CSI3670
Failover Clustering

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Server Considerations

What do we *mainly* care about when we're hosting a server?

- Performance
  - Server should be *usable* by users
- Uptime
  - > 99% uptime usually preferred

How could this happen?
Exhibit 1: https://www.youtube.com/watch?v=EkfqL
Exhibit 2:
http://www.cc.com/video-clips/l3pebb/futurama-th
tdated-robots

Failover Clustering

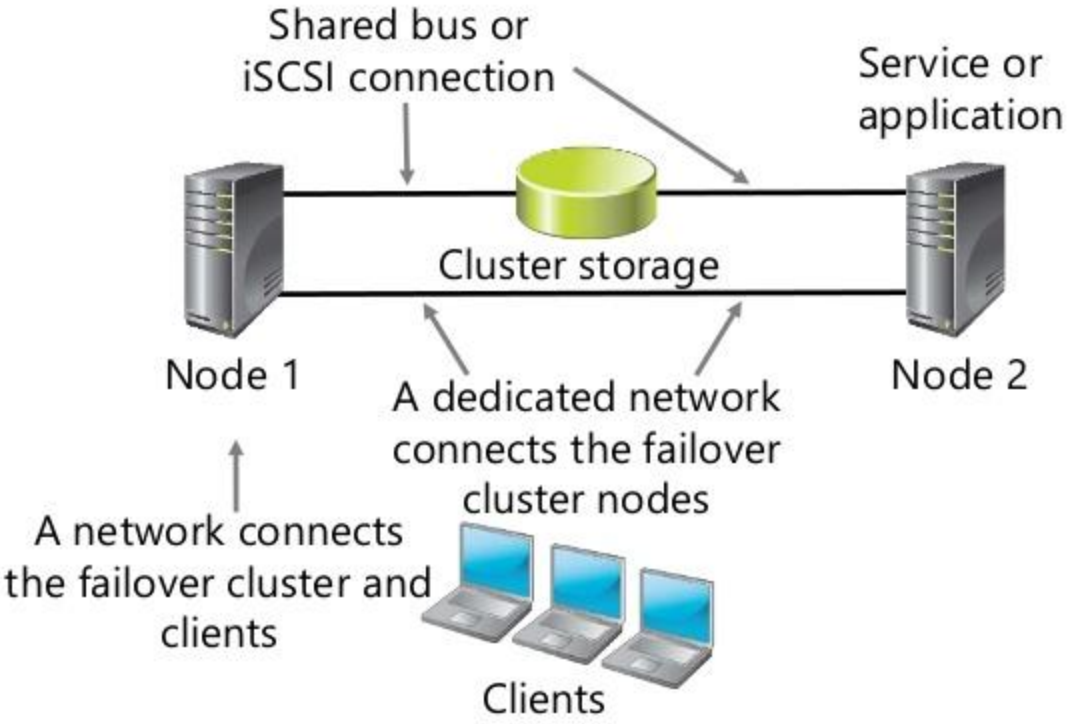
What is failover clustering (or failover for short)?

A group of servers, working together, to increase performance and uptime

Avoid downtime, increase relative performance, BUT:

- More complex
- More to manage
- Higher in cost

Failover Cluster Components



Terms

Cluster
- Essentially a group of servers working together

Node
- Server within a cluster

Quorum
- Consensus that cluster members can provide services
- “Votes” by Windows Server nodes
  - Nodes, file shares, shared disks have a ‘vote’
- Cluster remains online if sufficient votes come in

Failover and Failback

Failover

- Clustered instance (and associated resources) moved to new node
- Occurs:
  - Node hosting instance is inactive
  - Instance resource failure
  - Administrator decision

Failback

- Return to original node after issue resolved

What do we need?

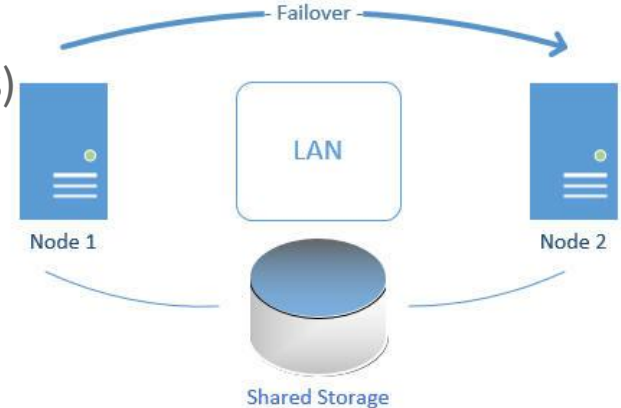
Failover cluster networks

- Multiple NICS recommended for performance/redundancy
- Public network ➔ client connection to clustered service
- Private network ➔ node communication
- Public/private ➔ communicate with external storage

Failover cluster storage

- Similar to a live migration, we need shared storage
- Consistent data access after failover (moving pointers)

Same version of Windows Server, same updates, etc.



What do we need [hardware edition]?

Should be “Certified for Windows Server 201X”

Connected to multiple networks
- Communication redundancy

Or single network with redundant equipment
- Communication redundancy

Network adapters *should* be the same
- But need same IP protocols, speeds, etc.

Shared storage to provide “magical” failover

What do we need [infrastructure edition]

Cluster nodes must use DNS resolution

All must be in the same AD domain

Cluster creator must have admin rights on all servers

Limit role installation on server to the failover role
    Definitely NOT AD DS

Need a Quorum

Quorum Mode	What has the vote?	When is Quorum maintained?

When you configure, make sure you have an **odd** number of members (no ties)
Otherwise you need to configure a **witness** that has an additional vote

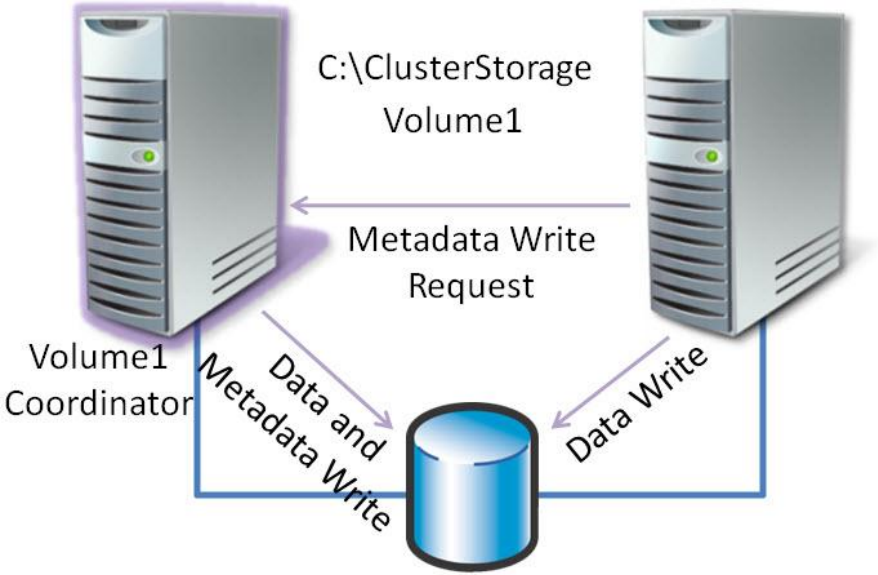
Need a Quorum

Quorum Mode	What has the vote?	When is Quorum maintained?
Node majority	Only cluster nodes	>half nodes online
Node/disk majority	Cluster nodes with disk witness	>half votes online
Node/file share majority	Cluster nodes with file share witness	>half votes online
No majority : disk only	Quorum-shared disk	Shared disk online

When you configure, make sure you have an **odd** number of members (no ties)
Otherwise you need to configure a **witness** that has an additional vote

Cluster Shared Volume (CSV)

1) Create/format volumes on shared storage
2) Add disks to failover cluster storage
3) Add storage to created CSV



Cluster Resources and Services

Services

- Service/application that can be clustered
  - (Failover possible)
- Running on one node but can shift to another as needed

Resources

- Components of clustered service
- Only run on a single node at once
  - Moved when node fails
- IP addresses, shared disks, etc.

Cluster Administration

Application settings
- Preferred owner(s) -- set in ordered list
- What is to be “failed over”
  - Application, service, role, etc.

Troubleshooting
- Reviewing logs (cluster log, hardware log, CSV log, etc.)
- Validating cluster configurations (Windows wizard)

https://clusteringformeremortals.com/2012/12/31/windows-server-2012-clustering-step-by-step/

Installation

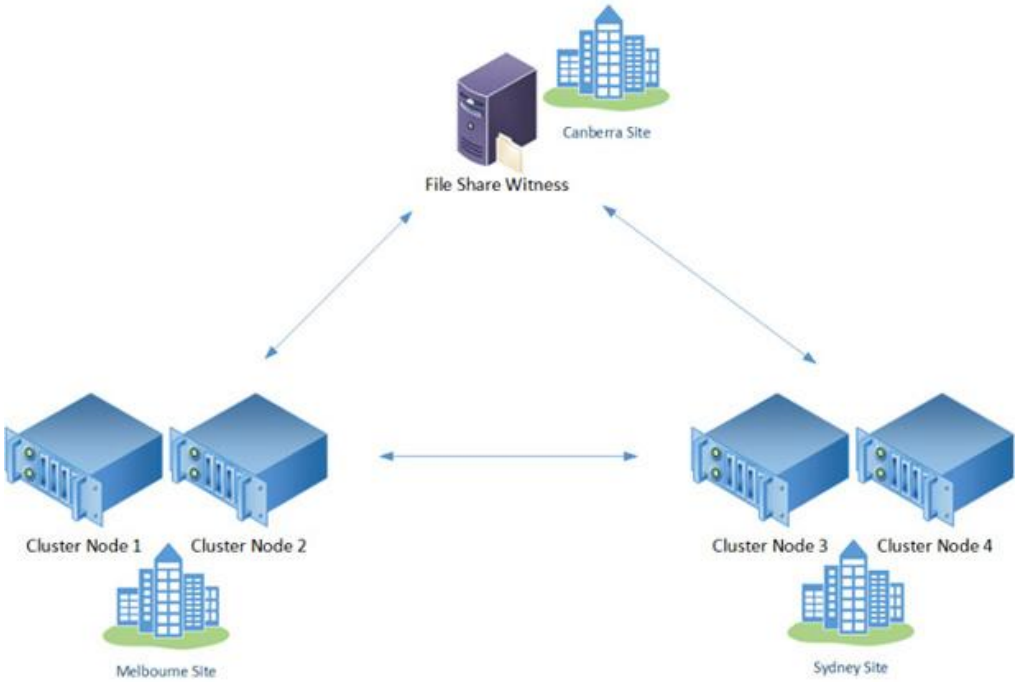
Install and configure failover clustering

1) Install Clustering **feature** on all machines you want to cluster (need at least 2)
2) On the primary, start creating the cluster by Validating the Configuration
    a) If an error exists, it must be fixed otherwise the cluster won't be created

Generally not recommended to install on a DC, due to DC replication
And, the install will often fail

Multi-site Clusters

Cluster nodes exist in different AD sites
(Different **physical** locations)



Synchronous and Asynchronous Replication

Replication

Mirror storage between sites

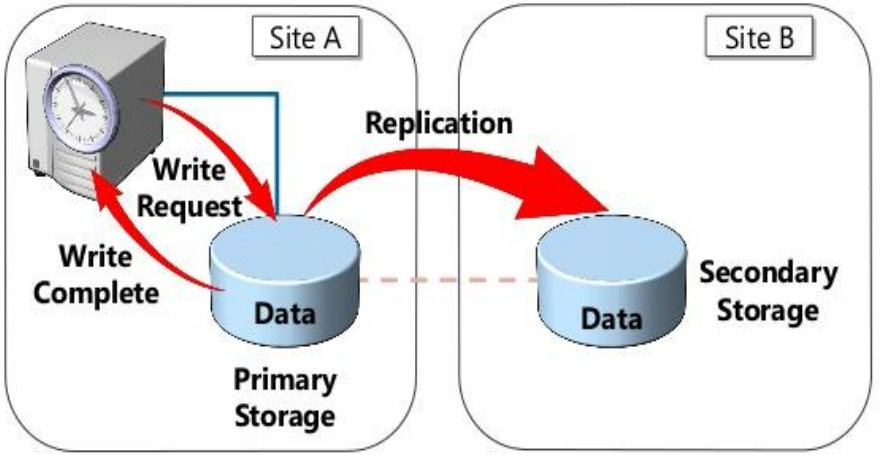
Synchronous

“Write complete” issued to host after both storage locations write data

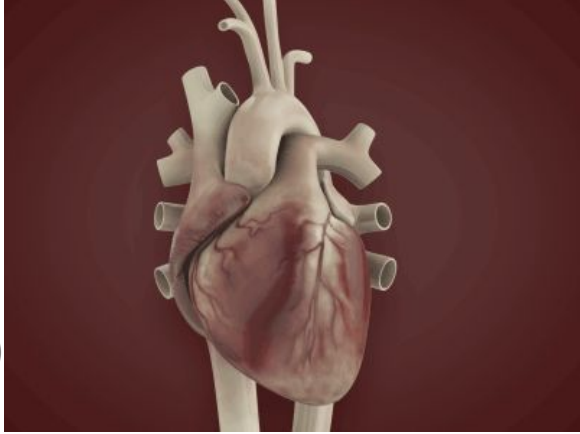
Asynchronous

“Write complete” issued after primary storage writing

Secondary storage written later



Ubuntu-version



What do we need?

Two servers (don’t need the Verified for Ubuntu sticker)

Heartbeat

Network tool that maintains high availability

DRBD (distributed replicated block device)

Synchronizes node data

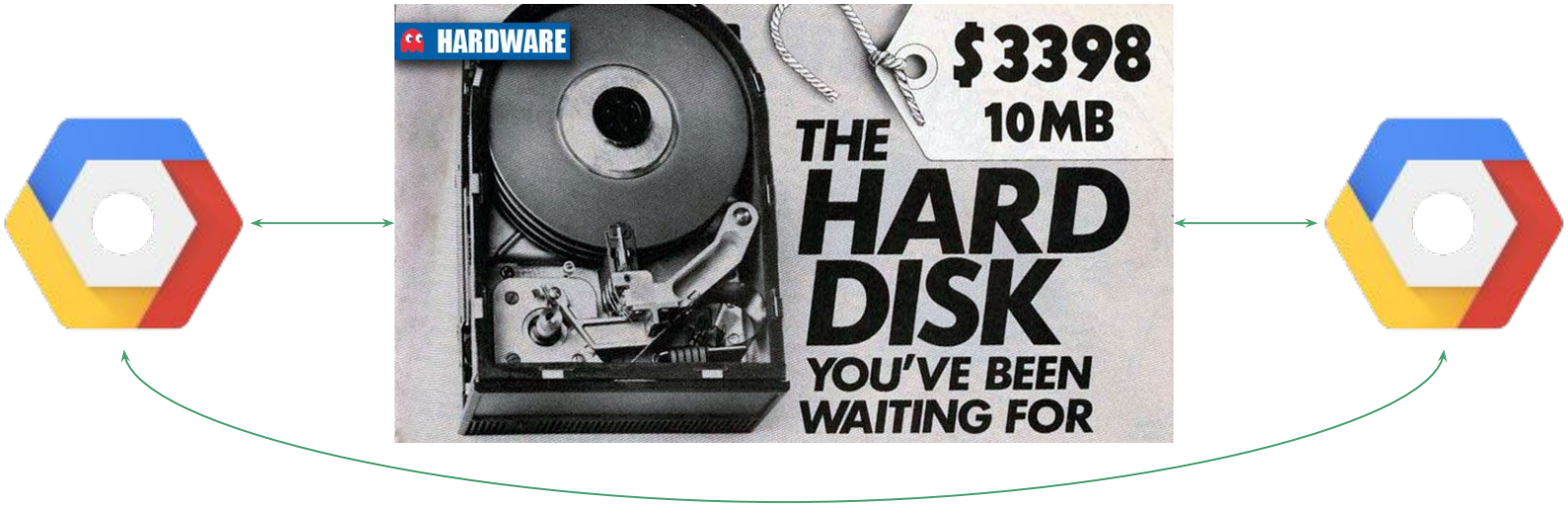
https://www.globo.tech/learning-center/high-availability-heartbeat-drbd-ubuntu-16/

(Failover of MariaDB)

Probably the only provided possibility for failover...

Why can’t we do failover on the school VMs again?

In Google Cloud you are able to configure a addressable, persistent hard drive...



Sharing your teammates PCs

To enable remote access you'll have to do the following:

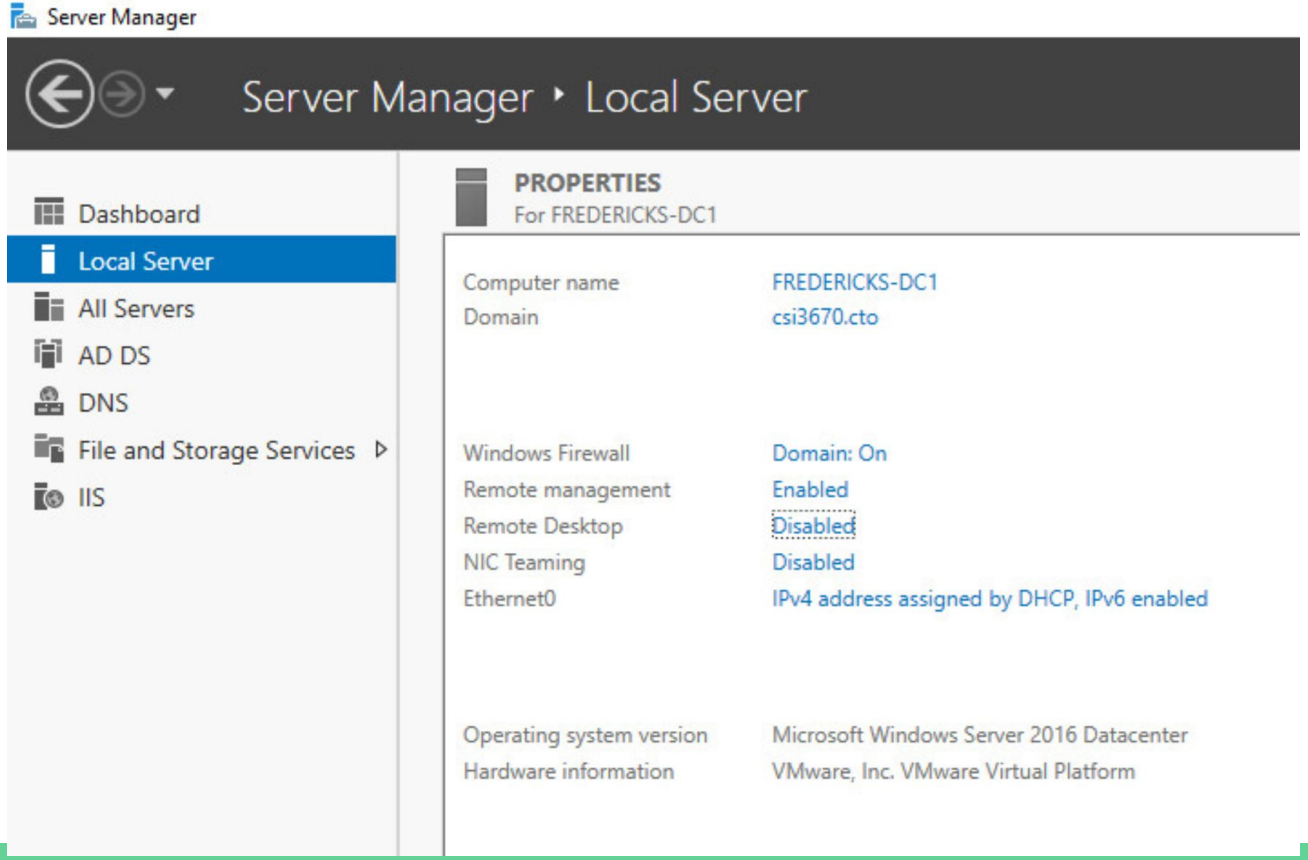
1) Everybody should be able to login, at least if you go to the @csi3670.cto domain
    a) Trust relationship exists

2) Allow Remote Desktop
    a) You will need to share IP addresses if you use this

3) Open up the Remote Management firewall rule
    a) Share via All Servers window

4) Add server to list

Allow remote desktop



Enable remote management (via Server Mgr)

This allows you to add and control the other PCs from your Server Manager

Open PS as an administrator on each PC

```
netsh advfirewall firewall set rule group="Windows
Management Instrumentation (WMI)" new enable=yes

netsh advfirewall firewall set rule group=“remote event log
management” new enable=yes
```

Add Server

Dashboard ➜ Add other servers to manage

Search by last name and your teammates' servers *should* appear

- Unless if they're named something different

Time for Group Project Work

Time for theoretical work

- What information are you presenting in your webpage
- How is progress going on your service
  - Who can contribute to areas where you may be struggling
- Consider starting your project website content in parallel
  - Remember, this is considered your **term project report** for content
    - And I will grade it as such (grammar, etc.)