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Evènement
On-line
5 Nov

SESSION
Db2 Mirror for i :
Disponibilité continue des applications

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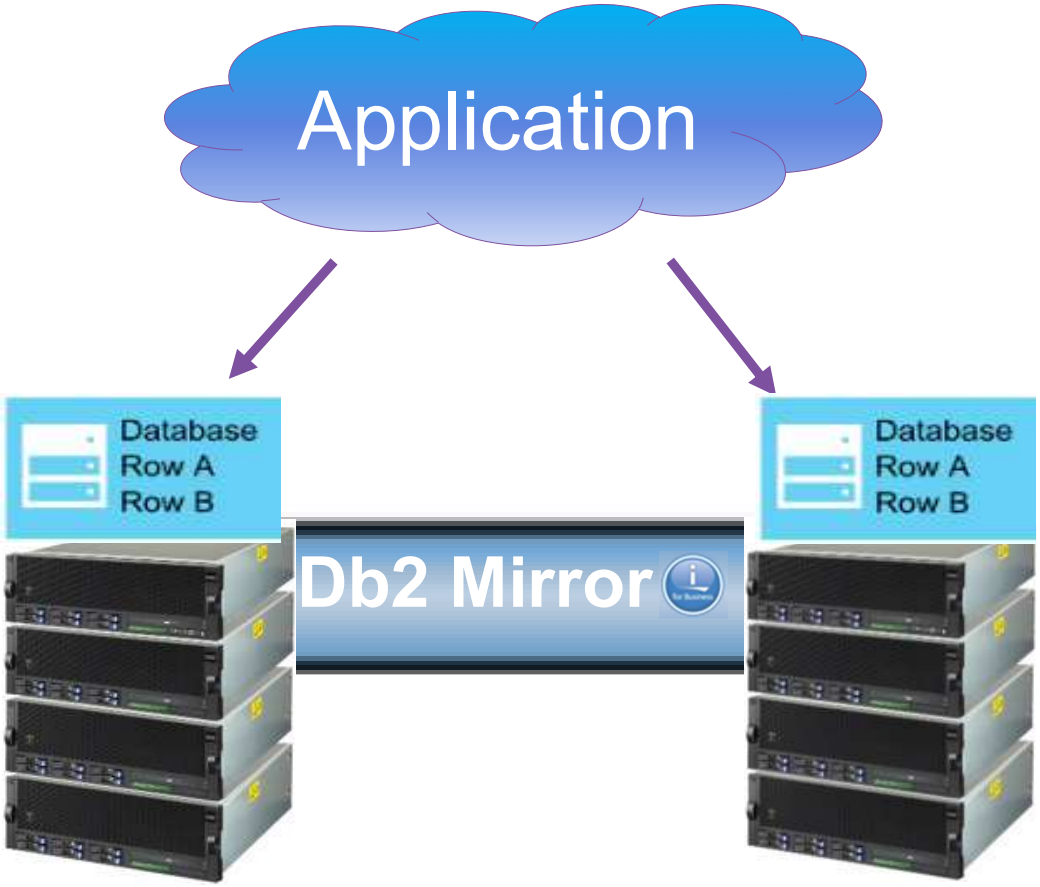
Avec :

FRESCHE GAIA Gamma soft GROUPE HISI REMAIN M81 Resiliane XCASE

IBM Db2 Mirror for i



- **IBM Db2 Mirror for i: Enables Continuous Availability**
  - High speed synchronous replication of Db2 for i (Data Center Solution)
  - Access Db2 objects from either LPAR
- **Application Availability Enablement**
  - Two Nodes read and write to the same DB Files
  - Enables quickly moving all work to one node, for planned maintenance or node failure
- **Enables Business Continuity for Disruptive System Upgrades**
  - Nodes can be at different OS levels
  - Nodes can be on different Power Hardware Generations
  - Rolling upgrades for no downtime
  - Roll a node back a release with minimal impact if Active/Active applications are deployed

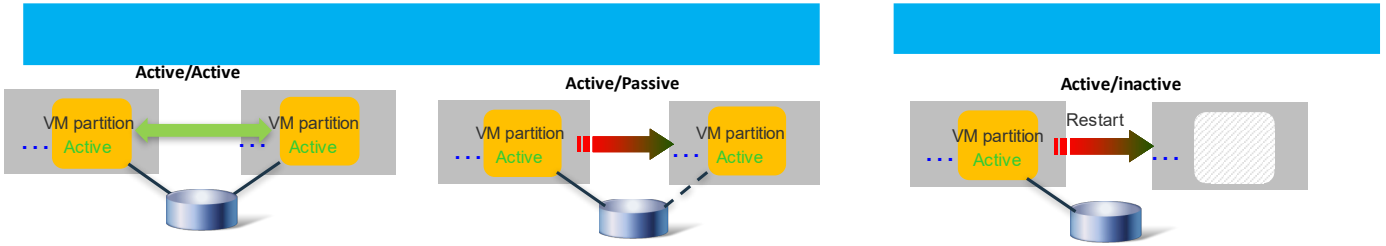
Requires POWER8 or later and IBM i 7.4
New IBM i LPP 5770DBM

Recovery Time Objective

Recovery Point Objective

Near 0

High Availability topology classification & positioning

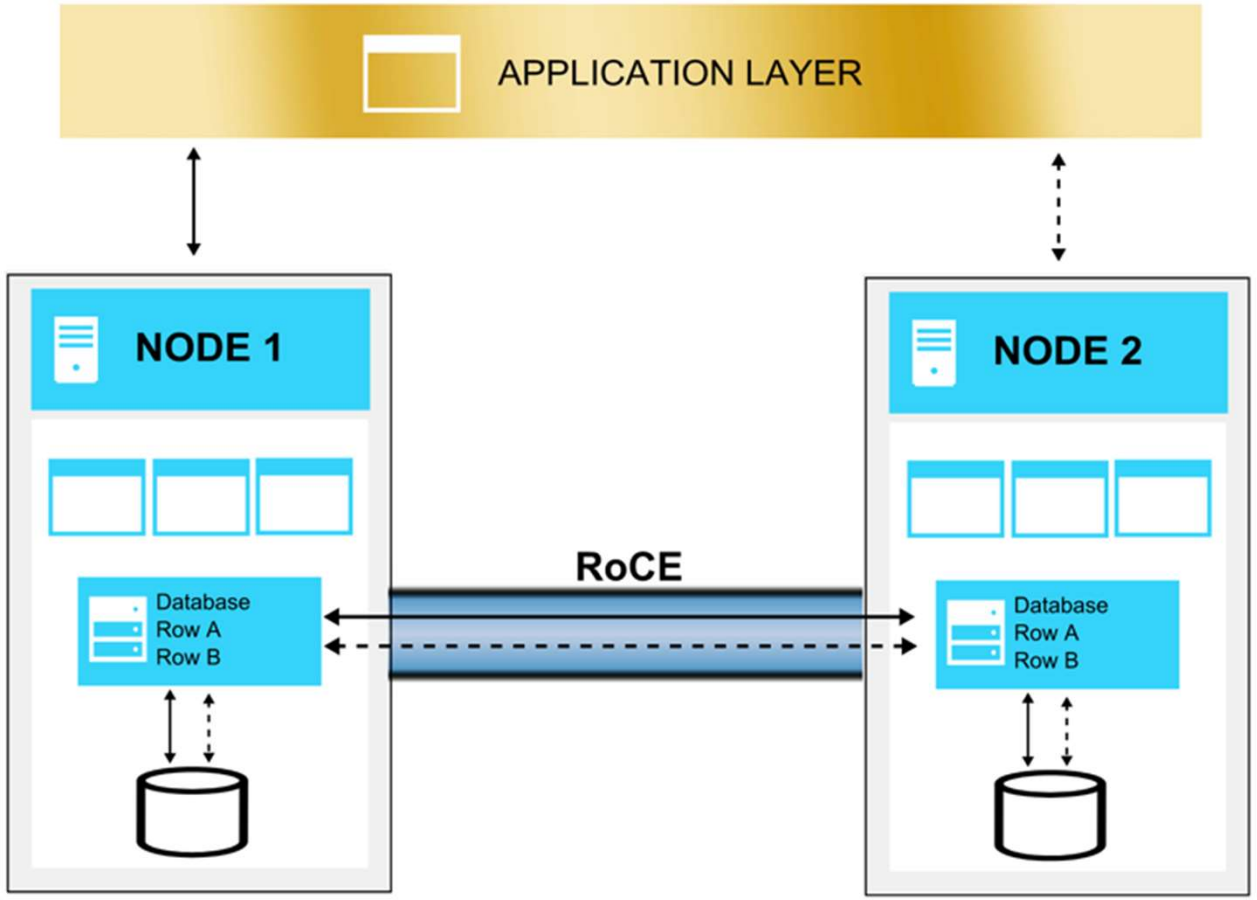


Technology	Active/Active Clustering	Active/Passive Clustering	Active/Inactive
Definition	**Application level clustering**; applications in the cluster have simultaneous access to the production data therefore no app restart upon an app node outage. Certain types enable read-only access from secondary nodes	**OS level clustering**; one OS in the cluster has access to the production data, multiple active OS instances on all nodes in the cluster. Application is restarted on a secondary node upon outage of a production node.	**VM level clustering,** One VM in a cluster pair has access to the data, one logical OS, one or two physical copies. OS and applications must be restarted on a secondary node upon a primary node outage event. LPM enables the VM to be moved non-disruptively for a planned outage event.
Outage Types	SW,HW,HA, planned, unplanned RTO 0, limited distance	SW,HW,HA,DR, planned, unplanned, RTO>0, multi-site	HW,HA,DR, planned, unplanned, RTO>0, multi-site
OS integration	Inside the OS	Inside the OS	OS agnostic
RPO	Sync mode only	Sync/Async	Sync/Async
RTO	0	Fast (minutes)	Fast Enough (VM Reboot)
Licensing*	N+N licensing	N+1 licensing	N+0 licensing
Industry Examples	Oracle RAC, **Db2 Mirror**, pureScale	PowerHA, Redhat HA, Linux HA	VMware, VMR HA, LPM,

- N = number of licensed processor cores on each system in the cluster
- illustrations represent two-node shared-storage configurations for conceptual simplicity. There are many other topologies and data resiliency combinations

Architecture

- Remote Direct Memory Access (RDMA)
- RDMA over Converged Ethernet (RoCE)
- Maximum distance 100m or 200m



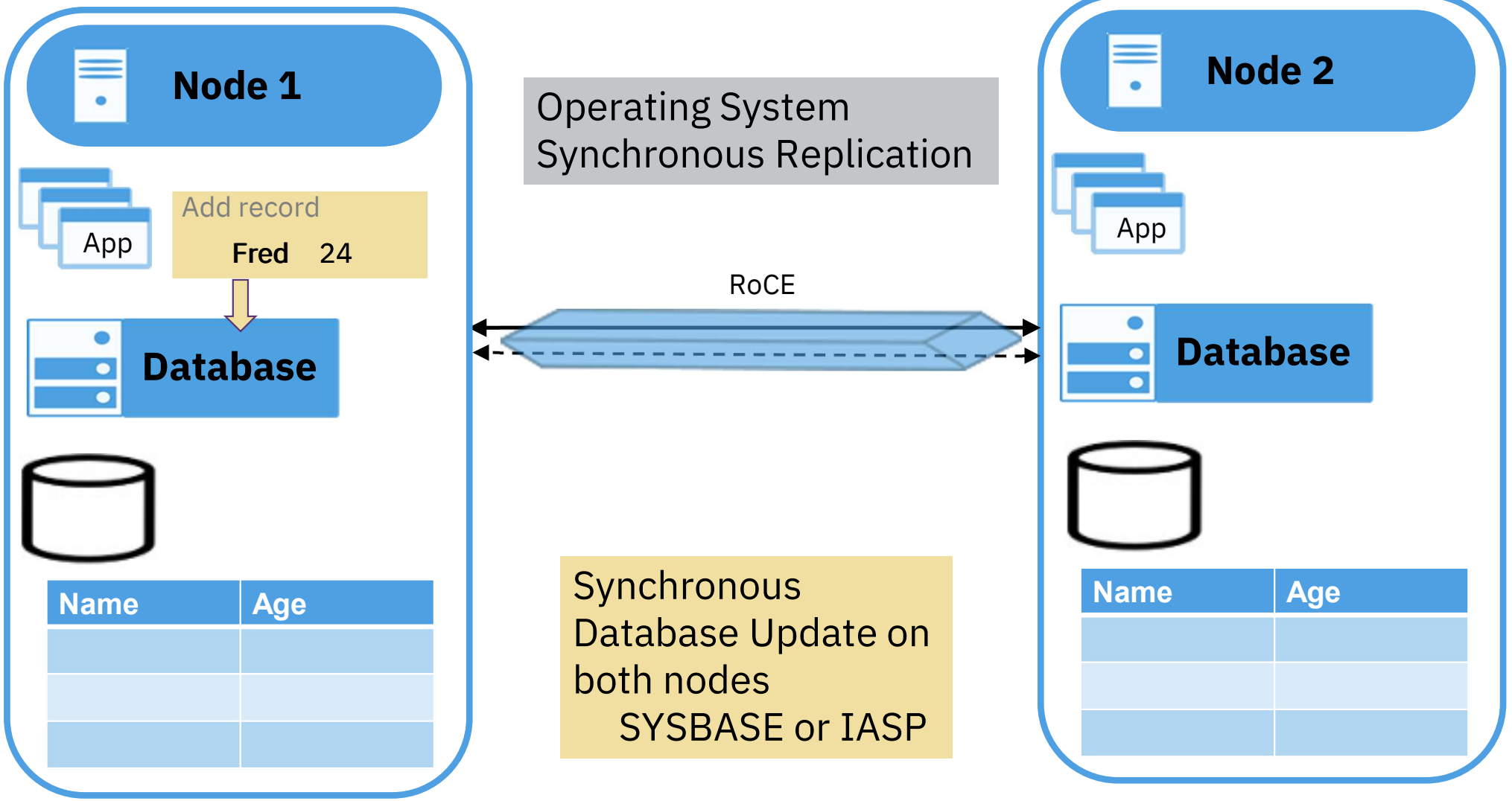
Db2 Mirror Statement of Direction

2020 iSight

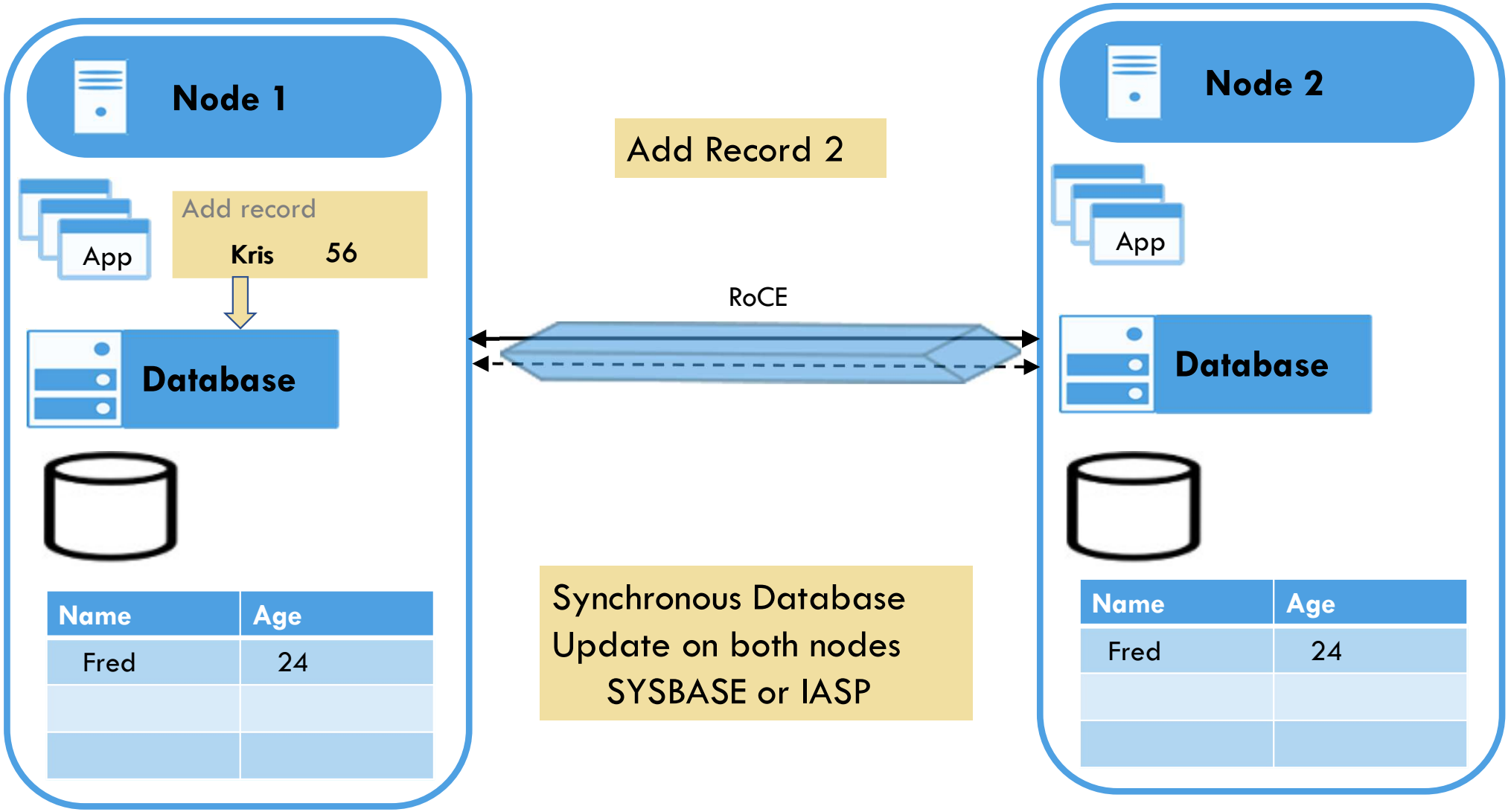
IBM Db2 Mirror for i planning insights:

IBM plans to enhance IBM Db2 Mirror for i (5770-DBM) to extend the physical distance allowed between two nodes, allowing the two nodes to be located up to 10 kilometers apart.

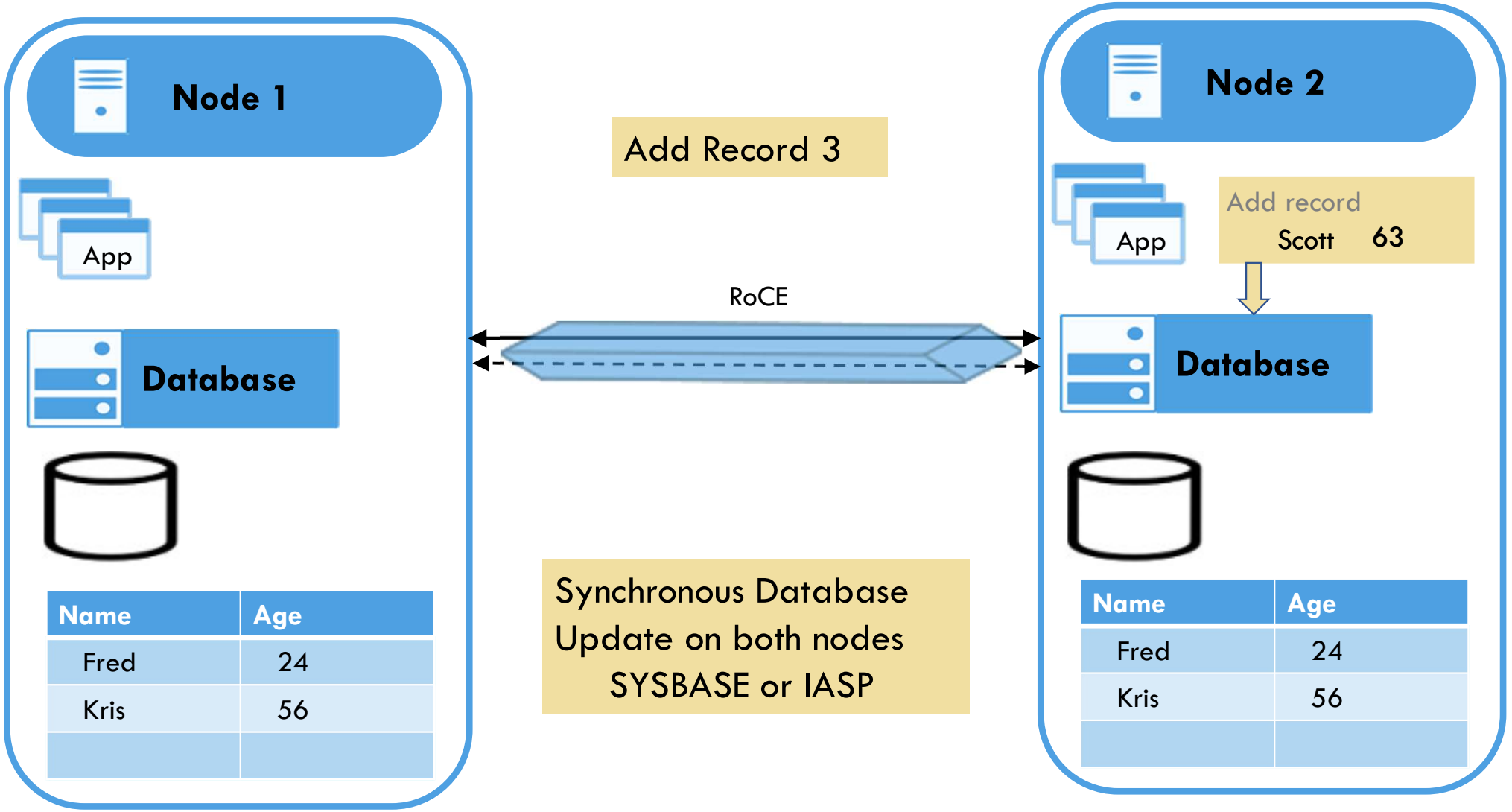
Db2 Mirror – Active Active



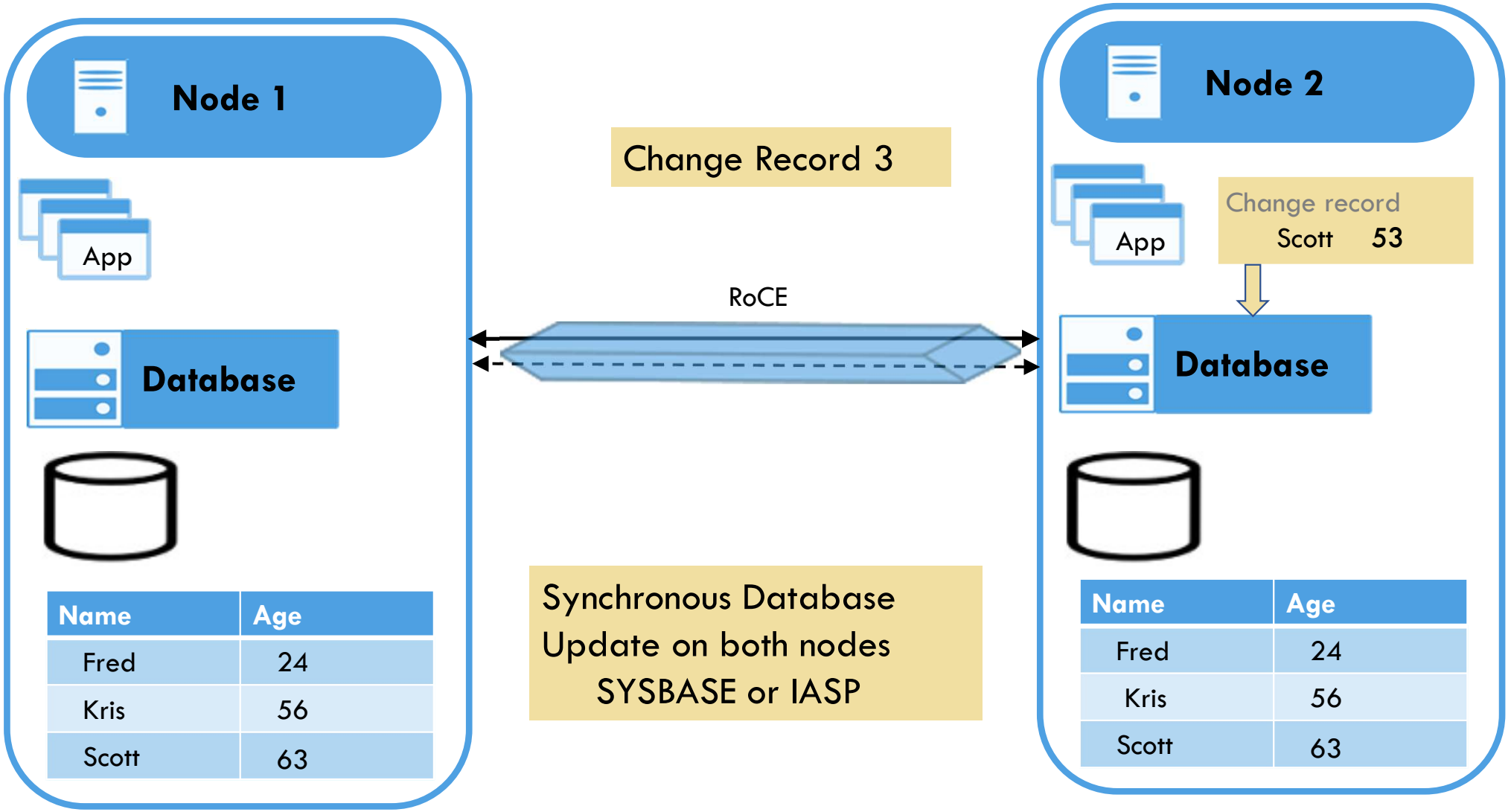
Db2 Mirror – Active Active



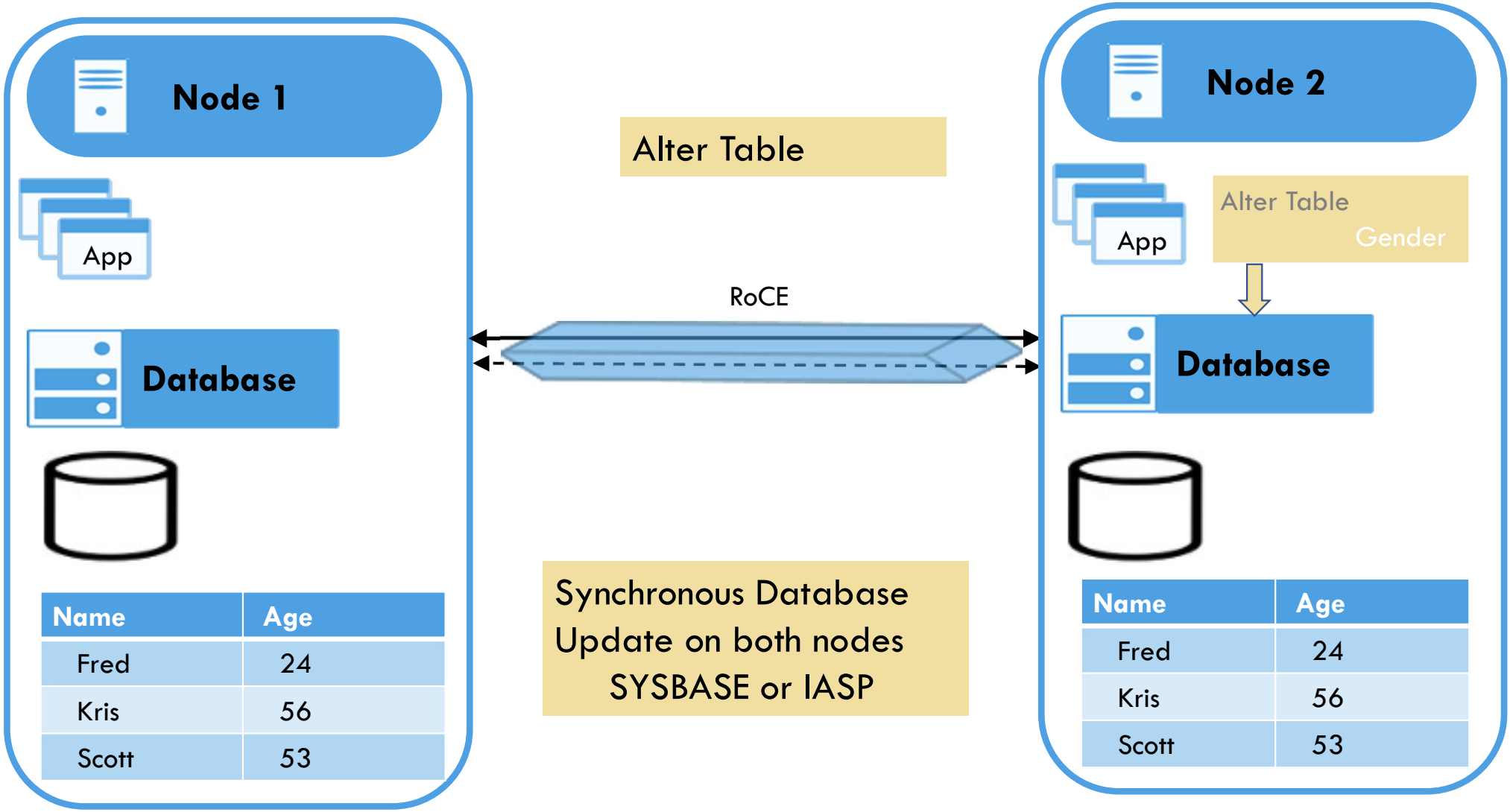
Db2 Mirror – Active Active



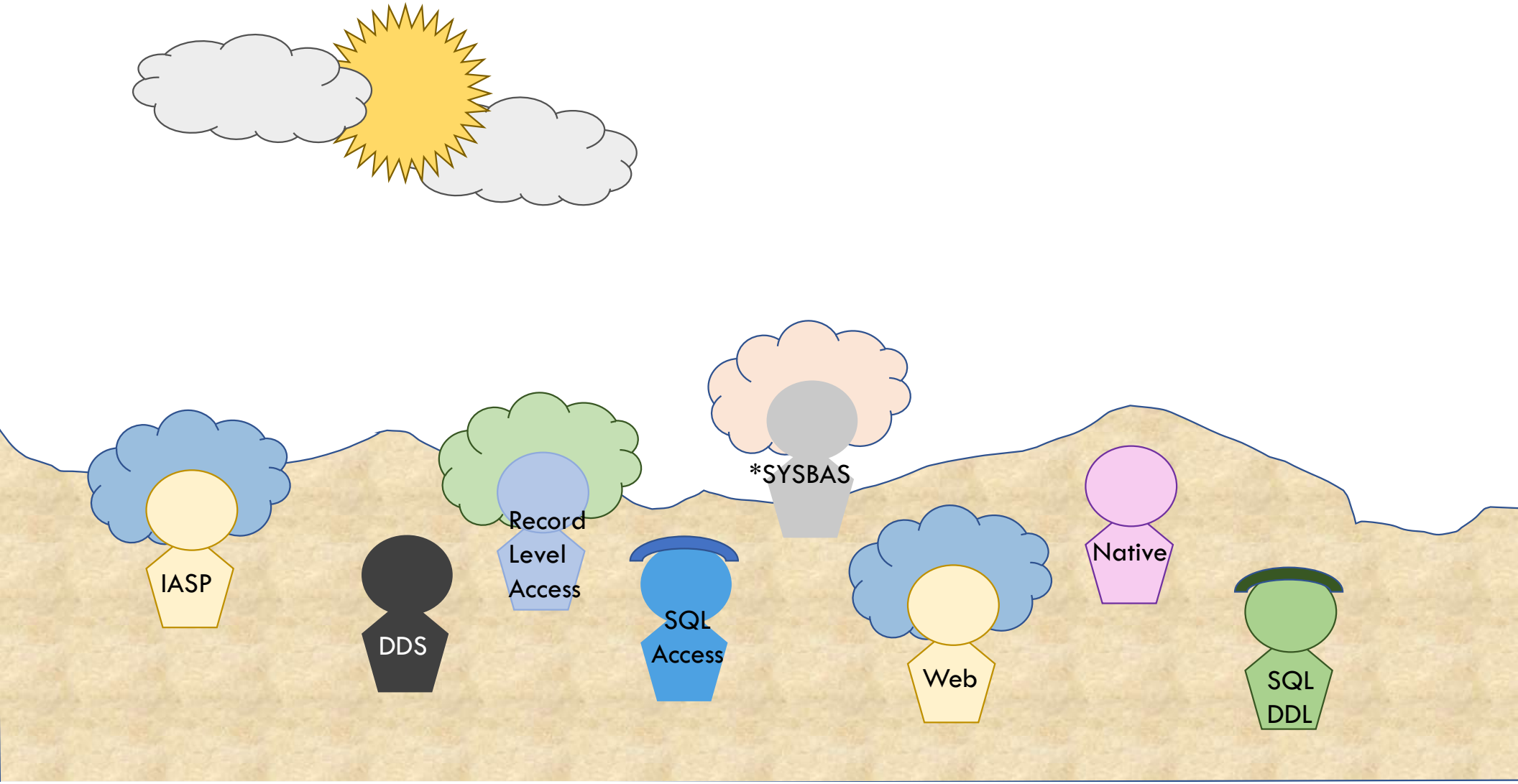
Db2 Mirror – Active Active



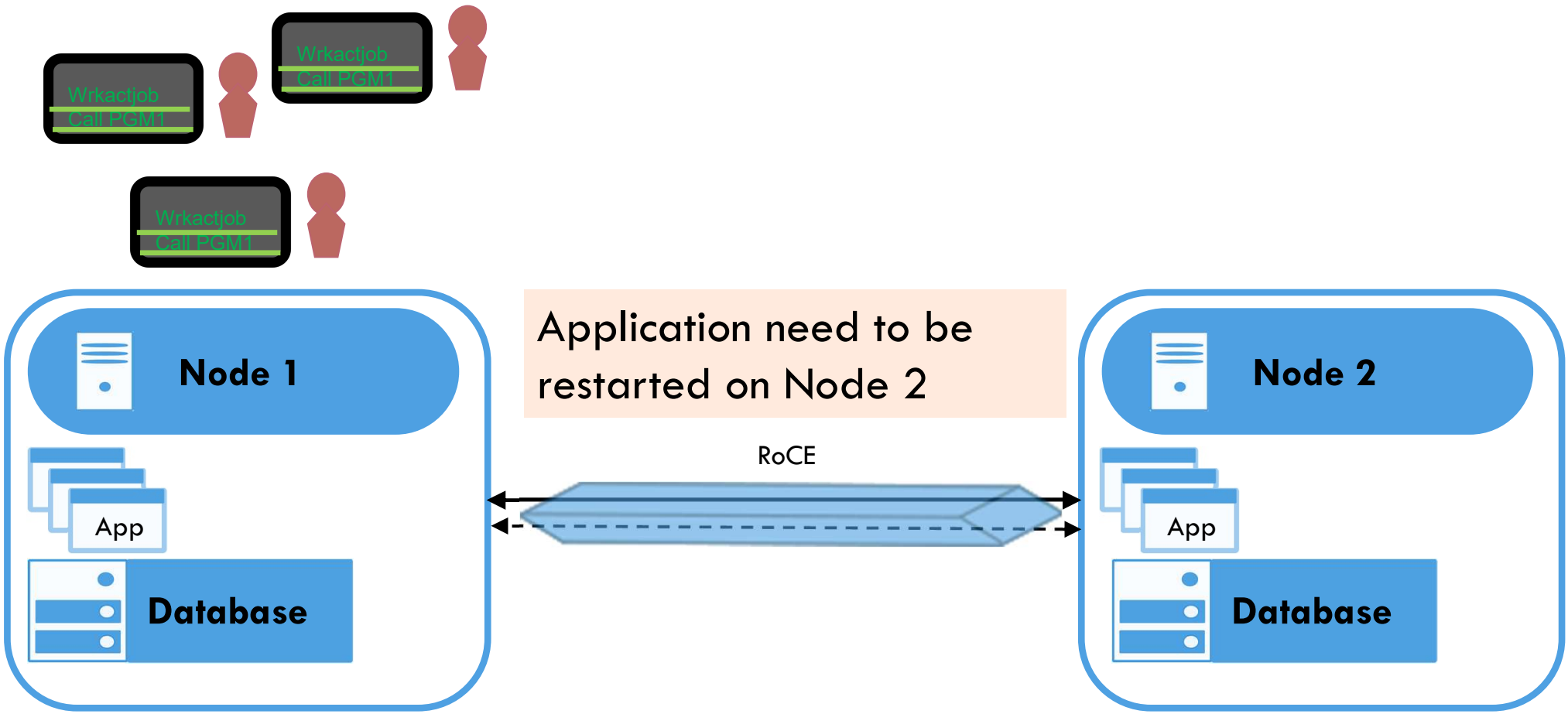
Db2 Mirror – Active Active



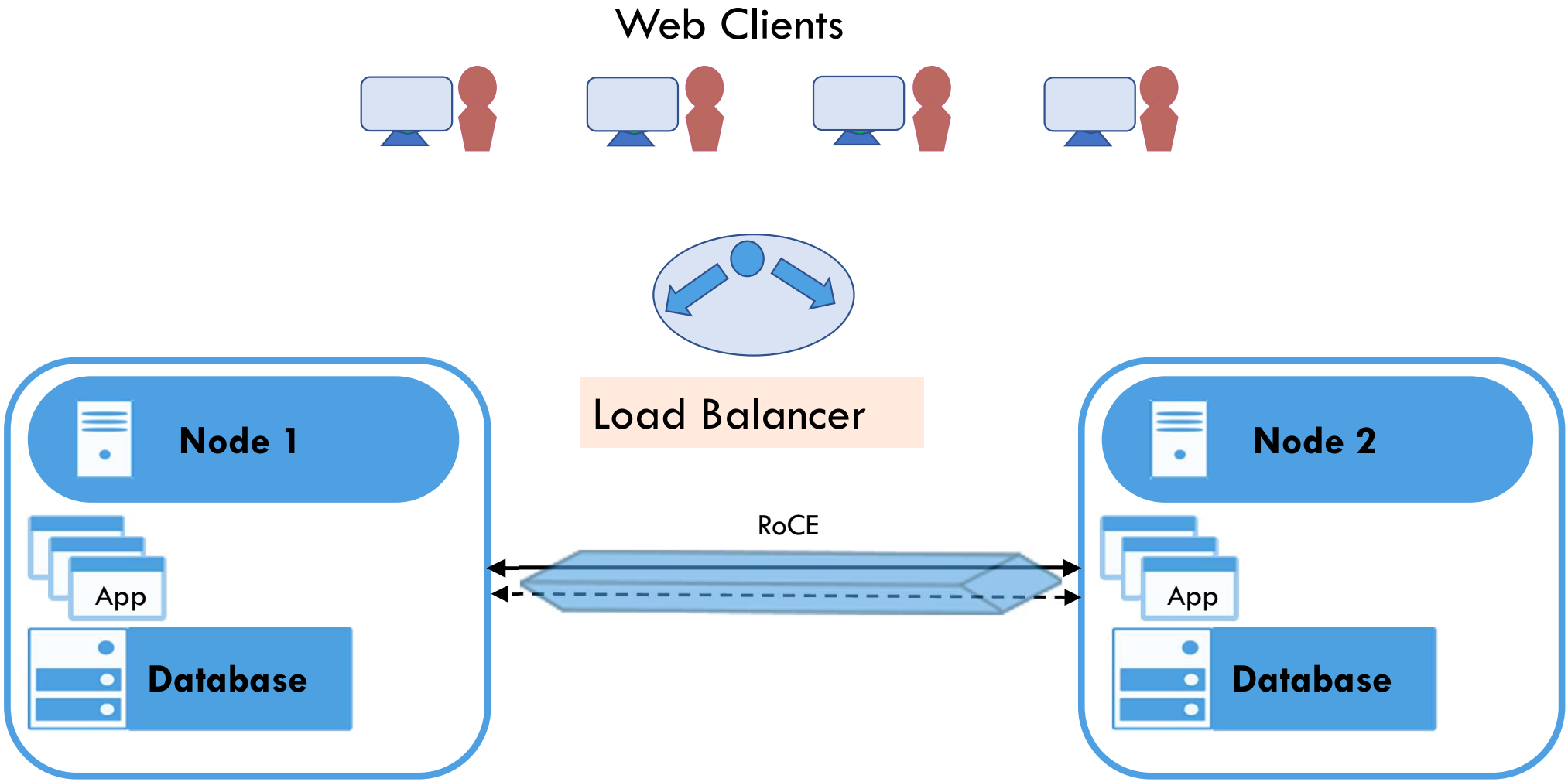
Db2 Mirror – Welcomes All Sorts of Applications



Db2 Mirror – Active Passive, Green Screen Application



Db2 Mirror – Active Active, Web Clients with Load Balancer



Db2 Mirror – Database Supported Objects

Database replication eligible objects

Native:

- Database Physical & Logical File

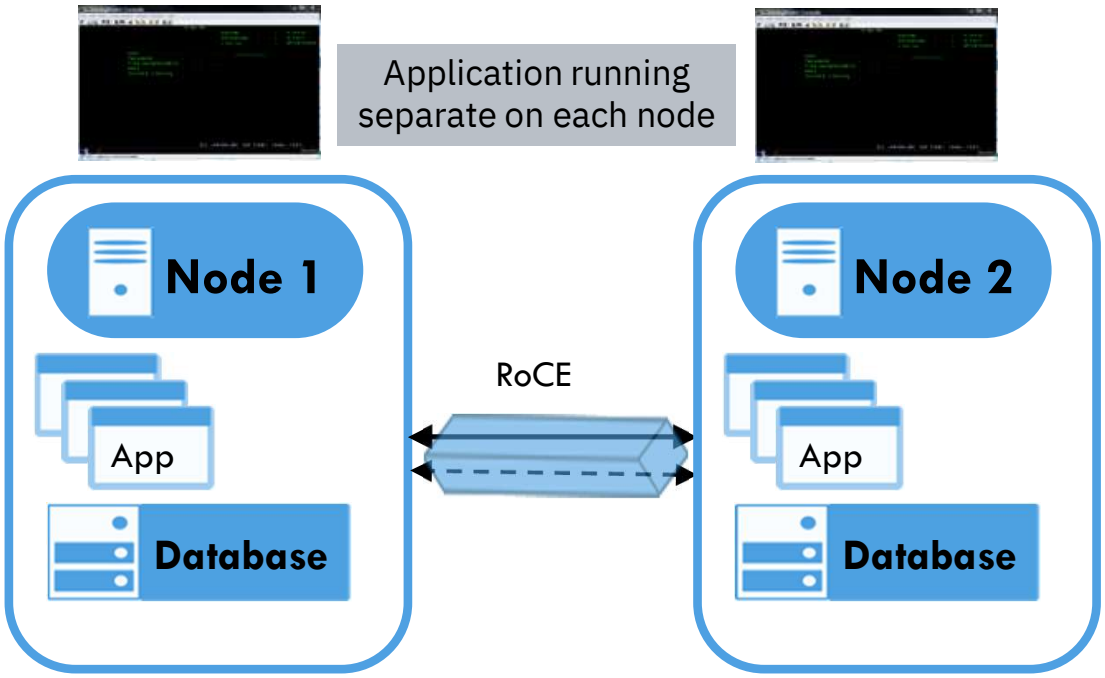
SQL:

- Alias
- Function
- Global Variable
- Index
- Procedure
- Schema
- Sequence
- SQL Package
- Table
- Trigger
- User Defined Type
- View
- XML Schema Repository

Included with File support:

- Row Permission
- Column Mask
- Temporal Table
- Constraint
- Etc...

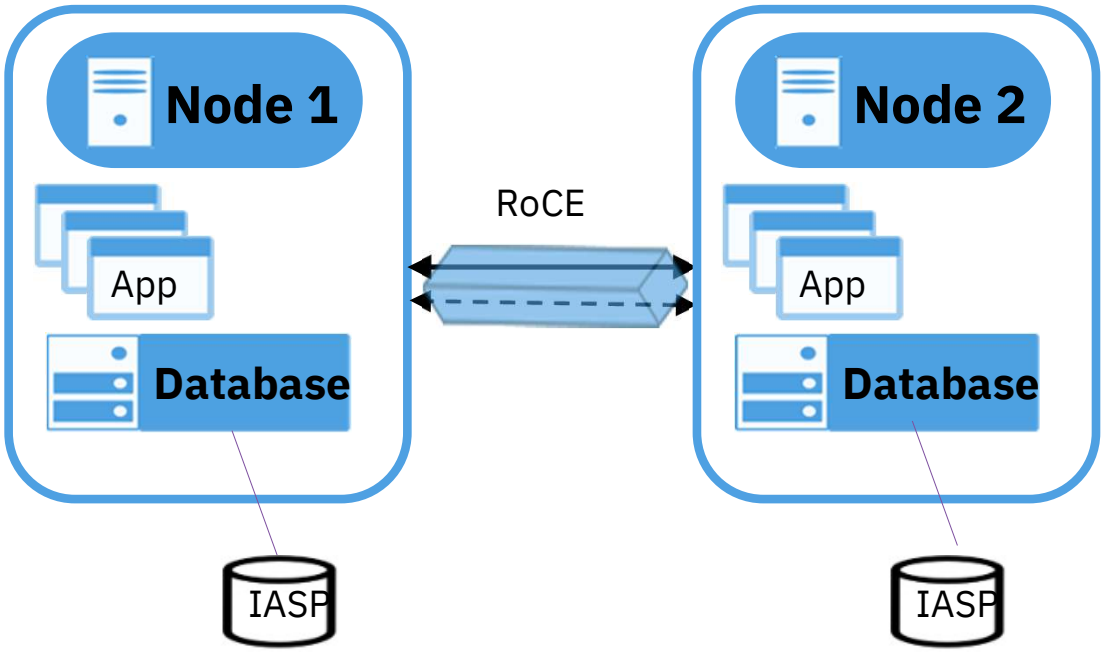
DDS / Record Level Access
SQL / Set Based Access



Db2 Mirror – Other Supported Objects

- Other Objects
  - User profiles
  - Authority
  - Ownership
  - Security
  - PGM/SRVPGM
  - Data Areas
  - Data Queues (DDL Only)
  - SYSVALs
  - ENVARs
  - LIB
  - JOBD
  - Journals
  - Files (also has DDL Only option)
- Special Handling
  - OUTQ / Spool
  - Job Queue

Objects can be in either **SYSBAS** or **IASP**s



Db2 Mirror – Security Implementation

Security changes are always replicated:

- User Profiles
- Public & Private Authorities
- Function Usage
- Ownership
- Security Attributes
- Authorization Lists
- Security related System Values

Synchronous replication of Security Implementation is **not** optional

Determining Rules for Replication

Replication Criteria List
- Rules based engine
- Hierarchical

Default Inclusion State
- Include – replicate every eligible object that exists plus any new objects as they are created
- Exclude – replicate nothing

Then add hierarchical rules at lower levels
- Library
- Object type within library
- Specific object

Example 1:
Default Inclusion State: Exclude
Include everything in library Sales except output queues, but include output queue Receipts

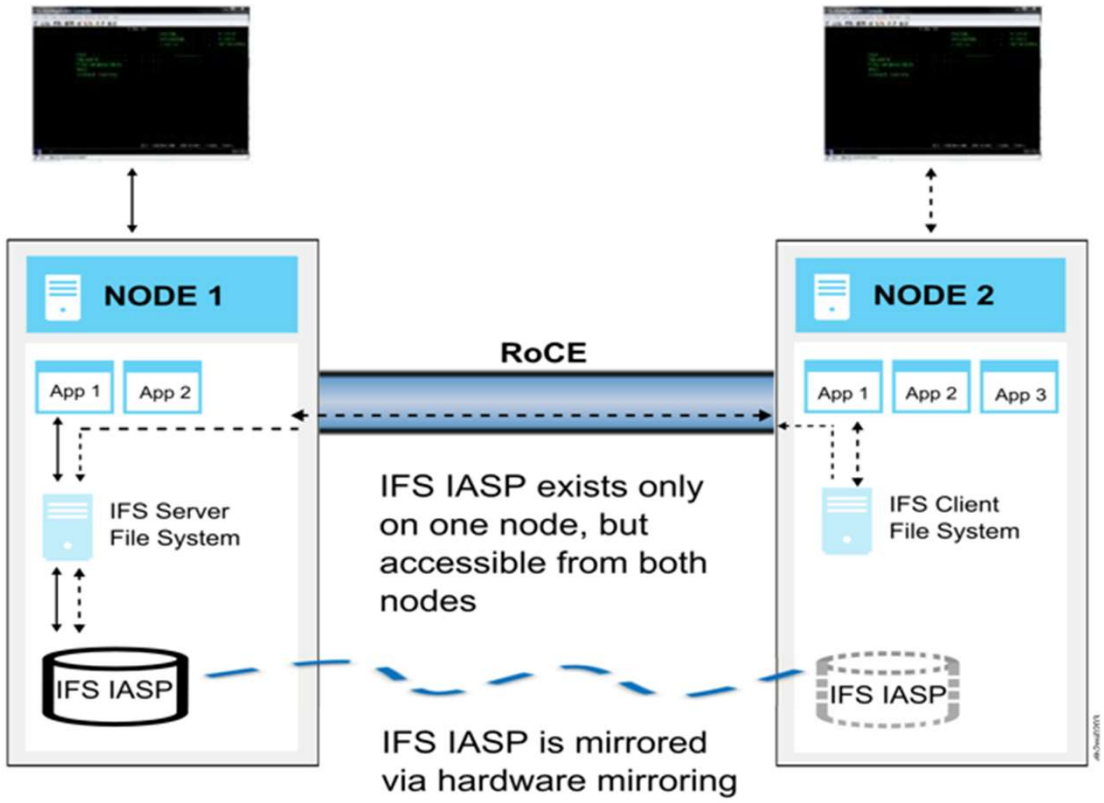
Library	Object Type	Object	Incl/Excl
Sales	*all	*all	Include
Sales	*OUTQ	*all	Exclude
Sales	*OUTQ	Receipts	Include

Example 2:
Default Inclusion State: Include
Include everything in library Sales except output queues, but include output queue Receipts

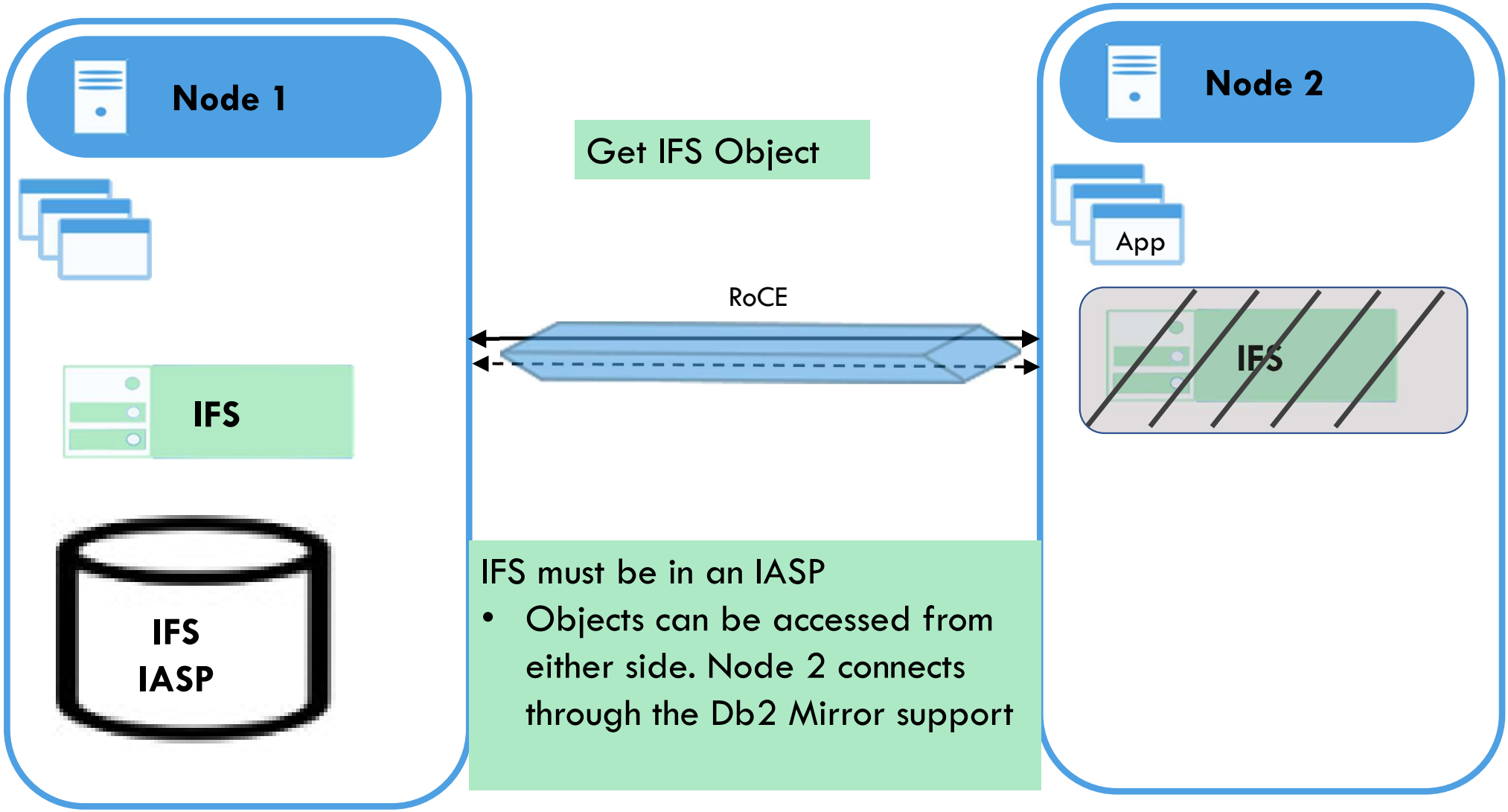
Library	Object Type	Object	Incl/Excl
Sales	*OUTQ	*all	Exclude
Sales	*OUTQ	Receipts	Include

IFS Support

- Requires IASP
- IFS accessible on both Nodes (R/W)
- Requires PowerHA
  - Db2 Mirror provides the simultaneous access.
  - PowerHA switches the IASP
- Filesystem automatically ’mutates’ when the storage is switched



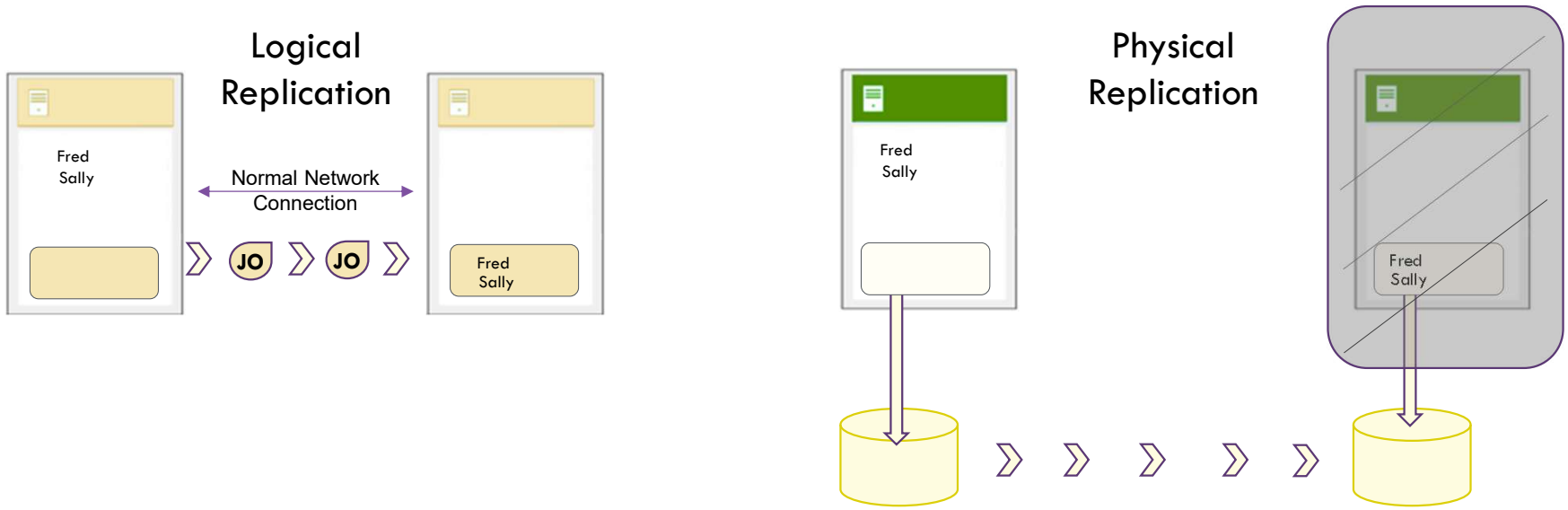
Db2 Mirror – IFS



Db2 Mirror – What makes it different

- New integrated IBM i synchronization technology
- Does not leverage any existing availability technology to provide continuous availability
  - But does work with existing technology

Operating System Replication Technology



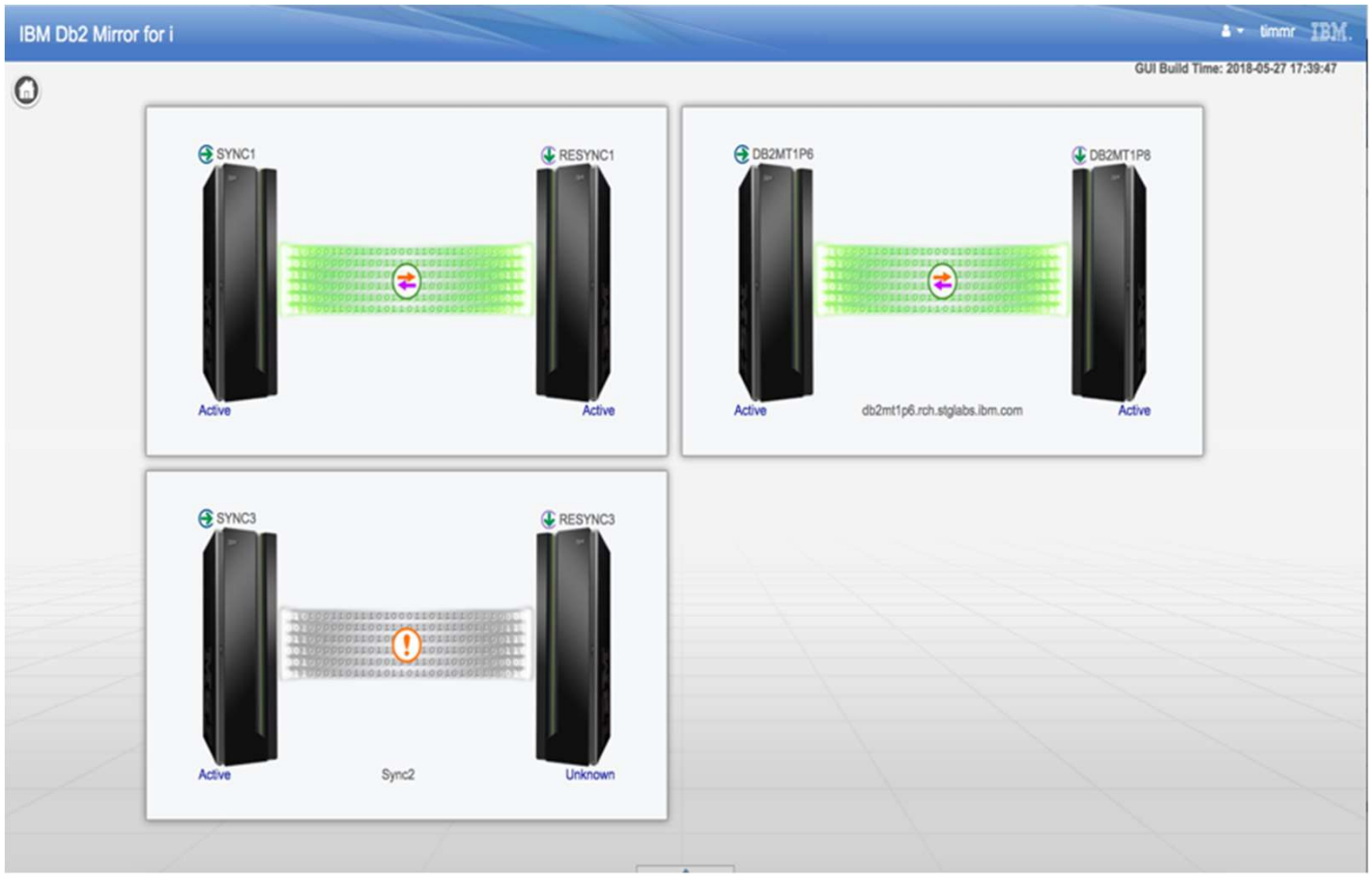
Db2 Mirror GUI

GUI runs on IBM i

GUI can run on the Db2 Mirror nodes

GUI can run outside of the Db2 Mirror nodes and manage multiple pairs

http://systemname:2006/Db2Mirror

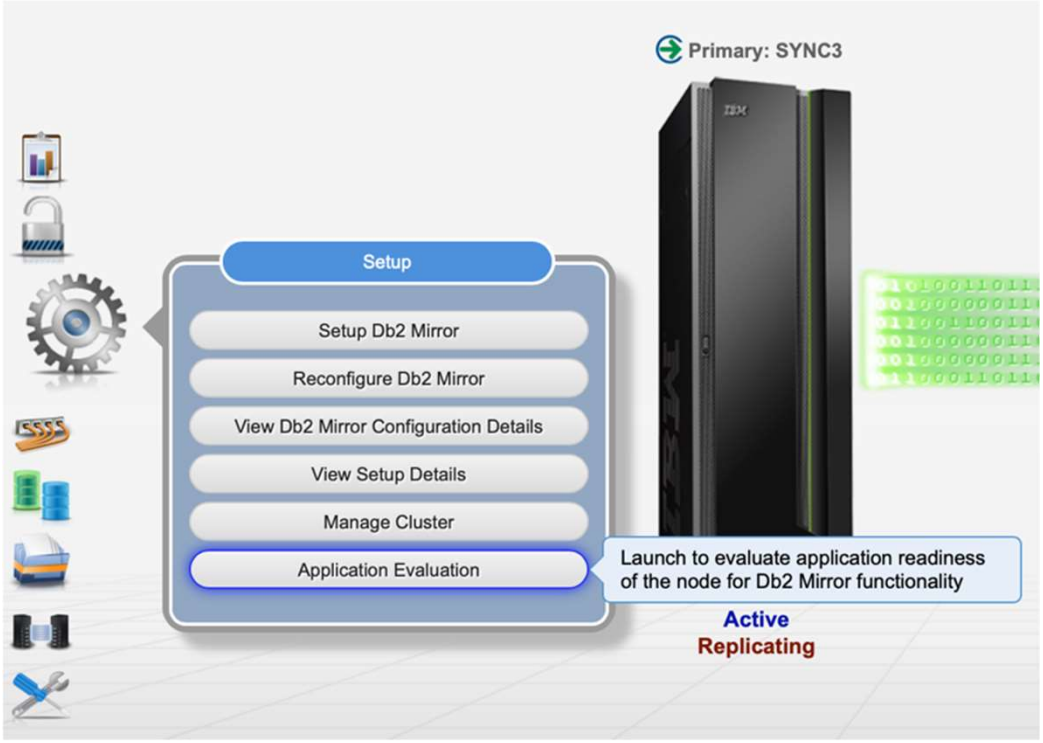


Db2 Mirror for i now supports Direct Attach Storage

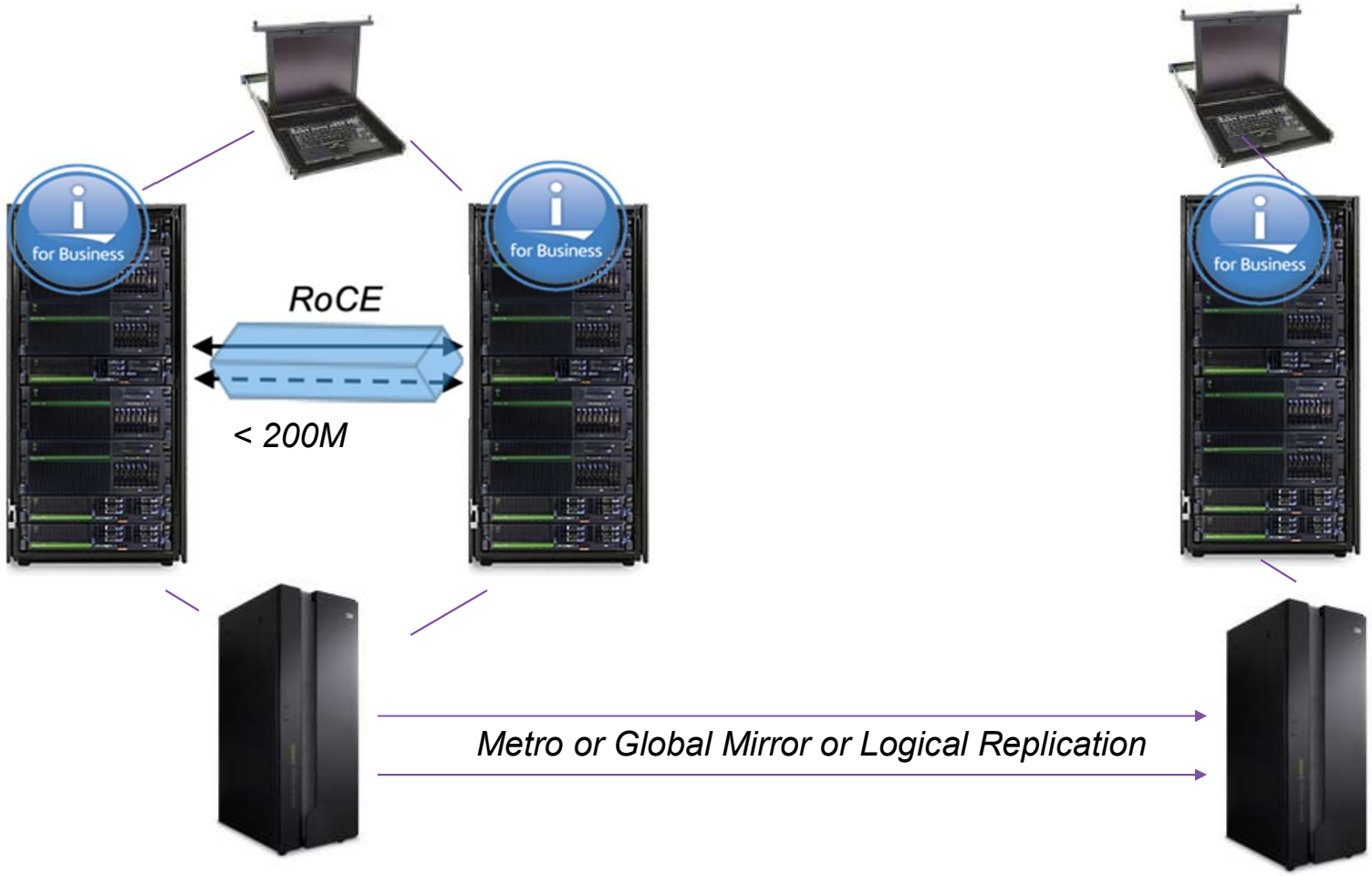
- Can configure Db2 Mirror for i regardless if the storage has copy service functionality.
- Db2 Mirror for i can use save and restore to configure mirroring
- Enables support for storage such as NVMe or SAS SSD

GUI Review of Application Readiness

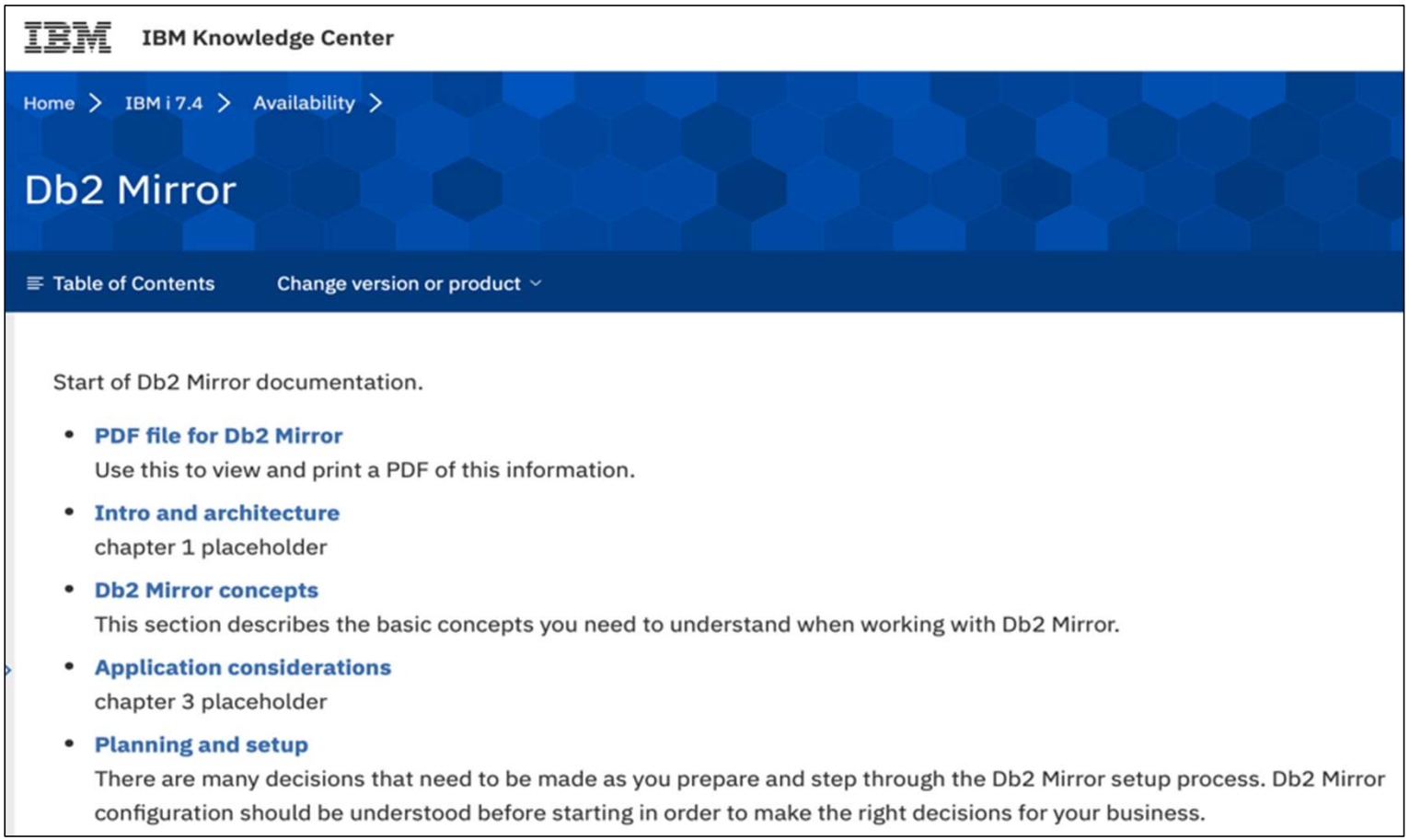
- From an IBM i LPAR with the base 5770-DBM installed it is possible to point to another IBM i LPAR that is at 7.2, 7.3 or 7.4 to gain insight into some considerations for Db2 Mirror.
- Examine Replication Eligibility
- Examine Object Statistics
- Look for Journal Improvements



Topology Options – Disaster Recovery



Db2 Mirror – Where to get more information



www.ibm.com/support/knowledgecenter/ssw_ibm_i_74/db2mi/db2mintro.htm

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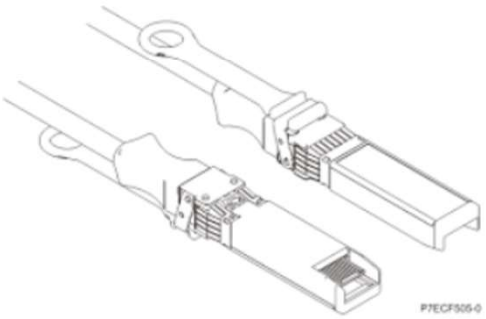
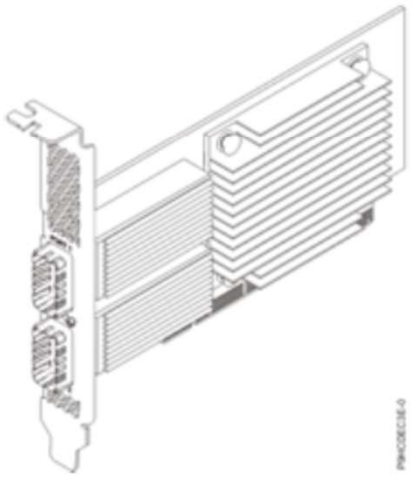
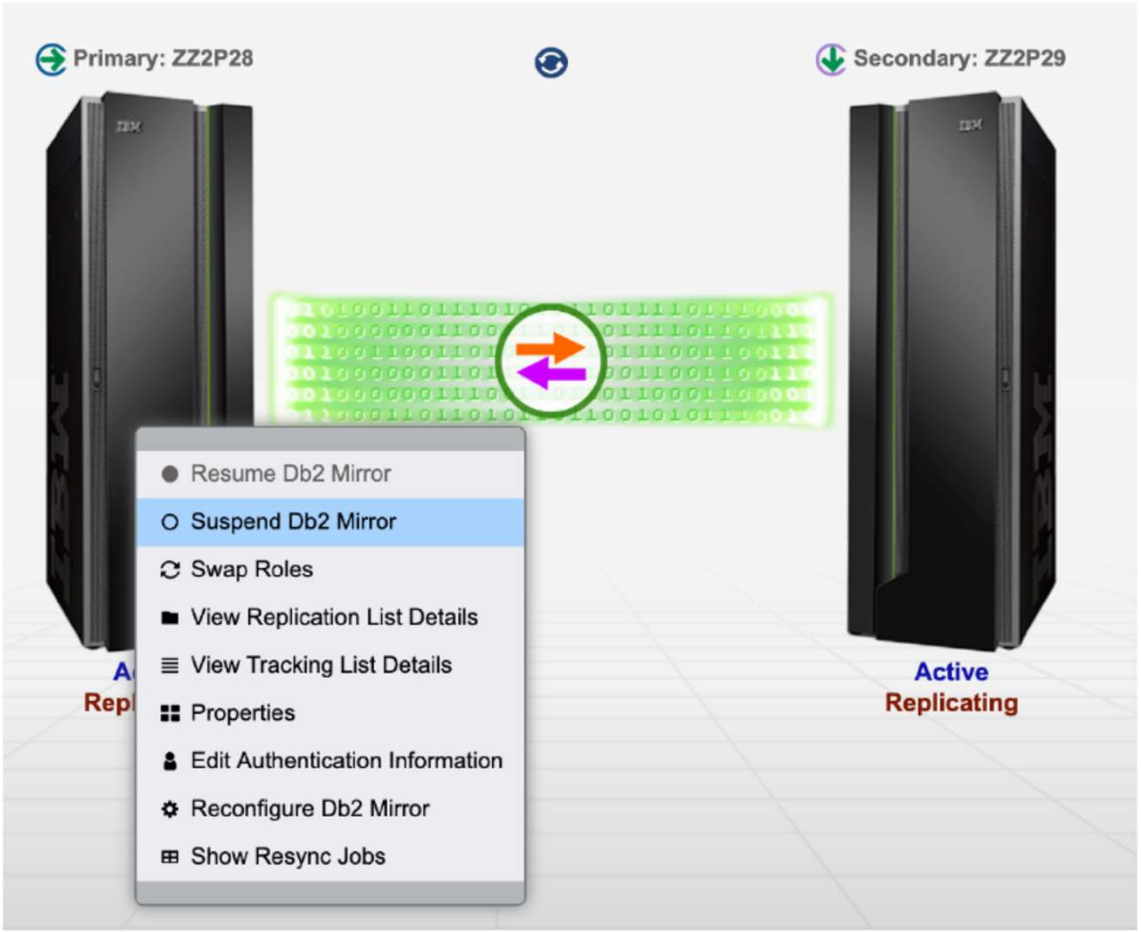
RoCE Adapters for Db2 Mirror

Adapter	Feature Code	Platform
PCIe3 2-port 100GbE NIC & RoCE QSFP28	EC3L / EC3M	Power8 & Power9
PCIe3 2-port 10Gb NIC & RoCE SR/Cu	EC2R / EC2S	Power9
PCIe3 2-port 25/10Gb NIC & RoCE SFP28	EC2T / EC2U	Power9
PCIe4 2-port 100GbE RoCE x16	EC66 / EC67	Power9



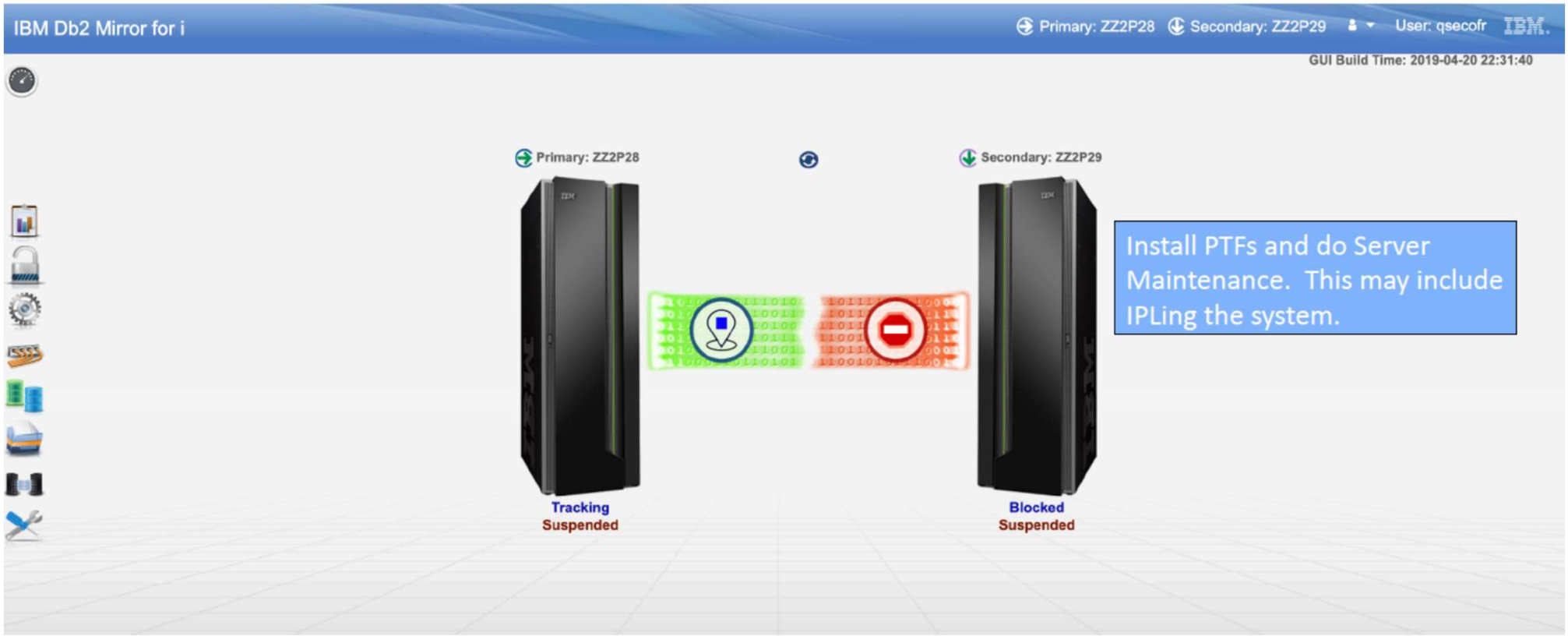


Rolling Upgrade Scenario



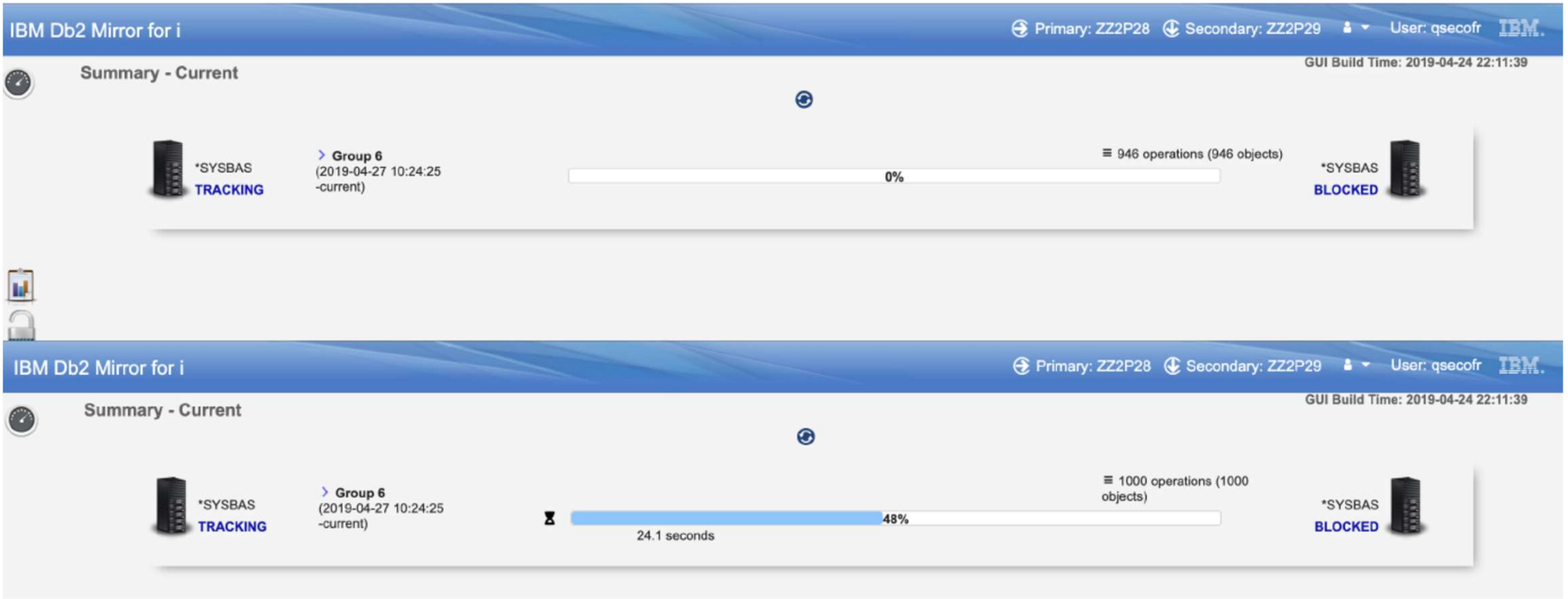
Suspend the secondary node

Do your maintenance on the Secondary suspended node



Resume Mirroring to get the Systems back in Sync

Mirror Resume Progress



Resync is Complete, Swap roles and repeat

Performance Expectations

- With synchronous replication the complete path length will increase since the action may drive I/O on both nodes in order to finish. This could increase by up to ~(2-3)X
- The ability to run transactions on both nodes will mitigate per transaction overhead and with a target of achieving equal to or greater transactional throughput
- Read workloads will not be impacted since they do not have to be replicated
- Single threaded or serial I/O workloads will be the most impacted.