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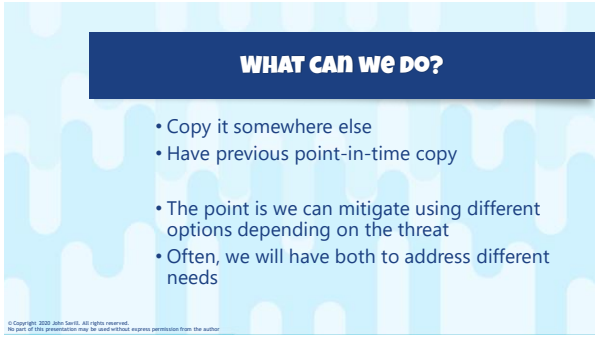

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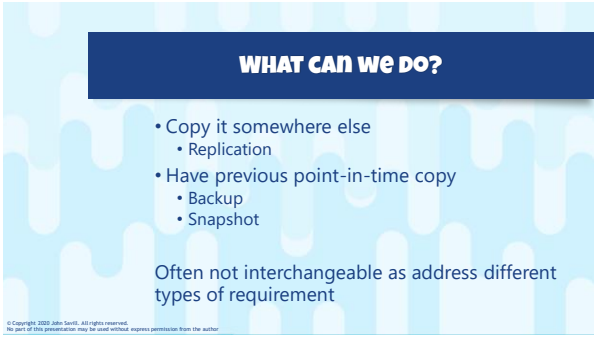

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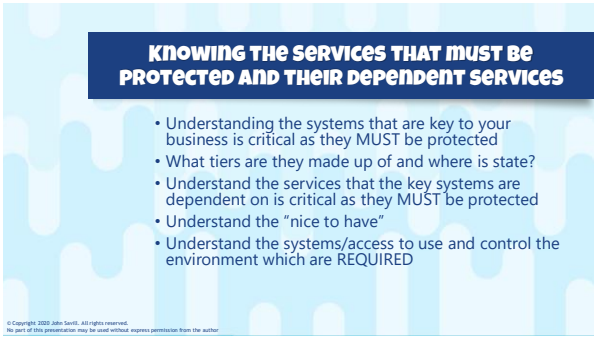

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Asynchronous vs Synchronous Replication

- Asynchronous – Transactions are committed on primary as created and then sent to secondary as fast as possible
  - No real impact to primary performance
  - Risk of data loss in unplanned failure
- Synchronous – Transactions are not committed on primary until acknowledged on the secondary
  - Can impact primary performance
  - No risk of data loss
- Asynchronous is used cross-site because of latency in nearly all scenarios

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Azure Resiliency Constructs

Fault Domain
Availability Set – 99.95%
Availability Zone – 99.99%
Region

~~Proximity Placement Group~~

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Understanding Azure Resource Support for Resiliency Constructs

- Some Azure services are global and resilient against any regional failure
  - Azure AD, Front Door, Traffic Manager
- Most are deployed to a specific region where different options are available
  - Regional
  - Zone-redundant
  - Zonal
- Make sure all components match and don't cross resiliency boundaries for dependencies

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Multi-Region Deployments

- For true resiliency deploy to at least two regions
- Azure regions are paired for serialized platform updates
- This could be active/passive or active/active
- Ensure all core elements are available in other regions (don't be wasteful)
- Some resources cannot move between regions, e.g. public IP
- Need to balance between regions
  - Azure Traffic Manager, Azure Front Door, Global Load Balancer, DNS

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Use IaC
Ensures consistency
Enables rebuild
Policy to enforce consistency between deployments

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What's the Preference for Replication?

- Native application/service multi-master
- Native application replication to standby (hot or warm)
- Hyper-V Replica at VM level (possible to Azure with Azure Site Recovery)
- In-OS replication (e.g. Mobility Service via ASR)
- Storage replication that is used by a Failover Cluster spanning locations or just making data available in Azure
  - Storage Spaces Direct (S2D)
- Restoring a backup/VM
- Not having any and leaving industry in disgrace

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Remember

If there is no state does it need replicating?

Just have process to create as needed via IaC

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What about VM Replication?

- From on-premises to Azure two solutions via Azure Site Recovery (ASR)
  - Hyper-V VMs – Hyper-V Replica
  - VMware VMs or physical – Mobility Service (in-guest)
- Azure to Azure via ASR
  - Uses mobility service via extension
- Can have recovery points (app consistent) including multi-VM consistency groups

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We don't pick one

- We pick the highest one for EACH of the elements we need for DR!
- It's far better to have the best option for each type than a single "lowest common denominator" technology
- This means some extra considerations for management and failover but worth it!
- Processes can still be automated across technologies with recovery plans
- Cost should be considered as difference between replication to storage than replication to a running VM in Azure!

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Clustering in Azure IaaS

- Needed for solutions such as SQL AlwaysOn both in Azure and in hybrid scenarios
- Complicated as Azure does not allow IP's to float between VMs
- Common was to use a load balancer but in Server 2019 can use a distributed network name (DNN) instead for CNO
- Cloud Witness uses a storage account
- Shared disk supported IF shared storage required

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DR Planned vs Unplanned

- There are really 3 types of DR failover
- Planned
  - "A storms coming, lets move our systems to the DR location"
  - Should be no data loss or unexpected outage
- Unplanned
  - "Where did that storm come from and where has the datacenter gone?"
  - May be data loss and longer outage depending on replication and process
- Test
  - "Lets test a failover process, while not affecting production, in case there is a storm one day"

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Azure Backup

- At the simplest level Azure also provides backup services via recovery vaults
- These can be used by backup applications and many Azure components (including VMs via extension)
- Data can then be recovered when needed
- Delta-based storage with many recovery points
- Retention settings enable day, week, month and year retention goals
- Vaults can have local, zone-redundant or geo-redundant configuration

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Service Backup & Snapshots

- Some services utilize their own backup technologies, e.g. Azure SQL Database, PostgreSQL
- Some utilize snapshots such as Azure Files (which can be managed by Azure Backup)
- Azure Blob has snapshot and soft delete
- Azure Block Blob also has object replication
- May need custom solution

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Questions?

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