 

SECTION A: Theory/‘How, Why, When and What Impact’ (5 questions | 10 points | 50 minutes)

1. 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.

What?

* Quickly explain what a backup is/how they are different

How?

* Show the code perhaps

Why?

* Again…impact of absence

When?

* Shoe the difference between volume of transactions and frequency of backups

Impact?

* Show that you understand the importance of why backups are so important.
* What occurs in the absence of backups?

1. Describe the steps presented in lecture in performing proper database troubleshooting.

What?

* When things are running well…what do we do?
* SLA
* Protocols/procedures/policies agreed upon with customer
* Maintenance

How?

* Communication 🡪 no rumors
* Validate 🡪 false alarm?
* Communication 🡪 yes/no for being real
* Define scope 🡪 delegate to other teams to help
* Communication 🡪 what have we learned
* Always writing notes!!! 🡪 fix problem in future 🡪 knowledge base

Why?

* Better over time
* Optimized environment
* Reduce errors/risk/data loss

When?

* Maintenance is on-going always!!
* We fix things at any time 🡪 goal is to get better over time

Impact?

* Data loss/crappy service for customers
* Company is in jeopardy!

1. Describe the differences between Online Transaction Processing (OLTP) databases and those that are supporting Data Warehousing or Online Analytical Processing (OLAP).

What

Write vs READ

Volatile vs dead

Normalized vs denormalized

Many small bits of data (transaction) vs. few very large updates (loading of DW)

Many users (millions of consumers) vs few users (hundreds of strategic planners/analysts)

Short shelf-life (days…weeks?) vs Long shelf life (decades)

Relational vs dimensional

Who

When

* OLTP is reactionary…immediate…operations
* OLAP is proactive…strategic…marketing
* All (?) companies need OLTP 🡪 paper-trail of business obligations
* Mature organization leverage OLAP 🡪 better understanding of markets/business space

How

Why

Impact

* Goal is to determine if people know the difference between these structures

1. Describe the aspects of a database environment that are considered critical for a database administrator to have deep knowledge on.

Transactions

Data Flow

Customers

Hardware

Database objects

Skills of other technicians

1. Describe the preparations a database administrator must take to reduce the risk of data loss.
2. Name four Dynamic Management Views (DMVs) presented in lecture and describe their use.
3. Explain what is meant by 'Fault-Tolerance' and identify three system component examples.

* High failure rate of new computers in 1950’s – 1990’s
* Last 20 years pretty good machines 🡪 fault tolerance everywhere
* CPU 🡪 SMP
* RAM 🡪 DIMMS vs SIMMS
* RAID 🡪 Redundancy are hard drive level
* Dual Power supply
* Database mirroring
* Battery back-ups on CACHE 🡪 disk controllers | CPU

1. Describe the differences between the various types of indexes presented during lecture and identify why each is preferred in certain read or write scenarios.

* Clustered vs non-clustered
* How structured differently?
* Write out the balanced tree diagram 🡪 circle where they are different!!
* Talk about when/where we want them
  + Read vs write environment
  + Clustered index does range search

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

IF..ELSE

BEGIN..END  
CASE

WHILE

WAITFOR DELAY |TIME

1. Compare database mirroring, log shipping and replication; when is each the preferred tool of use?
2. Describe the memory caching algorithm implemented by databases to improve performance.
3. Explain the key characteristics of a database maintenance plan as presented in lecture.

* Result of knowing environment
* Geared towards reducing risk to data
* Documented 🡪 easier to on-board 🡪 easier to introduce to new environments
* Practiced 🡪 only way to get good is do tasks frequently
* Measured for effectiveness 🡪 why do anything that does not improve operations

1. Define the different data warehouse design structures: star schema, snowflake schema, ‘star flake’ schema, fact table, dimension table in addition to a ‘measure’.
2. Explain what an execution plan is and what an administrator learns from one to improve performance.
3. Explain the differences between an index seek and index scan and address when each is preferred.
4. Compare the differences between RAID 0, RAID 1, RAID 5 and RAID 0 + 1 or RAID ‘Ten’
5. Explain the differences between a Data Warehouse and a Data Mart.
6. Compare asynchronous communications versus synchronous; which is preferred to reduce risk of data loss?
7. Name four monitoring tools presented in lecture and identify the best-use of each.

* Profiler: low-level intended to find details of database activity
* Activity Monitor: high-level 🡪 quickly observe anything obvious
* System Monitor: low-level tool of operating system and hardware activity
* Dynamic Management Views: low or high-level tool 🡪current state of database
* SQL 🡪 prepared scripts
* Task Manager: high-level tool for hardware resources/services

1. 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 query that leverages subqueries to answer a complex business question.
* Create at least one complex view (multiple JOINs, GROUP BY, HAVING, CASE)

