



BRENT OZAR
UNLIMITED®

Designing a New Solution

This time it'll be a little different

1. You'll pick one of two different design problems
2. You may work alone *or* team up with others
 - Work on the problem for 20 minutes
 - Diagram out architecture changes you recommend
3. We'll meet back and go over different solutions

Notes:

- There may not be a perfect solution given every restriction listed
- You do NOT have to design the hardware (no core counts/ memory amounts)

Choose your problem

Make your choice now!

Problem 1: A thousand databases (and counting)

Problem 2: Designing AlwaysOn Availability Groups to stay “On”



3

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Three components to each solution

People

Process

Technology



4

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Problem 1: 1,000 databases (and counting)



5

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The application

Application has been prototyped already and is in beta use

- It can be changed, but that's a ton of work and re-coding

The design:

- One database per client
- There will be many client databases: estimated 1,000 in the first year
- Expect to increase by 3x in the first year thereafter

Each client database will be small (< 200MB each)

One centralized database, "Metadata" that holds information that all the other databases will access

- Client databases will all have queries that join to the Metadata database
- Metadata will also be small (100 MB)



6

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The team

Invested heavily in virtualization

- Everything in the current environment is virtualized
- Have multiple SANs hosting a variety of applications already

No experience with Windows Failover Clustering or Availability Groups

Team consists of:

- 10 developers
- 1 “accidental” DBA (who is one of the 10 developers)
- 2 system engineers who work on storage, virtualization, Active Directory, networking, printers, phones, and get stuck cleaning people’s keyboards



7

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1,000 databases - RPO and RTO

The business has signed off on these numbers for the initial architecture

The numbers apply both to the client databases and the “metadata” database

	Server Offline	Corrupt data	“Oops” deletes	Datacenter offline
RPO: Minutes of data loss allowed	10 minutes	10 minutes	10 minutes	4 hours (to be implemented later)
RTO: Minutes of downtime allowed	5 minutes	4 hours*	4 hour*	1 week (to be implemented later)

* If data is incorrect or corrupt, would rather have the system offline.



8

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Licensing and requirements

Can have an hour of planned downtime each month for maintenance

- The RTO of 5 minutes is for unplanned downtime

Want to minimize licensing costs

- Prefer Standard Edition strongly, especially if they need multiple instances

No current DR site

- They don't expect you to solve that problem

Your mission

1. What technologies do you use to achieve the RPO and RTO (you don't have to solve DR)?

1. What are the benefits to your approach?

1. What are the risks?

Problem 2: Keeping AlwaysOn Availability Groups “On”



11

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The business problem

Torosaurus Tech has purchased Agilisaurus, Inc.*

- All databases will be migrated to new servers and storage in the Torosaurus datacenter

Torosaurus is ready to invest

- Expects to increase the number of customers by 50% in the next year
- Grow the Agilisaurus team as needed to support the environment

There's no huge rush on the new environment. They just want to do it right.

** These are fake companies, but their story isn't unusual.*



12

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Agilisaurus application

Popular website

- 200GB database
- 20GB tempdb currently
- Inactive customers are archived
- Slow to moderate data growth

Current hardware

- Physical server with 256GB of memory and 8 logical cores (4 physical). No HA or DR.
- Performance is very high and consistent
- Team has invested in application caching, index tuning, query tuning



13

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Current teams

Torosaurus Tech – new parent company

- 4 system engineers (SAN, Networking, Active Directory)
- 5 busy database administrators who manage a mix of SQL Server and Oracle databases (Mostly SQL Server)
- 40 developers working on a variety of products

Agilisaurus, Inc – the purchased company

- 5 developers

Torosaurus is planning to

- Hire a Senior SQL Server DBA
- Have them specialize in Availability Groups and train the rest of the team to work in an on-call rotation



14

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Torosaurs - RPO and RTO

The business has signed off on these numbers for the initial architecture

	Server Offline	Corrupt data	"Oops" deletes	Datacenter offline
RPO: Minutes of data loss allowed	0 minutes	0 minutes	0 minutes	0 minutes
RTO: Minutes of downtime allowed	1 minute	1 minute	1 minute	1 hour

Torosaurs' infrastructure

Both virtualized and bare metal

- Most production databases are not virtualized
- Dev environments are all virtualized

Want to use the best technology for each purpose

- Use SAN technology heavily
- Open to using commodity SSDs in local storage when it makes sense for price and speed

Primary Datacenter: 20 minutes from the main office

- Hire datacenter support for hands-on support
- Sysadmins go to the datacenter regularly and rack, cable their own machines

DR Datacenter: 60 miles away

Licensing and requirements

Want to avoid unplanned downtime

- Customers around the world, 24 x 7 use
- Published goal is 99.9% uptime (43 minutes per month)
- Internal process is report when downtime exceeds 5 minutes each month for “gold” level applications

Backups and failovers:

- Want to take backups in both production and DR site
- DR servers should be as powerful as production, but don't need automatic failover WITHIN the DR site
- Want automatic protection from corruption in the primary site



17

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1. Design the solution:

- Number of SQL Server instances /servers: _____
- Virtualized or Bare Metal? _____
- Is there a Windows Failover Cluster Instance? _____
- Is there an AlwaysOn Availability Group?
 - Number synchronous replicas: _____
 - Number asynchronous replicas: _____
- How many Enterprise licenses are needed with your design?



18

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Your mission (continued)

2. What processes will be key to making this a success?
3. What are the risks?

Possible solutions

**Not every problem has
a perfect solution.
Often, you have to
change more than just
the SQL Server.**

**Surprises?
Objections?**

After a day of architecture... what's most exciting?



37

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Questions?



Don't forget to complete an online evaluation on EventBoard!

Session: PRECON06

SQL Server Architecture:

Choosing Virtualization, Clustering, AlwaysOn, and More

Your evaluation helps organizers build better conferences
and helps speakers improve their sessions.



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Thank you!