 

SECTION A: Database Theory/‘How & Why’ (8 questions | 10 points | 50 minutes)

1. Describe the four different types of table growth patterns and maintenance concerns associated with each.
2. Continuous growth

* high volume of inserts with few deletes
* clustered index on sequential value
* a query that touches most rows before filter: perf will degrade over time
* great candidate for archival of unused rows

1. Purge by age

* Archive old unused data
* Rows are deleted fairly consistently
* Maintains sequential order but has potential gap
* Able to keep in cache relatively easily

1. Purge no by age

* Rows are deleted by another criterion other than age
* Scatters data across pages with potential gaps

1. Truncate/rebuild

* Similar to continuous growth
* Must maintain gaps with truncate/drop/recreate
* Potential for huge performance if not watched

1. Normalization seeks to eliminate several different types of data anomalies; please identify what these data anomalies are and how normalization can eliminate them.
2. Describe the differences between full, differential and transaction log back-ups and provide an example of a disaster recovery strategy that uses all three types of backups.
3. Describe the steps presented in lecture in performing proper database troubleshooting.
4. Describe the differences between Online Transaction Processing (OLTP) databases and those that are supporting Data Warehousing or Online Analytical Processing (OLAP).
5. Describe the aspects of a database environment that are considered critical for a database administrator to have deep knowledge on.
6. Describe the preparations a database administrator must take to reduce the risk of data loss.

* Know database environment
* Evaluate risk
* Try to eliminate single point of failure
* Document and practice disaster recovery

1. Name four Dynamic Management Views (DMVs) presented in lecture and describe their use.
2. Explain what is meant by 'Fault-Tolerance' and identify three system component examples.

* Ability to take a failure and continue processing
* Data base mirroring – synchronous data transfer
* Clustering – server failure
* RAID – disk failure
* Dual raid cards – hardware failure

1. Describe the differences between the various types of indexes presented during lecture.
2. Discuss the mechanisms employed by database management systems to ensure recoverability for all transactions that may be interrupted during processing.

* Write-ahead logging, write to transaction log for ensure durability from ACID principle
* Checkpoint – take whatever has been written to the transaction log
* Synchronous data transfer from data mirroring
* Begin/Commit tran

1. Describe 5 different SQL commands that are considered ‘control of flow’ language.

* IF/ELSE
* WHILE
* BREAK/CONTINUE
* CASE
* TRY/CATCH
* GOTO

1. Compare database mirroring, log shipping and replication; when is each the preferred tool of use?

* Mirroring – high availability, automatic failover guaranteed no data-loss, minimal downtime
* Log Shipping – Scalability solution, backup copy and load of entire database without filtering. Read only, good to use to separate read and write activity
* Replication – Scalability solution, Filtering, partition by column, row, functional, geographic.

1. Describe the memory caching algorithm implemented by databases to improve performance.

Only most active data in object in present in memory

It goes to page file

1. Explain the key characteristics of a database maintenance plan as presented in lecture.
2. ~~Define the different data warehouse design structures: star schema, snowflake schema, ‘star flake’ schema, fact table, dimension table in addition to a ‘measure’.~~
3. Explain what an execution plan is and how an administrator can read one to improve performance.
4. ~~Explain the differences between logical read and a physical read.~~
5. Explain the differences between an index seek and index scan.
6. Compare the differences between RAID 0, RAID 1, RAID 5 and RAID 0 + 1 or RAID ‘Ten’
7. Explain the differences between a Data Warehouse and a Data Mart.
8. ~~Compare asynchronous communications versus synchronous; which is preferred to reduce risk of data loss?~~
9. Name four monitoring tools presented in lecture and identify the best-use of each.
10. Explain the differences between a page fault, page split, fill factor and checkpoint.

SECTION B: SQL coding UNIVERSITY database ERD (5 questions | 15 points | 75 minutes)

* Create at least one stored procedure that takes in several parameters of friendly names and INSERTs into multiple tables in an explicit transaction with proper error-handling
* Create at least one business rule or computed column leveraging a function
* Create at least one stored procedure that calls another stored procedure (‘nested’ stored procedures) leveraging OUTPUT parameter
* Create at least one complex view (multiple JOINs, GROUP BY, HAVING, CASE)

