Replication Solutions with Open-E Data Storage Server (DSS)

April 2009

Replication Solutions Supported by Open-E DSS

	Replication Mode		Source/Destination			Data Transfer		Volume Type			
									iSCSI		
	Synchronous	Asynchronous	w/ System	LAN	WAN	File based	Block based	NAS	File-IO	Block-IO	FC
Asynchronous Data Replication within a system		✓	✓			✓		✓			
Asynchronous Data Replication over a LAN		✓		✓		✓		✓			
Asynchronous Data Replication over a WAN		✓			✓	✓		✓			
Asynchronous Volume Replication over a LAN		✓		✓			✓	✓	✓	✓	✓
Asynchronous Volume Replication over a WAN		✓			✓		✓	✓	✓	✓	✓
Synchronous Volume Replication over a LAN	✓			✓			✓	✓	✓	✓	✓
Synchronous Volume Replication over a WAN	✓				✓		✓	✓	✓	✓	✓
Synchronous Volume Replication with Failover over a LAN	✓			✓			✓			✓	

Replication Solutions Supported by Open-E DSS

- **Open-E DSS supports three different types of *file based* Data Replication**
  - Asynchronous Data Replication (file based) within the system
  - Asynchronous Data Replication (file based) over a LAN
  - Asynchronous Data Replication (file based) over a WAN

- **Additionally, DSS Supports five types of *block based* Volume Replication**
  - Asynchronous Volume Replication (block based) over a LAN for NAS, iSCSI and Fiber Channel appliances,
  - Asynchronous Volume Replication (block based) over a WAN for NAS, iSCSI and Fiber Channel appliances,
  - Synchronous Volume Replication (block based) over a LAN for NAS, iSCSI and Fiber Channel appliances,
  - Synchronous Volume Replication (block based) over a WAN for NAS, iSCSI and Fiber Channel appliances,
  - Synchronous Volume Replication (block based) with ***Failover*** over a LAN for iSCSI appliances

Data Replications

Replication Solutions Supported by Open-E DSS

	Replication Mode		Source/Destination			Data Transfer		Volume Type			
									iSCSI		
	Synchronous	Asynchronous	w/ System	LAN	WAN	File based	Block based	NAS	File-IO	Block-IO	FC
Asynchronous Data Replication within a system		✓	✓			✓		✓			
Asynchronous Data Replication over a LAN		✓		✓		✓		✓			
Asynchronous Data Replication over a WAN		✓			✓	✓		✓			

- **Open-E Data Replication** enables asynchronous file and folder copy from one storage system to another for maximum data availability.
  - With Asynchronous Replication, a point-in-time snapshot copy of data on the source is made and copied to the target storage system.
  - For maximum flexibility, you can run a data replication task in two directions: one system can be both the source and the destination at the same time, allowing cross data backups on several systems. Replication can be used in disaster recovery or for disk-to-disk backup.

Asynchronous **Data Replication** within a System

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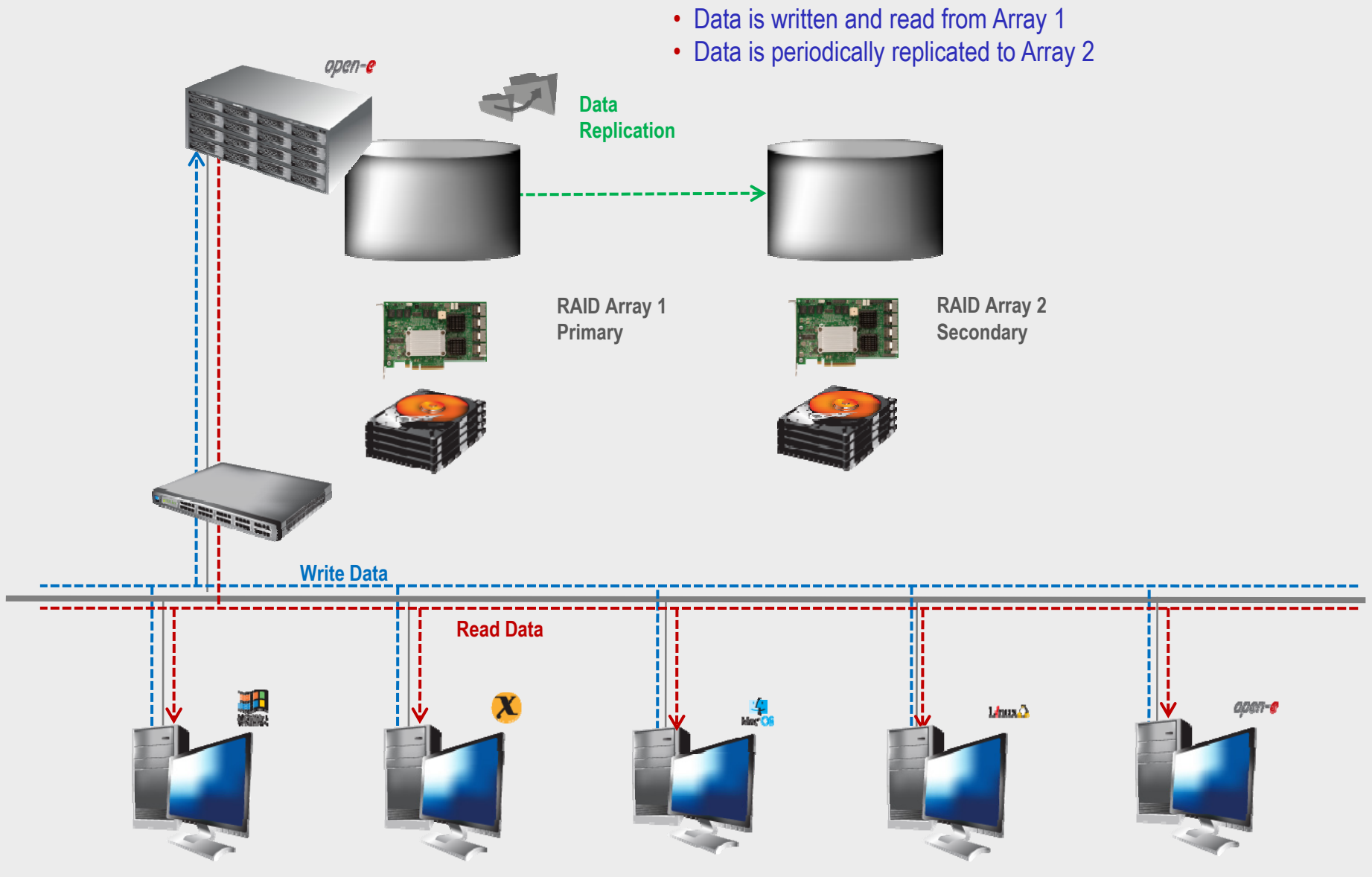
REPLICATION BETWEEN TWO RAID ARRAYS WITHIN ONE SYSTEM

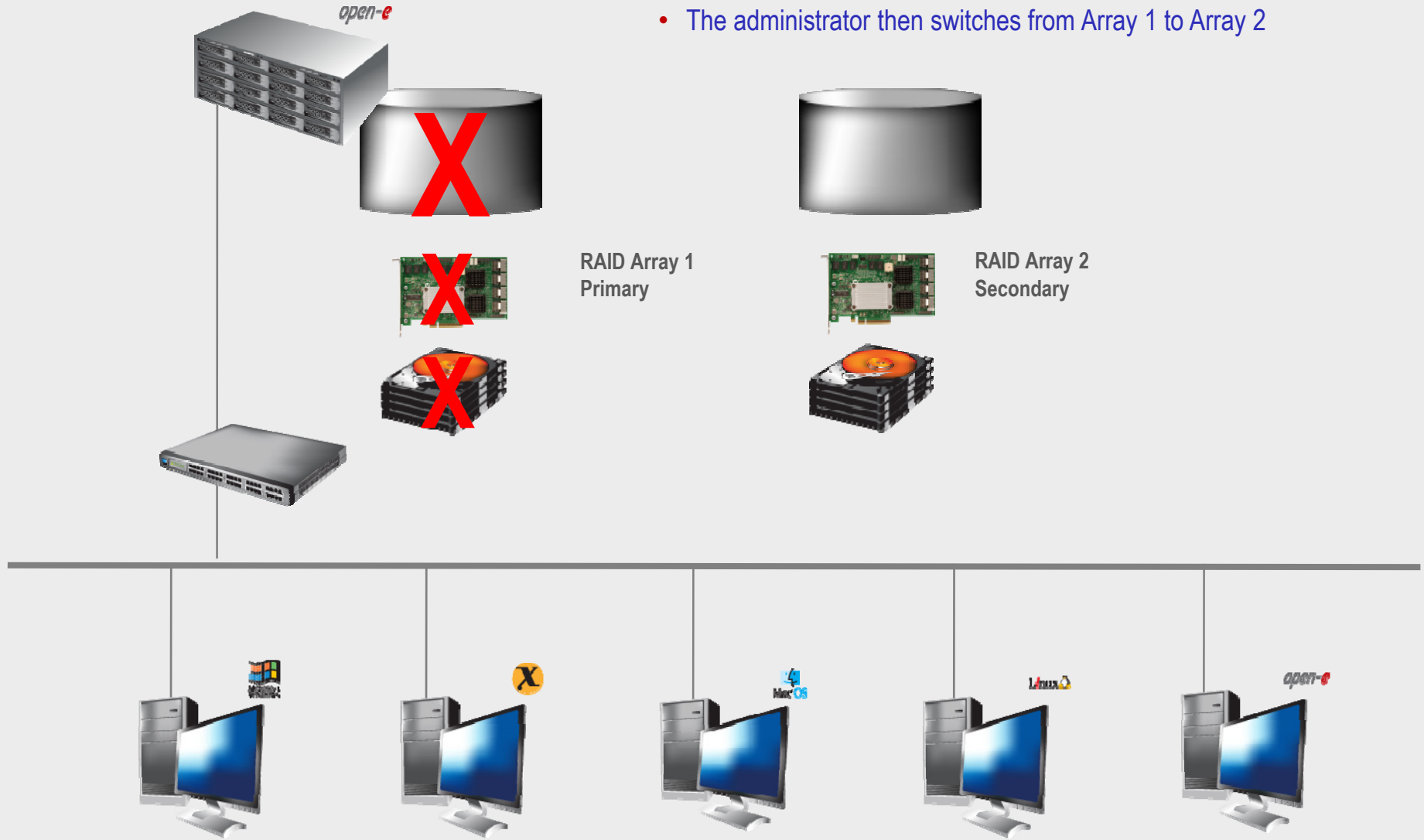
- **Recommended Resources**
  - Key Hardware
    - ✓ x86 compatible
    - ✓ RAID Controller 1
    - ✓ RAID Controller 2
    - ✓ HDD's
    - ✓ Network Interface Cards
  - Software
    - ✓ Open-E DSS (recommended) or Open-E NAS-R3
- **Benefits**
  - Data redundancy over RAID Array
  - Local data availability
  - Low cost solution
- **Disadvantages**
  - In case of complete system failure, data will be lost or inaccessible

Asynchronous **Data Replication** within a System

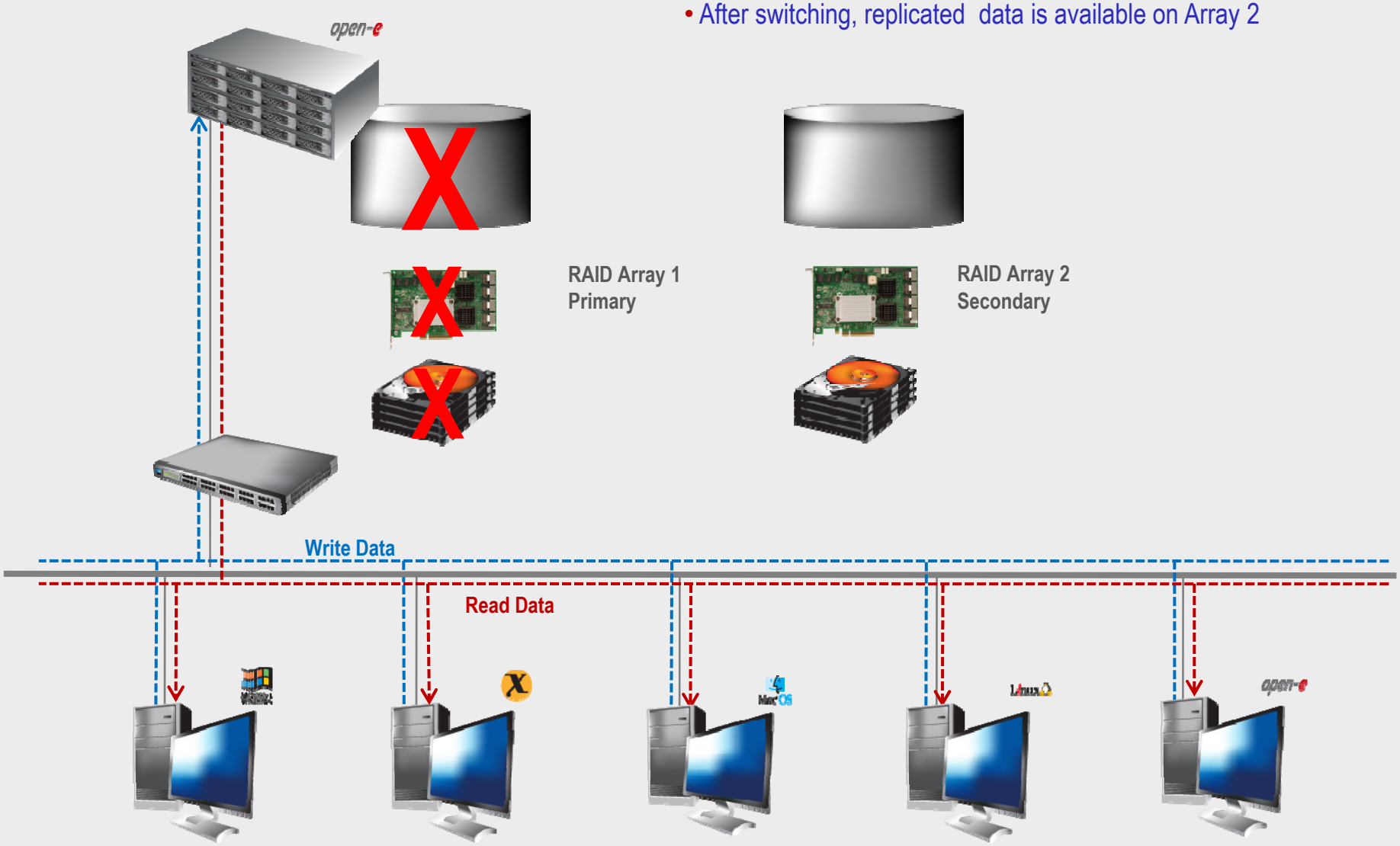


Asynchronous **Data Replication** within a System

- In case of raid array error or disk drive error on the Raid Array 1, the server will send an e-mail notification to the administrator and/or users
- The administrator then switches from Array 1 to Array 2



Asynchronous **Data Replication** within a System



Asynchronous **Data Replication** over a LAN

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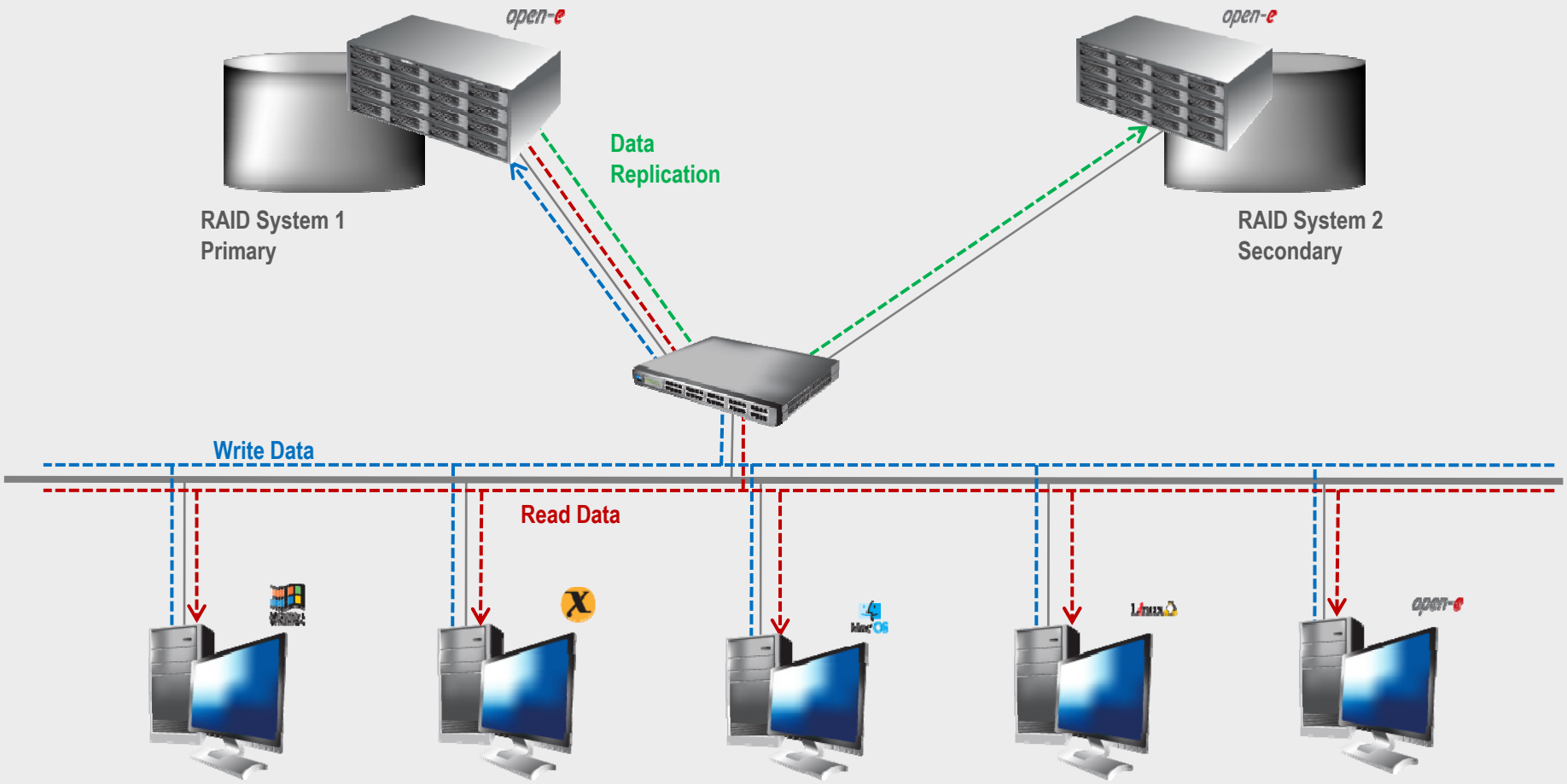
REPLICATION BETWEEN TWO SYSTEMS WITHIN A SINGLE LAN

- **Recommended Resources**
  - Key Hardware (two systems)
    - ✓ x86 compatible
    - ✓ RAID Controller
    - ✓ HDD‘s
    - ✓ Network Interface Cards
  - Software
    - ✓ Open-E DSS (recommended) or Open-E NAS-R3, 2 units
- **Benefits**
  - Data Redundancy over a LAN
  - Local data availability
- **Disadvantages**
  - Natural disasters can destroy both machines
  - High cost of solution

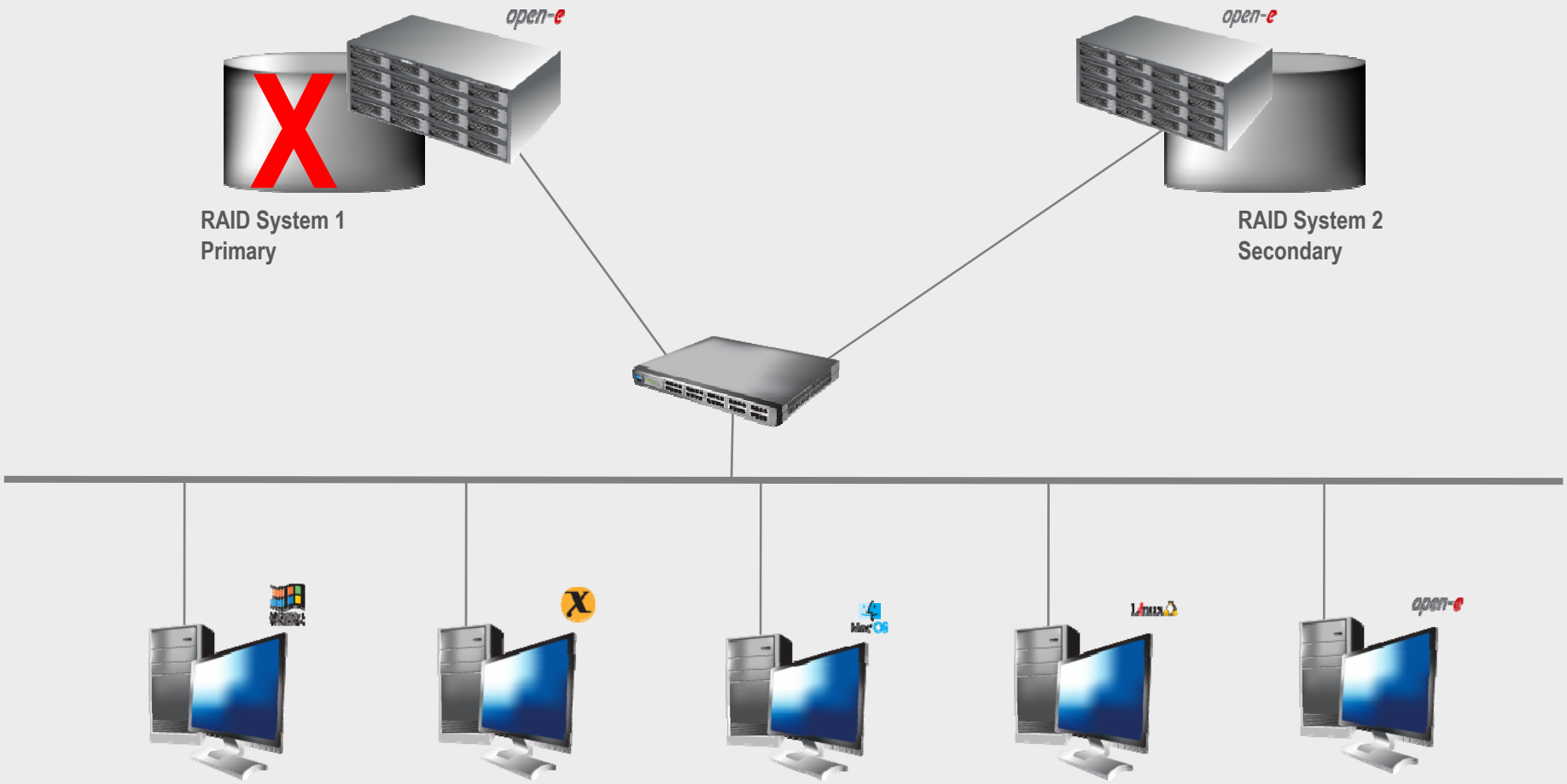
Asynchronous **Data Replication** over a LAN

- Data is written and read in System 1
- Data is periodically replicated from System 1 to System 2 over the LAN



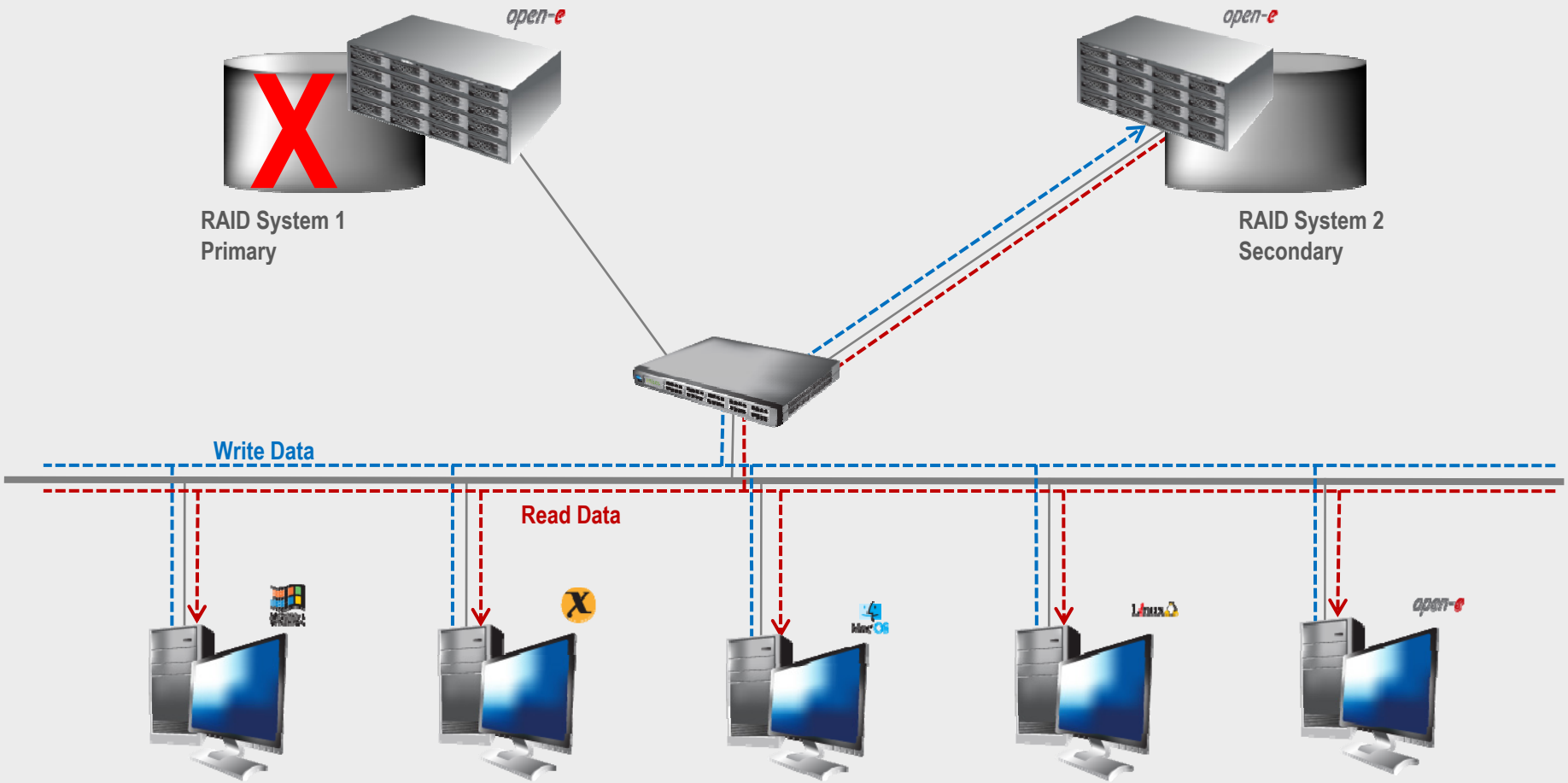
Asynchronous **Data Replication** over a LAN

- In case of raid array error, or disk drive error on System 1, the system will send an e-mail notification to the administrator
- Administrator then switches users to System 2



Asynchronous **Data Replication** over a LAN

- After switching, replicated data is available on System 2



Asynchronous **Data Replication** over a WAN

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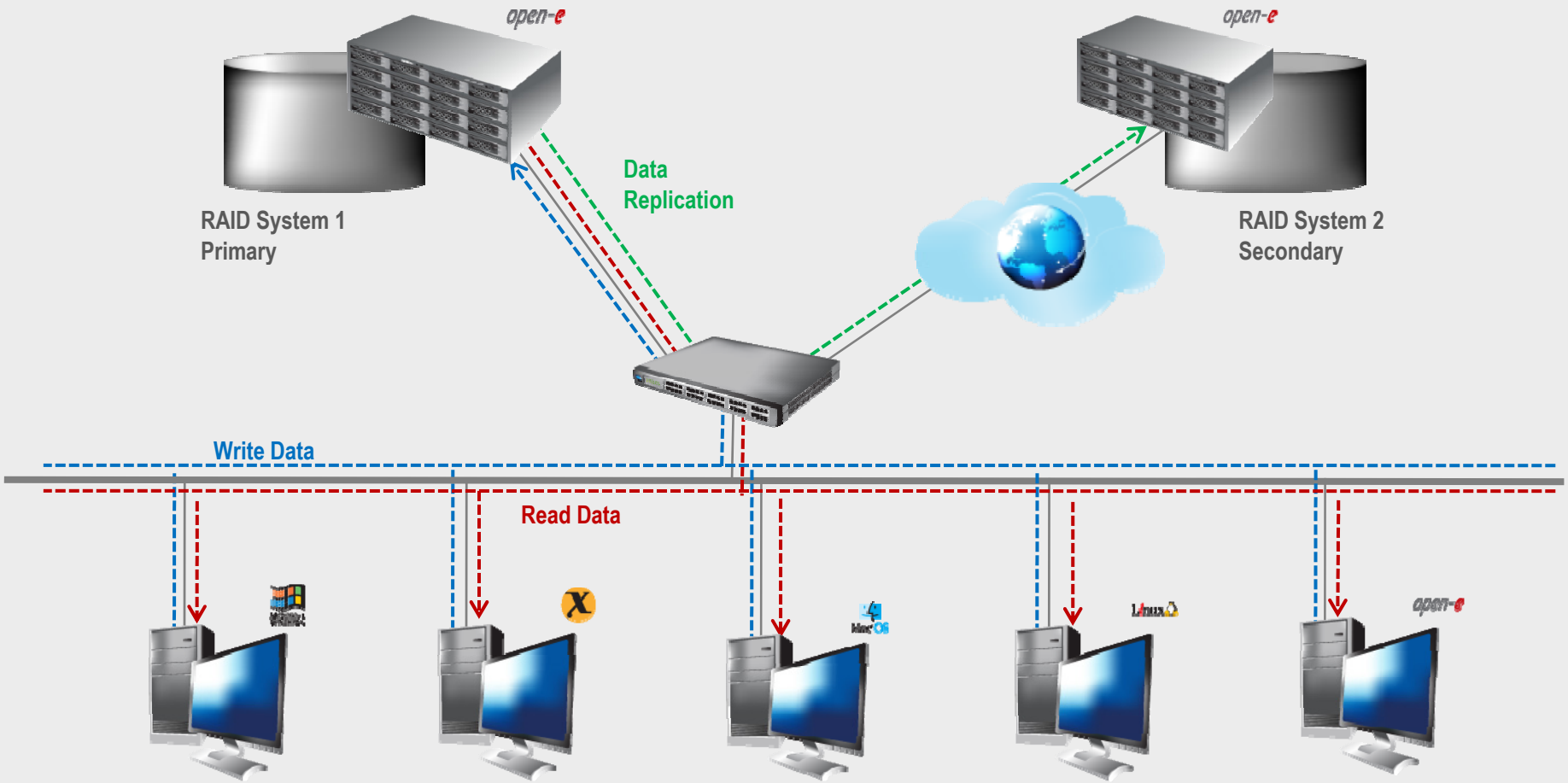
REPLICATION BETWEEN TWO SYSTEMS OVER A WAN

- **Recommended Resources**
  - Key Hardware (two system)
    - ✓ x86 compatible
    - ✓ RAID Controller
    - ✓ HDD‘s
    - ✓ Network Interface Cards
  - Software:
    - ✓ Open-E DSS (recommended) or Open-E NAS-R3, 2 units
- **Benefits**
  - Data redundancy
  - Maximum data safety
- **Disadvantages**
  - High cost of WAN solution

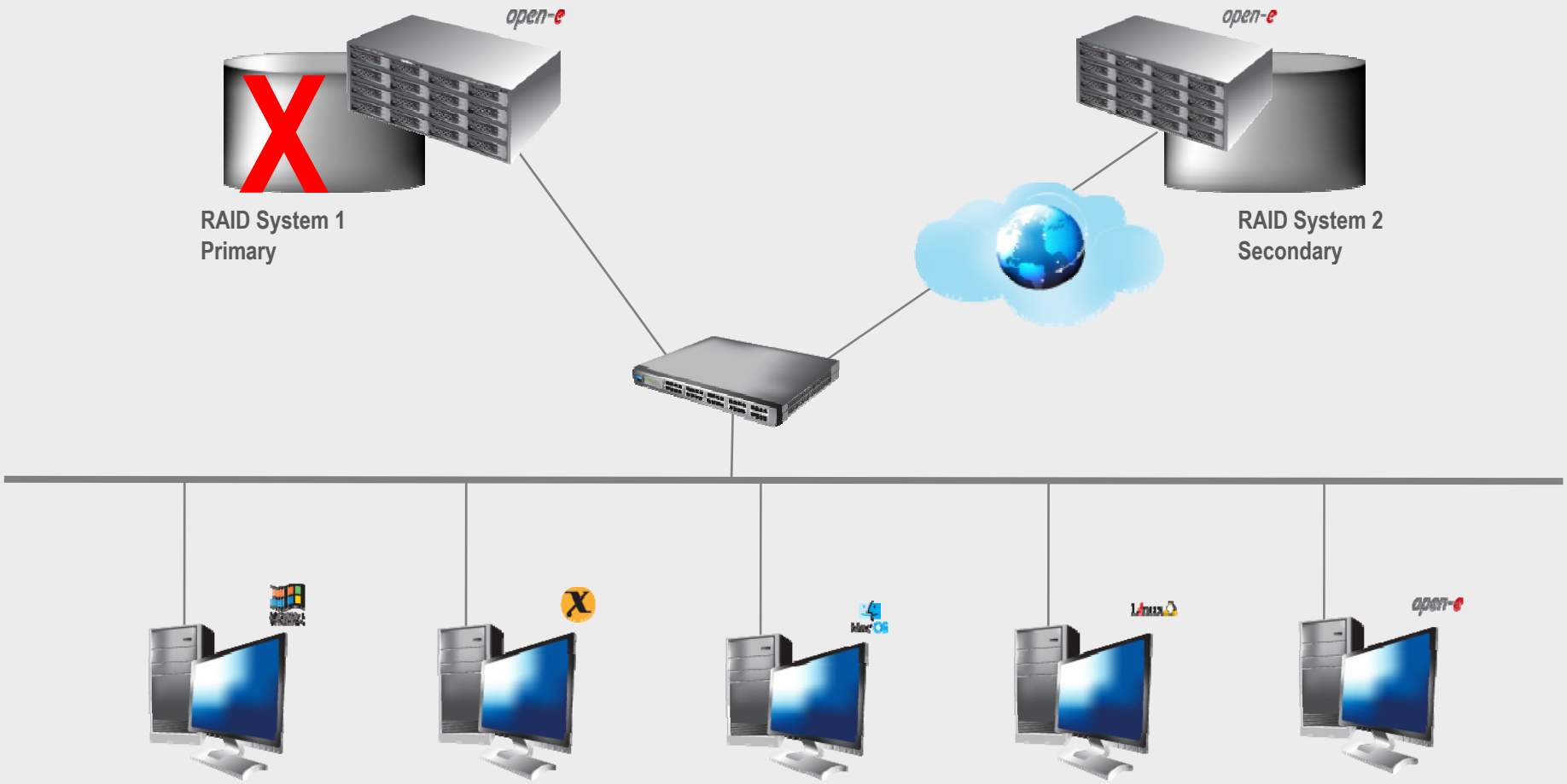
Asynchronous **Data Replication** over a WAN

- Data is written and read in System 1
- Data is periodically replicated to System 2 via an Internet connection



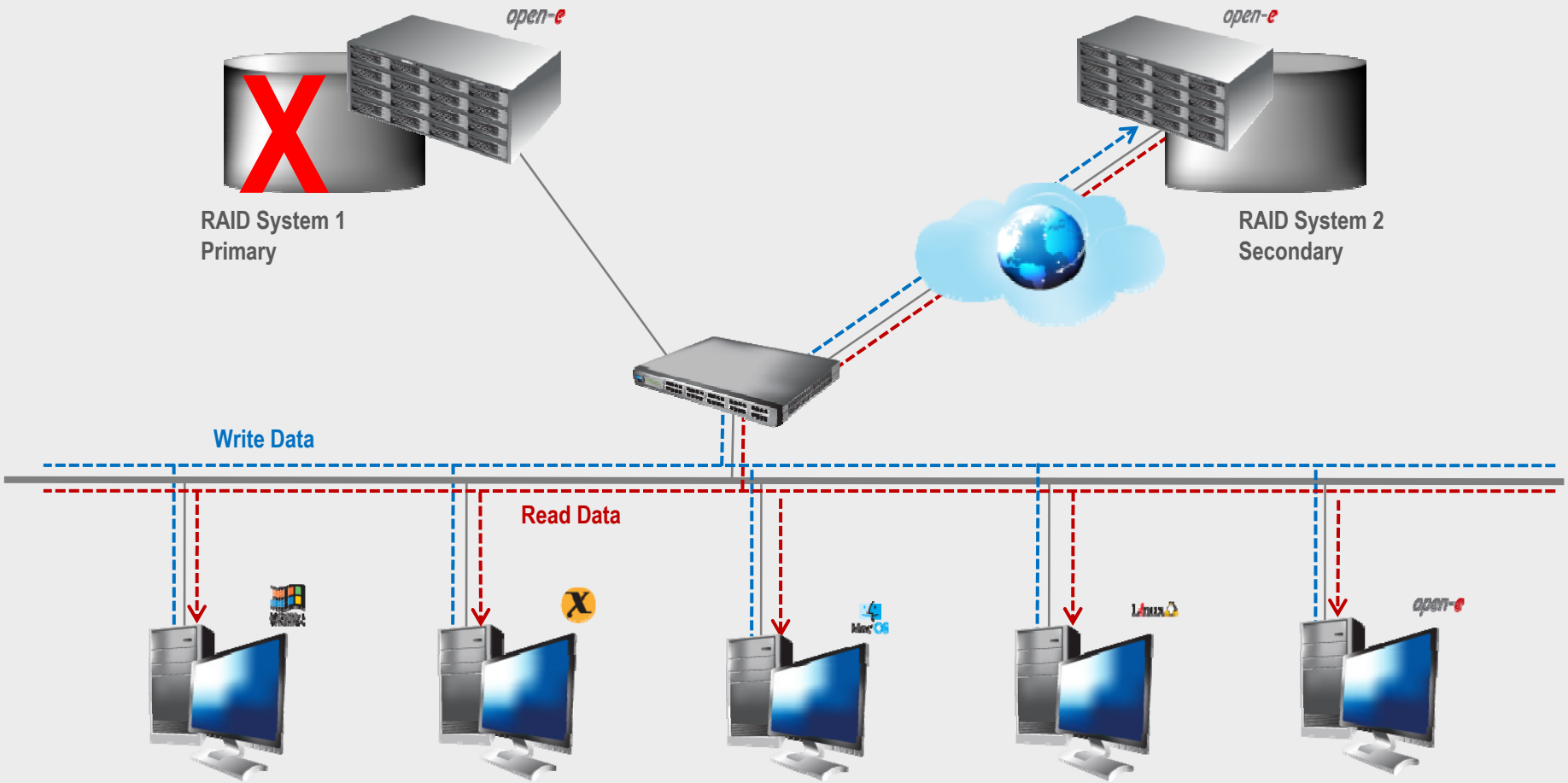
Asynchronous **Data Replication** over a WAN

- In the event of a raid array error or disk drive error on System 1, the server will send an e-mail notification to the administrator,
- In the event of a loss of system 1 users will be notified,
- Administrator then switches users to System 2 over the WAN.



Asynchronous **Data Replication** over a WAN

- After switching, replicated data is available on System 2



Volume Replications

Replication Solutions Supported by Open-E DSS

	Replication Mode		Source/Destination			Data Transfer		Volume Type			
									iSCSI		
	Synchronous	Asynchronous	w/ System	LAN	WAN	File based	Block based	NAS	File-IO	Block-IO	FC
Asynchronous Volume Replication over a LAN		✓		✓			✓	✓	✓	✓	✓
Asynchronous Volume Replication over a WAN		✓			✓		✓	✓	✓	✓	✓
Synchronous Volume Replication over a LAN	✓			✓			✓	✓	✓	✓	✓
Synchronous Volume Replication over a WAN	✓				✓		✓	✓	✓	✓	✓
Synchronous Volume Replication with Failover over a LAN	✓			✓			✓			✓	

Volume Replication (asynchronous and synchronous) over LAN or WAN is block based and supports iSCSI, FC and NAS logical volumes. It provides data availability in case the source system is offline from a disaster and the destination will have the replicated data of the source server. When using Asynchronous Replication, the data on the standby node is consistent after the active node has failed, however the most recent updates performed prior to the crash could be lost.

Volume Replication with Auto Failover is a fault tolerance process via iSCSI Volume Replication, that creates mirrored target data volumes.

- Data is copied in real-time.
- Every change is immediately mirrored on the secondary storage server.
- In case of a failure, scheduled maintenance of the primary server, or loss of the primary data source, failover automatically switches operations to the secondary storage server, so all processes can be continued as usual.

Asynchronous **Volume Replication** over a LAN

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REPLICATION BETWEEN TWO SYSTEMS WITHIN ONE LAN

- **Recommended Resources**
  - Key Hardware (two systems)
    - ✓ x86 compatible,
    - ✓ RAID Controller,
    - ✓ HDD's,
    - ✓ Network Interface Cards.
  - Software
    - ✓ Open-E DSS, 2 units.
- **Benefits**
  - Data Redundancy over a LAN,
  - Enables continuous data access.
- **Disadvantages**
  - High cost of solution,
  - Natural disasters can destroy local systems.

Asynchronous **Volume Replication** over a LAN

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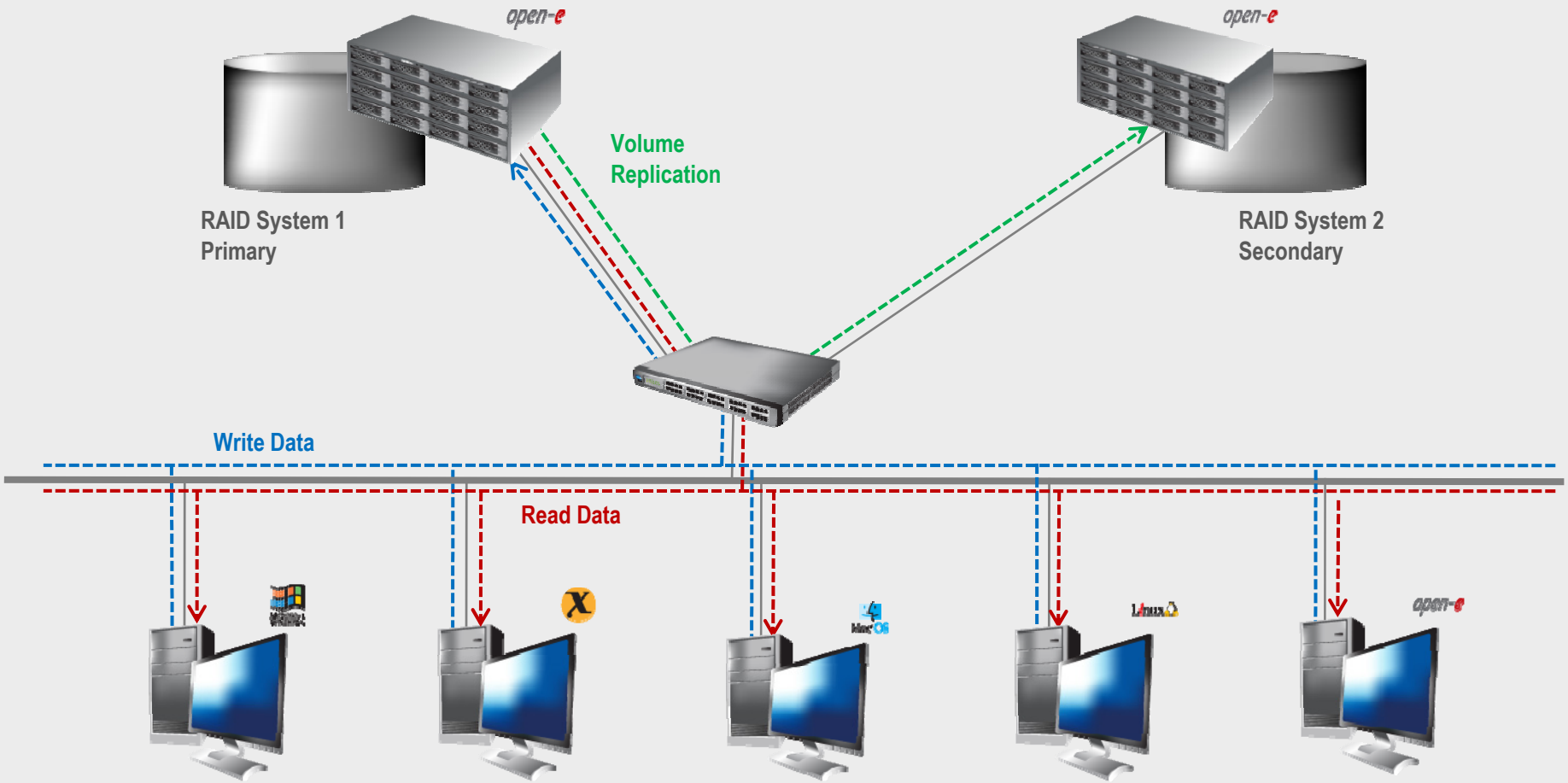
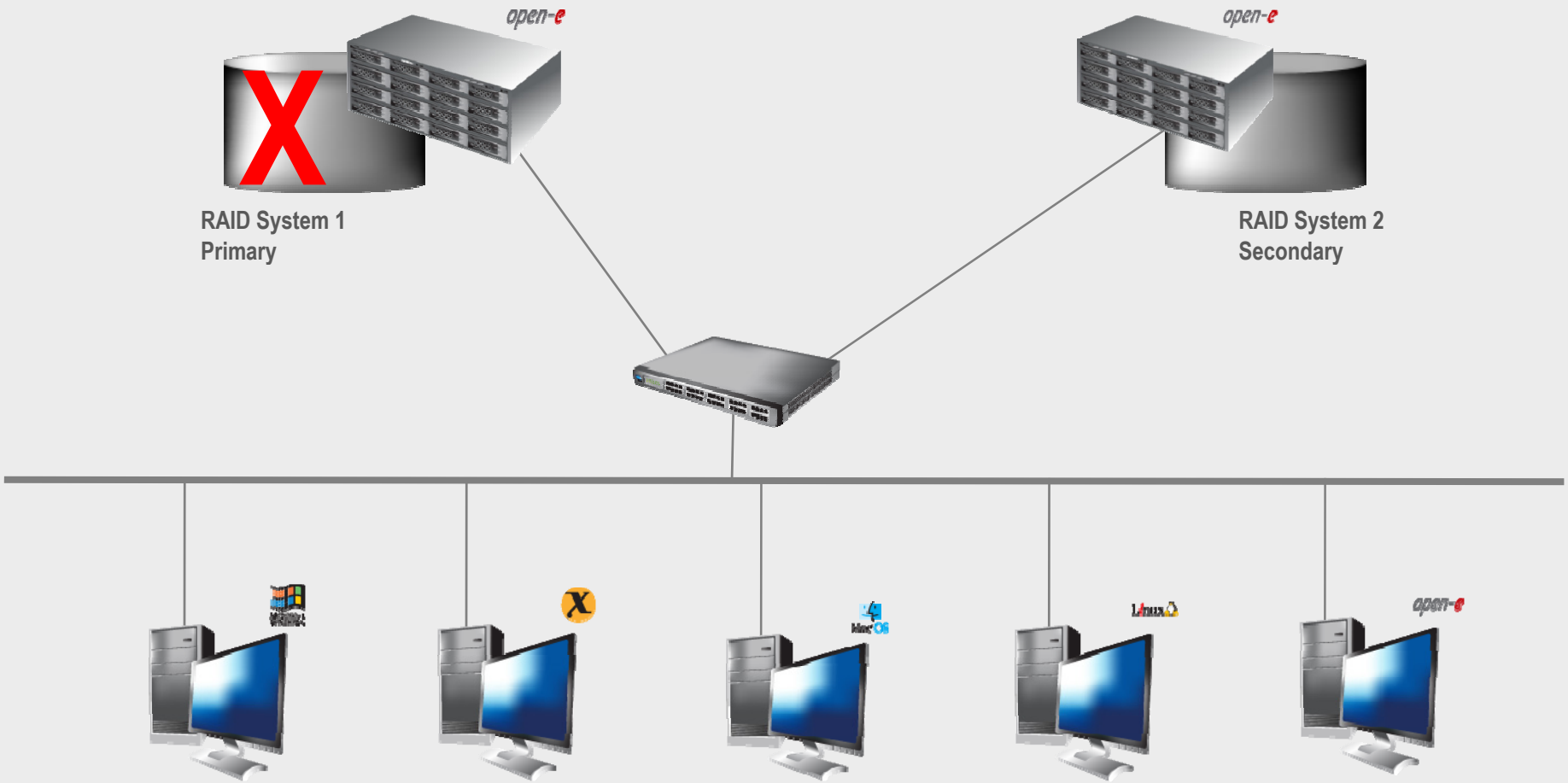
- Data is written and read to System 1
- Data is replicated to System 2



Asynchronous **Volume Replication** over a LAN

- In case of raid array error or disk drive error on the System 1, the server will send an e-mail notification to the administrator,
- In the case of a failure of system 1, users will be notified,
- Administrator then switches users to the System 2.



Asynchronous **Volume Replication** over a LAN

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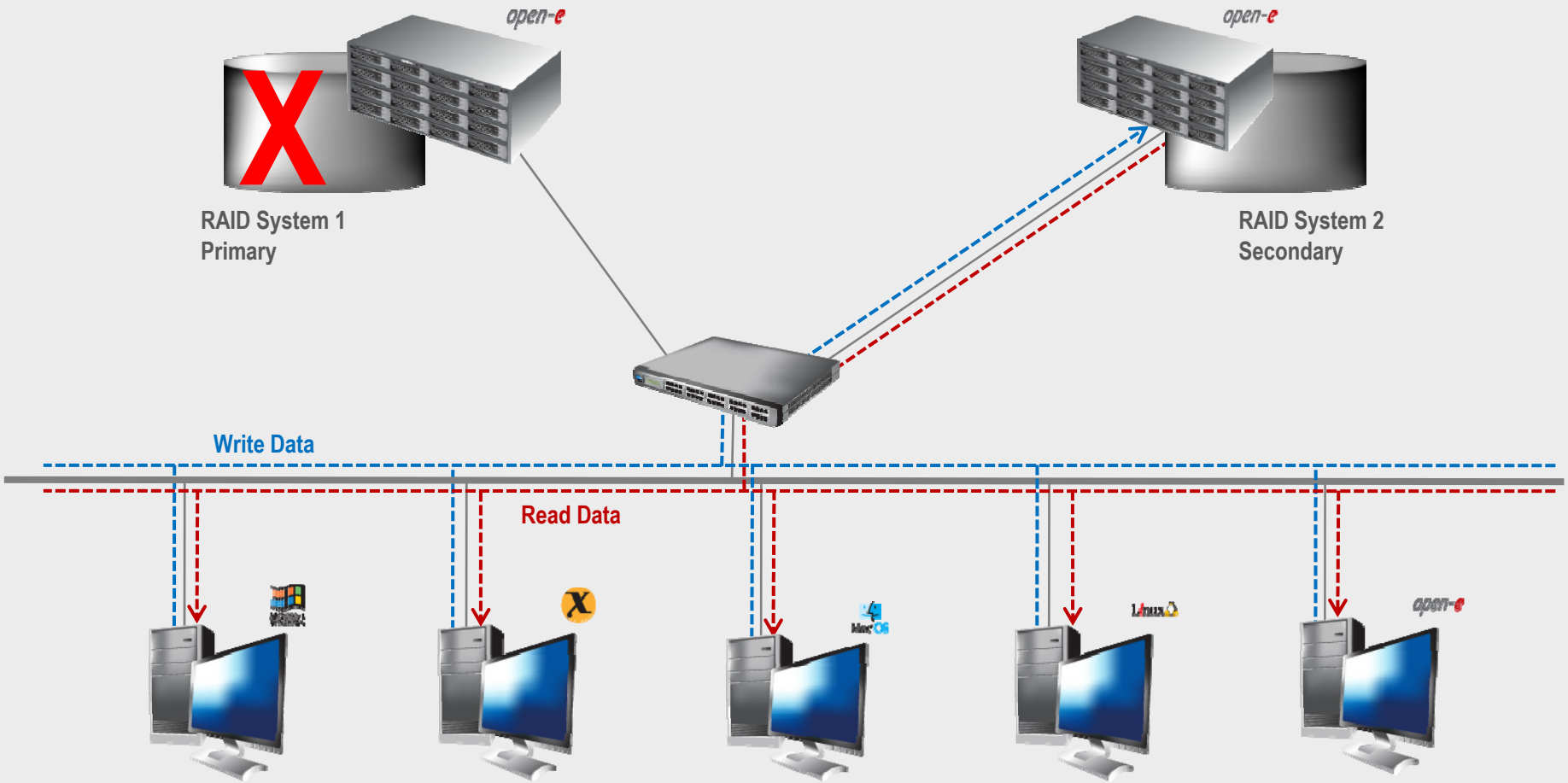
- After switching, replicated volume is available on System 2



Asynchronous **Volume Replication** over a WAN

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REPLICATION BETWEEN TWO SYSTEMS OVER A WAN

- **Recommended Resources**
  - Key Hardware (two systems)
    - ✓ x86 compatible,
    - ✓ RAID Controller,
    - ✓ HDD's,
    - ✓ Network Interface Cards.
  - Software
    - ✓ Open-E DSS, 2 units.
- **Benefits**
  - Data redundancy
  - Maximum data safety
- **Disadvantages**
  - High cost of WAN solution

Asynchronous **Volume Replication** over a WAN

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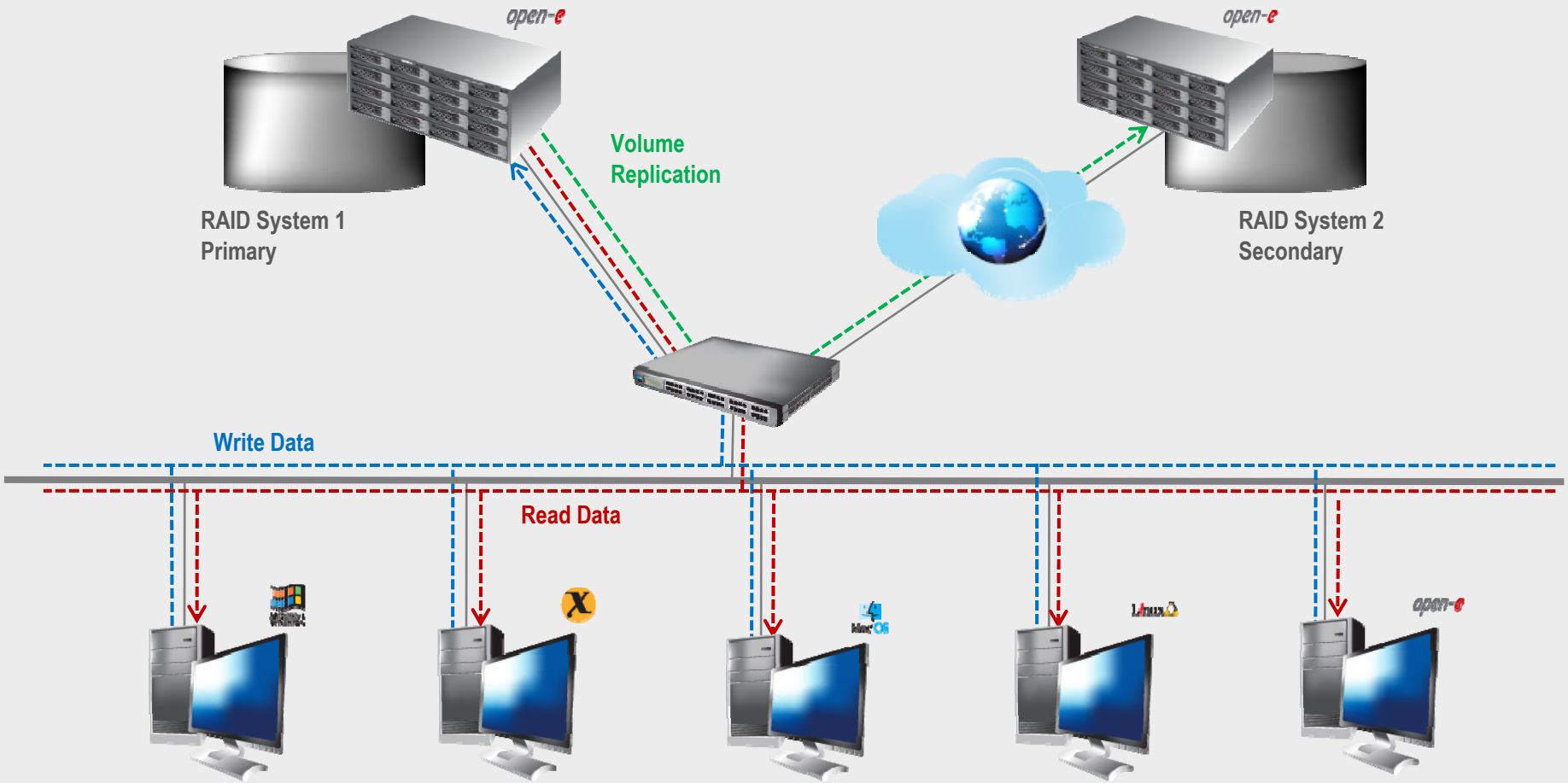
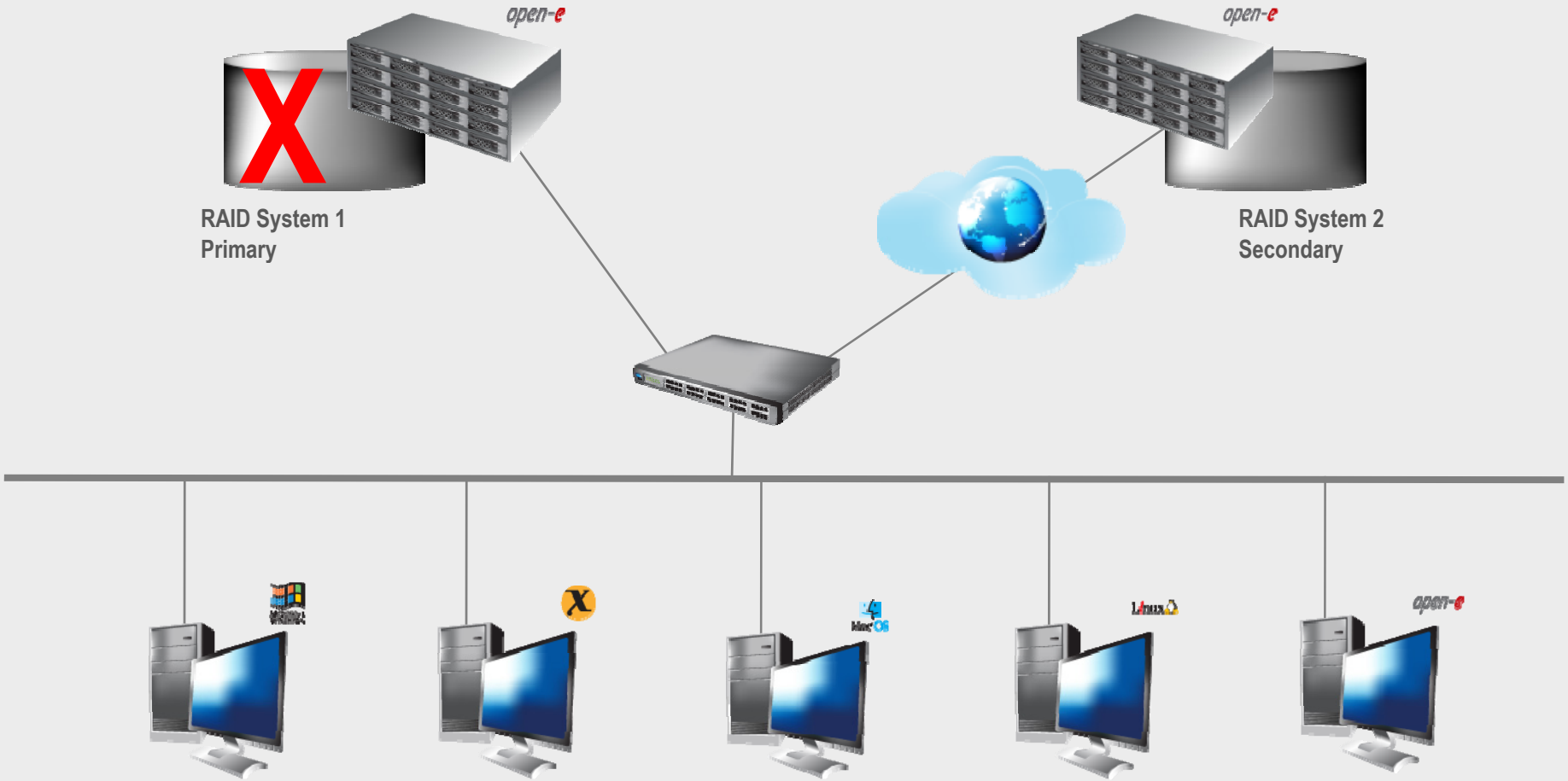
- Data is written and read to System 1
- Data is replicated to System 2 via an Internet connection



Asynchronous **Volume Replication** over a WAN

- In case of raid array error or disk drive error on the System 1, the server will send an e-mail notification to the administrator,
- In the case of a failure of system 1, users will be notified,
- Administrator then switches users to the System 2 over the WAN.



Asynchronous **Volume Replication** over a WAN

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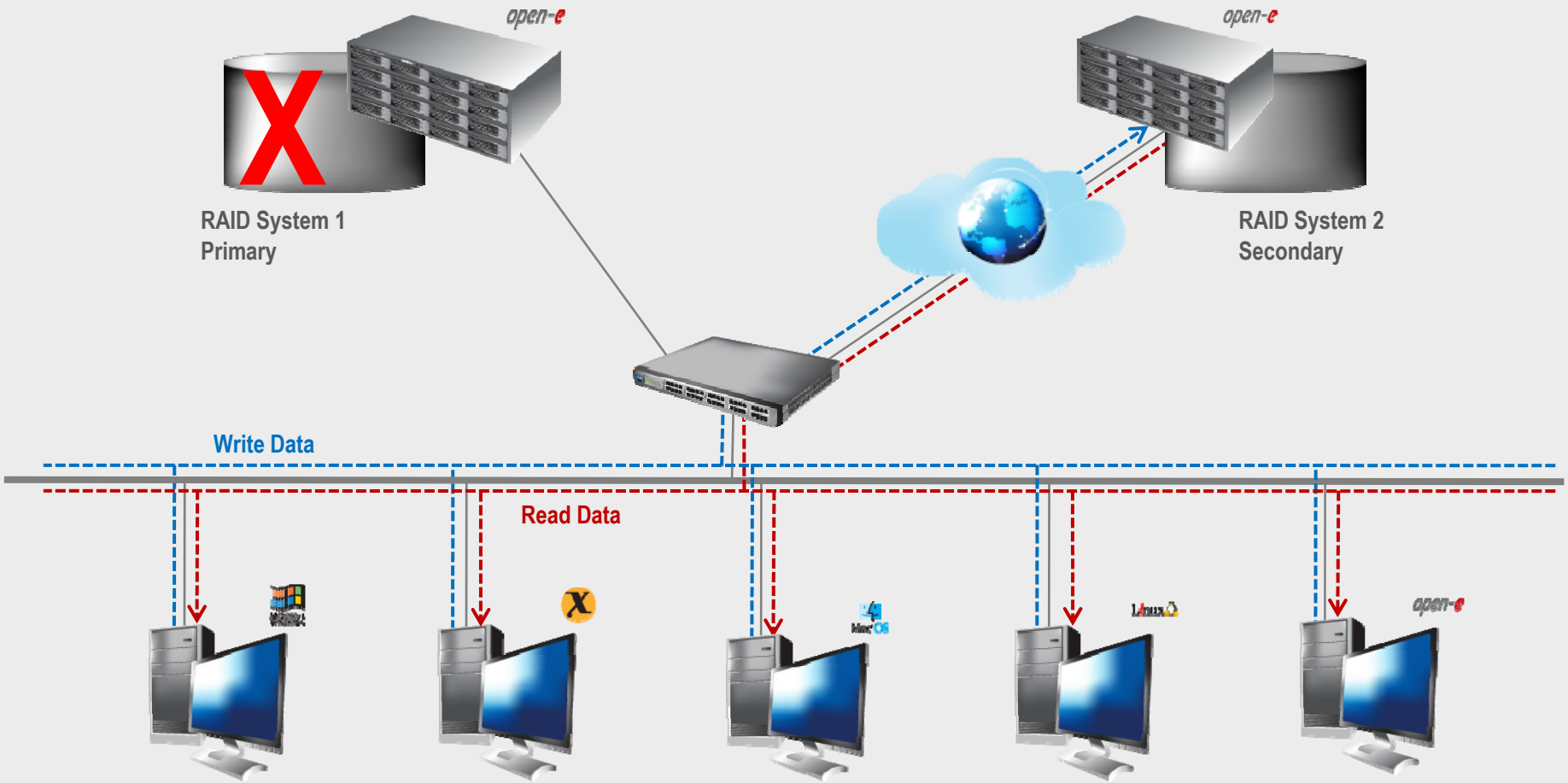
- After switching, replicated volume is available on System 2



Synchronous **Volume Replication** over a LAN

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REPLICATION BETWEEN TWO SYSTEMS WITHIN ONE LAN

- **Recommended Resources**
  - Key Hardware (two systems)
    - ✓ x86 compatible,
    - ✓ RAID Controller,
    - ✓ HDD's,
    - ✓ Network Interface Cards.
  - Software
    - ✓ Open-E DSS (recommended) or Open-E iSCSI-R3, 2 units.
- **Benefits**
  - Data Redundancy over a LAN,
  - Enables continuous data access.
- **Disadvantages**
  - High cost of solution,
  - Natural disasters can destroy local systems.

Synchronous **Volume Replication** over a LAN

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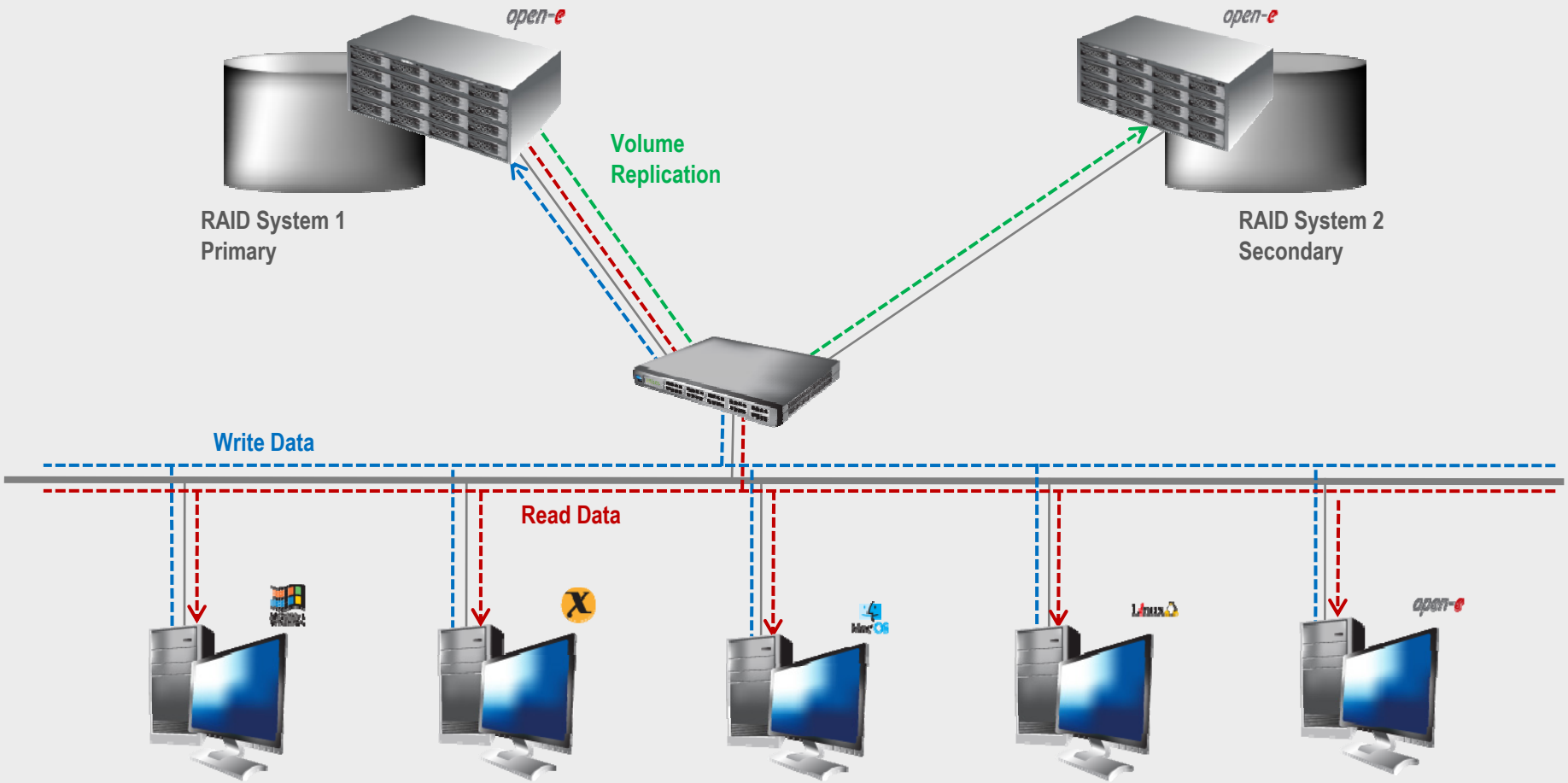
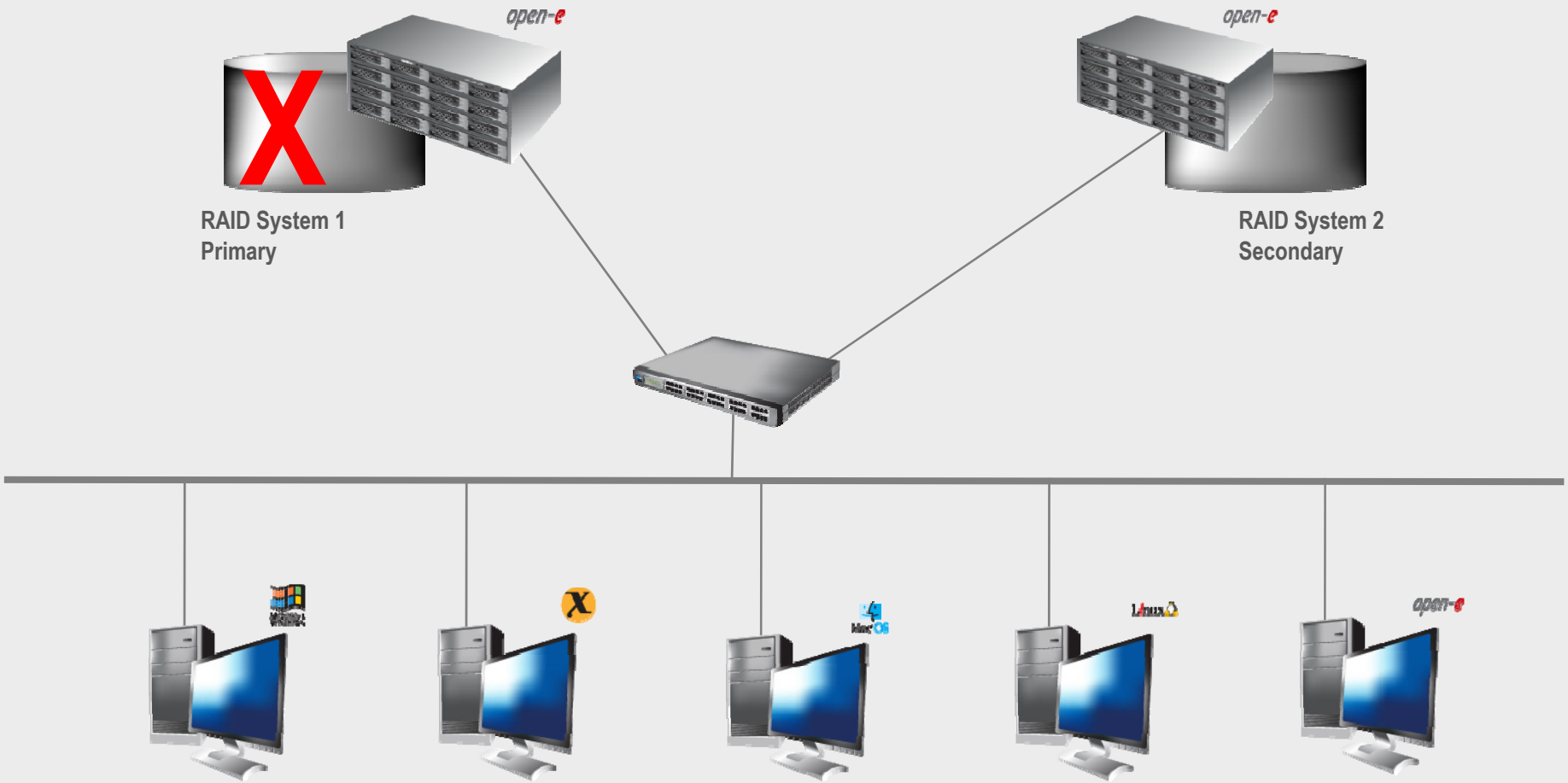
- Data is written and read to System 1
- Data is continiously replicated to System 2



Synchronous **Volume Replication** over a LAN

- In case of raid array error or disk drive error on the System 1, the server will send an e-mail notification to the administrator,
- In the case of a failure of system 1, users will be notified,
- Administrator then switches users to the System 2.



Synchronous **Volume Replication** over a LAN

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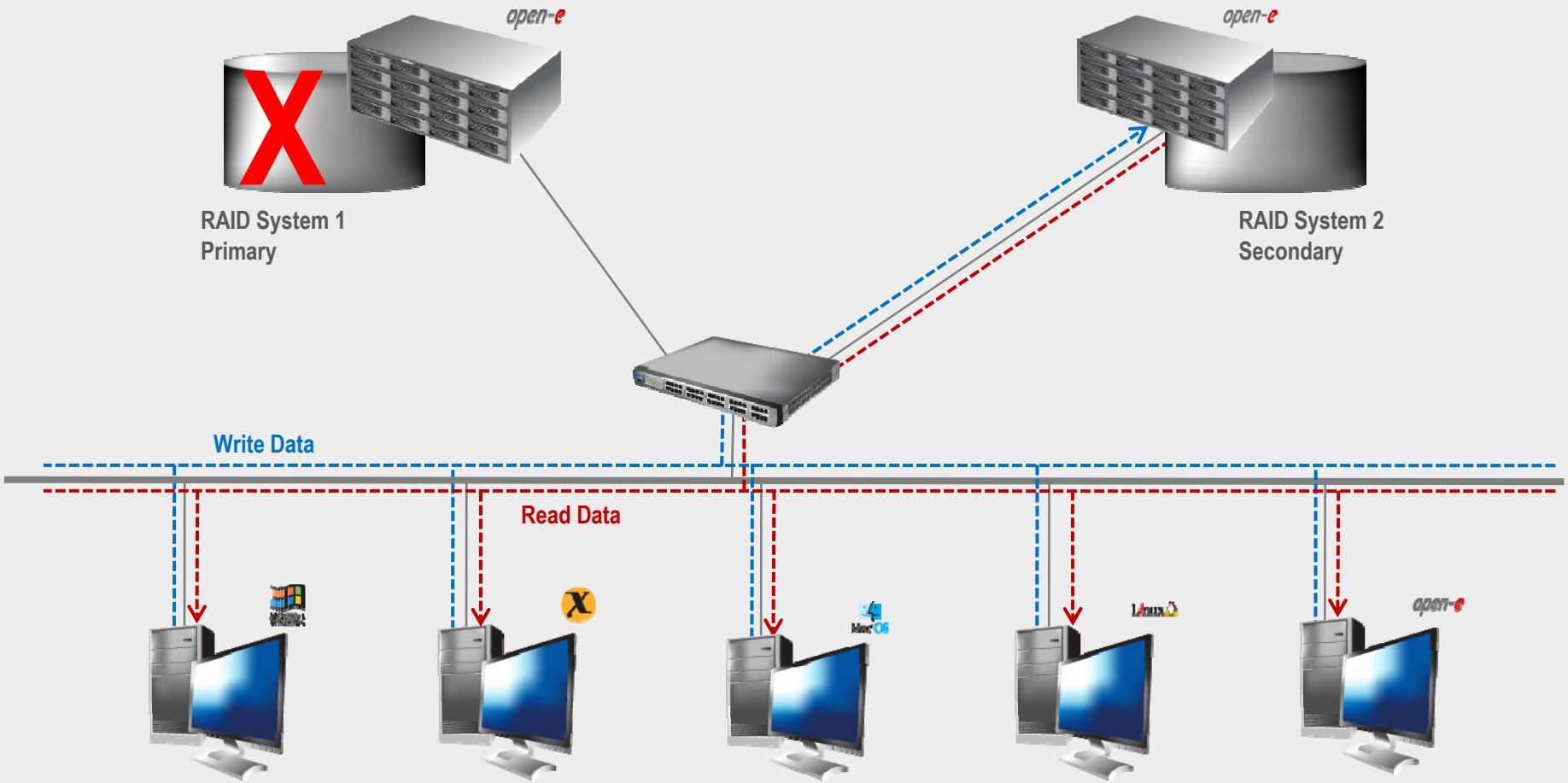
- After switching, replicated volume is available on System 2



Synchronous **Volume Replication** over a WAN

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REPLICATION BETWEEN TWO SYSTEMS OVER A WAN

- **Recommended Resources**
  - Key Hardware (two systems)
    - ✓ x86 compatible,
    - ✓ RAID Controller,
    - ✓ HDD's,
    - ✓ Network Interface Cards.
  - Software
    - ✓ Open-E DSS, 2 units.
- **Benefits**
  - Data redundancy
  - Maximum data safety
- **Disadvantages**
  - High cost of WAN solution

Synchronous **Volume Replication** over a WAN

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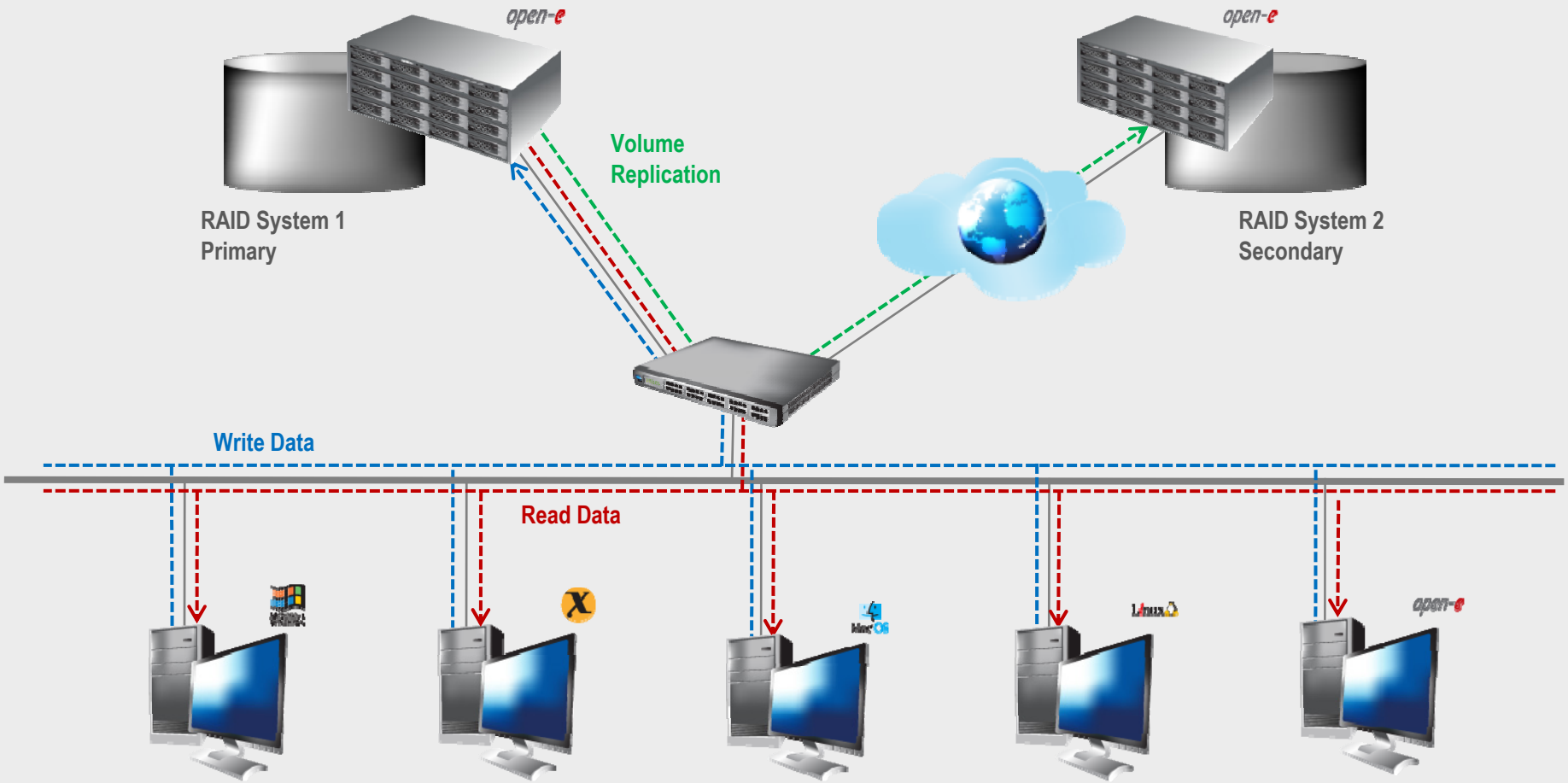
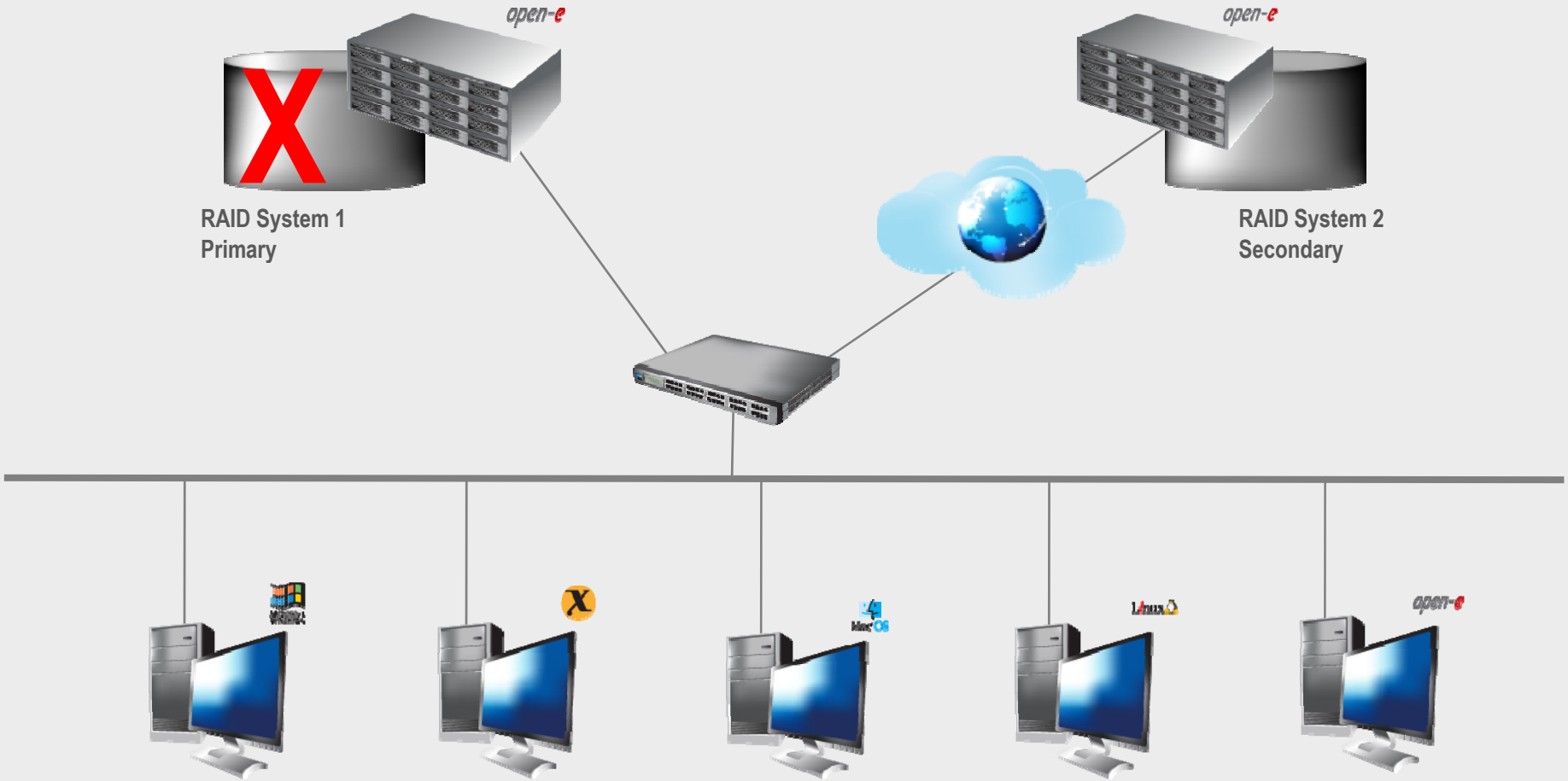
- Data is written and read to System 1
- Data is replicated to System 2 via an Internet connection



Synchronous **Volume Replication** over a WAN

- In case of raid array error or disk drive error on the System 1, the server will send an e-mail notification to the administrator,
- In the case of a failure of system 1, users will be notified,
- Administrator then switches users to the System 2 over the WAN.



Synchronous **Volume Replication** over a WAN

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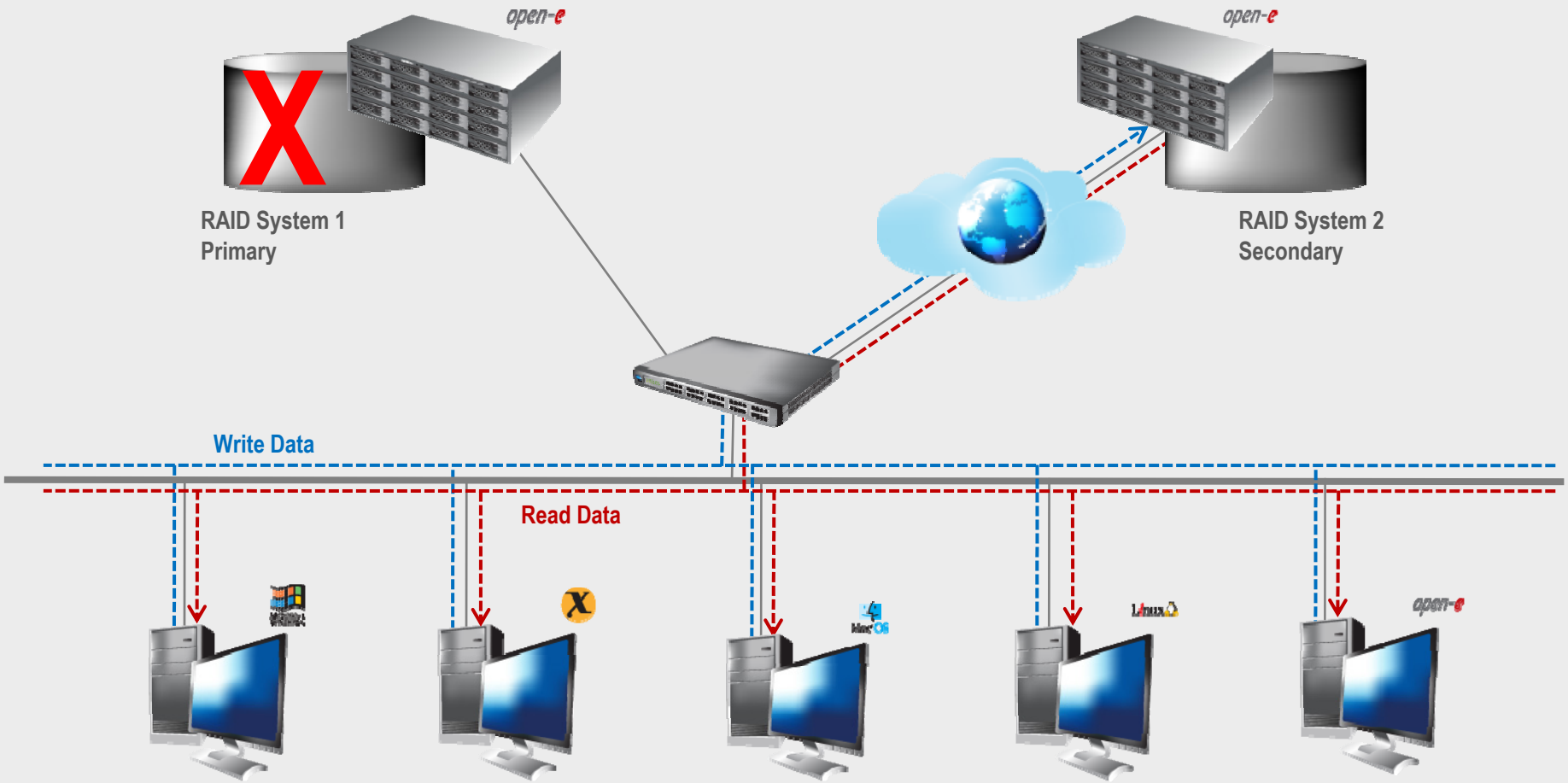
- After switching, replicated volume is available on System 2



Synchronous **Volume Replication with Failover** over a LAN

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VOLUME REPLICATION WITH FAILOVER BETWEEN TWO SYSTEMS WITHIN ONE LAN

- **Recommended Resources**
  - Key Hardware (two systems)
    - ✓ x86 compatible
    - ✓ RAID Controller with **Batery Backup Unit**
    - ✓ HDD‘s
    - ✓ Network Interface Cards
    - ✓ Ping Node (ping node it is any permanently (24/7) available host in the network. In particular case the ping node function can be performed by the server storing the data on the iSCSI failover volume).
  - Software
    - ✓ Open-E DSS, 2 units
- **Benefits**
  - Eliminates business disruption
  - Provides data redundancy over a LAN
  - Enables switch redundancy
- **Disadvantages**
  - High cost of solution
  - Natural disasters can destroy local systems

Synchronous **Volume Replication with Failover** over a LAN

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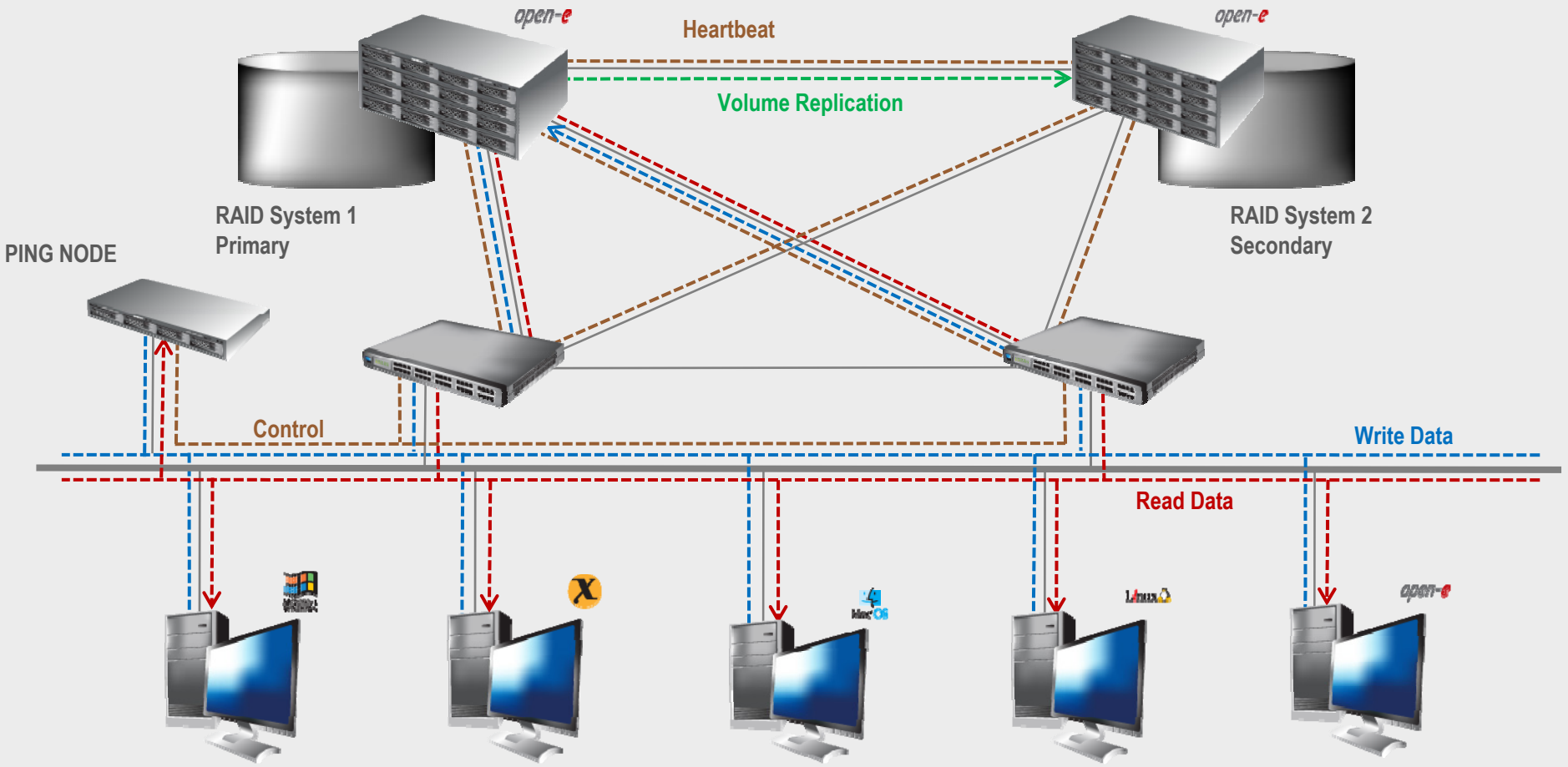
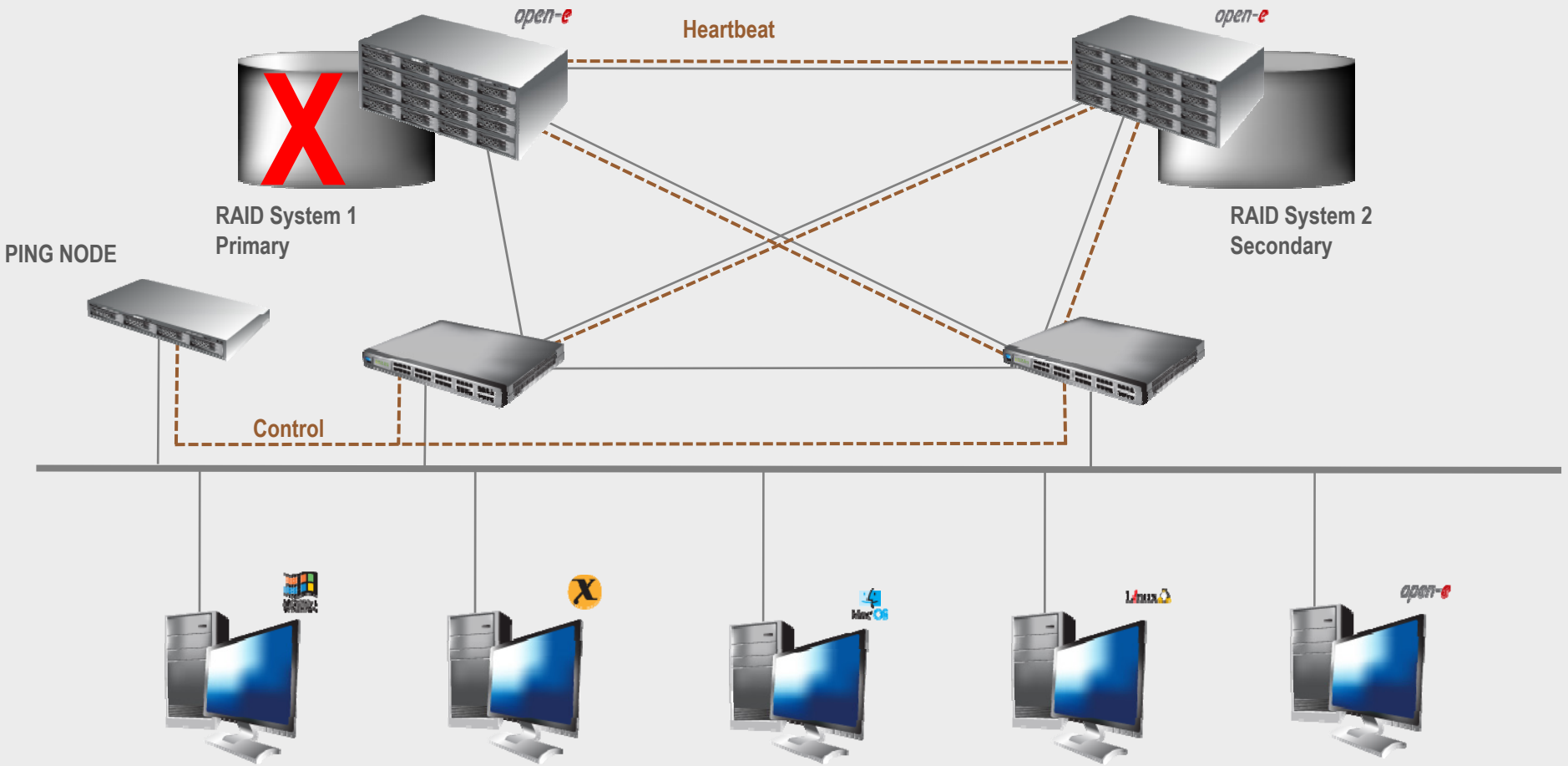
- Data is written and read to System 1 (primary)
- Data is continually replicated to System 2 (secondary)



Synchronous **Volume Replication with Failover** over a LAN

- In case of raid array or disk drive error on System 1 (primary), the server will send an e-mail notification to the administrator.
- iSCSI Auto Failover determines there is no connection between the servers
- After a few seconds Automatic Failover is executed and users are switched to System 2 (secondary)



Synchronous **Volume Replication with Failover** over a LAN

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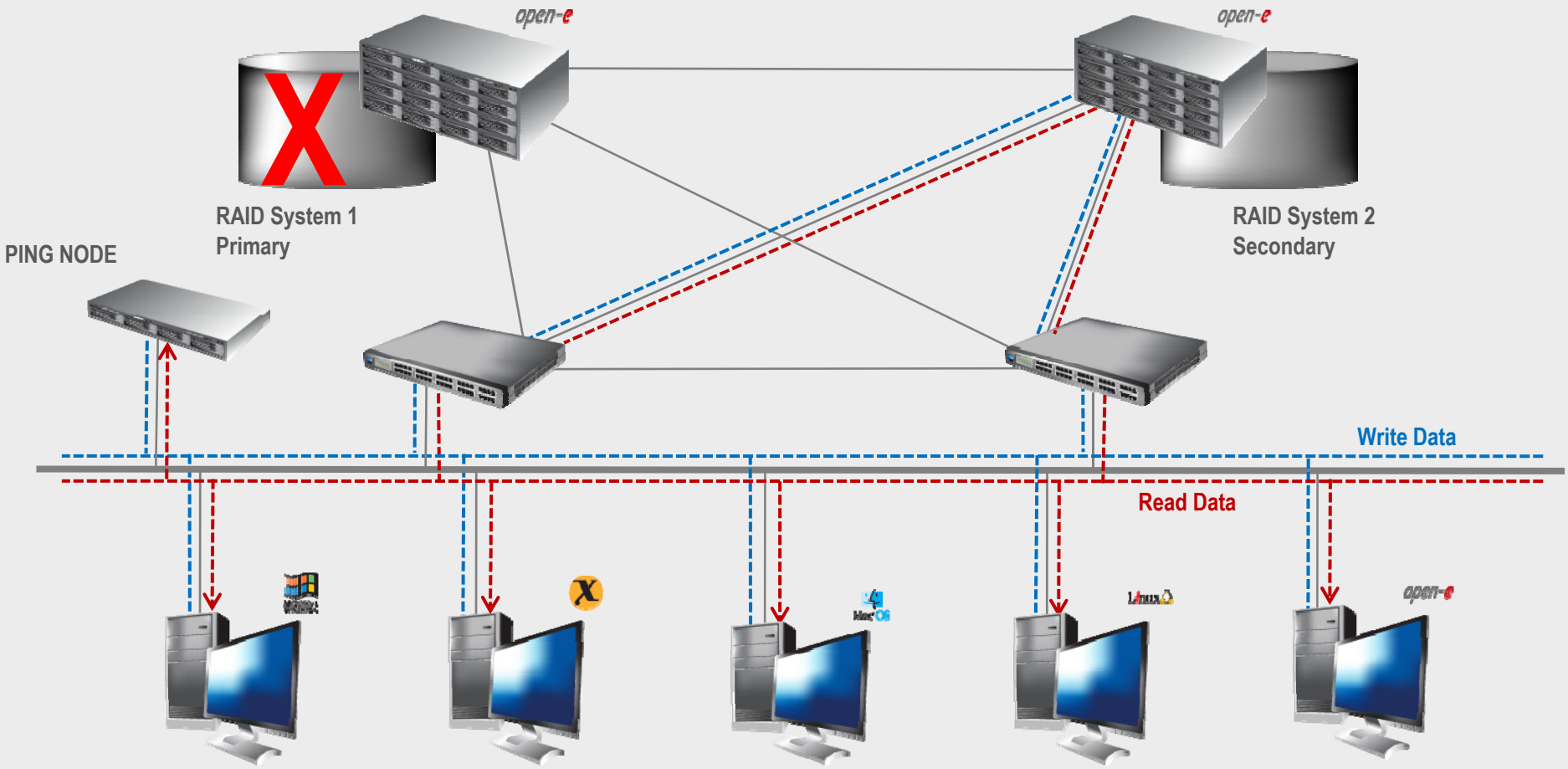
- After switching, the replicated volume is available on System 2 (secondary)



Thank You