DATABASE MANAGEMENT SYSTEMS

E0 261

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E0 261

PRE-REQUISITES

- Undergrad DBMS course with Basic Concepts, Data Models, Query Languages, Logical & Physical Design

- Willingness to work hard

- Good knowledge of movies and cricket ☺

DBMS Myths

- Databases? Isn't that the boring part of accounting?

- Macha, hazaar dumb Cobol programming!

- Maha-bore - almost as dull as watching Rahul Dravid play!

- High-tech name for data entry!

- Will only get job with TCS!

- ...

DBMS Reality

- Design of database engines has lots of really, really interesting intellectual problems with practical applications
  - theory, algorithms, data structures, experiments, prototypes

- Turing awards:
  - 1981: Edgar Codd (relational data model)
  - 1999: Jim Gray (transaction model)
  - 2015: Mike Stonebraker (high-performance systems)

- Ullman, Silberschatz, Papadimitrou, ...

Course Contents

- Query Processing

- Transaction Management

- ~~Distributed Databases~~ (shortened semester)

- Data Mining and Data Warehousing

- Database Architectures

- Database Storage

- BASE databases
  - Basic Availability, Soft State, Eventual Consistency

WORKLOAD

- Assignments: Background Review
  - Background assignment is already put up (sorry!)

- Exams: Mid-term and Final

- Projects: Cancel due to online situation ☹
  - (truncated semester, unknown peers, remote locations, remote resource persons, …)

- **Plagiarism: 0 for the entire assignment/exam/project, report to OCCAP.**

READING MATERIAL

- **Database System Concepts**
  - H. Korth, A. Silberschatz and S. Sudarshan,   McGraw Hill
- **Database Management Systems**
  - R. Ramakrishnan and J. Gehrke,   McGraw Hill
- **Fundamentals of Database Systems**
  - R. Elmasri and S. Navathe,   Addison Wesley
- Schema Design: Chapter 7 (available online) of
  Principles of Database and Knowledge-Base Systems
  - J. Ullman, Computer Science Press

- **Set of research papers** (available online)
  - some are papers arising out of your seniors course projects!

COURSE INFORMATION

- TAs:
  - Hemant Kumar and Subhodeep Maji

- Web-site:

  dsl.cds.iisc.ac.in/~course/DBMS/DBMS.html

- Sign-up sheet on website **[enter by February 25]**

- All lectures in PPT – their PDF versions will be on the Web-site after each class
  - Class videos will be made available for the exams

- Background assignment on website

CLASS VENUE and TIMINGS

- Room: Microsoft Teams

- Timings: T / R 2.00 – 3.30

DBMS OVERVIEW

Database Management Systems (DBMS)

- ## Large and complex software systems

  - Millions of lines of code

- ## Efficient and convenient mechanisms for capturing, storing, querying, maintenance of enterprise data

- ## Cornerstone of computer industry

  - Uses > 80 percent of computers worldwide

  - Employs > 70 percent of computer professionals

  - Largest monetary sector of computer business

Current Database Systems

- ## Commercial
  - IBM DB2 / Oracle / Microsoft SQL Server
    HP SQL/MX; SAP Hana; Sybase IQ

- ## Public-domain
  - PostgreSQL / MySQL / Berkeley DB

DBMS FEATURES

- ## Handle data of arbitrary size
  - Income-Tax records are in Petabytes (10^{15})

- ## Self-contained
  - contains both data and meta-data

- ## Program-Data insulation
  - application s/w not affected by storage changes

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DBMS FEATURES (contd)

- **DECLARATIVE ACCESS**
    - state what you want, not how to get it

- On-the-Fly Questions
    - ask new questions without writing new programs

- **PEACE OF MIND**

    - changes to the database are guaranteed to be immune to subsequent system failures

        Sri Sri Ravishankar of the Information World

DATABASE RESEARCH (upto 80's)

- How to model the data?

- How to provide the DBMS goodies
  in an efficient and user-friendly manner?

- How to maximize the data processing
  speed?

PARADIGM SHIFT in 90's

- Decision Support Systems

- Web Database Systems

- Mobile Database Systems

- Multi-media Database Systems

IN THE NEW MILLENIUM

- XML Databases

- Bio-Databases

- High-dimensional Databases

- Small-device Databases

- Main Memory Databases

- Columnar Databases

- No-SQL Databases

- Cloud-resident Databases

- Big Data platforms

SUMMARY

Database Technology will rule in the 21st century !