

Introduction to Databases

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Basic Definitions

- Database (DB) - collection of data
- DBMS - generic program to manage databases
- DB Application - App with specific purpose that accesses one database

- Data - basic facts
- Information - processed data
- Metadata - data about data
 - Computer and Human metadata
- Schema (intension) - description of data (metadata)
- Instance (extension) - actual data

DB vs File System Apps

- Apps that deal directly with files have **program-data dependence**
 - the program needs to know the format of the data
 - if the format changes, the program changes too !
- DBMS provides **program-data independence**
 - DBMS knows data format, programs do not !
- DB Apps usually include
 - SQL - Standard query language**
 - Client-Server - remote access, centralization**

- Advantages
 - Program-data independence
 - which entails Reduced program maintenance
 - And enables data centralization, and so
 - Less data redundancy
 - Improved data consistency, quality, standards
 - Improved Data sharing
 - Improved data accessibility and ad-hoc queries

DB Apps Disadvantages

- Special software, DBMS
 - But simple nowadays
- Entails DBA
 - But most sysadmins can do it, not perfectly but ...
- Specialized backups etc
 - But again, no big deal usually

DB Application size

- Personal DB Apps - one person, no network
- Workgroup DB Apps - small group, LAN
- Enterprise DB Apps - mission critical, many users, WAN
- Internet DB Apps - many users, probably casual users, over the internet

Client-Server

- DBMS server, controls access to database
- Clients use network connection to send SQL, receive data
- General clients (GUI or Text) - for programmers or DBAs
- DB Apps are just another client - used by end-users

Three-Tier apps

- Add another layer between client and server
- Middle tier is business logic
- Client can be very simple (browser)
- As far as DBMS, client is business tier
- Updating business logic tier is easy

Three-Schema architecture

- 3 levels of abstraction
 - Conceptual - high-level, technology independent
 - Logical - for specific technology (relational)
 - Physical - full info for computer
- Completeness:
 - external schemas (subsets of internal)

Development Process



- Analysis
 - Conceptual Modeling
- Design
 - Logical DB Design
 - Physical DB Design
- Implementation
 - DB Implementation
- Maintenance
- Waterfall vs Iterative

