**Week 9 Notes**

Triggers

* Special kind of stored procedures that executes when action/event occurs
* Associated with some command
* Benefits
  + Data integrity
  + Auditing and logging
  + Derived column generation
* Types of DML Triggers
  + AFTER triggers
    - After triggering operation completes successfully
  + INSTEAD OF
    - Do something instead of something else

Security

* Confidentiality – only authorized users have access to information

Views: relation defined by a query

* Control who has access to values
* Increase logical data independence

Encryption

* Encrypt data
* Application-Level Encryption
* Database-Level Encryption
* Storage-Level Encryption
* Network-Level Encryption
* TDE
  + Scramble Data
    - AES or 3DES
  + Steps
    - Create a master key
    - Create or obtain a certificate projected by the master key
    - Create database key encryption

How to handle security on other levels?

* Application: encrypt data whenever possible
* OS: firewalls, virus protection, close unused ports
* Network: additional system of authentications
* Physical: lock everything
* Human: give permissions to correct users

**Indexing**

* Process of creating data structures to make data
* Searching through data quickly
* Attribute can speed up execution of queries
* Always analyze tradeoff
* Aspects to consider
  + Insertion time
  + access time
  + Deletion time
  + Storing overhead
* Types of File Organization
  + Sequential file organization
  + Hash file organization
* Types of indices
  + Primary index
  + Secondary index
  + Clustered index
  + Non-clustered index
  + Unique index
  + Dense index
  + Sparse index
* Uses B+ or B-Tree for indexing
  + Trees ordered lexicographically
  + B-tree => every leaf contains associated datapoint
    - Quicker search
  + B+tree => will still traverse no matter what
    - Won’t make too much of difference with speed although it’s slower
    - Don’t need to manage data at every node
  + Alternative to index clustered file
  + Cost of Disk I/O operation