

INFS 614
Database Management Systems

Lecture One - Introduction

Instructor: Dr. Jessica Lin

- The class is now full. If you are not yet enrolled in the class:
 - Consider the other two sections
 - Wednesday 4:30-7:10pm, by Prof. Alex Brodsky (also full)
 - Thursday 7:20-10:00pm, by Prof. Ken Smith (new section; still OPEN!)
 - Wait until someone drops

Basics

Instructor: Dr. Jessica Lin

Contact Info:

Email: jessica@ise.gmu.edu

Homepage: <http://www.ise.gmu.edu/~jessica>

Office: Science & Tech II Room 453

Phone: (703)993-4693

Fax: (703)993-1638

Office Hours: **Monday** 4-6pm or by appointment

Class Meeting: **7:20-10pm** Tuesday, Innovation Hall 105

TA: Huaming Liu hliu5@gmu.edu

TA office hours: TBA

Outline

- Course syllabus
- Satisfaction of prerequisites
 - Signed form must be submitted ***TODAY***
- Break (long)
- Introduction to DB & DBMS
 - Outline of the entire course material

Administration Trivia

- Class webpage:
http://www.ise.gmu.edu/~jessica/INFS614_F07.htm
- In most cases (except today), I will put the slides online 24 hours in advance of the class.
- I recommend that you print out the slides (six to a page) before attending lecture.
- You are obliged to visit the webpage AT LEAST once a week, and every time before class, to check for announcements and updates. You are 100% responsible for any announcements made.

Textbook

- Required Book:
 - Database Management Systems, 3rd ed. by Raghu Ramakrishnan & Johannes Gehrke, McGraw-Hill.
- Recommended Book:
 - Oracle 9i Programming: a Primer, by Rajshkhar Sunderraman, Addison Wesley, ISBN 0-201-61258-5
([or later versions](#))

www.cs.wisc.edu/~dbbook

3rd Edition



Grading

- Midterm Exam: ~ 25%
- Final Exam: ~ 35%
- Homework Assignments: ~ 20%
- Project(s): ~ 15%
- Quizzes: ~ 5%

• I may give pop quizzes at the beginning of class. You cannot “make up” missed quizzes. However, the lowest quiz grade will be dropped at the end of the semester.

• Homework is due on my desk in the first 5 minutes of the class on the date in question, unless specified otherwise. After 5 minutes the homework is considered late. You will be penalized 5% for each day you are late.

• Faxed-in submission accepted (703-993-1638, attention to instructor)

• For all homework and projects you are obliged to keep an electronic copy until at least one week after the final. If requested, you must email me a copy of the file(s) within 48 hours. Failure to produce the electronic copy will result (at least) in a grade of zero for the assignment in question.

Honor Code System

- GMU honor Code
<http://www.gmu.edu/catalog/acadpol.html#honor>
- For this class
 - Homework & project are all individual. Group discussions are encouraged but final solution and write up must be individual.
 - Exams: individual effort, closed books
- Satisfaction of prerequisites Form
 - Signed with honor code invoked.

Contact Policy

- Contact the TA if you
 - Have questions about the assignments/projects (including grading)
- Contact me if you
 - Have questions about the course materials
 - Have questions about the exams
 - Have general questions/concerns about the course

Email/Phones

- Always use email as the **first means** to communicate with me!
- I strongly prefer that you only email me from your official GMU email. If you must email me from another account (i.e. a hotmail or yahoo account) you must state your full name, your G-number, and your official GMU email address.
- You must check your GMU email account at least twice week until one week after the finals. If I send you an email requesting clarification on some issue, and you do not respond within 4 days, I will give you zero credit for the material in question.
- Think before emailing me or the TA; do not call unless it is a true emergency.

Class Schedule

Useful links for your computing needs

- <http://www.gmu.edu/departments/ucis> (especially the "Technical Info" section) for mason account information.
- <http://www.ite.gmu.edu/labs> for ITE computing lab and Oracle DBMS information.
- <http://oracle.com/ip/deploy/database/9i/index.html?persed.html> for personal edition of Oracle 9i.

Satisfaction of prerequisites

- Prerequisites
 - INFS501 (Discrete mathematics)
 - INFS515 (Computer architecture/organization)
 - INFS590 (Programming with data structures)
- For IS/SWE/ISA students
 - Satisfaction = foundation requirements are all satisfied. Check letter of admission for foundation requirements.
 - Student signs the form.
- For other students
 - Satisfaction = talk to instructor and instructor agrees.
 - Instructor signs the form.
- The SoP form must be signed in order to receive a grade for the course.



Any Questions?

Break

*Talk to Non-IS/SWE/ISA students
about their prerequisites*

What are Database and DBMS?

- Database:
 - A very large, integrated collection of data.
 - Data integrity is a concern.
 - Models real-world *enterprise*.
 - Entities (e.g., students, courses)
 - Relationships (e.g., Frodois taking INFS614)
- A *Database Management System (DBMS)* is a software package designed to store, provide access and manage databases.

Examples of DBMS Usage

- Airlines: reservations and schedules
(expedia.com)
- Universities: student info, grades
- Banking: customer info and accounts
(bankofamerica.com)
- Credit Cards: customer info, transactions
- Sales: customer info, inventory
(Amazon.com)
- Government: taxes, census

Why Use a DBMS?

Easier and More Efficient

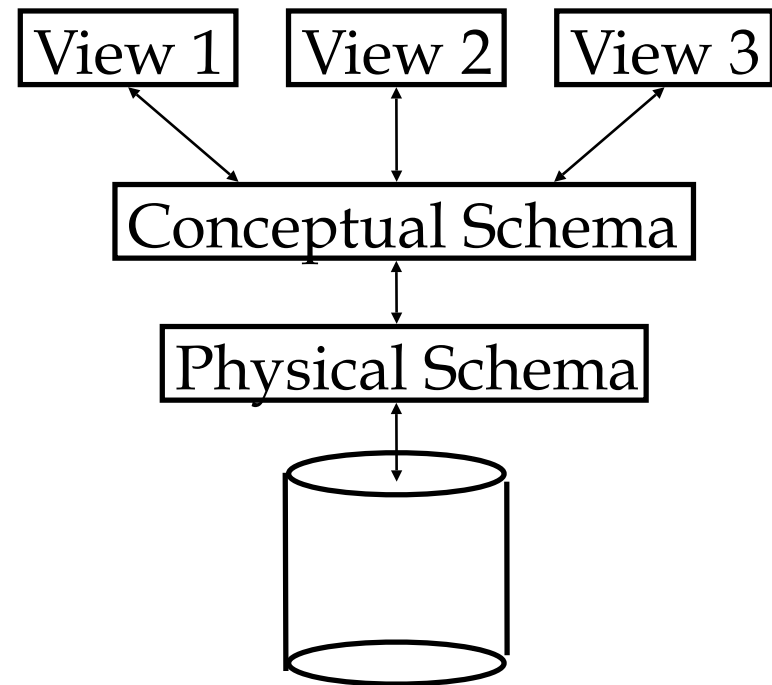
- Data independence and efficient access.
- Reduced application development time.
- Data integrity and security.
- Uniform data administration.
- Concurrent access, recovery from crashes.

Data Models

- A *data model* is a collection of concepts for describing data.
- A *schema* is a description of a particular collection of data, using a given data model.
- The *relational model of data* is the most widely used model today.
 - Main concept: *relation*, basically a table with rows and columns.
 - Every relation has a *schema*, which describes the columns, or fields.

Levels of Abstraction

- Many *views*, single *conceptual (logical) schema* and *physical schema*.
 - Views describe how users see the data (ex. given an employee database, show all data but the salary info)
 - Conceptual schema defines logical structure
 - Physical schema describes the files and indexes used.



➡ *Schemas are defined using DDL; data is modified/queried using DML.*

Data Independence

- Applications insulated from how data is structured and stored.
 - *Logical data independence*: Protection from changes in *logical* structure of data.
 - *Physical data independence*: Protection from changes in *physical* structure of data.
- ➡ *One of the most important benefits of using a DBMS!*

Database Users

- End users (or DB application users)
- DB application programmers (more precisely, they are DBMS users)
 - E.g. smart webmasters
 - *This course is mostly to learn how to (start to) be a DB application programmer.*
- Database administrator (DBA)
 - Designs logical /physical schemas
 - Handles security and authorization
 - Data availability, crash recovery
 - Database tuning as needs evolve

Must understand how a DBMS works!

Summary

- DBMS used to maintain, query large datasets.
- Benefits include recovery from system crashes, concurrent access, quick application development, data integrity and security.
- Levels of abstraction give data independence.
- We will learn how to
 - Set up a database
 - **Design** (ERD and Relational Model), and **refine** (Relational Normalization Theory)
 - Use to *query* the database
 - Relational Algebra/Calculus and SQL