Outline

- Introduction
- Background
- Distributed DBMS Architecture
- Distributed Database Design (Briefly)
- Distributed Query Processing (Briefly)
- Distributed Transaction Management (Extensive)
- Building Distributed Database Systems (RAID)
- Mobile Database Systems
- Privacy, Trust, and Authentication
- Peer to Peer Systems
Instructor Introduction

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Bharat Bhargava is a professor of the Department of Computer Science with a courtesy appointment in the School of Electrical & Computer Engineering at Purdue University. Professor Bhargava is conducting research in security and privacy issues in distributed systems. This involves host authentication and key management, secure routing and dealing with malicious hosts, adaptability to attacks, and experimental studies. Related research is in formalizing evidence, trust, and fraud. Applications in e-commerce and transportation security are being tested in a prototype system. Based on his research in reliability, he is studying vulnerabilities in systems to assess threats to large organizations. He has developed techniques to avoid threats that can lead to operational failures. The research has direct impact on nuclear waste transport, bio-security, disaster management, and homeland security. These ideas and scientific principles are being applied to the building of peer-to-peer systems, cellular assisted mobile ad hoc networks, and to the monitoring of QoS-enabled network domains.
Instructor Introduction

In the 1988 IEEE Data Engineering Conference, he and John Riedl received the best paper award for their work on "A Model for Adaptable Systems for Transaction Processing." Professor Bhargava is a Fellow of the Institute of Electrical and Electronics Engineers and of the Institute of Electronics and Telecommunication Engineers. In 1999, he received the IEEE Technical Achievement Award for a major impact of his decade long contributions to foundations of adaptability in communication and distributed systems. He has been awarded the charter Gold Core Member distinction by the IEEE Computer Society for his distinguished service. He received Outstanding Instructor Awards from the Purdue chapter of the ACM in 1996 and 1998. He has graduated the largest number of Ph.D students in CS department and is active in supporting/mentoring minority students. In 2003, he was inducted in the Purdue's Book of Great Teachers.

He serves on seven editorial boards of international journals. He also serves the IEEE Computer Society on Technical Achievement award and Fellow committees. Professor Bhargava is the founder of the IEEE Symposium on Reliable and Distributed Systems, IEEE conference on Digital Library, and the ACM Conference on Information and Knowledge Management.

For details please see http://www.cs.purdue.edu/people/bb
Course Introduction

- This course will deal with the fundamental issues in large distributed systems which are motivated by the computer networking and distribution of processors, and control. The theory, design, implementation, and performance of large systems will be discussed. Concurrency, Consistency, Integrity, Reliability, Privacy, and Security in distributed systems will be included.

- Advanced features of the course include research related to Mobile Data Management, Streaming databases, and Peer to Peer systems.
Slides

- Most of the slides are taken from http://www.cs.ualberta.ca/~database/ddbook.html based on the main textbook by Tamer Oszu and Patrick Valduriez
- Some slides have been excluded from various chapters
- Some slides have been updated by Prof. Bhargava
- Some slides have been prepared by Prof. Bhargava
- Some slides are based on research papers that are available at the website as reading materials http://www.cs.purdue.edu/homes/bb/cs542-20Spr
Reading materials

- **Textbooks**
  - Principles of Distributed Database Systems, Prentice Hall, Tamer Oszu and Patrick Valduriez (Maint Text)
  - Concurrency Control and Reliability in Distributed Systems, Van Nostrand and Reinhold Publishers, Bharat Bhargava (Ed.), 1987 (Out of Print)

- **Supplemental Textbook**

- **Research papers**
  - From the reading list on the course web page
    [https://www.cs.purdue.edu/homes/bb/cs542-20Spr](https://www.cs.purdue.edu/homes/bb/cs542-20Spr)
Assignments and Grading Policy

- Non programming assignments: 4 (every 2-3 weeks: 20% of grade)
- Mid Term and Final Exams: 2 (20% of grade each)
- Project: 30% of grade
- Class contributions: 10% of grade

> 94% = A, 90-93% = A-

Same scale for B and C grade.

If you do not do any part of the project or home works or score less than 75%, a C grade is possible.
Distributed Database Systems

- Computer network (communication system)
- Database systems
- Users (programs, transactions)

Examples:
- Distributed INGRES (UC-Berkley)
- SDD-1 (Computer Corporation of America)
- DB2 and System R* (IBM)
- SIRIUS – DELTA (INRIA, France)
- RAID (Purdue)
## Distributed Database Systems

### Computer Networks:
- Ethernet
- ATM
- FDDI
- ARPANET
- BITNET
- Internet2
- ...

### Communications:
- UDP/IP
- TCP/IP
- ISO

### User Interaction:
- SQL
- Transaction
Fundamental References

Fundamental References (see Website)

- B. Bhargava, *Building Distributed Database Systems*.
Fundamental References (cont’d)


Fundamental References (cont’d)


Other References

- **Transaction Management:**
Other References

- Interoperability:
Other References

- **Data Warehousing**
  - There are many books. A small sample:
Other References

- Parallel Database Servers:
Other References

- Distributed Object Management:
Other References

- Mobile Databases
Other References

- Web Data Management