SQL Server Consolidation

Lowering the Total Cost of Ownership (TCO)

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Seminar Agenda

- **Session One (08:30 – 09:30)**
  - Why consolidate SQL Server?
  - High Level SQL Server Consolidation Options
  - Using SQL 2008 for Consolidation
- **Short Break**
- **Session Two (09:45 – 11:00)**
  - Discovering your SQL Server Environment
  - Practical SQL Server Consolidation Approach
  - Consolidation Case Study Review
- **Session Three (11:00 – 11:30)**
  - Q & A

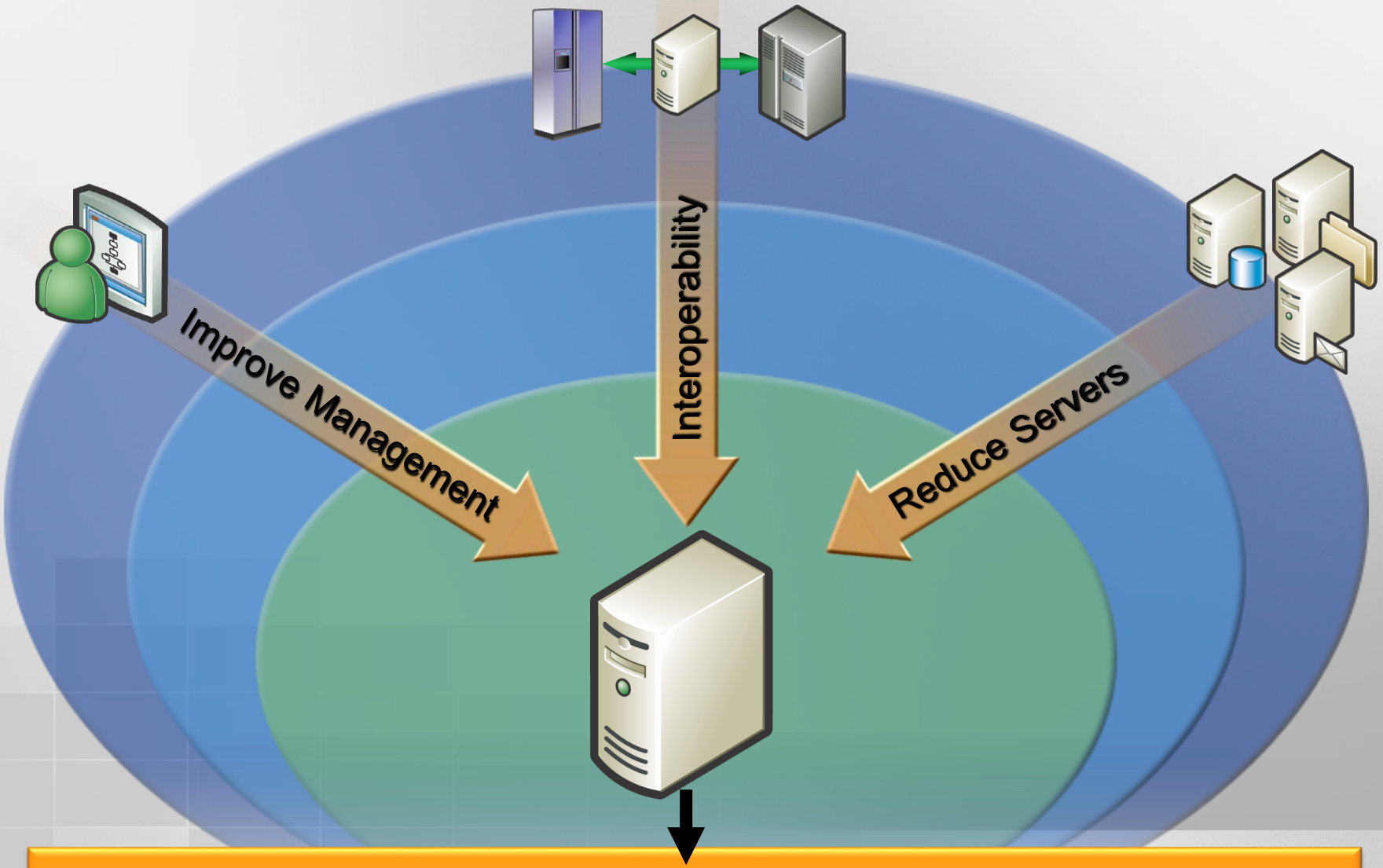
Session 1 - Agenda

- Why consolidate SQL Server?
  - What is consolidation rationale?
  - What are the key issues and solutions?
- High Level SQL Consolidation Options
  - What are the basic consolidation models?
- Using SQL 2008 for Consolidation
  - What are the consolidation benefits of SQL 2008

Why Consolidate SQL Server?

- What is the rationale for consolidation?
- What are some of the problems and costs facing IT departments today?
- How does consolidation help?

Rationale for Consolidation



What are the typical costs in TCO?

- Server/Network Hardware and Software deployment costs
- Infrastructure (floor space) and cooling costs
- Hardware warranties, maintenance, insurance and audit costs
- Technology training costs
- Migration costs
- Testing costs
- Backup and Recovery Process costs
- Decommissioning costs
- Management Time costs
- ***...and more!***

What are the typical IT problems?

1. Too many servers
2. Licensing compliance
3. Data centre space and resources
4. Consistent management and configuration
5. Server resource under-utilisation
6. Availability and recoverability concerns
7. Reporting and workload management
8. Staff retention and skills update

Issue 1: Too Many Servers

Business Concerns:

- We don’t know how many servers we have, or where they are
- We can’t back-up, patch, tune, upgrade or support servers we can’t find
- The business notifies us of a problem for SQL servers we didn't know existed

Consolidation Helps:

- *Finding all servers*
- *Reducing the count*
- *Makes it easier to support and maintain SQL Server, for every database in the organisation*

Issue 2: Non-compliant Licensing

Business Concerns:

- Too many servers installed
- Wrong mix of MSDN, Workgroup, Standard, Enterprise

Consolidation Helps:

- *Identifying the servers you have now*
- *Working towards a licence compliant consolidation model*
- *In a post-consolidated environment, installation of new servers is rare*

Issue 3: Data Centre Overload

Business Concerns:

- Our Data Centre is overloaded, we can't add any more servers
  - Power
  - Air conditioning
  - Rack space

Consolidation Helps:

- *Removes older, larger, less efficient servers*
- *Manage more databases on fewer boxes*

Issue 4: Configuration Management

Business Concerns:

- Maintaining consistent configurations, version release management and patch levels across development, test and production is a nightmare with all these servers

Consolidation Helps:

- *Fewer servers means fewer configurations*
- *In a consolidated environment there is less to change, less to go wrong*

Issue 5: Under-utilised Servers

Business Concerns:

- We have a lot of servers that run at 20% CPU utilisation and less than 50% of RAM

Consolidation Helps:

- *Consolidating point solutions means that you don't waste computing resources*
- *Removes older, less efficient servers*
- *Manage more databases on fewer boxes*

Issue 6: High Availability and Disaster Recovery Demands

Business Concerns:

- Business units expect increasing levels of up-time and data continuance, but we don’t have the resources to manage their servers

Consolidation Helps:

- *Brings the opportunity to apply HA and DR techniques such as clustering, mirroring and log shipping to more databases with less effort*

Issue 7: New Workloads and Reporting

Business Concerns:

- Our users clamour for reporting solutions, but we can't spare the hardware, time and resources to set up new databases

Consolidation Helps:

- *Can plan for reporting structures in a new server model*
- *Makes it easier to scale reporting solutions, and to manage different workloads across database resources*

Issue 8: Staff Retention

Business Concerns:

- Our DBAs keep resigning because
  - Overworked
  - Technology backwater
  - Constant fire fighting

Consolidation Helps:

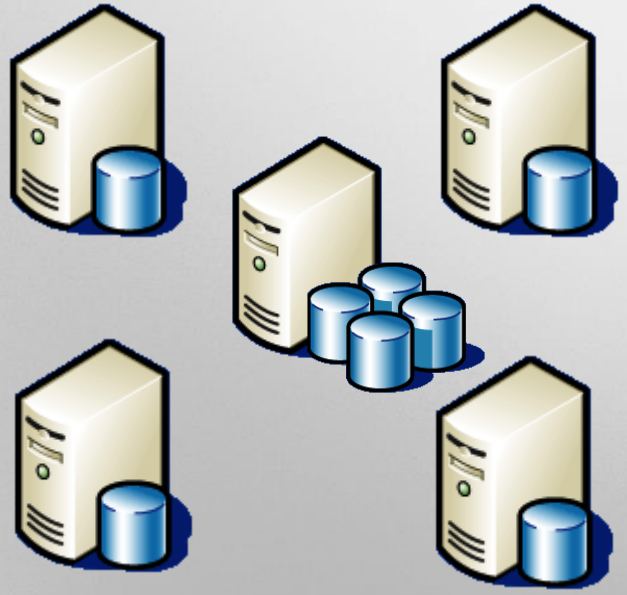
- *Eases the workload of the DBAs, and gives them the opportunity to invest in advanced database management techniques and solutions*

High Level Consolidation Options

- What do we mean by “Consolidation”?
- What are some of the basic consolidation models and options?

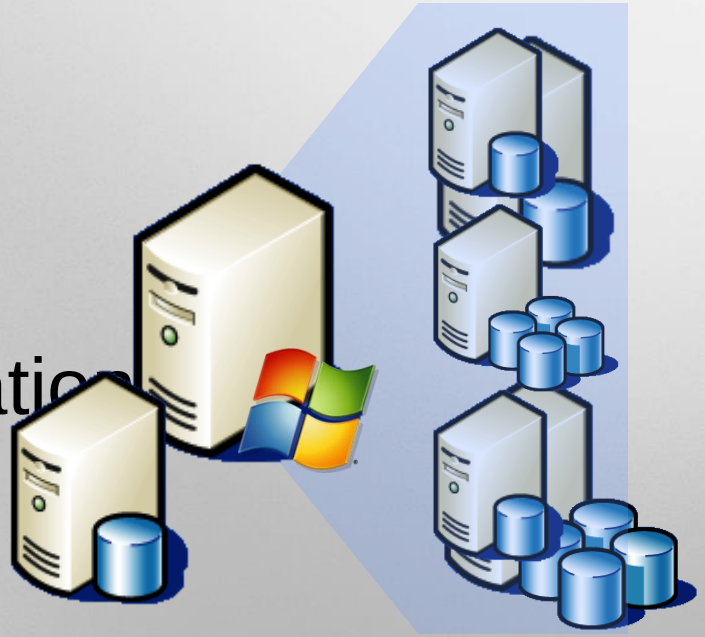
Consolidate to Single SQL Instance

- Merge multiple SQL instances onto single server with single instance
- Reduces physical servers
- Centralizes database server administration
- Performed selectively



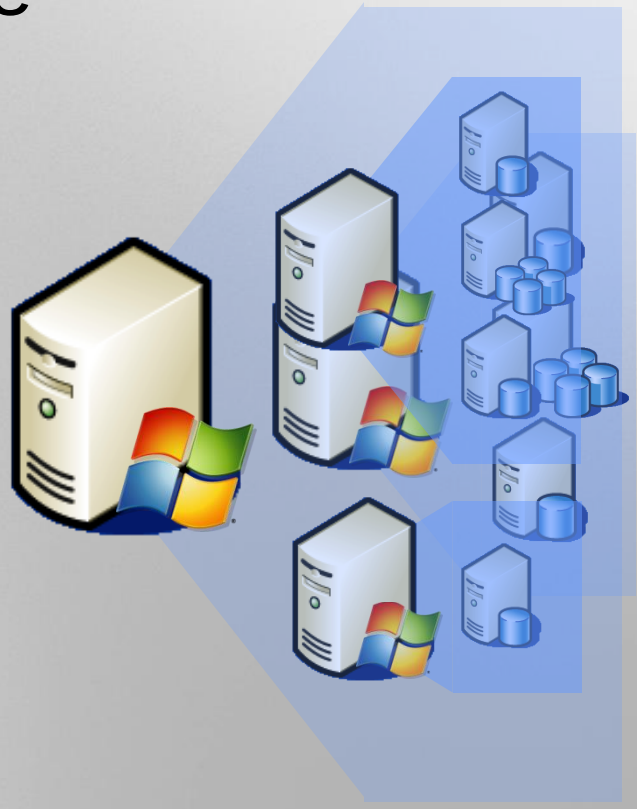
Consolidate to Multiple SQL Instances

- Merge multiple SQL instances onto single server with multiple instances
- Reduces physical servers
- Centralizes server administration
- Supports isolation of:
  - Workload
  - Security
  - Administration
  - Compatibility

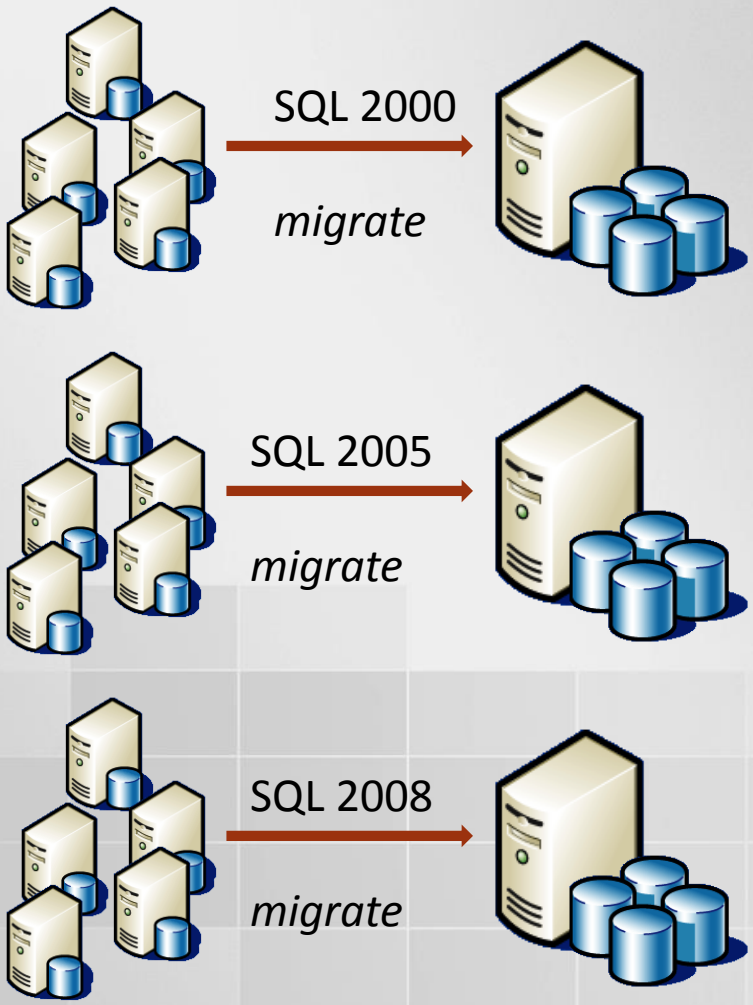


Consolidate via Server Virtualisation

- Reduces physical servers
- Centralizes server hardware administration
- Full server isolation
- But need to consider:
  - Licensing issues
  - Performance issues
  - Support issues

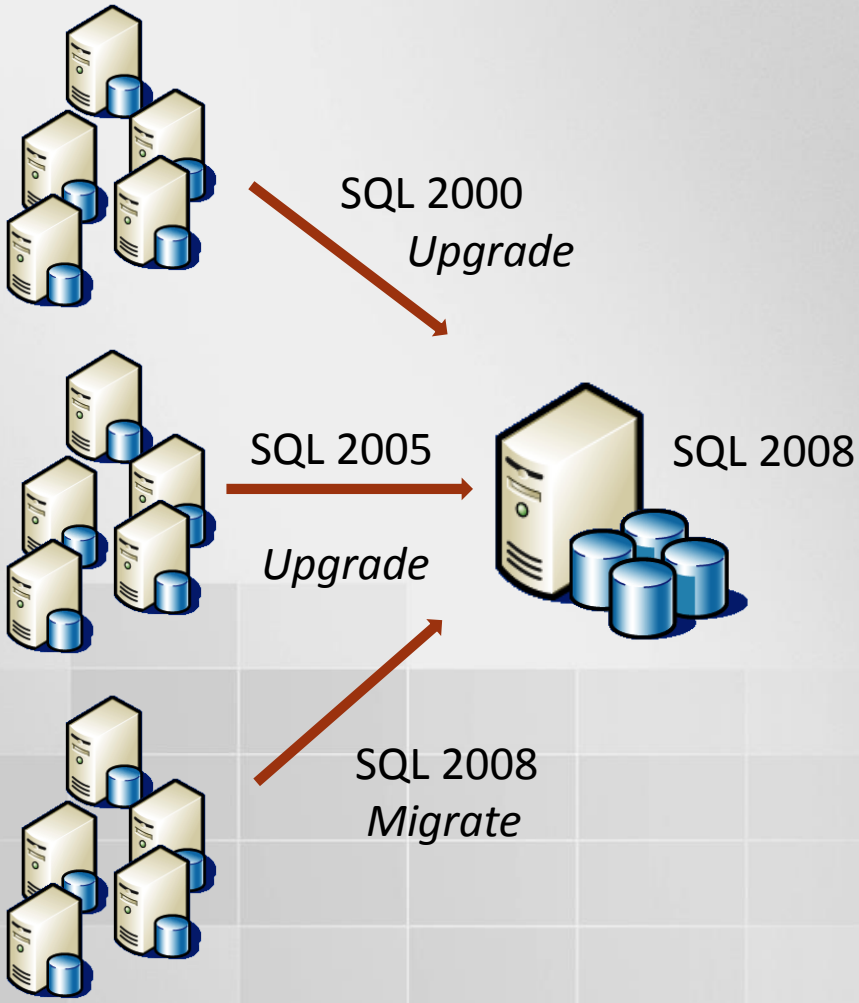


Good Consolidation Approach



- Consolidate servers by version of SQL Server
- Benefits:
  - Fewer servers
  - Fastest consolidation
  - Lowest Risk
- But consider:
  - SQL 2000 still out of support
  - No management changes

Great Consolidation Approach



- Upgrade and Consolidate to SQL Server 2008
- Benefits:
  - Fewer servers
  - Better performance
  - Better management
- But consider:
  - Not everything can migrate/upgrade easily

Using SQL 2008 for Consolidation

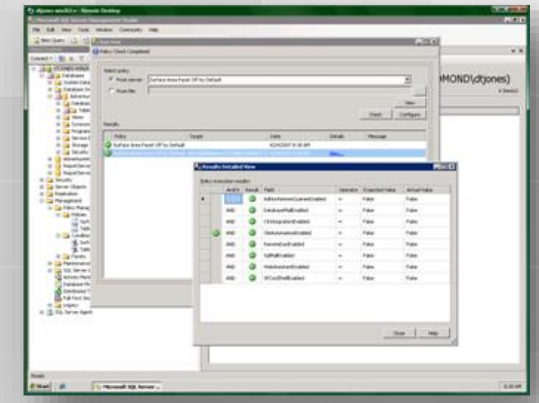
- Benefits of using SQL Server 2008
  - Reduces physical servers
  - Centralizes server administration
  - Offers enhanced availability and recovery
  - Increased performance and stability
  - Supports isolation of:
    - SQL Workload via SQL 2008 Resource Governor
    - Security and Compatibility via SQL Instances
    - Administration via SQL 2008 Policy Management

Key 2008 Feature - Auditing

- Define audit filters on one instance, and apply to many instances
- Centralize enterprise wide audit reporting

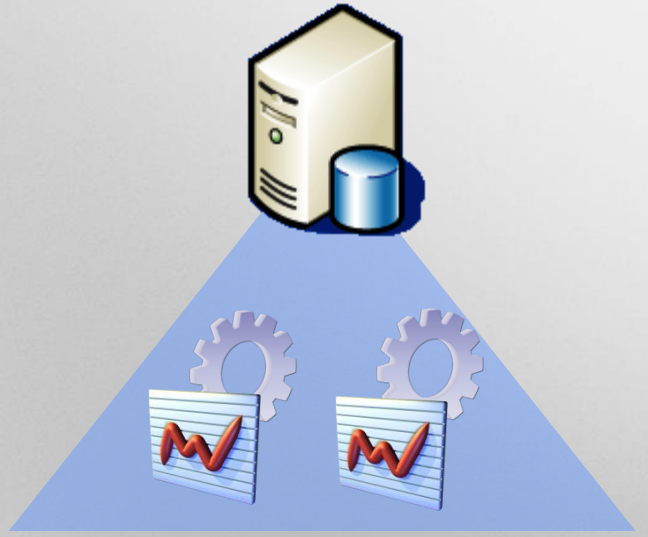
Key 2008 Feature – Configuration

- Define policies on one instance, and apply to many instances
- Enforce policies:
  - Proactively through triggers
  - After changes through Service Broker
  - On a scheduled basis through SQL Server Agent
  - On an ad-hoc basis



Key 2008 Feature - Resource Governor

- Differentiate workloads
  - Based on application, user, etc
- Define resource utilization limits
  - CPU
  - Memory
- Covered Scenarios:
  - Preventing runaway queries
  - Predictable concurrent execution of different-size workloads
  - Workload prioritization



Key 2008 Feature - Scaling Up

- 64-bit scalability
  - Take advantage of 64-bit hardware
- Hot-add memory and CPU
  - Add hardware without downtime
- Native data compression
  - Reduce storage requirements
  - Increase performance for high I/O workloads

Short Break

- 10 Minutes

- *Next is;*
  - Discovering Your SQL Environment
  - Practical Guide to Consolidation
  - 2 x Case Studies

Session 2 - Agenda

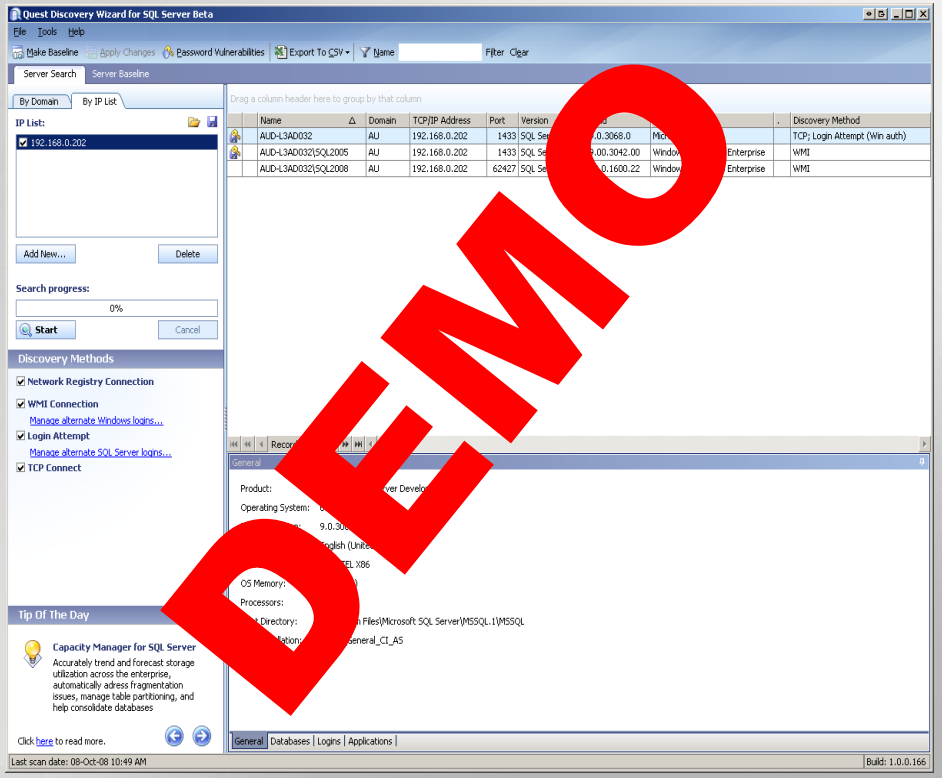
- Identifying your SQL Environment
  - How many SQL Servers do I have? And Where?
- Practical Guide to Consolidation
  - What is a realistic consolidation approach
  - Common pitfalls and challenges
- Case Studies
  - VLine Passenger Trains strategic consolidation
  - St Vincent's Hospital staged consolidation

SQL Environmental Identification

- How do I know what SQL Servers exist?
- What basic information do I need to know?

SQL Discovery Wizard (Quest)

- Starting point for unknown environments
- Can dynamically detect and identify SQL instances
  - Multiple domain search
  - IP address or range search
- Various detection methods
  - Network enumeration scan
  - Active directory scan
  - WMI and TCP connection
  - SQL connection
- Can export most results
- **Free download (but Beta)**



What basic data do I need?

- Initial basic SQL review data
  - Windows server name and IP address
  - Version and edition of Windows
  - Server specification, including 32 or 64 bit

  - SQL Server instance name(s)
  - Version and edition of SQL Server(s)
  - SQL Server system collation(s)

- More detailed SQL discovery to come later

Practical Approach to Consolidation

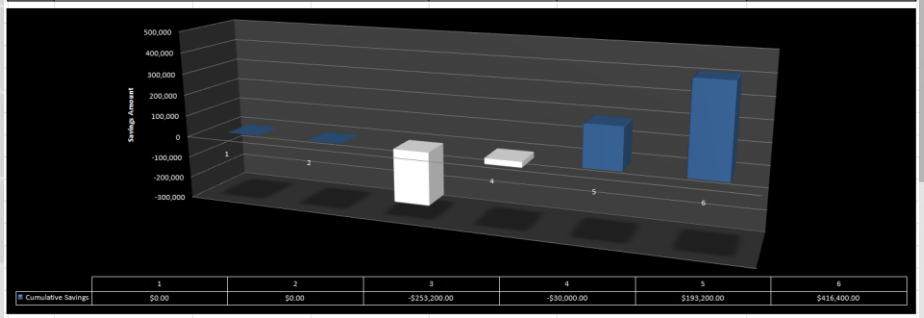
- Phased approach

- **Phase 0** – Business Case (Server Identification)
- **Phase 1** – SQL Detailed Discovery
- **Phase 2** – SQL Design
- **Phase 3** – SQL Implementation and Build
- **Phase 4** – SQL Test and Migration
- **Phase 5** – SQL Support

Phase 0 – Consolidation Business Case

- Present business case for project, include;
  - Server identification findings, future goals
  - Licensing requirements and obligations
  - Financial benefits including TCO and ROI
  - Business benefits from new SQL platform
- TCO and ROI Calculation Model

Year	Pre-Cost	Effort-Cost	Post-Cost	Savings	Cumulative Savings	Break Even (ROI)
1	$1,285,800.00	$0.00	$0.00	$0.00	$0.00	No
2	$379,800.00	$0.00	$0.00	$0.00	$0.00	No
3	$379,800.00	$54,400.00	$578,600.00	-$253,200.00	-$253,200.00	No
4	$379,800.00	$0.00	$156,600.00	$223,200.00	-$30,000.00	No
5	$379,800.00	$0.00	$156,600.00	$223,200.00	$193,200.00	YES
6	$379,800.00	$0.00	$156,600.00	$223,200.00	$416,400.00	No



Microsoft® SQL Server™ 2008

Phase 1 –SQL Detailed Discovery

Phase 1

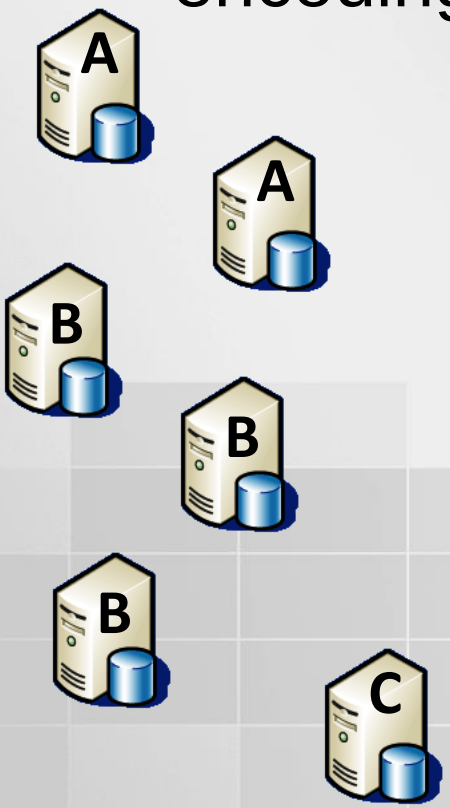
- Build a detailed profile of;
  - SQL Server and database parameters
  - Network, storage and server capabilities
  - SQL performance (only when required)
  - Applications and usage (including SSRS and SSAS)
- Perform SQL upgrade review (only when required)
  - SQL 7.0, 2000, 2005 upgrade assessment to SQL 2008
  - Document upgrade issues and remediation steps
- Assessment of HA and/or DR infrastructure and capabilities
  - Match against business RPO and RTO expectations

Phase 1 – Data Collection Tools

- What tools are used?
  - SQL Health Check Script (Dimension Data)
  - SQL Server Profiler, SQL Upgrade Advisor
  - Windows Performance Monitor (perfmon)
  - Questionnaires/Interviews with Business & IT
- Collate findings in Excel and/or Word
- Workshop the barriers/findings within IT

Phase 1 – Common Challenges

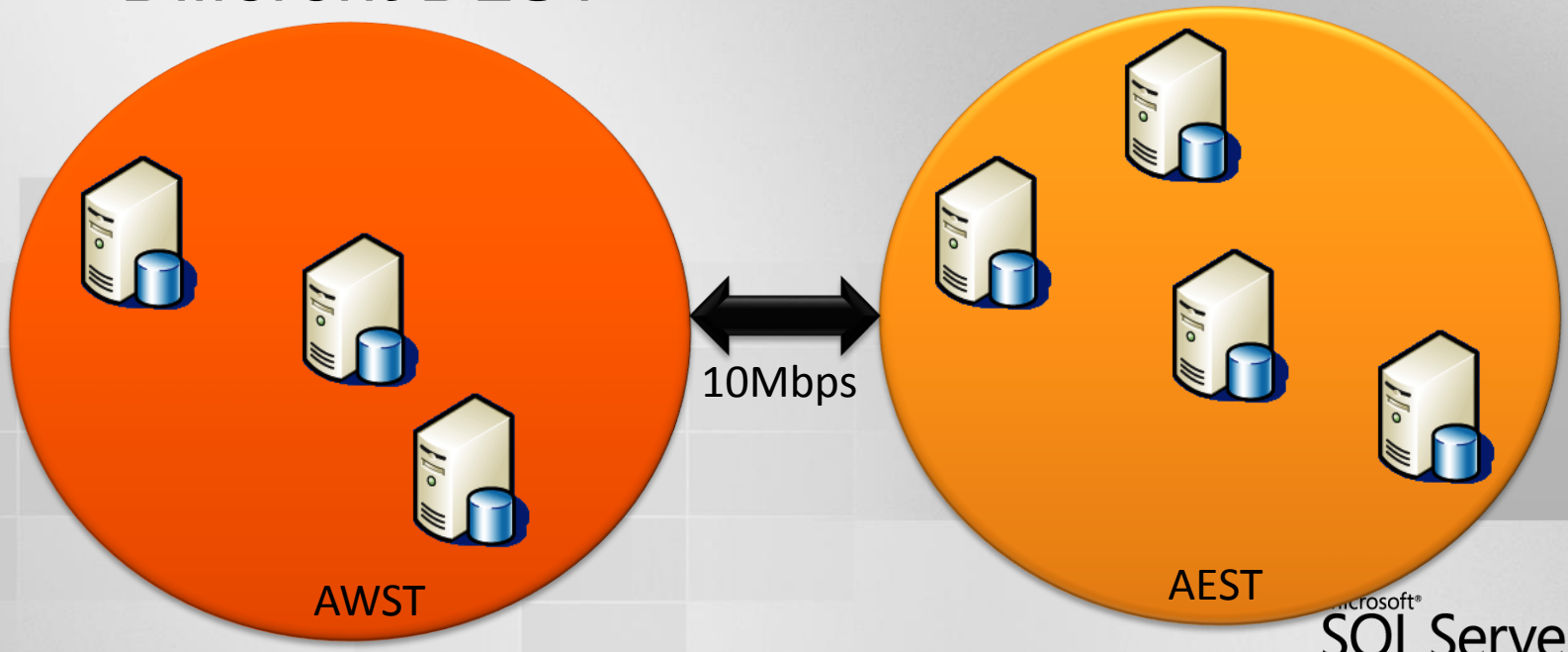
- SQL Collation
  - SQL text data encoding method



- **Cannot mix collations**
  - *Collation A <> Collation B*
  - *Rebuild all databases, or*
  - *Deploy to different servers*

Phase 1 – Common Challenges

- Time Zone + DLST
  - Servers in different locations around country or world
  - Different DLST
- **Assess applications**
  - *Locale affects apps*
  - *Network latency*
  - *Keep DB server local*



Phase 2 – SQL Design

Phase 1 | **Phase 2**

- Based on findings, design deployment options;
  - **Hardware**: Servers, storage (SAN), networks
  - **Software**: SQL Server, Windows, licences
  - **Technologies**: Virtualisation, 32/64 bit, SSD, HA/DR, SSRS, SSAS, ...
  - **Applications**: Grouping, criticality, recovery, business usage, ...
  - **Policies**: Management, security, deployment, change control, ...
- Workshop models with IT stakeholders
- Document detailed design, including BoM

Phase 2 – Common Challenges

- Virtualisation
  - Should we virtualise?
- 32 bit or 64 bit
  - What is deployed or better?
- Workload variations
  - OLTP, OLAP?
- Mixing SQL versions
  - 7.0, 2000, 2005, 2008?
- Availability
  - Uptime and recovery?
- Change control
  - How to manage?

- ***It depends!***
  - Smaller systems generally OK
- ***It depends!***
  - 3rd party x64 compatibility?
- **Split if possible**
  - At storage and server levels
- **Split where possible**
  - For unsupported SQL versions
- **Provide HA and DR**
  - Cluster, mirror, SAN replication
- **Develop CR Policy**
  - Outages, testing, patching

Phase 3 – SQL Implement and Build

- Build new SQL environment
  - Based on agreed design
  - Typically deployed to new or upgraded infrastructure
- Phase typically includes
  - Infrastructure sourcing/ordering based on BoM
  - Infrastructure deployments, builds and/or upgrades
  - Windows and SQL builds, including HA/DR solution
  - Platform infrastructure verification and testing
  - As built documentation

Phase 3 – Common Challenges

- Infrastructure deployments
  - Is it best practice?
- Infrastructure tests
  - Server hardware
  - Network (server to storage throughput)
  - Storage (IO latency, data transfer rates)

- **Review can be done**
  - *Ensure vendor and engineer certification*
  - *Consider internal or 3rd party review*
- **SQL stress test tools**
  - *SQLIO*
    - *raw disk IO stress test utility*
  - *SQLIOSim*
    - *very closely simulates SQL IO activity*

Phase 4 – SQL Test and Migration

Phase 1 | Phase 2 | Phase 3 | **Phase 4**

- Prepare cutover and migration plan
- Setup SQL environment for testing pass
  - Test and time upgrade and migration processes
  - Handover to application testing personnel
  - Update cutover plan based on test feedback
- Perform production cutover
  - Could be “big bang” or staged approach
  - Redirection of applications to new platform (DNS?)
  - Train teams and activate any new SQL policies
  - Decommission old infrastructure (frees resources)

Phase 4 – Common Challenges

- Doesn't represent true or real live production
  - Don't have server resources for testing
- Repointing applications to platform
  - DNS redirection an option?
  - Big bang approach risky for shared SQL platforms
- Policy push back from business units
- What to do with decommissioned servers

- **Build realistic test bed**
  - Virtualisation is an option
  - Application load testing tools like Load Runner or Profilier
- **Test application repointing**
  - Involve developers
  - Involve key vendors
  - Workshop and test cutover plans
- **Involve business stakeholders**
- **Redeploy as Test or Dev servers**
  or... *Decommission!*

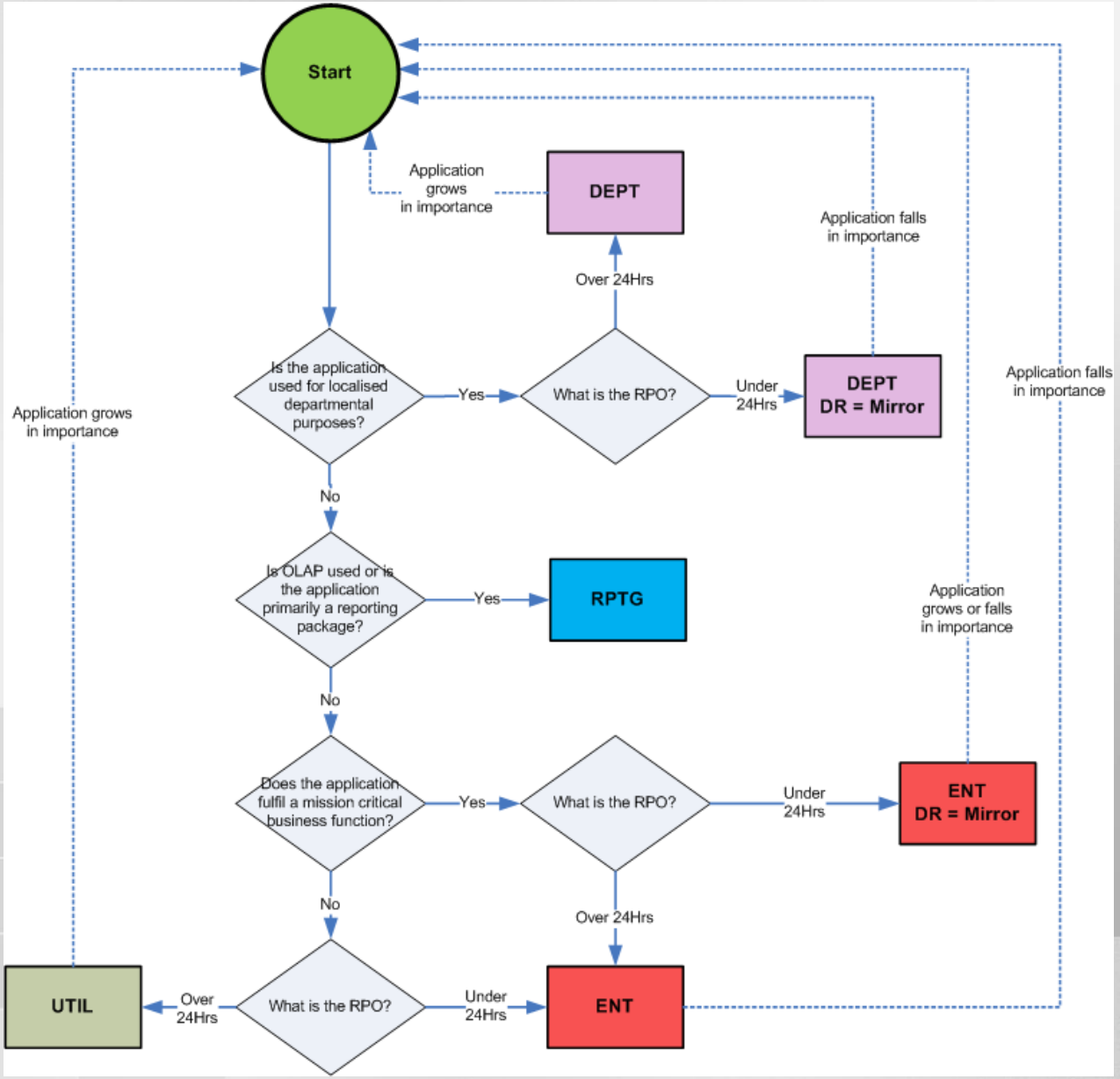
Phase 5 – SQL Support

Phase 1 | Phase 2 | Phase 3 | Phase 4 | **Phase 5**

- Job is not over once platform is deployed
- Need to actively manage SQL platform
- Ensure continuous recovery/availability via...
  - Regular cycle of ***R**eview, **R**eport, **R**emediate*
  - SQL backups, maintenance, alerting
  - Keep across new SQL hotfixes or patches
  - Structured approach to application deployment via **policies** prevents recreating SQL sprawl
- Consider benefits of SLA with the business
  - Can be managed in-house or outsourced

Phase 5 – Example Deployment Policy

- Repeatable, proven and practical method to release new database systems to existing SQL infrastructure
- Can be document or flowchart



Phase 5 – Common Challenges

- Environment quickly falls back into old routines
- Business expectations on the IT team and new environment are unrealistic
- The IT Team is not interested in the day to day administrative support and quality is slipping

- **Draw up** appropriate and realistic policies and follow them
- **Devise** suitable and realistic SLA with the business for key operations/functions
- **Engage** competent 3rd parties who do it and ensure they have a good track record
  ...Or get new staff!

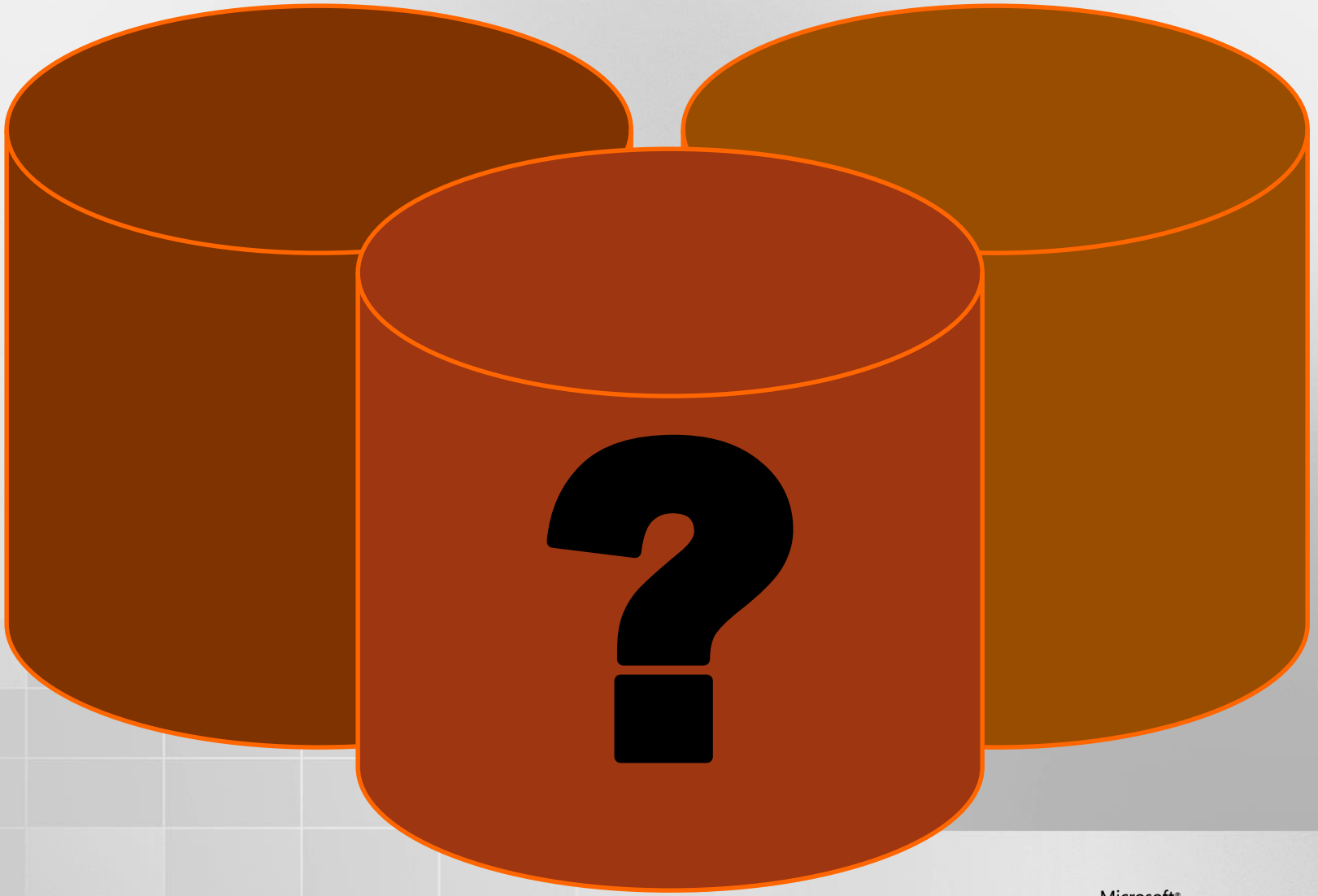
SQL Server Consolidation Summary

Consolidation		SQL Platform IT Challenges
Reduce	✓	Too many servers
Discover	✓	Licensing compliance
Decommission	✓	Data centre space and resources
Policy and Processes	✓	Consistent management and configuration
Merge	✓	Server resource under-utilisation
Match RPO/RTO	✓	Availability and recoverability
Plan Balance	✓	Reporting and workload management
Technology	✓	Staff retention and skills update

Your Call to Action – What's Next?

- Perform initial discovery on environment
  - Use Quest SQL Discovery Wizard
  - Identify how many SQL instances exist
  - Gather basic discovery elements
  - **We can assist to provide a high level assessment, benefits analysis and estimation**
- Start thinking about consolidation

Session 3 – Q & A



Thank You...

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Discussion References

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- **Quest SQL Discovery Wizard** http://www.quest.com/landing/?ID=1305
- **SQL IO** http://www.microsoft.com/downloads/detailsaspx?familyid=9a8b005b-84e4-4f24-8d65-cb53442d9e19&displaylang=en
- **SQL IO Sim** http://support.microsoft.com/kb/231619
- **HP Load Runner** https://h10078www1hpcom/cda/hpms/display/main/hpms_contentjsp?zn=bto&cp=1-11-126-17%5E8_4000_100__
- **Shashank Pawar Blog** http://blogs.technet.com/sqlman