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UNLIMITED®

Reworking Existing Architecture

We're going to work in teams

A sick SQL Server needs your help!

Your team will get information about the current architecture and the problem

- Work together for 20 minutes
- Diagram out architecture changes you recommend

We'll meet back and go over what you came up with, and what I came up with

There's more than one answer to each problem.

The teams (and mentors)

Team 1 - Jeremiah

- Sad scale-up SQL Server

Team 2 - Kendra

- Scale out SQL Server pains (replication)

Team 3 - Brent

- SQL Server Availability Group is not-so-available



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When recommending architecture, consider...



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Hardware

You can recommend changes to:

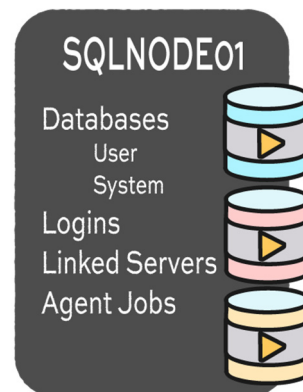
- Memory
- CPUs (but consider licensing)
- Storage
- Other physical components



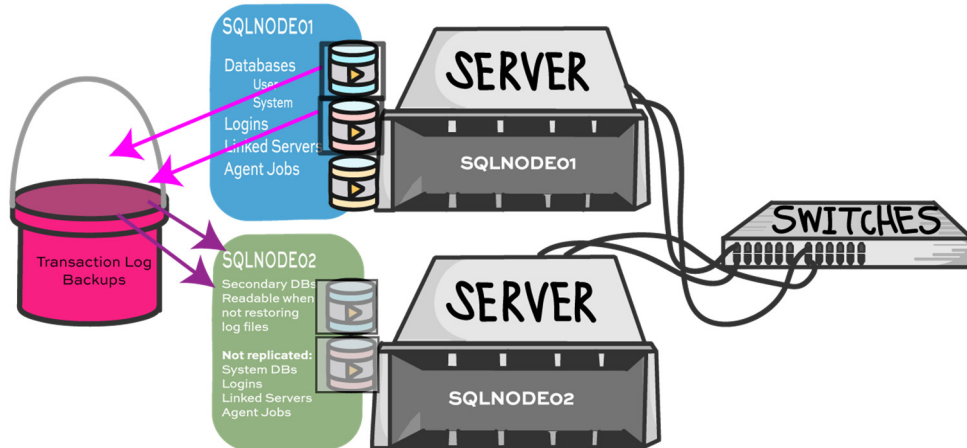
SQL Server instance and code

You can recommend changes to:

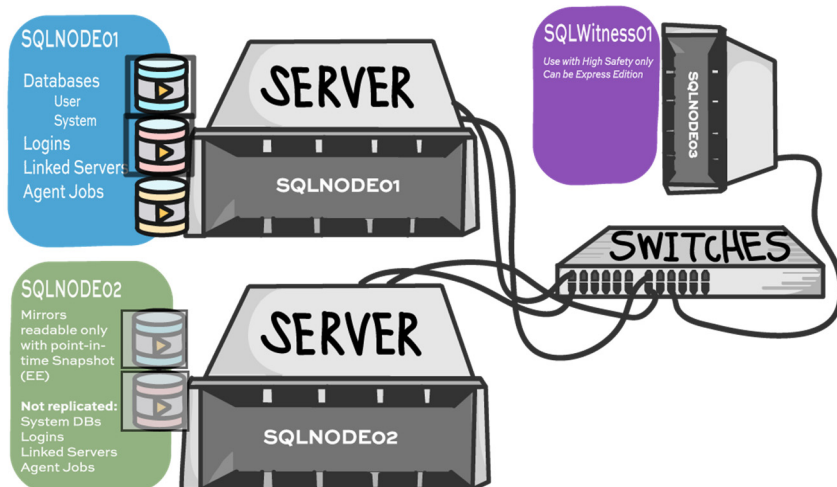
- Isolation levels
- SQL Server instance settings
- Application patterns



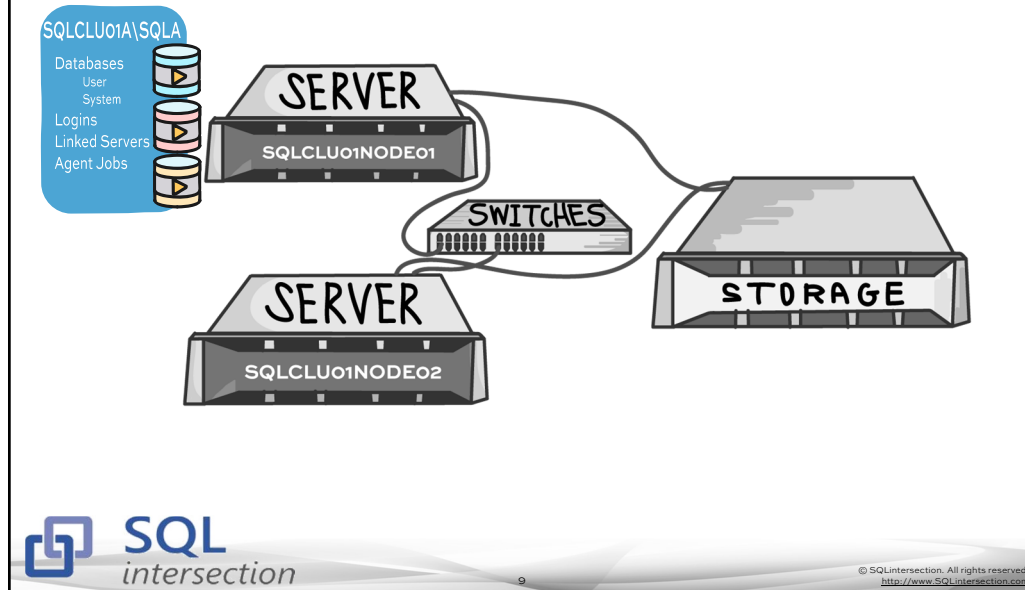
Transaction log shipping



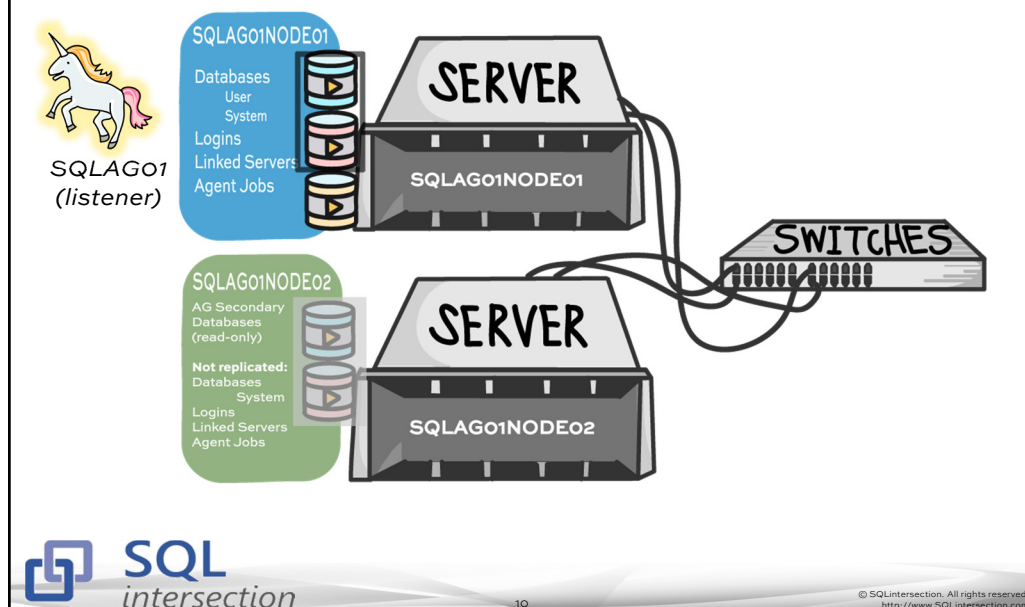
Database mirroring



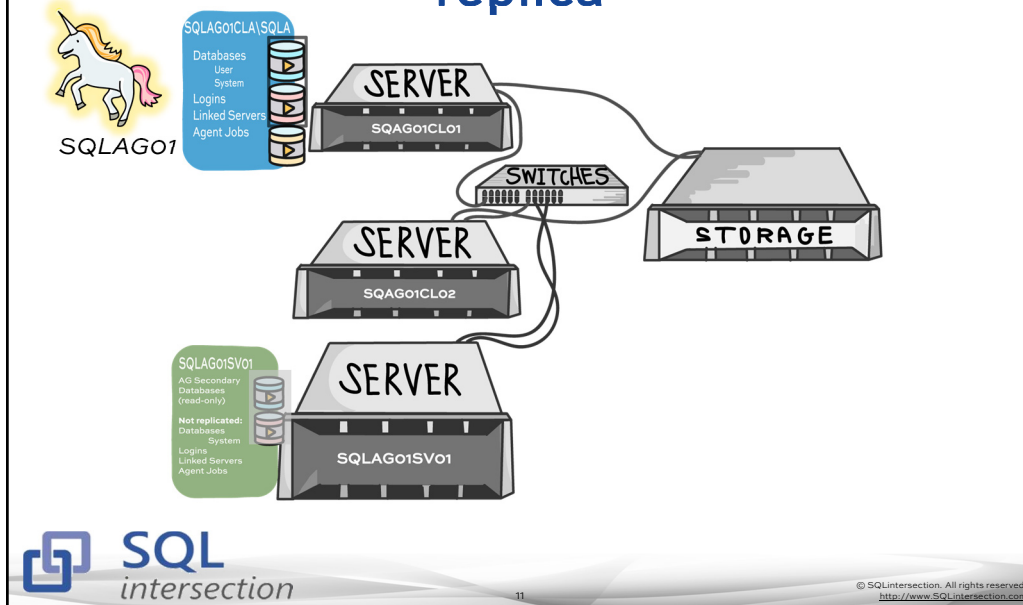
Failover cluster



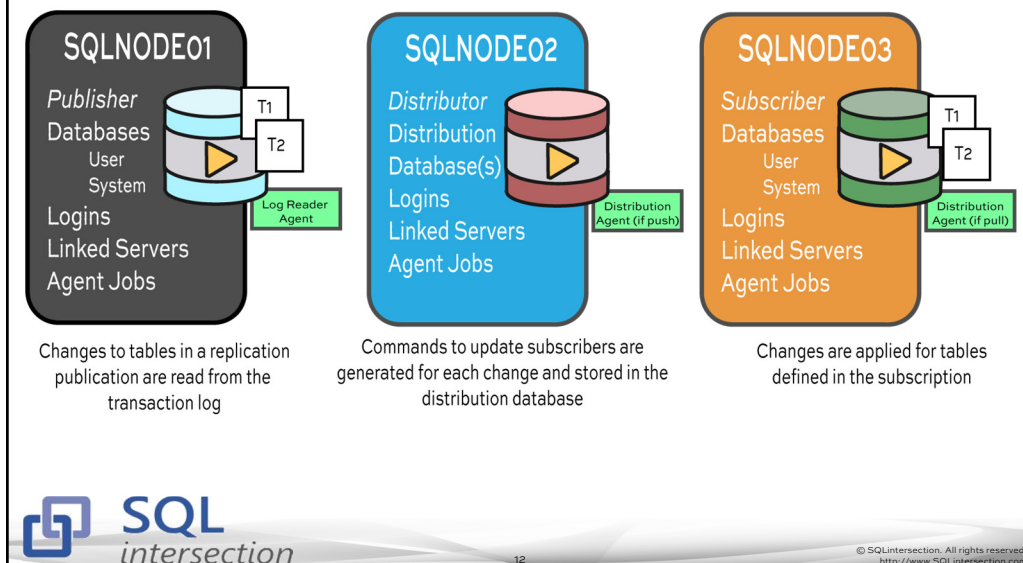
AlwaysOn availability group



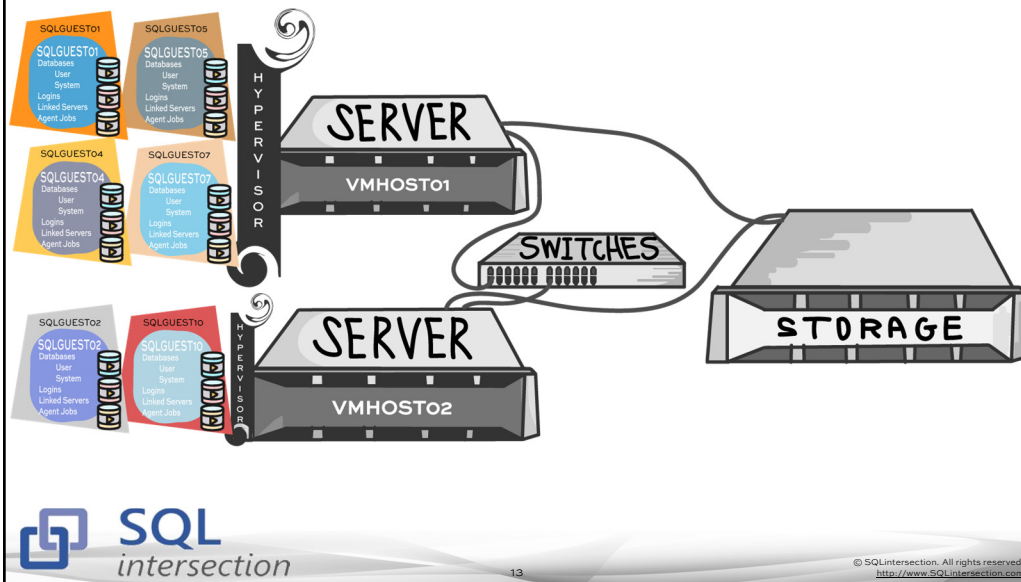
AlwaysOn failover cluster instance + availability group replica



SQL Server transactional replication



Virtualized SQL Server instances



People

You can recommend changes to:

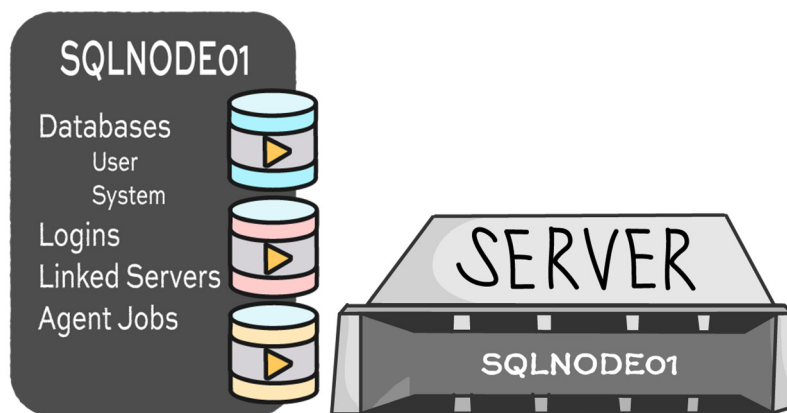
- Monitoring tools
- Hiring / team members
- Processes



Team 1

Sad scale-up SQL Server

Scale up SQL Server



Team 1 RPO/RTO

Team:

- 1 full time DBA
- 9 developers

Budget: “We can spend whatever it takes to make it right.”

	Server Offline	Corrupt data	“Oops” deletes	Datacenter offline
RPO: Minutes of data loss allowed	5 minutes	5 minutes	5 minutes	1 hour
RTO: Minutes of downtime allowed	5 minutes	2 hours	4 hours	1 week

SQL Server 2008R2 SP3, Enterprise Edition

SQL Server data sizes:

- 500 GB of data across 8 related databases
- 100 GB tempdb

Server basics:

- 768 GB of memory
- 32 logical processors (hyperthreading)
- SAN storage

Backups

- Back up to a file share, then copied to the cloud
- Full backups nightly
- Transaction log backups every 1 minute

Here's the problem...

Application profile:

- Used constantly by many web services and applications (OLTP)
- Large amounts of data are imported multiple times a day. Insert, update, delete speed is critical.
- Reporting queries also run against the same instance. Reports must be accurate and real-time.

Bottlenecks:

- Row and page level lock waits
- Deadlocks

Usually, things are fine

When large reports run, the server grinds to a halt



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Answer three questions

1. What are the top changes you would explore?

1. What are the benefits to your approach?

1. What are the risks?



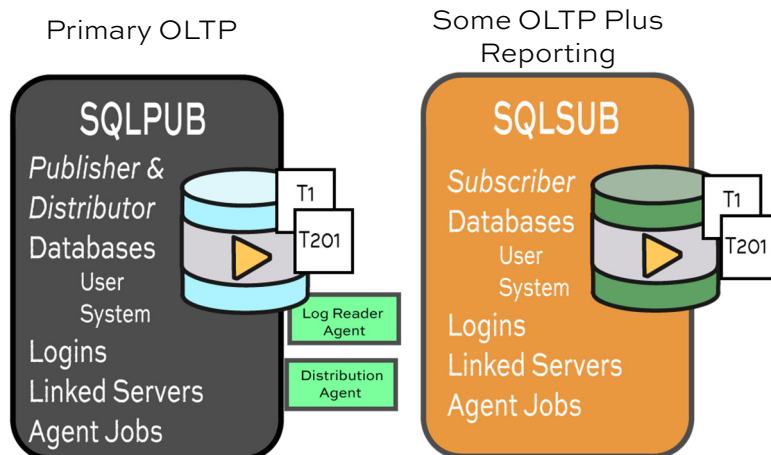
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Team 2

Scale out pains

Scale out SQL Server



Team 2 RPO/RTO

Team:

- Two full time DBAs
- 25 developers

Budget: “We can spend some, but we really hope we don’t have to buy Enterprise licenses.”

	Server Offline	Corrupt data	“Oops” deletes	Datacenter offline
RPO: Minutes of data loss allowed	N/A. The data is completely from other sources, this is a pure secondary instance.			
RTO: Minutes of downtime allowed	1 hour	1 hour	12 hours	1 day

SQL Server 2012 RTM, Standard Edition

The publisher and subscriber are set up the same way

Replication was put in place to spread the load out to more than one server

SQL Server data sizes:

- 450 GB of data (and growing) in one database
- 60 GB tempdb

Server basics:

- 128 GB of memory
- 16 logical processors (hyperthreading)
- SAN Storage (an old, overburdened SAN)

Here's the problem...

Application profile:

- Replication is constantly bringing data over
- Some application connection strings that require real-time data point to the instance
- Internal business users run reports against the instance during daytime hours.
 - They are used to real-time data, but would be willing to have data as of the prior midnight if it would stop the pain.

The problem:

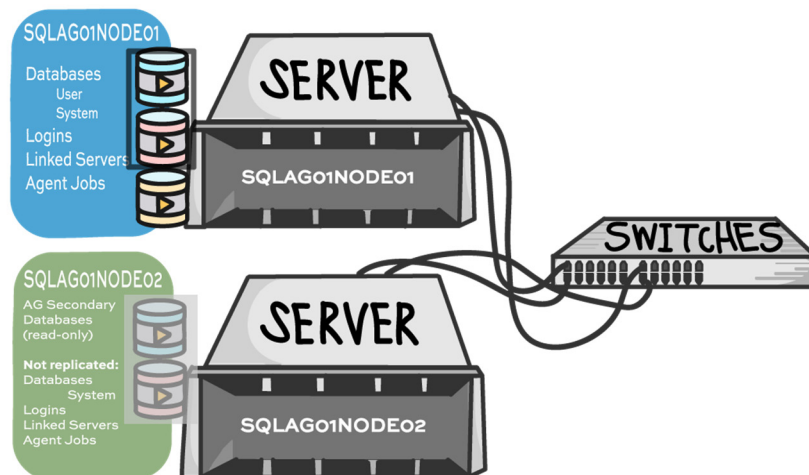
- When activity on the primary server gets high, replication gets very far behind
- The application queries pointing to the secondary then have data that is wrong
- Sometimes replication has to be rebuilt and that disrupts the report users

Answer three questions

1. What changes do you recommend? (Diagram it out)
1. What are the benefits?
1. What are the risks?

Team 3:
“Our Availability
Group is bringing us
down. Literally.”

Availability group



Team 3 RPO/RTO

Team:

- 5 developers

Budget: “We’ve invested a lot. We don’t want to spend much more.”

	Server Offline	Corrupt data	“Oops” deletes	Datacenter offline
RPO: Minutes of data loss allowed	5 minutes	5 minutes	5 minutes	??? (No DR plan)
RTO: Minutes of downtime allowed	5 minutes	5 minutes	5 minutes	??? (No DR plan)

SQL Server 2012 RTM, Enterprise Edition

SQL Server data sizes:

- 120 GB of data (and growing) in one database
- 20 GB tempdb

Server basics:

- 256 GB of memory
- 16 logical processors (hyperthreading)
- Local SSD Storage (PCI Express Cards)
- Dual NICs with network teaming
- Windows Server 2008R2 Enterprise

Availability Group configuration

- Synchronous AG with automatic failover
- Two nodes, no disk or fileshare witness
- One node licensed, not reading from the other node

Everyone's unhappy

Application profile:

- Web applications doing internet retail

The problem:

- SQL Server is periodically unresponsive
- The SQL Server databases sometimes go offline
- No similar dev environment

Answer three questions

1. What changes do you recommend? (Diagram it out)
1. What are the benefits?
1. What are the risks?

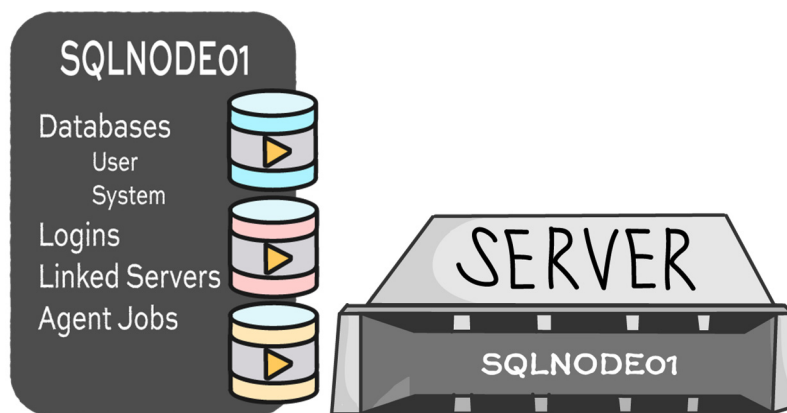
Time to work!

Possible solutions

Team 1

Scale-up sadness

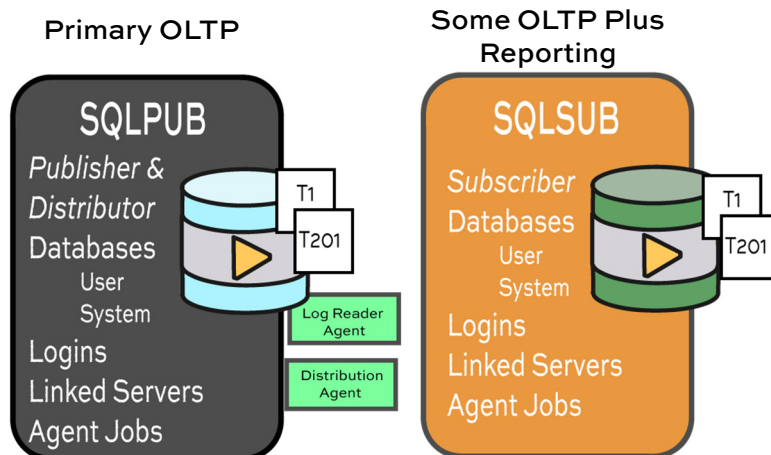
What did you recommend?



Team 2

Scale-out pains

How did you approach this problem?

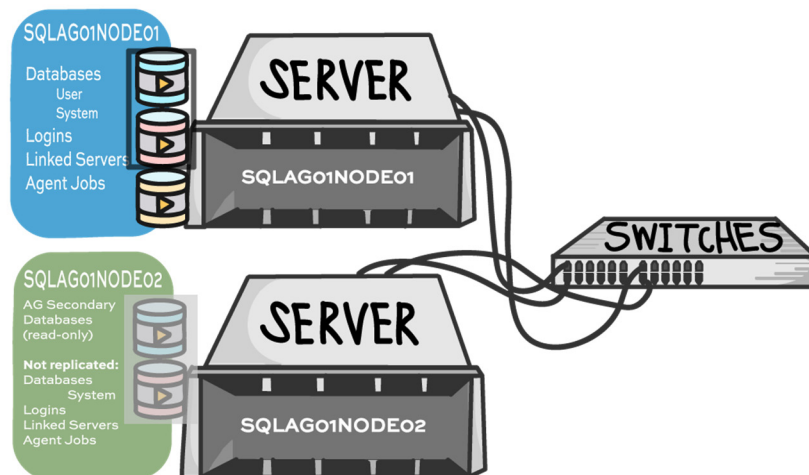


All 201 tables are replicated

Team 3

Availability group not-so-available

Can this AG be saved?



The real world is full of hard choices

It's not *only* about technology

It's also about

- The team
- How they work together

There's something to that old trio of
“People, Process, Technology”

