CS 445
Introduction to Database Systems

MWF 11:45-12:50

Chadd Williams

Overview

- Practical introduction to databases
  - theory + hands on projects
- Topics
  - Relational Model
    - Relational Algebra/Calculus
  - Database Design
    - ER Diagrams
  - Structured Query Language (SQL)
  - Web accessible databases / Architecture / Model-View-Controller
  - Non-structured Data (NoSQL)
  - Cloud computing
- There will be a number of lab days for hands on work
  - approximately 6

What can you do over summer vacation?

http://opensourcebridge.org/

June 18–21, 2013

Portland, OR

Syllabus

- *Database Management Systems* (3rd), Ramakrishnan & Gehrke
- Grades:

Midterm 1	15%
Midterm 2	15%
Final	20%
Homework/Quizzes	10%
Database Projects	40%

First DB Assignment	Design Docs	8 pts
	MySQL DB	12 pts
Big DB Assignment	Design Docs	25 pts
	MySQL DB	30 pts
	Web Interface	15 pts
	Presentations	10 pts

- Quizzes: frequent, unannounced, open-note quizzes will be given
- Late Policy: No late assignments accepted
- Grade Complaints: one paragraph summary of why the grade is wrong, **within one week of receiving the graded material**

- http://zeus.cs.pacificu.edu/chadd/cs445s13

Database Projects

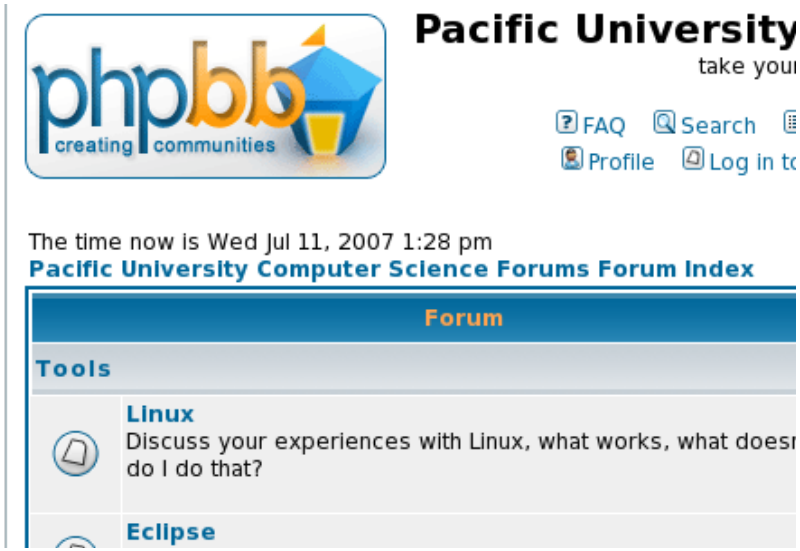
- All database projects are to be done using MySQL 5.5 Community Server
  - http://dev.mysql.com/downloads/mysql/
  - http://www.apachefriends.org/en/index.html (XAMPP)
- First DB Assignment
  - Learn to use MySQL & SQL
  - Build graphical front end (Web/MS Access/OpenOffice)
- Big Database Project
  - You (and a friend) design, document, and implement a database
  - Build a web-based front end
    - We will discuss how to do this using PHP and the Apache webserver
  - 5 minute presentation of your design
  - 7-10 minute presentation of your final design and implementation

Introduction to Databases

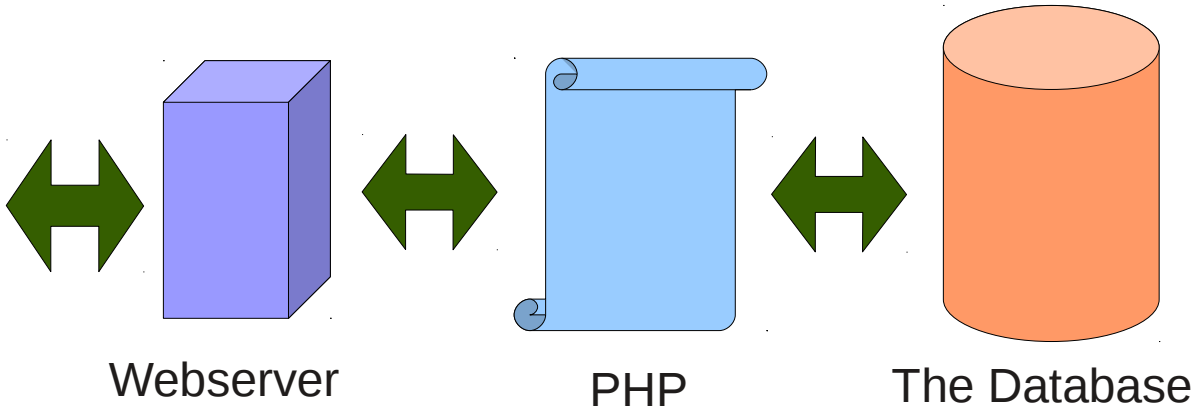
- Read Chapter 1
  - homework: page 23: 1.2, 1.6, page 52: 2.2 (1-5) (Due Feb 8)
- What's a database?
  - DBMS?
- Why do we use one?
- Who uses one?
- How do we model the data?

Review Questions at the end of each chapter are great exam study guides.

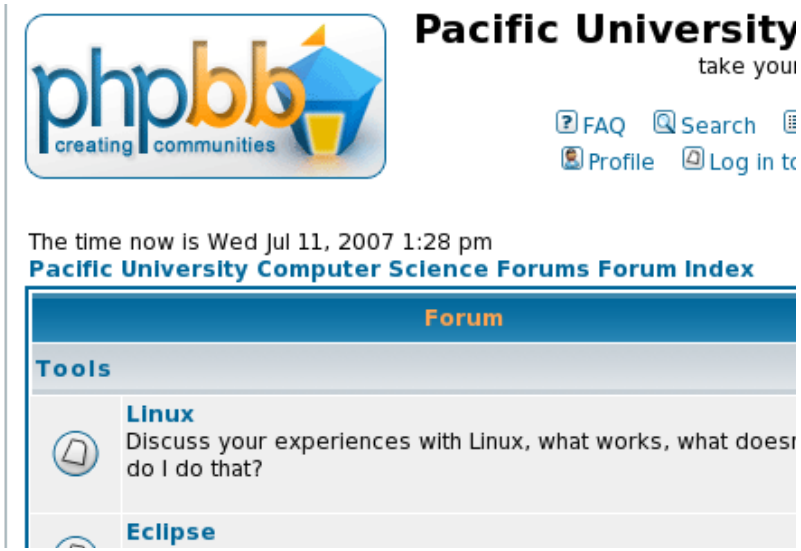
Basic Database Usage Scenario



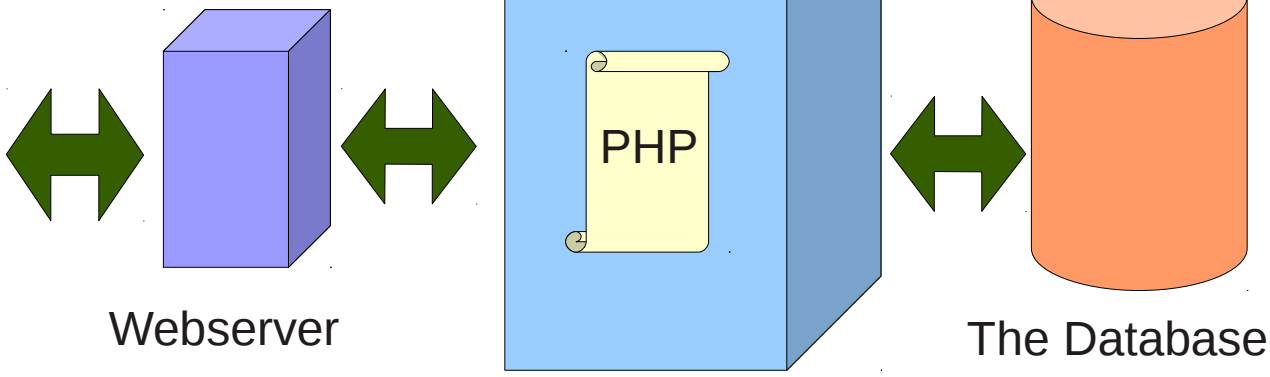
User



More Complicated Database Usage Scenario



User



Webserver

Application Server

The Database

Why not just use a text file/file system/XML?

- Data Independence
- Efficient Data Access
- Data Integrity and Security
- Data Administration
- Concurrent Access/Crash Recovery
- Reduced Application Development Time

(page 9)

Storing data in the DB

- Data Models
- Semantic Data Model (high level)
  - Entity-Relationship (ER) Model
    - Entity:
    - Relationship:
- Relational Data Model (low level)
- Schema
- Constraints/Integrity

Relational Databases

- Well defined structure of data
  - schema
- Flexible queries

NoSQL databases
schema

queries

What's inside a Relational database?

- Tables
- Indexes/Keys
- Data

How do we access the data?

- Query Language
  - Structured Query Language (SQL)
  - What types of queries can we run?

What about multiple users?

- Transactions

- Concurrency

Dirty Details

- Figure 1.3 page 20

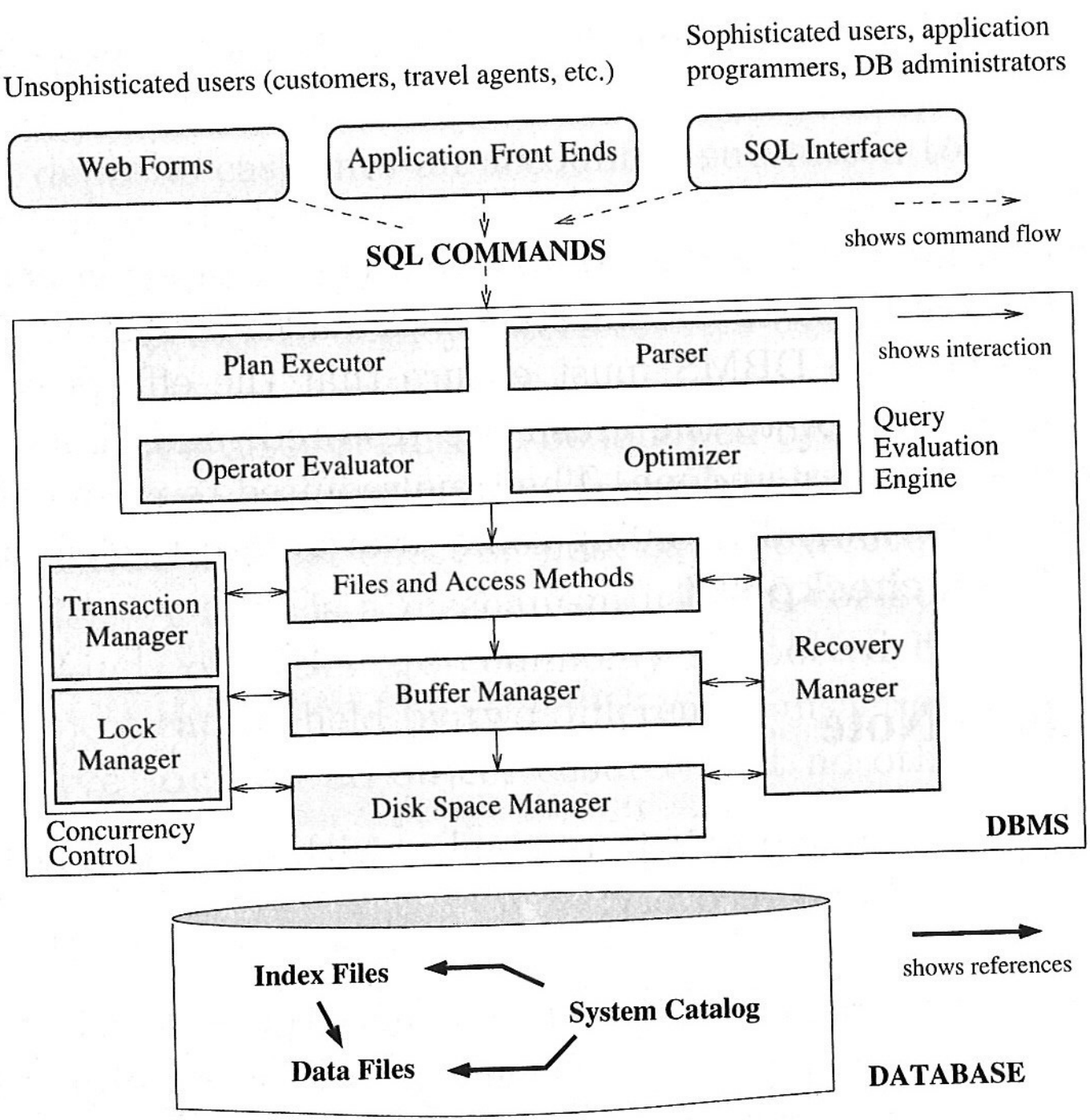


Figure 1.3 Architecture of a DBMS