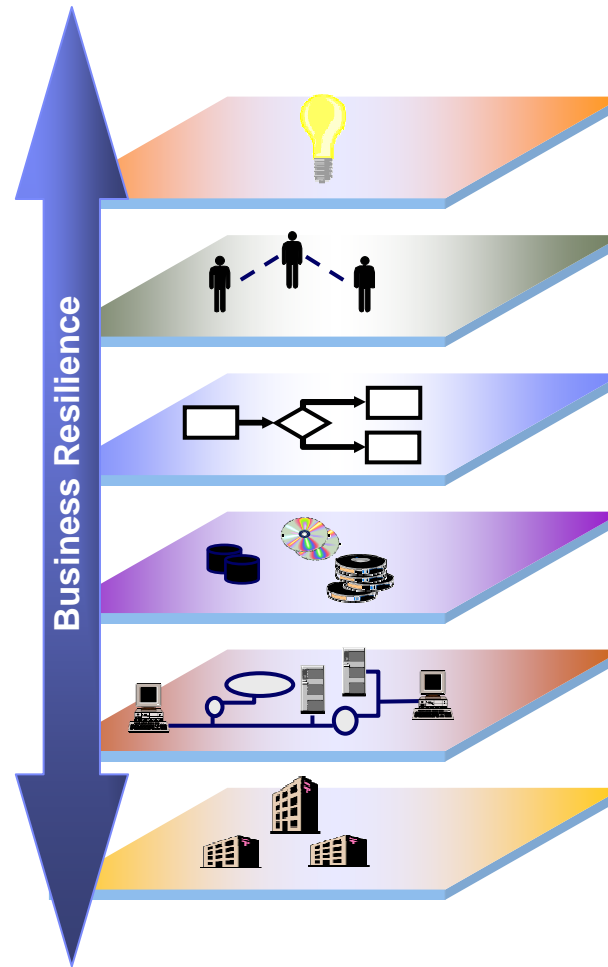
Organization

Processes

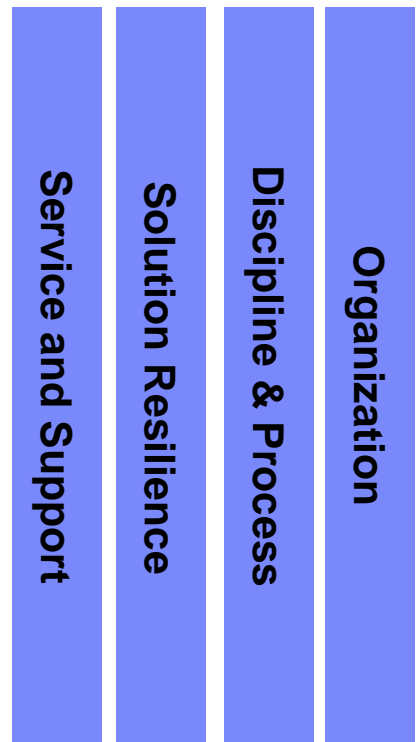
Applications and Data

Technology

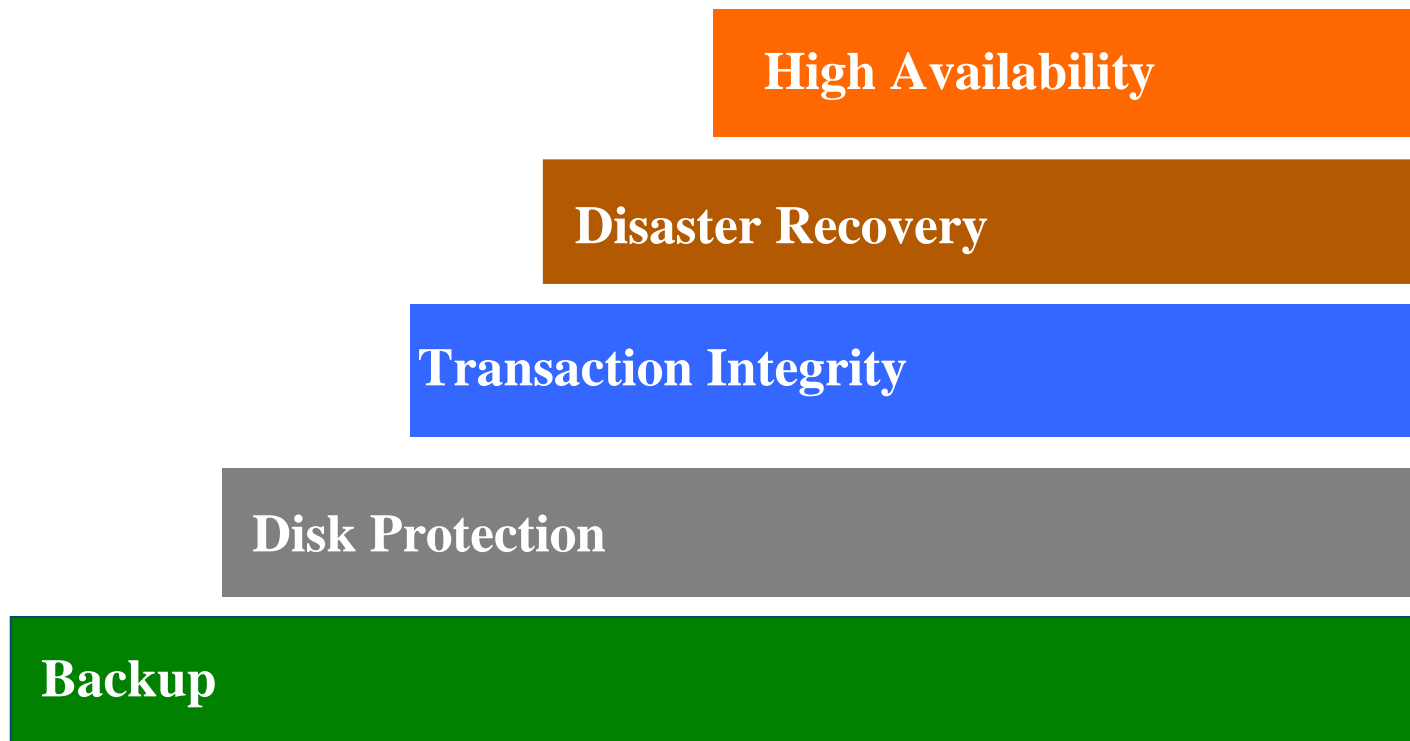
Facilities



Needs

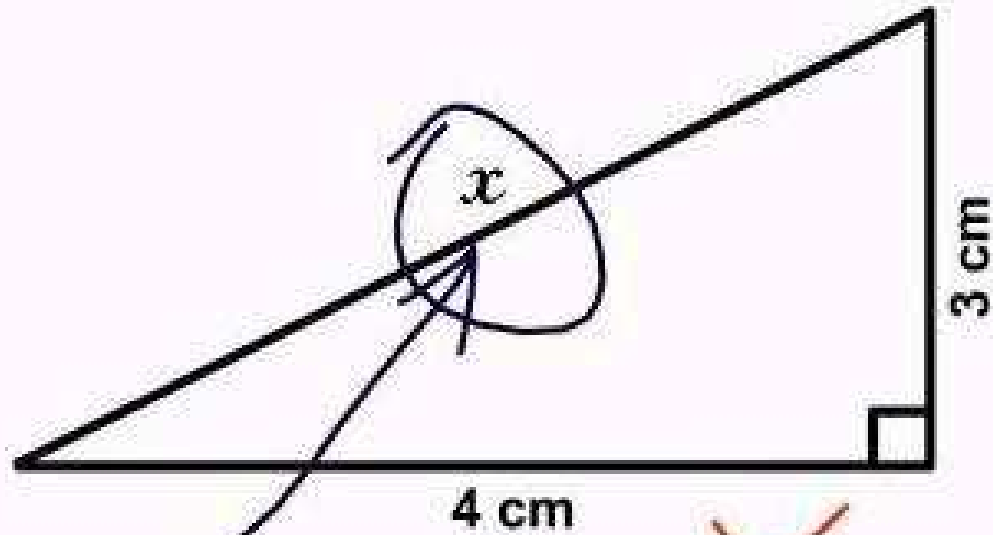


Fundamentals of Business Resilience



The Right Solution ?

Find x .



Here it is



Establish A Baseline

- **Availability Coverage**
- **Single Points of Failure**
- **Interdependencies**
- **Ownership and Process**
- **Skills and Staffing**
- **Achievability of current SLA**



Resiliency Objectives

Sample Application Environments	Objectives
Reservation System Major Hotel Chain	no save window, 10mins planned downtime per year, RTO 15mins, RPO last transaction, no data loss, no performance impacts,
ERP Solution Small Manufacturing Firm	½ hour save window/night, 7 hours planned downtime per week, RTO 6 hours, RPO 12hours, no performance impacts
Customer Care and Billing Large Telco	Zero save window, no planned downtime, RTO 2 mins, RPO last transaction, no data loss no performance impacts
Payment Server ATMs at large bank	No planned outages, RTO 30 seconds, RPO last transaction, no data loss, no performance impacts

Resiliency Coverage Baseline

Coverage Type	Customer Care & Billing Application	ERP Application
Redundant Power	Yes	Yes
UPS	Yes	Yes
Journaling	Yes	No
Raid5	No	Yes
Mirroring	Yes	No
TCP/IP Route Fault Tolerance	No	No
Backup Recovery	LTO, Parallel Saves , SMAPPs	Yes, LTO
DR	XSM	Yes, async replication
HA	Logical Replication (async)	No
Clustering	IASP & Clustering	No

Single Points of Failure

Assessment Category	Status	Assessment
Personnel	Steve back up for Bob or Mike	No succession process in place
Power	Single diesel generator Redundant UPS Redundant Power	Need to evaluate redundant generator
Communication Subsystem	Redundant Ethernet	Complete
CC&B Application	No application or data CRGs , no commitment control, journaling active	Manual Application recovery
Data for CC&B Application	Raid5, no replication, journaling not active	Single points of failure: Raid5 Verses mirroring, no redundant copy of data, No data loss protection
ERP Application	Inactive copy on 2 nd machine ,	No application recovery automation
Data for ERP Application	Mirrored and replicated data no data CRGs implemented Journaling active	No single points of failure on disk Replicated data not Synchronous

Achievability

Sample Application Environments	Objectives	Assessment
Reservation System Major Hotel	no save window, 10mins planned downtime per year, RTO 15mins, RPO last transaction, no data loss, no performance impacts	Current SLA not Achievable
ERP Solution Small Manufacturing Firm	½ hour save window/night, 7 hours planned downtime per week, RTO 6 hours, RPO 12hours, no performance impacts	Achievable
Customer Care and Billing Large Telco	Zero save window, no planned downtime, RTO 2 mins, RPO last transaction, no data loss no performance impacts	Current SLA not Achievable
Payment Server for ATMs at large bank	No planned outages, RTO 30 seconds, RPO last transaction, no data loss, no performance impacts	Achievable

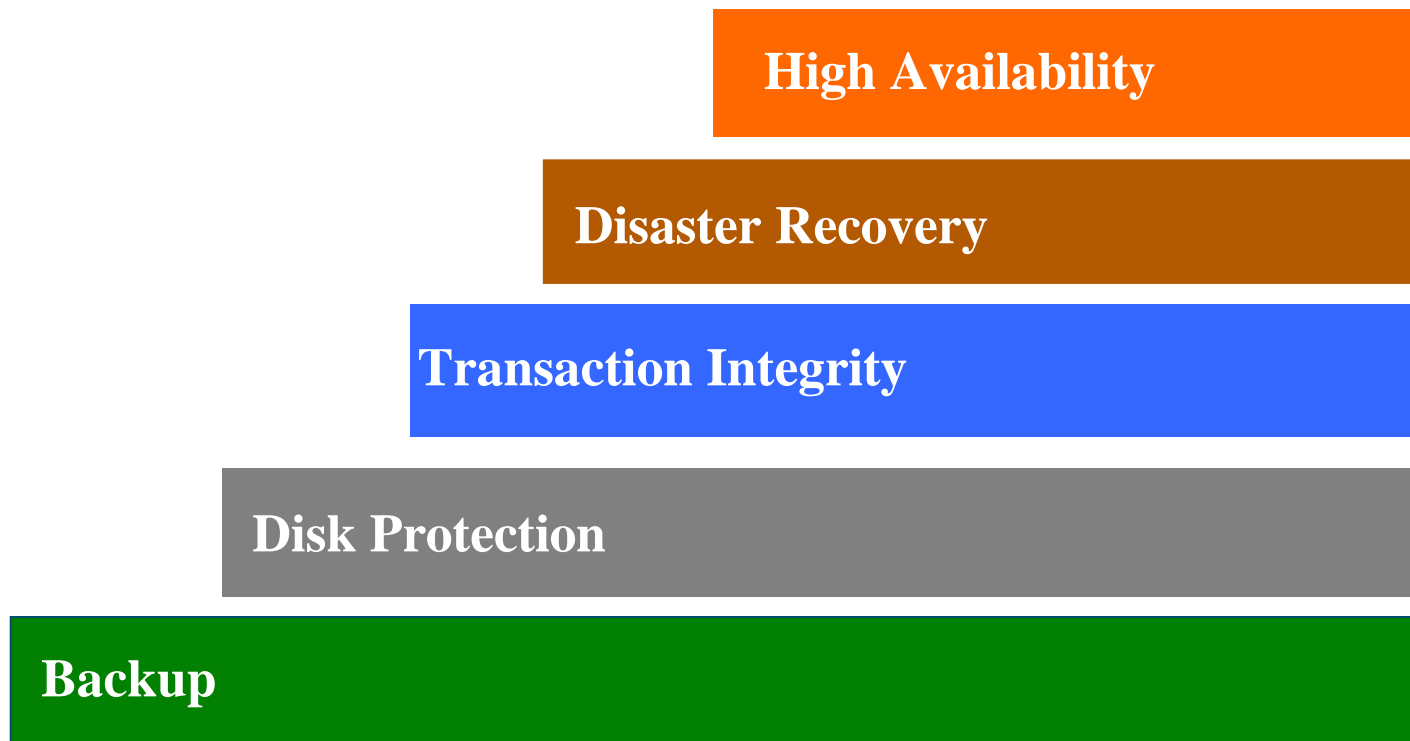
Gap Analysis

Sample Application Environments	Objectives	Assessment	Gap
Reservation System Major Hotel	No save window, 10mins planned downtime per year, RTO 15mins, RPO last transaction, no data loss, no performance impacts	Current SLA not Achievable	Save window 30 hrs planned downtime per year, Actual recovery time: 6 hours or more
ERP Solution Small Manufacturing Firm	½ hour save window/night, 7 hours planned downtime per week, RTO 6 hours, RPO 12hours, no performance impacts	Achievable	Current resiliency environment meets objectives
Customer Care and Billing Large Telco	Zero save window, no planned downtime, RTO 2 mins, RPO last transaction, no data loss no performance impacts	Current SAL not Achievable	Save window, single points of failure, data loss exposure, recovery time 6 hours or more,
Payment Server for ATMs at large bank	No planned outages, RTO 30 seconds, RPO last transaction, no data loss, no performance impacts	Achievable	Current resiliency environment meets objectives

Requirements and A Plan of Action

Sample Application Environments	Objectives	GAP	Action
Reservation System Major Hotel	No save window, 10mins planned downtime per year, RTO 15mins, RPO last transaction, no data loss, no performance impacts	Save window 30 hrs planned downtime per year, Actual recovery time: 6 hours,	
Customer Care and Billing Large Telco	Zero save window, no planned downtime, RTO 2 mins, RPO last transaction, no data loss no performance impacts	Save window, single points of failure, data loss exposure, recovery time 6 hours or more,	

Fundamentals of Business Resilience



Transaction Integrity

- **Challenges**

- Recoverability
- Application/Data Coherency
- Performance

- **Best Practices**

- Journaling
- Commitment Control
- Synchronous Replication



Application Resilience

Fully transparent

- Full resilience with automatic restart & transparent failover
- Users repositioned to last committed transaction
- No data loss, no sign-on required, no perceived loss of server; only delay in response

Semi-transparent:

- Automatic application restart & recovery to last transaction boundary
- The resilient data & the application restart point match exactly

Semi-automatic:

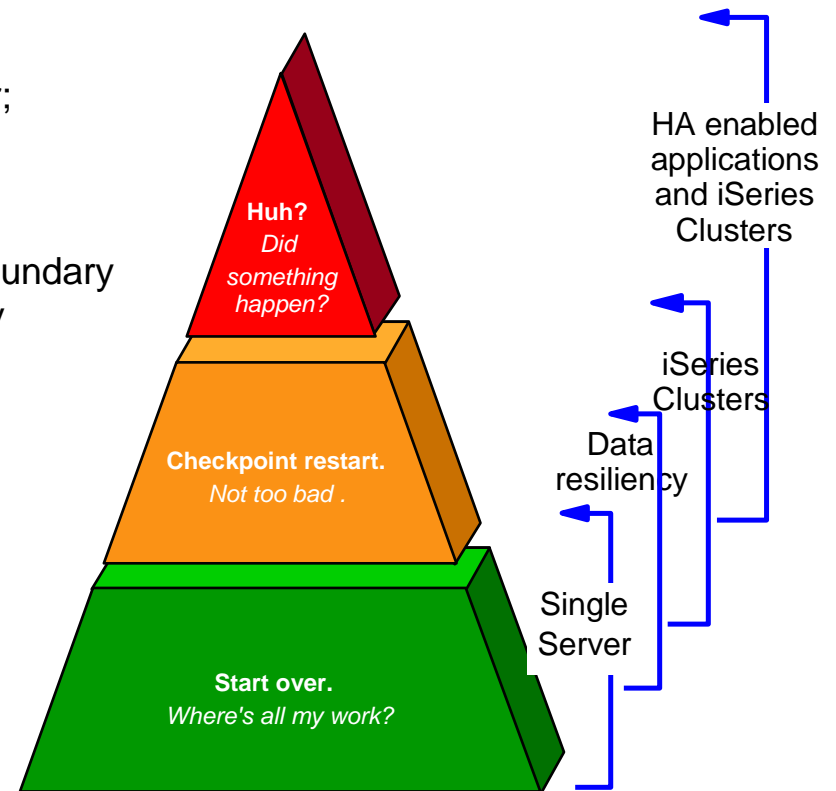
- Automatic application restart & recovery to some architected application “restart” point
- Normally consistent with state of data, but user may have to manually match application to position of data

Basic application failover:

- Automatic application restart after outage
- User manually repositions within application

No application recovery:

- Users manually restart application with resilient data
- User determines where to resume work

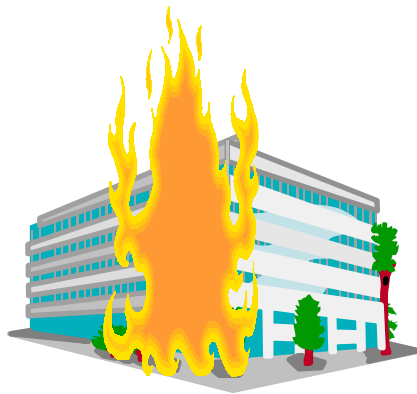


Combine with Data Resilience for complete solution

Disaster Recovery

- **Challenges**

- Recovery facility (internal or outsource)
- Recovery point (last tape or last transaction)
- Recovery time (two hours or two days)



Data Center



Remote Recovery Center

Disaster Recovery Technologies

- **Solution Approaches**

- Off-site tape storage
- Logical replication (consider Capacity BackUp Edition)
- Business recovery services (BCRS) offerings
- IBM DS8000 and PPRC
- Cross Site Mirroring (XSM)

- **Best Practices**

- Plan
- Practice

Disaster Recovery – ISVs (software solutions)



Data Center



Remote Recovery Center

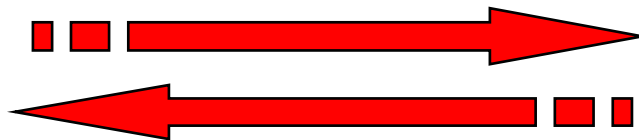


High Availability

- **Challenges**
 - Continuous application availability
 - Minimize planned outages
 - Minimize unplanned outages

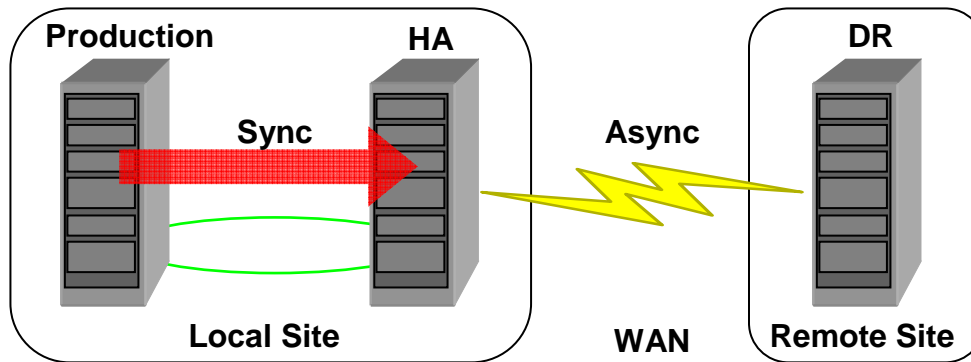


Production System

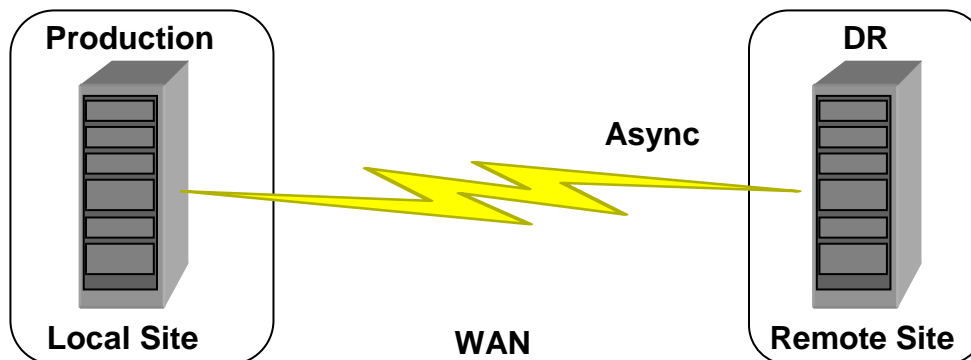


Backup System

Fully understand DR vs. HA requirements



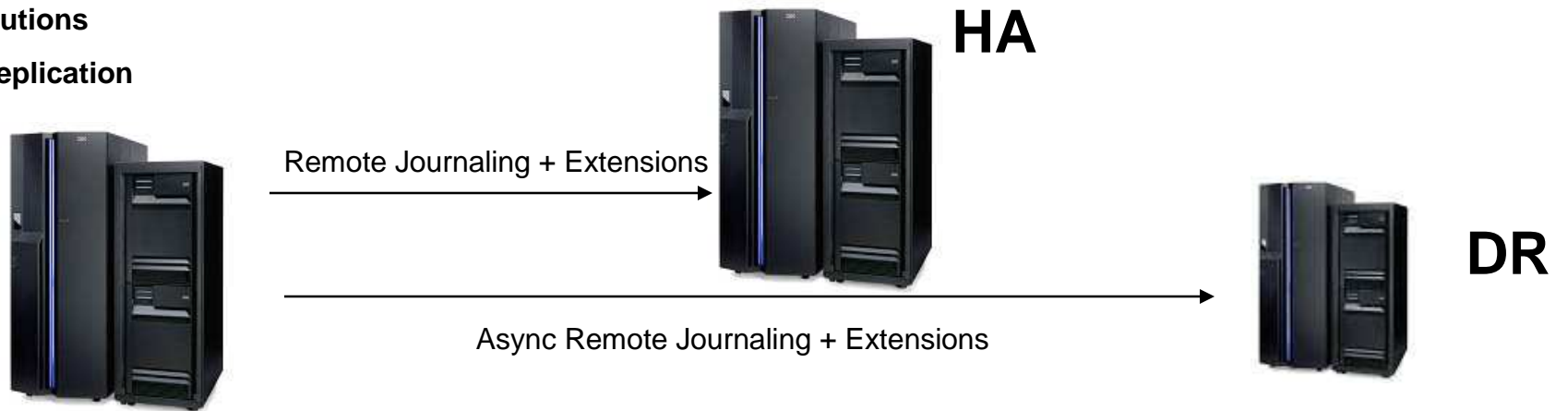
- **HA must be able to effectively address local outages**
 - Very fast recovery times usually expected and possible (RPO/RTO critical)



- **DR is remote - addresses site or facility loss**
 - Longer recovery times, more in-flight data loss possible, effected more by peak workloads

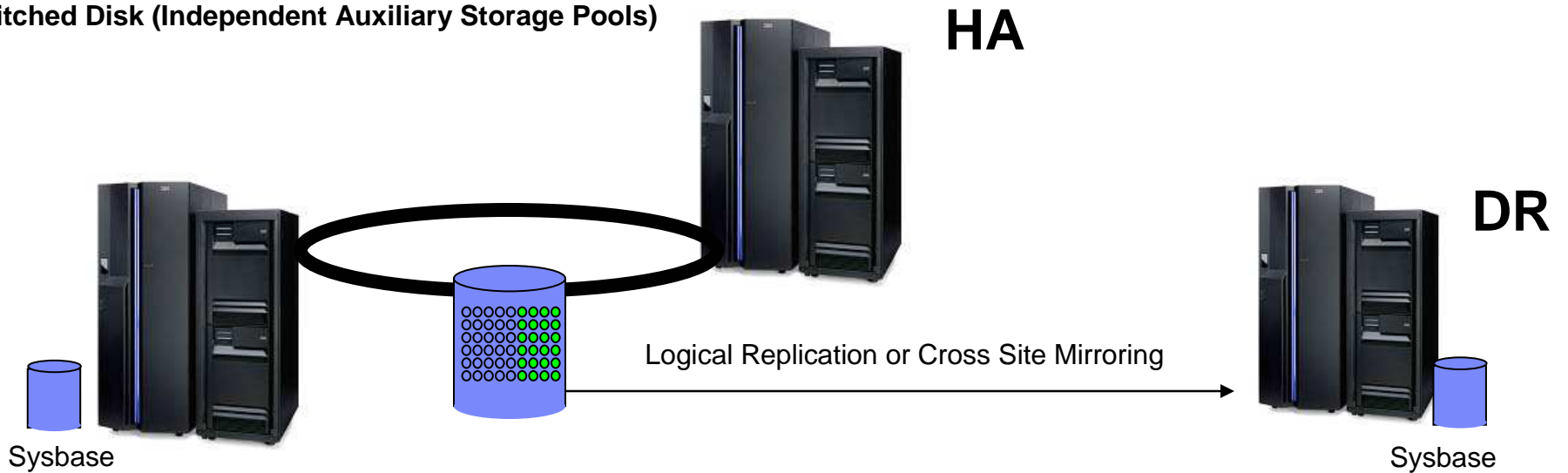
IBM System i5 HA Technologies

HABP Solutions Logical Replication



IBM (and HABP) Solutions

Switched Disk (Independent Auxiliary Storage Pools)

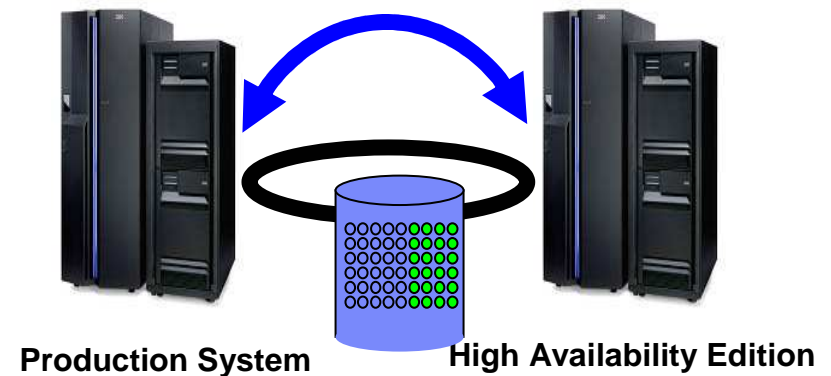


IBM System i5 HA Technologies

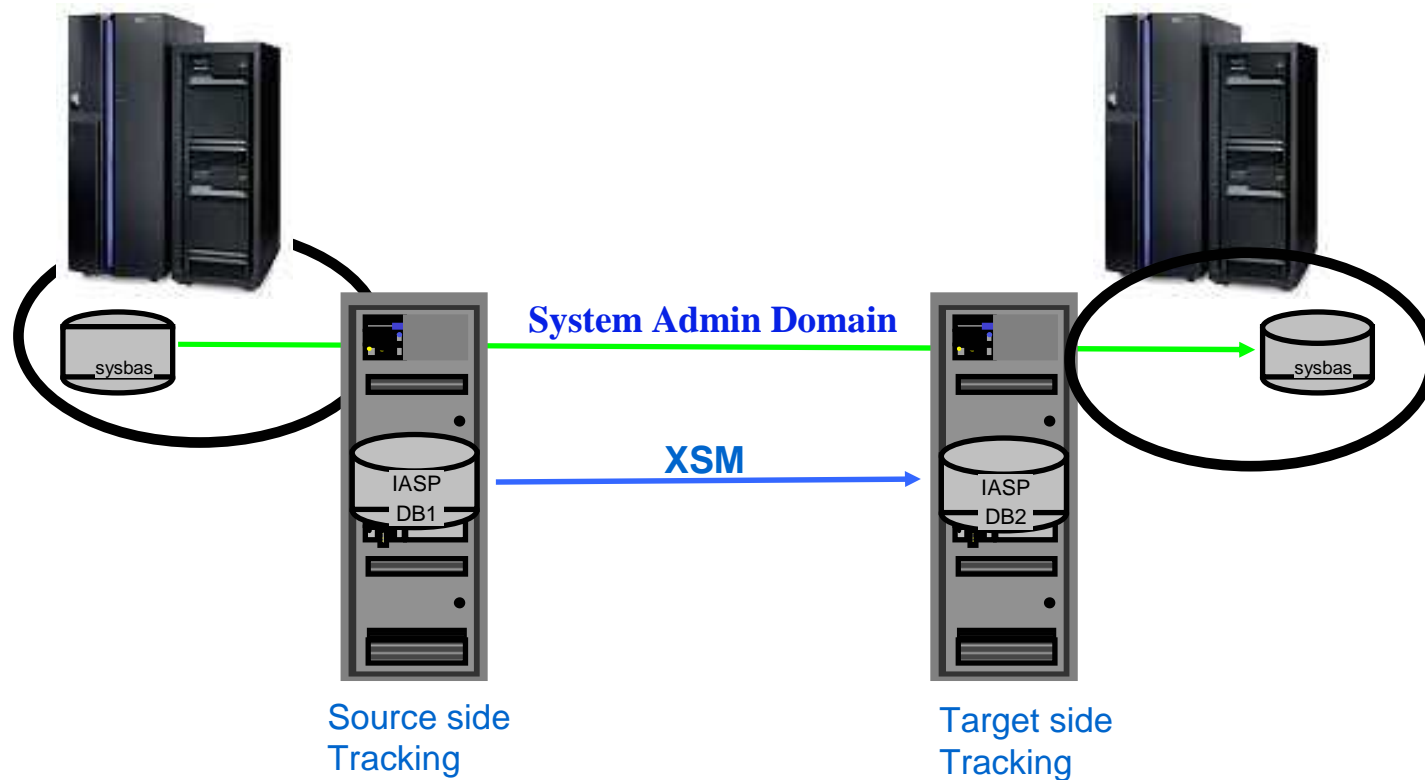
- **Solution Approaches**
 - Logical replication
 - Switchable IASPs
 - IASP & logical replication
 - IBM DS8000 PPRC with IASP
- **Best Practices**
 - Plan role swap
 - Practice role swap
 - Implement regular role swap

New with i5/OS V5R4

- System administration domain
- XSM source side tracking



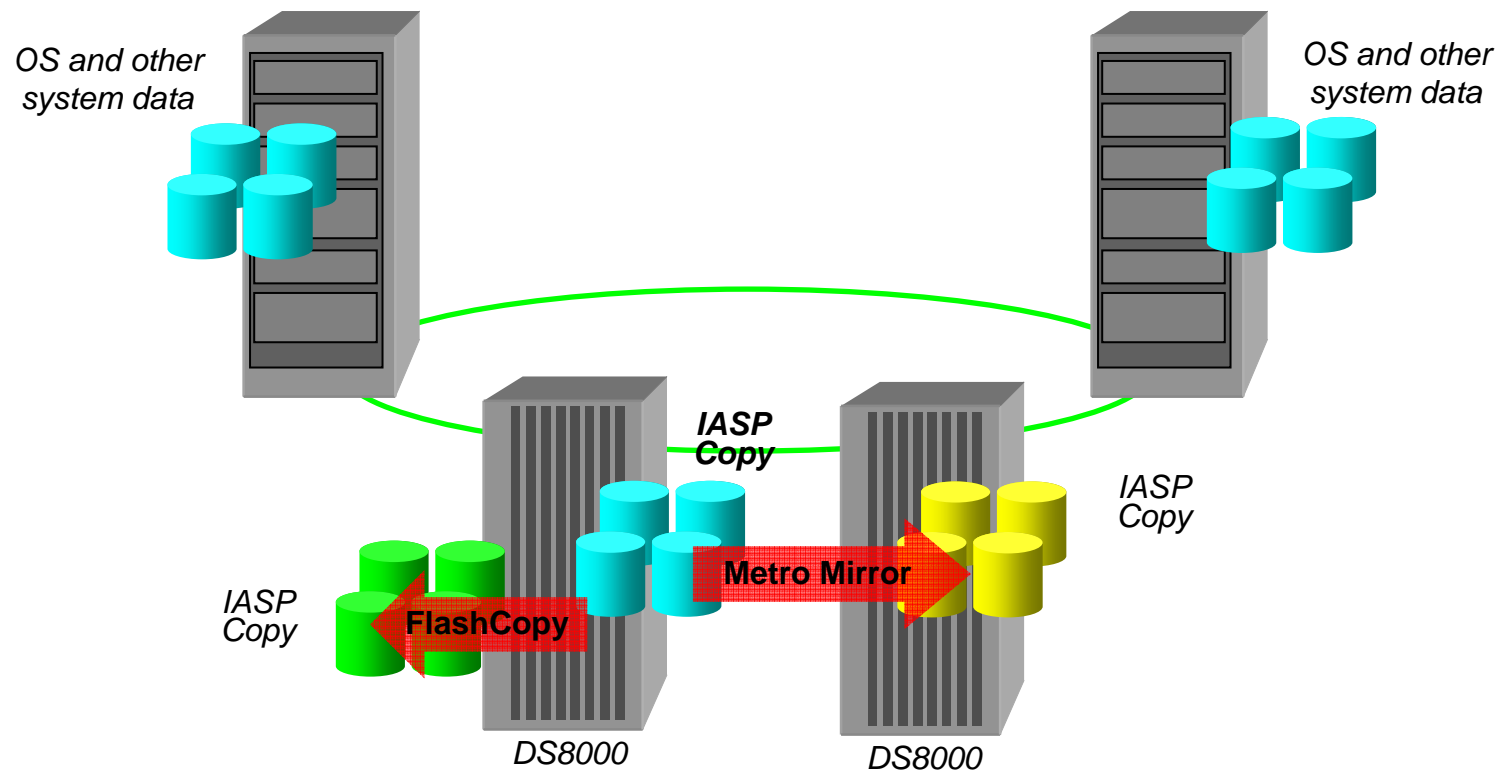
Basic IASP/XSM Topology



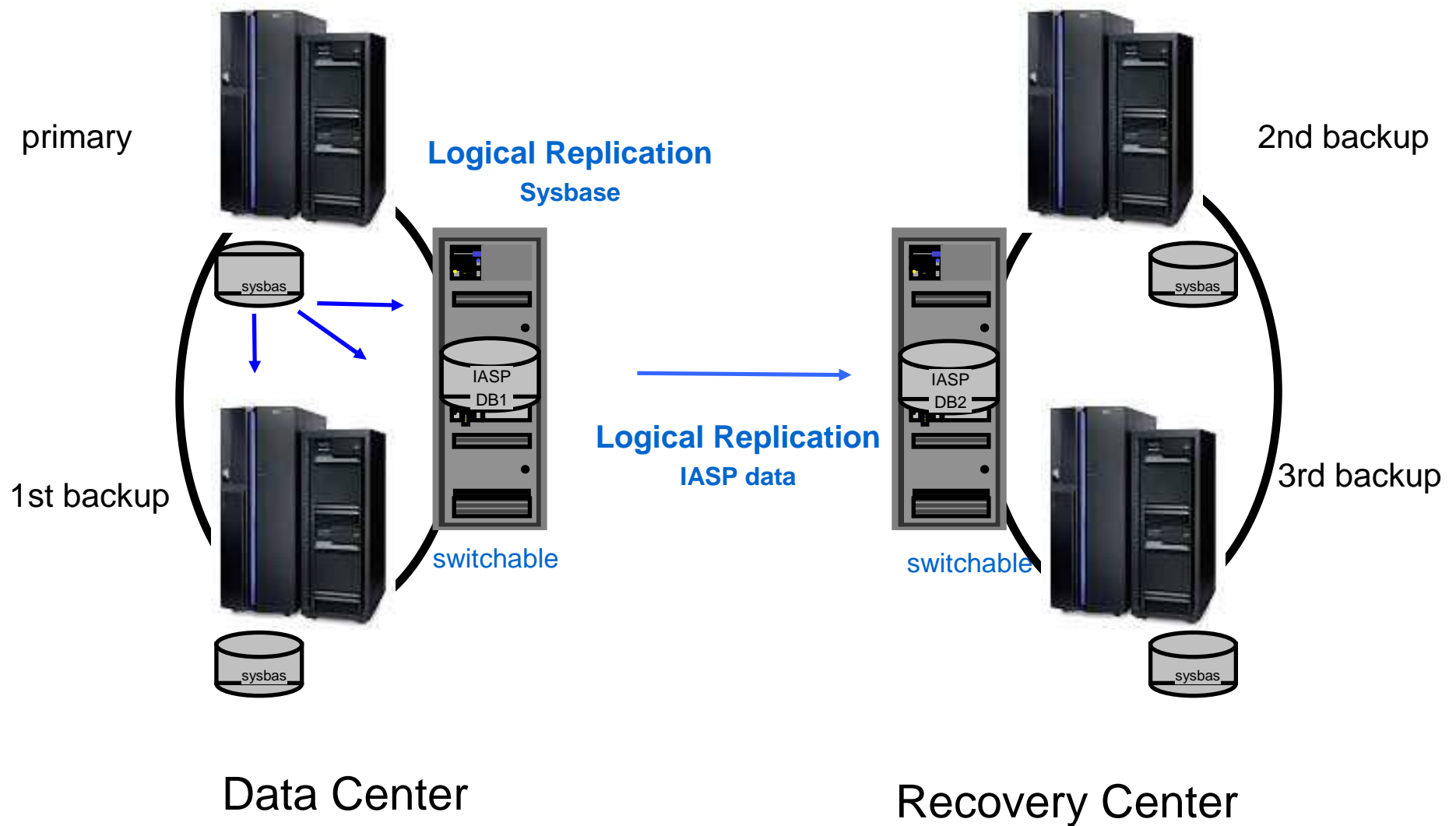
Cross Site Mirroring (XSM)
Storage Management Synchronous Replication

iSeries Copy Services toolkit for IBM TotalStorage

- Metro Mirror generates a second IASP copy identical to first
- Changes to production IASP replicated to second copy of IASP
- Cluster and SAN combined replication solution

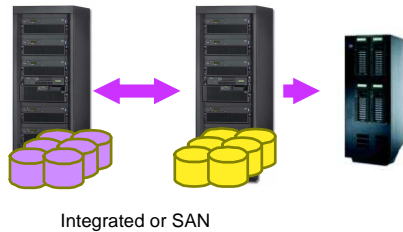


Advanced Solution Topology



System i Data Resiliency Technologies

1. Logical Replication



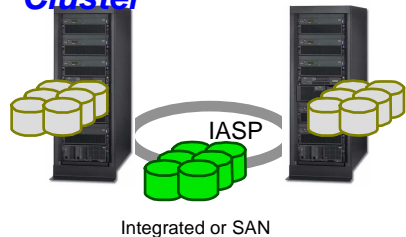
- Most widely deployed availability solution for iSeries
- Very flexible (any hardware, various OS release, most ISV software, etc.).
- Concurrent access on backup

4. Advanced Copy Services*



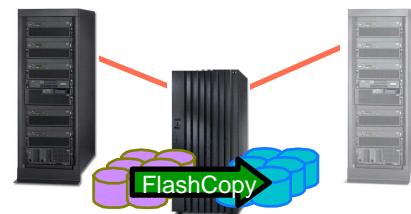
- Switched IASPs combined with ESS/DS Copy Services
- More complex - but offers more availability options
- Requires planning and consulting

2. Switched IASP Cluster



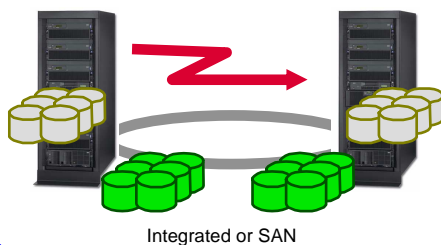
- Simple availability
- Single copy of data - no concurrent access from both hosts - cannot mask outages from backups
- Building block for other solutions

5. Basic Copy Services



- FlashCopy, Metro Mirror and Global Mirror
- Moves Load Source Unit to ESS/DS - available on i5 models only
- Simple - but limited to types of outages they can address

3. Cross Site Mirroring



- Utilizes Switchable IASPs
- Provides two synchronous copies of IASP data
- Currently deployed for DR and basic availability
- Campus - metro distance
- Enhancements in V5R4

High Availability and Disaster Recovery is much more than just a copy of data or disk. Application level resiliency requirements like RPO and RTO must be established before the optimal availability solution topology can be selected. Other factors such as solution usability, skills & staffing should be identified as well.

Critical Success Factors

- **Clearly Established Requirements**
 - Look Beyond Disaster Recovery and Involve Emerging Availability Requirements
 - Understand The Various Alternatives and Solution Combinations
- **Executive Sponsorship**
 - Resiliency is Likely a Top “Business” Priority
- **Available Budget**
 - Budget May Exist But The Business May Elect to Re-Direct to Other Projects if HA = DR
- **Financial Justification (ROI)**
 - While DR May Be More Difficult to Cost Justify, Business Availability is a Relatively Simple Justification
- **Local Certified Business Partner Support, Service and Support Capabilities**
 - Most HA Solutions Involve 3rd Party ISV Software and Knowledgeable Assistance is Critical!
 - Implementation and Post-Sale Support are More Important Than the Sales Support
 - Does The Solution Provider Have Master Level IASP Implementation Consultancy ?
- **Established Solution Practice for Packages (SAP, JDE, Jack Henry, etc)**
 - Engage ERP ISV Solution Support for Guidance to Eliminate Unnecessary Analysis of ISV Solutions
- **Usability, Autonomics and References**
 - Remotey and IASPs Should Be An Option
 - Does The Solution Provider Offer Services To Implement IASPs
 - Demonstrate Ease of Implementation and Use as Well as Automatic Recovery Functions
 - Use Similar References
- **Capability to Support Heterogeneous OS Environment**
 - Delivering Availability to Installed iSeries Systems is Only Part of the Requested Customer Solution
- **Understand The Alternatives**
 - There is no magic bullet, manage with carefully developed requirements



The Capacity BackUp Edition Offering Guide

	CBU Edition		CBU Standard Edition*
	i5/OS	Enterprise Enablements	i5/OS
595 4/32-way	4	4	4
595 2/16-way	2	2	2
570 2/16-way	1	1	1
570 1/8-way	1	1	1
570 1/4-way	1	1	1
550 1/4-way	1	1	1
520 1- way	1	1	0
520 2-way	2	2	0
520 1/2 - way	1	1	1

Positioning The HA & CBU Editions

	HA Edition	Earlier CBU Edition	Enhanced CBU Edition
Disaster Recovery	Yes	Yes	Yes
High Availability	Yes	No	Yes
Solutions/options which allow edition to be ordered:			
HA ISV Solutions	Yes	Yes	Yes
Independent Auxiliary Storage Pools	No	Yes	Yes
Cross Site Mirroring (XSM)	No	Yes	Yes
IBM DS8000	No	Yes	Yes
Permanent processor activations	Yes	No	Yes
Temporary i5/OS, AIX 5L, Linux entitlement transfers	Yes	No	Yes
Temporary enterprise enablement entitlement transfers	No	No	Yes
Upgrade into edition from 825/870/890	No	No	Yes
Registration of primary system to qualify	Yes	No	Yes
No charge On/Off CoD if primary system down by disaster	No	Yes	Yes
Primary system must be same size or larger	Yes	No	Yes

Positioning the System i 520 HA & CBU Editions

	HA Edition	i520 CBU Edition
Disaster Recovery	Yes	Yes
High Availability	Yes	Yes
Solutions/options which allow edition to be ordered:		
HA ISV Solutions	Yes	Yes
Independent Auxiliary Storage Pools	No	Yes
Cross Site Mirroring (XSM)	No	Yes
IBM DS6000	No	Yes
Temporary i5/OS, AIX 5L, Linux License Transfers (520 2 way)	No	Yes
Temporary Enterprise Enablements Transfers (520 2 way)	No	Yes
Standard Edition CBU	No	Yes
Upgrade into model 520 CBU Edition from model 810 *	No	Yes
Registration of primary system to qualify	Yes	Yes
Primary system must be same size or larger	Yes	Yes

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