

- COURSE CODE:** SQSDPT
- COURSE TITLE:** SQL Server 2005/2008/2008 R2 Advanced DBA Performance & Tuning
- AUDIENCE:** SQL Server DBAs, capacity planners and system administrators.
- PREREQUISITES:** Completion of our course 'SQL Server 2005/2008/2008 R2 DBA Fundamentals' (SQSDBA) or its equivalent (e.g., on-the-job experience).
- DURATION:** 4.5 days
- LEVEL:** Intermediate-to-advanced
- SUMMARY:** After an in-depth discussion of SQL Server storage engine, the remaining, about 65%, of this course is dedicated to:
- Troubleshooting and problem-solving
 - Performance and tuning optimization
 - Tuning methodology and tools
 - Best practices and performance:
 - Integration Services, especially ETL
 - Analysis Services
 - Reporting Services
- OBJECTIVES:** Upon completion of this presentation, the participant should be able competent to troubleshoot and resolve SQL Server performance issues as these relate to both OLTP and OLAP environments.
- FORMAT:** Hands-on (about 60%)

1. ARCHITECTURE

- Engine organisation
- Protocols (e.g., shared memory, TCP/IP)
- Query optimiser
- SQL Manager
- DB manager
- Access methods
- SQLOS (SQL Operating System)
- NUMA (Non-Uniform Memory Access) considerations
- Memory organisation (e.g., buffer pools)

2. CONFIGURATION

- Network
- Task management
- Resource allocation
- Paging files
- Memory options
- Threads
- Disk I/O
- 32- vs. 64-bit
- Default values
- Traces

3. EDITION OPTIONS

4. DATABASE TYPES

- Master
- Model
- TempDB
- MSSQLSystemResource
- msdb
- Sample databases
- Database files

5. DATABASE PROPERTIES & MAINTENANCE

- Create options
- Expansion/shrinkage
- Filegroups
- Space allocation
- Allocation map pages (GAM vs. SGAM)
- Consistency checks
- Database configuration options
- Database snapshots (e.g., how they work)
- When to use database snapshots
- Attach/detach/reattach DB
- Optimisation and best practices

6. LOGGING & RECOVERY

- Fundamentals
- Page Log Sequence Number (LSN)
- Virtual log file
- Truncation vs. shrinkage
- Backup types
- Recovery models
- Database restore options
- Page restore
- Recovery history files

7. TABLE PROPERTIES, INTERNALS & PERFORMANCE

- System objects
- Compatibility views
- Catalog views
- Information schema views
- System functions
- System stored procedures
- NULL best practices
- IDENTITY property usage
- Data storage metadata relationships
- Data page content and layout
- Data page row layout and content
- LOB data
- Constraints
- Table alteration options
- Materialised views

8. INDEX USAGE, STRUCTURE, INTERNALS & PERFORMANCE

- Purpose
- Structure
- Clustered vs. non-clustered
- Include columns
- Index page layout
- Index row layout
- Indexed views
- Computed column indexes
- ALTER index
- Index fragmentation
- Fragmentation maintenance
- Index rebuild: online vs. offline

9. TABLE PARTITIONING, MAINTENANCE & PERFORMANCE

- Usage
- Partitioned views vs. SQL Server 2005/2008/2008 R2 partitioning
- Filegroup views and creation
- Schema vs. function
- Storage aligned tables
- Range partitions vs. list partitions
- Index partitioning
- Split, merge and switch partitions
- Partition design options
- DDL considerations
- Partition joins
- Partition maintenance
- Metadata for partitioning

10. DATA MODIFICATION (INSERTs, DELETEs & UPDATEs)

- Inserts and page splits (data/index)
- Deletes from heap
- Deletes from B-tree index
- Reclamation of pages
- Update and row management
- Logging
- Locking

11. LOCKING & CONCURRENCY

- Reasons for
- Pessimistic vs. optimistic locking
- Transaction concepts via ACID
- Isolation levels
- Spinlocks
- Lock modes
- Key locks
- Application locks
- Lock duration
- Lock metadata
- Lock compatibility
- Deadlocks
- Partition locks
- Row vs. page locks
- Lock escalation
- Row versioning
- Snapshot isolation
- Lock hints

12. PERFORMANCE/OPTIMISATION FACILITIES

- Performance monitor
- SQL Profiler
- SQL trace
- Using Transact-SQL (e.g., Dynamic Management Views – DMVs)
- Database performance KPI
- Summary report pane
- SQL Server alerts
- Data engine tuning advisor

13. TUNING QUERIES & INDEXES

- Query execution
- Query analysis and tuning (e.g., show plans)
- Index options
- Data engine tuning advisor
- Training and profiling
- Troubleshooting query performance
- Plan caching and recompilation
- Join vs. subquery

14. DYNAMIC MANAGEMENT VIEWS

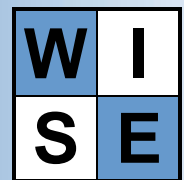
- Description, purpose and usage

15. INTEGRATION SERVICES (SSIS): BEST PRACTICES

- Concepts
- Pipeline
- Buffers
- Optimising data flow
- Execution trees
- Performance counters
- Tuning bulk inserts/text files
- Tuning Lookup transform
- Tuning Fuzzy Lookup/ Fuzzy Grouping
- Data flow parallelisation

16. ANALYSIS SERVICES (SSAS): BEST PRACTICES

- Dimensions
- Attributes/hierarchies
- Measures
- Partitions (MOLAP, ROALP, HOLAP)
- Aggregations
- Caching
- Performance counters



17. REPORTING SERVICES (SSRS): BEST PRACTICES

- Query design
- Rendering formats
- Page size
- Filters vs. query parameters
- Page breaks
- Headers and footers
- Drill-downs and conditional formatting
- Caching and storage
- Configuration
- Performance counters