

6306 Advanced Operating Systems



Instructor : Dr. Mohan Kumar

Room : 315 NH

kumar@cse.uta.edu

Class : TTh 7- 8:20PM

Office Hours : TTh1-3 PM

GTA : Byung Sung

sung@cse.uta.edu

Kumar CSE@UTA

1



- **All email messages**

- **SUB: CSE6306**

Kumar CSE@UTA

2



■ References :

Distributed Systems : Concepts and Design

G Coulouris J Dollimore and T Kindberg

Addison Wesley, Third Edition 2001;

<http://www.cdk3.net>

Distributed Operating Systems and Algorithms

R Chow and T Johnson

Addison Wesley, 1997

**Published articles from leading Journals and
Conference Proceedings**

(A list will be placed on the WWW site)

■ **Course Website :**

<http://crystal.uta.edu/cse/~kumar/cse6306>

- Please check website on a regular basis for announcements and lists of papers and projects



Course Description

Syllabus: Theory and implementation aspects of distributed operating systems. Distributed processes, distributed algorithms and distributed systems. OS issues related to the Internet, intranets, pervasive computing, active networks, mobile systems and wireless networks. Selected articles from leading journals and conference proceedings, and case studies. Discussions, seminars and debates on research issues and operating system implementations.

Prerequisites:

Graduate level course/s (at least one in each) in Computer Networks and Operating Systems



- ❑ **Active participation in discussions, seminars and debates is mandatory for this course.**
- ❑ **All components include some weight for class participation - absence and/or passive presence will seriously affect your grade.**
- ❑ **All participants will be required to review research articles and/or operating system implementations.**
- ❑ **Term paper topics, teams and project/debate topics will be identified by random selection.**



- **You will be required to write two papers**
 - **term paper is based on individual work**
 - **project/debate paper involves team work**



Assessment

Course grades will be based on the following:

- **Term Paper: 40%**
 - Topic will be assigned 4 weeks prior to your presentation
 - Written paper due 72 hours prior to presentation
- **Project and Debate: 40% (groups of 4)**
 - Topics and Teams will be assigned during Week 3 or 4
 - Written paper due 72 hours prior to presentation
 - Demonstration during last week of semester
- **Quizzes: 20%**
(First quiz on 01/17/2002, no special quiz for absentees)



Term Paper : Paper Preparation

- **10-12 pages** (including references)
 - **Font size : not less than 11**
 - **Margins : 1 inch all around**
 - **References : at least 15, at most 1 pg in font size 10. use IEEE style**
- **Format**
 - **Title**
 - **Abstract**
 - **Introduction**
 - **Main theme in 2/3 sections**
 - **Conclusions and Discussions**



Term Paper: Presentation

- Time : 20 Minutes (**NO MORE!, NO LESS THAN 15 Minutes**) + 5 Minutes of Q&A
 - **Class participation is very important**
- Presentation
 - Title
 - Outline
 - Problem
 - State of the art
 - Solutions, problems, challenges (15-20 slides)
 - Conclusions



Term Paper: Assessment

- Written Paper (30%)
 - Technical content, Organization, Technical writing, Critical assessment, References (citing)
- Presentation (30%)
 - Organization, breadth/depth, adherence to time, Q & A
- Class assessment (20 %)
 - Assessment by classmates
- Class participation (20%)
 - Your assessment of other seminars, Q&A



Project/Debate : Assessment

- Project work – 40 %
- Paper – 20%
- Debate – 40%
 - Class – 20%
 - Participation – 20%



Quiz

- 4 Quizzes
 - Topics
 - Lectures
 - Seminars
 - Debates



Organization

<http://cse.uta.edu/~kumar/cse6306>

- Jan-Feb : Lectures and Paper Discussions

- Mar-Apr : Seminars and Debates

- 3 seminars /day
 - 25 + 25 + 25
- 1 Debate /day
 - 20 + 20 + 10 +10

Jan 15,17, 22, 29, Feb 5, 7, 12, 14, 19, 21, 26, 28

Mar 5, 7,12, 14, 26, 28, April 2, 4, 9, 11, 16, 18, 23, 25,30,
May 2



General Notes

- The instructor reserves the right to modify course policies, course calendar, and assignment or project values and due dates
- If you require any accommodation based on disability, please meet with the instructor in the privacy of his office the first week of the semester to be sure you are appropriately accommodated
- All students are expected to be responsible users of the computer systems for this course



General Notes (Contd.)

- All students are expected to pursue their academic careers with honesty and integrity. Academic dishonesty includes, but is not limited to, cheating on a test or other course work, plagiarism (offering the work of another as one's own), and unauthorized collaboration with another person. Students found guilty of dishonesty in their academic pursuits are subject to penalties that may include suspension from the university.
- Students are encouraged to discuss homework with classmates, but are not allowed to copy the solutions of others or share solutions with others. All work turned in for grading must be the student's own work.



General Notes (Contd.)

- A public access course website will be used as a repository for all course material. This directory will contain copies of any homework assignments, course handouts, project and paper lists, notes etc.
- Students are expected to obtain accounts on any university computers needed for this class, and to be able to access the course repository and send and receive e-mail messages.



General Notes (Contd.)

- ❑ **Academic dishonesty includes PLAGIARISM. If any of the papers you submit are found to be plagiarized, then your grade will be 'C' or lower regardless scores in other components, in addition you may be penalized according to University policies.**
- ❑ **Seminars/Debates will not be rescheduled (provide proof for unavoidable circumstances)**

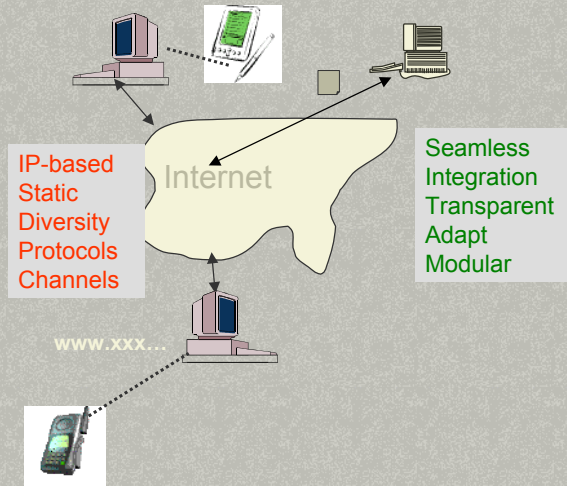


Topics

- Interprocess communication
- Distributed objects and remote invocation
- Operating system support
- Middleware
- Coordination and agreement
- Agent-based systems
- Migration, load balancing
- Caching, prefetching, push-caching and replication
- Quality of service

Internet, intranets, pervasive computers, active networks, mobile systems and wireless networks

Internet



- 8. Marjory S. Blumenthal and David D. Clark, Rethinking the design of the Internet: the end-to-end arguments vs. the brave new world, ACM Transactions on Internet Technology, Vol. 1, No. 1 Pages: 70 – 109.



Internet

- Number of users - unpredictable
- Stateful user session – complex
- Trust among interacting parties
- QoS guarantees ?
- Interoperability with legacy applications



Overview of Operating Systems and Distributed Systems

- **Computer Networks**
 - Internet
 - Intranets
 - Mobile phone networks
 - Campus networks
 - Office networks
 - Sensor networks
- **Distributed Systems**
 - Components of a computer network communicate and coordinate
 - Share resources
 - Exchange messages



Distributed Systems

- **Motivation : Resource Sharing**
 - Resource : Hardware,software, data (all kinds)
- **Challenges**
 - Heterogeneity
 - Transparency
 - Security
 - Scalability
 - Failure Handling
 - Transparency
 - Mobile Code



Heterogeneity

- **Networks**
- **Computer hardware**
- **Operating Systems**
- **Programming Languages**
- **Middleware**



Security

- Confidentiality
- Integrity
- Availability

Scalability

- Significant increase in the number of resources and users
- Phenomenal increase in the number of computers and servers



Failure Handling

- Detecting Failures
- Masking Failures
- Tolerating Failures
- Recovery from failures
- Redundancy
- Availability



Transparency

- Access
- Location
- Concurrency
- Replication
- Failure
- Mobility
- Performance
- Scaling



Background : Models

- Client-server model and variations
 - Clients invoke individual servers
 - Multiple servers provide service
 - Proxy servers – Web
 - Peer-to-peer process applications



Distributed Systems

- A collection of heterogeneous computers and resources connected via a network
- A distributed operating system – provide
 - A common, consistent global view of the file system, name space, time security and access to resources.
 - How can we provide this common view?



Middleware Challenges

Kurt Geihs, IEEE Computer, June 2001, pp 24-31.

- Middleware ?

Distributed Applications on the Network

Middleware

Distributed Operating System

- Interaction of arbitrary application programs
- Hides complexity of heterogeneous network
 - Systems, OS, Languages, faults, protocols etc
- QoS management, Information Security

