CS340 – Week1

* Databases – Overview
  + Database is a structured collection of related and meaningful data
  + Structured
    - Some relationships and organization within the piece of data
    - Not simply a collection of related data
  + Related
    - Database does not just collect data about everything
    - Data models some real work thing
  + Meaningful data
    - Data represents some aspect of the miniworld
* EX
  + Grocery store
    - Data
      * Inventory
      * Current stock
      * Employees
      * Departments
    - Structure
      * Current stock must come from possible inventory
      * Employees maintains department, etc..
    - Miniworld
      * Stuff in grocery store
* EX
  + Bank
    - Data
      * Customer
      * Accounts
      * Employees
      * Rates
    - Structure
      * Customers have accounts
      * Accounts have interest rates
      * Employees contact customers
    - Miniworld
      * The bank and related outside information
* Not databse
  + Pile of hard drives
    - Have data but have no meaning
    - There is no structure within data
    - Data is not confined to describing a specific miniworld
* Many kinds
  + Static geographiuc data GPS
  + Dynamic excel spreadsheet
  + Dynamic data like a website, AMAZON, NEWEGG
* Database Management System, DBMS is a tool for accessing
  + Provides
    - Redundancy control
      * Make sure doesn’t add same data twice
    - Access control
      * Users can only access, read data
      * Employees can access and edit
    - Persistent storage
      * Knows how to take all data and write to disk, and read it back
    - Querying system
      * We only want to see certain information
    - Backup
      * Saves information
    - Concurrent access
    - Enforcing constraints
      * Bank account values can only be X amount, etc
* Downsides
  + DBMS gives a lot by costs
    - Overhead
    - Complexity
  + When not to use?
    - Embedded system with little memory
    - Static data
    - Single user
* Who works?
  + Admin,
    - Control user access manage backups, work with physical hardware
  + Designers
    - Create schemas. Outline how data is section out in database
  + Application developers
    - Write queries that work directly with data, codes applications that call DB
  + End users
    - See information and results from applications
* Focus on application developer
  + Design data that makes sense to them
  + Consider type of queries that they will want ot run
* Focus on end user
  + Make sure that all data they want actually exist
  + Make sure db best tool to meet their needs
* Layers of abstraction
  + External layer
    - End user
    - Data must make sense
  + Conceptual level
    - How the data is organize for database designer
    - Diagrams!
  + Internal level
    - Mappings to the actual data on the physical storage media
* Data independence
  + Logical data independence
    - The idea that changes at the conceptual level should not break the external level
    - Adding data types should not break external level
    - Removing or changing usually will break the external level
  + Physical Data independence
    - Falling back to a backup hard drive should not break the conceptual level
    - Usually handled well by the DBMS