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Real-Time Business Insights

SQL Server 2016 Distributed Availability Groups

Ajay Jagannathan, Principal Program Manager, Microsoft
Sourabh Agarwal, Senior Program Manager, Microsoft

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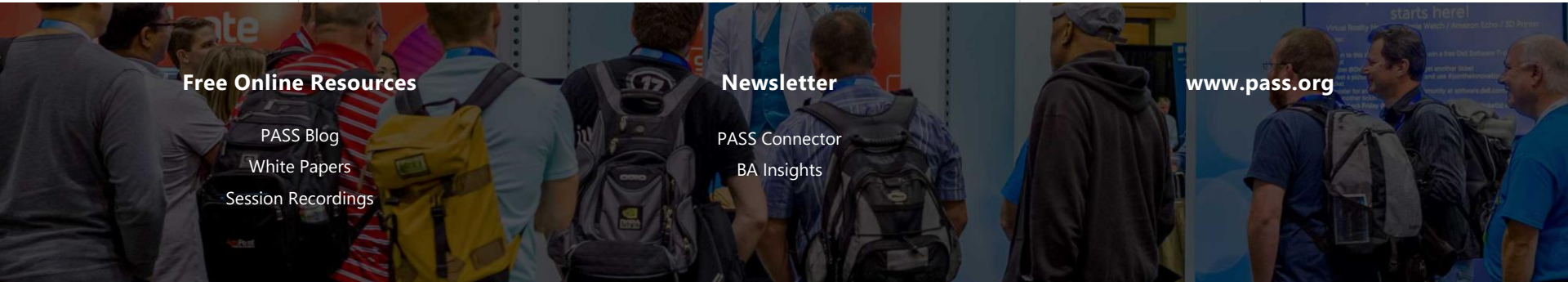

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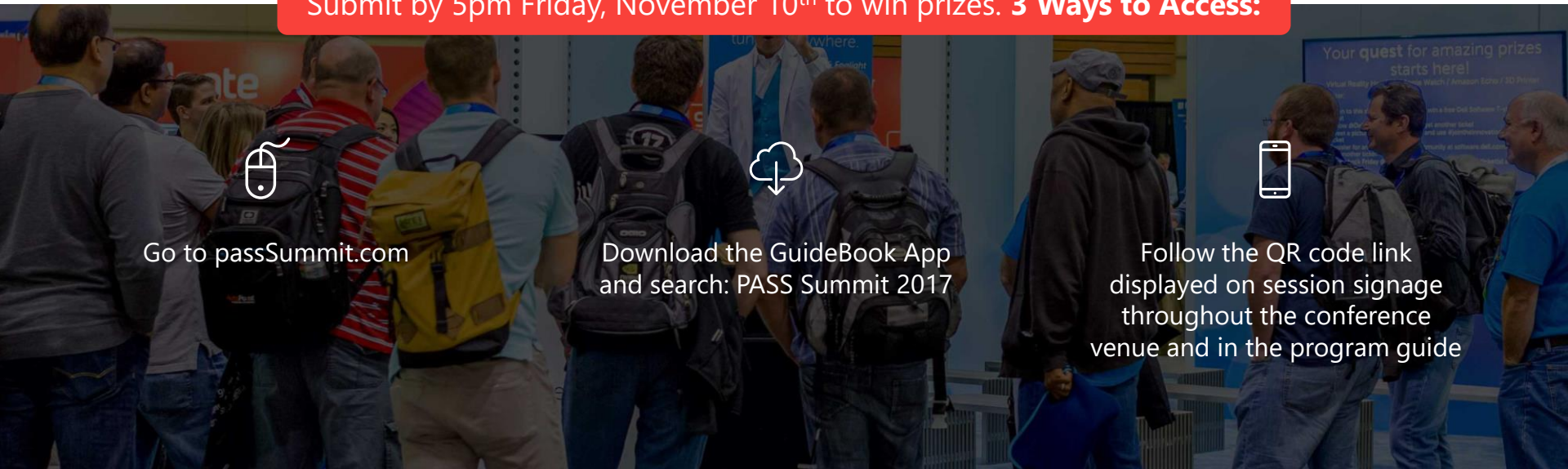

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Ajay Jagannathan

Principal Program Manager, Microsoft

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@mssqltiger

20 years of industry experience

M.S. in Computer Science

Currently leads SQL Server Tiger Team in Database Systems Group at Microsoft

SQL Server

Responsible for in-market versions of database engine

Have been involved with 9 releases of SQL Server starting with 6.5

Sourabh Agarwal

Sr. Program Manager, Microsoft

/napsterreturns

@SQLSourabh
@mssqltiger

BIOGRAPHY POINT ONE

SQL Tiger PM for HADR and Data Replication for In-Market versions of database engine

BIOGRAPHY POINT TWO

Previously, with Microsoft Consulting Services, specializing in Designing and Optimizing SQL Deployments, HADR, Microsoft Azure, and PowerShell Scripting.

Agenda

Data warehouses	>	**Today's challenge**
Deployment Architecture	>	**OLTP and BI using traditional model**
Customer Requirements	>	**Near real-time BI**
		Read Scale out
SQL Server 2016	>	**Domain independent Availability Groups**
		Distributed Availability Groups (DAG)
		Direct Seeding
Deployment Architecture	>	**OLTP and near real-time BI using DAG**

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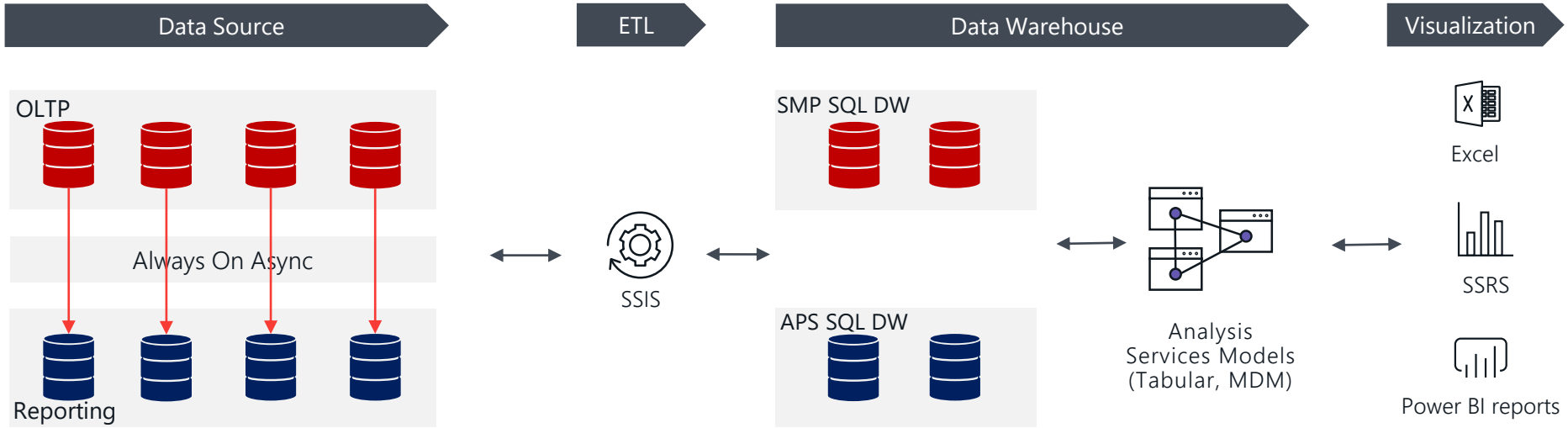
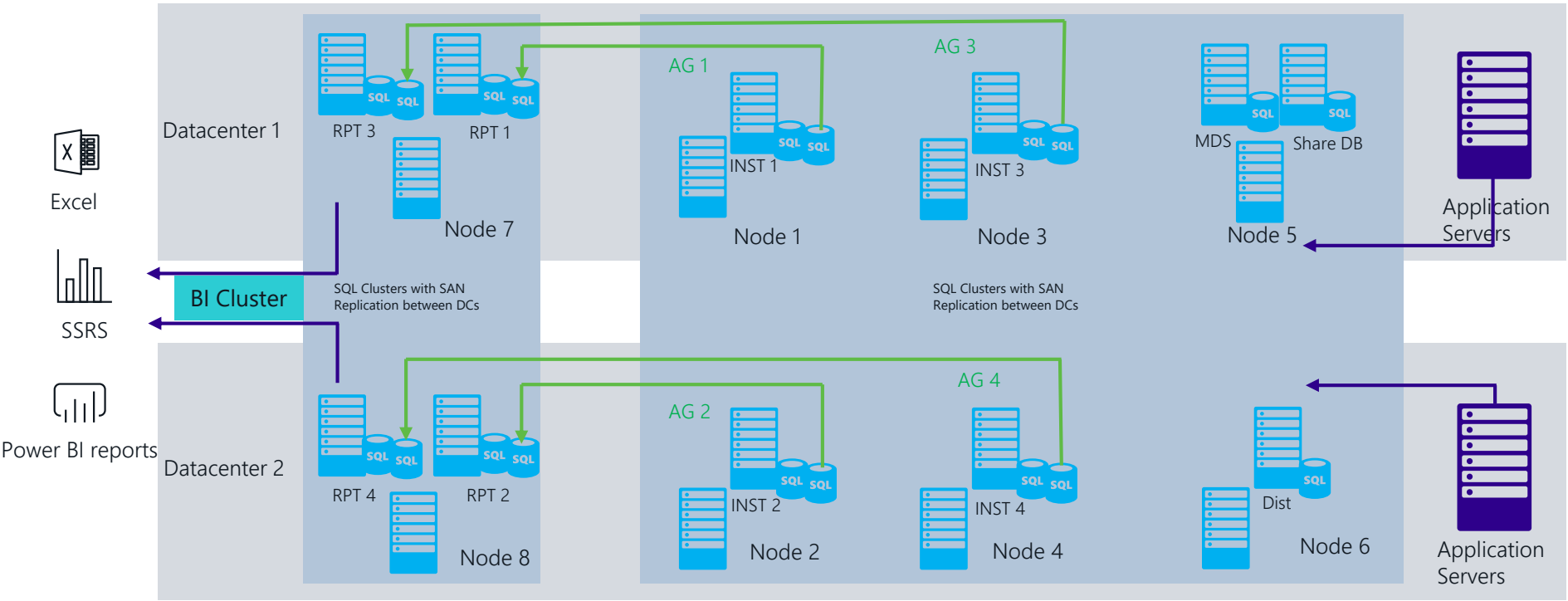
Data Warehousing Challenge

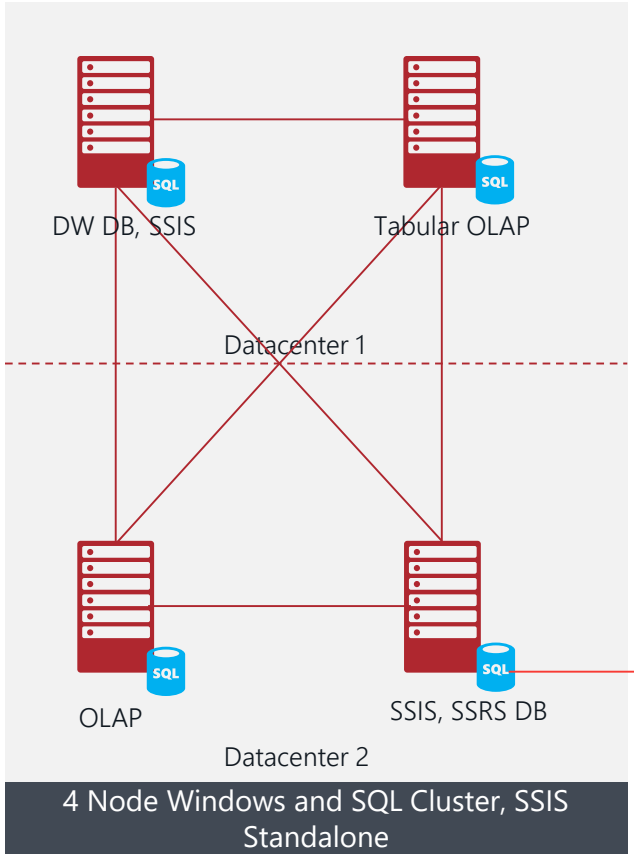
LOGICAL ARCHITECTURE – OLTP & BI



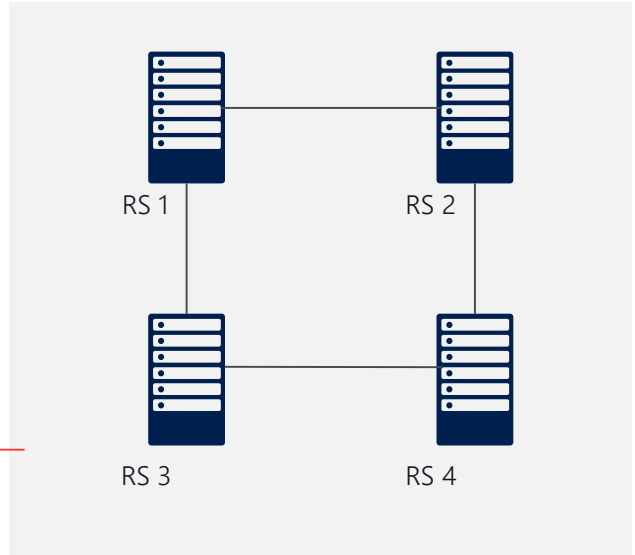
DEPLOYMENT ARCHITECTURE - OLTP



DEPLOYMENT ARCHITECTURE - BI



4 Node Windows and SQL Cluster, SSIS Standalone



Reporting Services (Web)

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CUSTOMER REQUIREMENTS

Platform for real-time BI

CxO Dashboards

Reduce ETL processing time

Modern data platform (In-memory and Columnstore)

Consolidate reporting environment

Application requirements

Isolation for critical applications

OLTP and EDW

Meet resiliency objective (3 primary and 1 DR)

Scale out architecture for future growth

New features in SQL Server 2016

Domain independent AG, Distributed Availability Groups, Direct Seeding

DOMAIN INDEPENDENT AGs

Environments have multiple domains that cannot be merged

No trust relationships

Installations do not use Active Directory domains

All nodes in a single domain

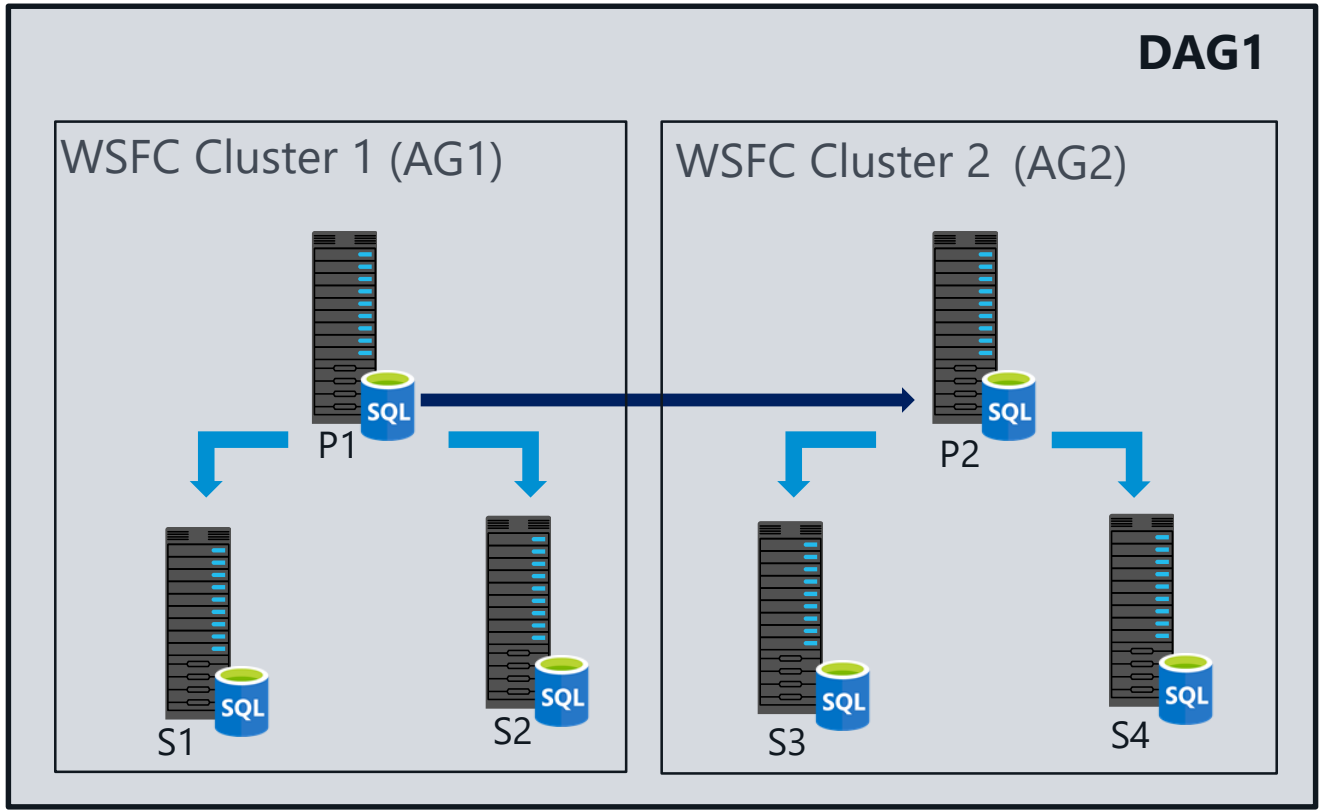
Nodes in multiple domains with full trust

Nodes in multiple domains with no trust

Nodes in no domain at all

Self-signed certificates similar to Database Mirroring

DISTRIBUTED AVAILABILITY GROUPS



- Separate quorum on each WSFC
- OS can be different
- Same database configuration on all instances
- Only Manual Failover between WSFCs
- Data sent one time from P1 to P2 and replicated (forwarded) locally

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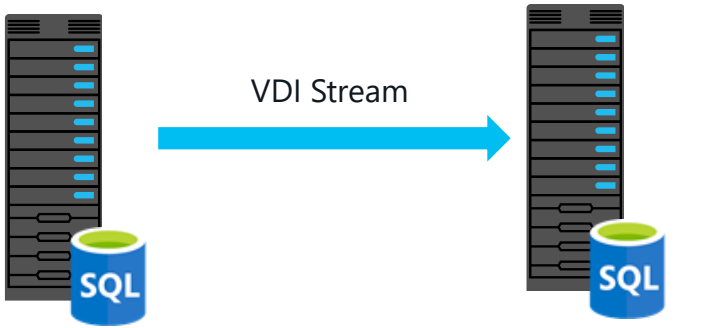
DIRECT SEEDING

Reliable, Integrated, Flexible and Efficient



Why Direct Seeding

No need to initial full backups on primary
Network share not required for backups
Automatic restores on secondary

How it works

VDI Stream - not compressed (use TF 9567)
Trade-off CPU v/s Network Bandwidth
Backup/Restore process - 1 worker per reader and writer per LUN

Diagnostics

Extended Events - dbseed category (debug channel)
DMVs –
sys.dm_hadr_automatic_seeding
sys.dm_hadr_physical_seeding_stats

Distributed Availability Groups and Direct Seeding

Demo

Near Real-Time BI

Putting it together

FACTORS INFLUENCING THE ARCHITECTURE

Number of instances, AGs, databases and sizes

Resource utilization on reporting instances

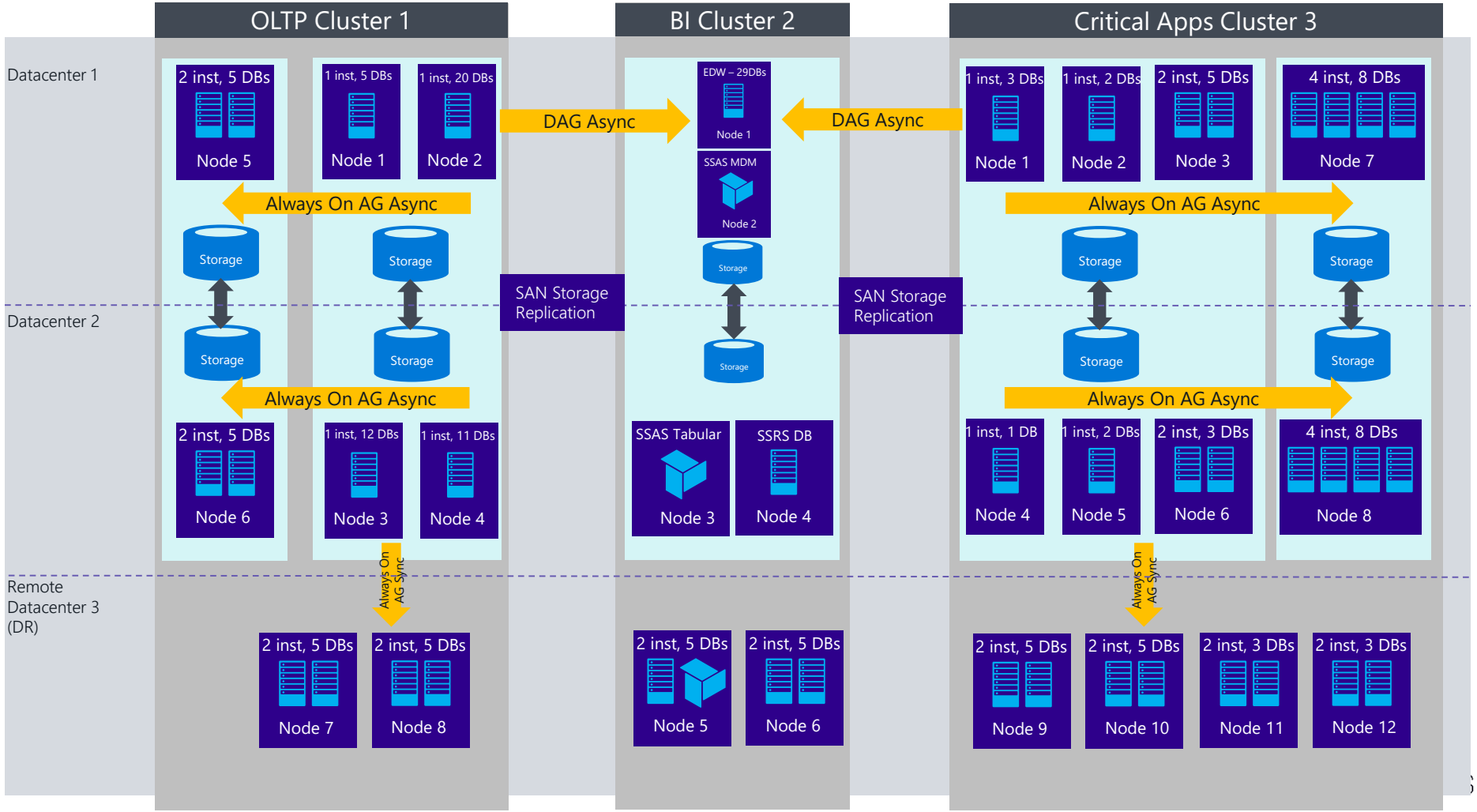
Network Latency

Log Generation Rate

SQL Replication

In-memory OLTP and Columnstore constraints

Future proofing for growth


OLTP Cluster 1
BI Cluster 2
Critical Apps Cluster 3
Datacenter 1
Datacenter 2
Remote Datacenter 3 (DR)
2 inst, 5 DBs
Node 5
1 inst, 5 DBs
Node 1
1 inst, 20 DBs
Node 2
DAG Async
EDW – 29DBs
Node 1
SSAS MDM
Node 2
DAG Async
1 inst, 3 DBs
Node 1
1 inst, 2 DBs
Node 2
2 inst, 5 DBs
Node 3
4 inst, 8 DBs
Node 7
Always On AG Async
Always On AG Async
Storage
SAN Storage Replication
SAN Storage Replication
2 inst, 5 DBs
Node 6
1 inst, 12 DBs
Node 3
1 inst, 11 DBs
Node 4
Always On AG Async
SSAS Tabular
Node 3
SSRS DB
Node 4
Always On AG Async
1 inst, 1 DB
Node 4
1 inst, 2 DBs
Node 5
2 inst, 3 DBs
Node 6
4 inst, 8 DBs
Node 8
Always On AG Sync
Always On AG Sync
2 inst, 5 DBs
Node 7
2 inst, 5 DBs
Node 8
2 inst, 5 DBs
Node 5
2 inst, 5 DBs
Node 6
2 inst, 5 DBs
Node 9
2 inst, 5 DBs
Node 10
2 inst, 3 DBs
Node 11
2 inst, 3 DBs
Node 12

BY THE NUMBERS

Number of OLTP instances, AGs, databases and sizes	>	12 instances, 64 DB, 29 AGs, 12TB
Resource utilization on reporting instances	>	Max 50% CPU
Network Latency	>	<8 ms between primary and DR
Log Generation Rate	>	Max 37 MB/sec
SQL Replication	>	Replication from/to all instances

Near Real-Time BI

Demo

WHAT'S NEW IN SQL SERVER 2017

Full DTC support for Availability Groups

New AG Cluster Type options (WSFC, External, None)

New REQUIRED_COPIES_TO_COMMIT option

Always on Availability Group available with SQL on Linux

Native integration with external cluster managers like Pacemaker

Bookmarks

SQL Server Tiger Team Blog	http://aka.ms/sqlserverteam
Tiger Toolbox GitHub	http://aka.ms/tigertoolbox
SQL Server Release Blog	http://aka.ms/sqlreleases
BP Check	http://aka.ms/bpcheck
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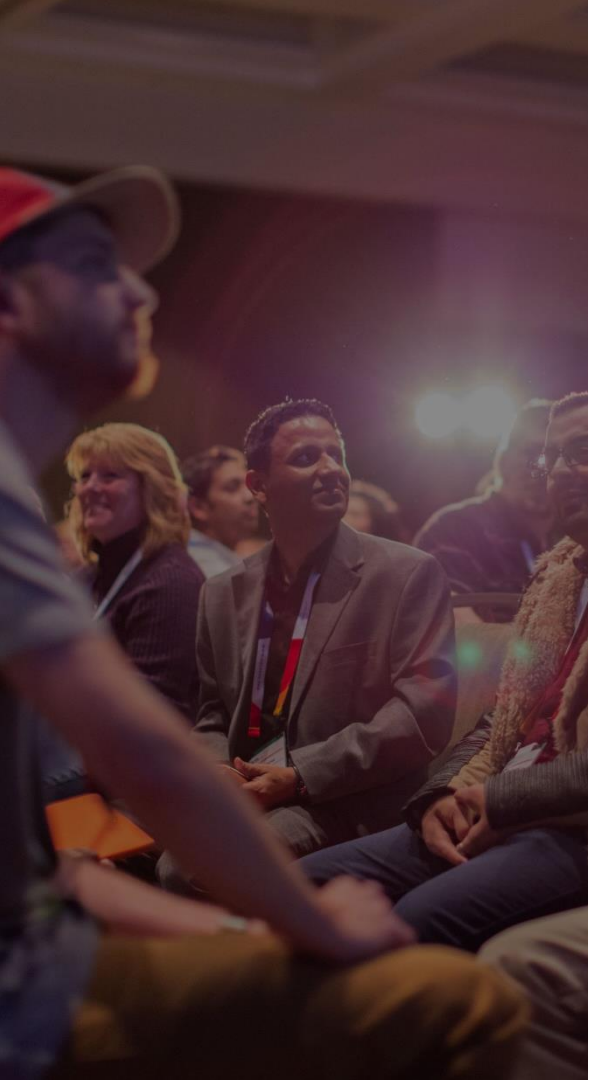

Upgrade to SQL Server 2017: Intelligent Diagnostics Just Built-in
Speakers: Parikshit Savjani, Pedro Lopes (**Room 2AB Fri 8:00 a.m.**)

Effectively Troubleshooting Latency and Failover of Always On
Speaker: Sourabh Agarwal (**Room 606 Fri 3:30 p.m.**)

Thank You

Learn more from Tiger Team

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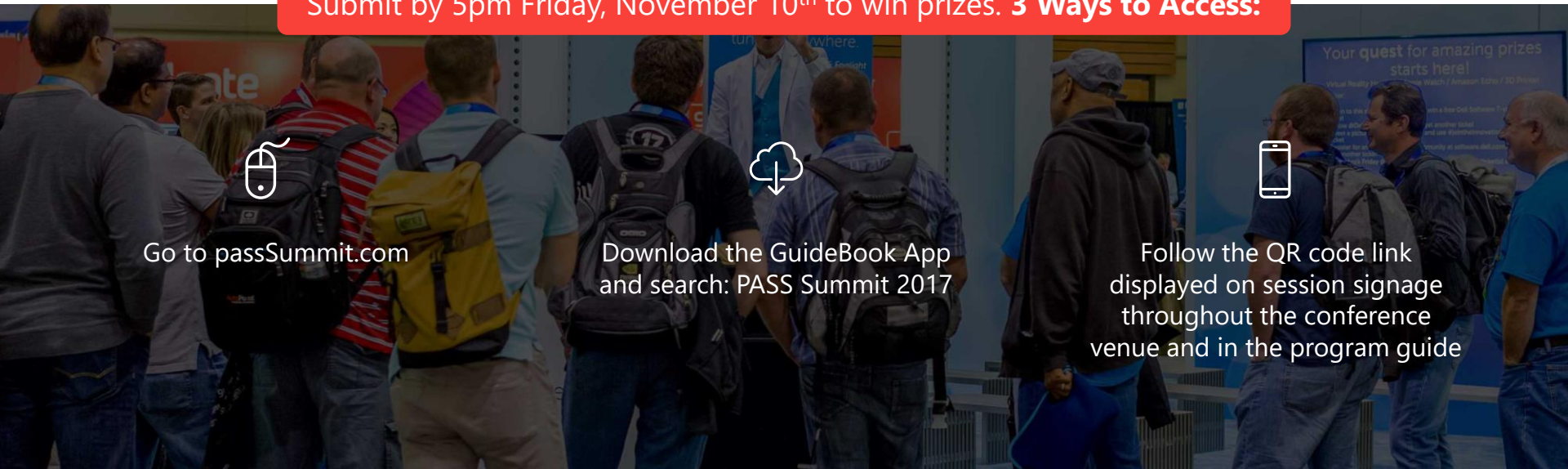

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