# Distributed Computing
## EG 3113 CT

**Year:     III**
**Semester:  V**

**Total: 6 hour /week**
**Lecture: 3 hours/week**
**Practical: 3 hours/week**

## Course Objective:

After completing this course the student will be able to know about the fundamental aspects of parallel and distributed processing, the taxonomies of parallel systems, the performance measures for parallel systems, and fundamental concept of distributed file system.

| Unit | Topics | Contents | Hours | Methods/ Media | Marks |
|------|--------|----------|-------|----------------|-------|
| 1 | **Fundamental Concept of Parallel Processing** | 1.1 Introduction<br>  1.1.1  History of computer<br>  1.1.1  Parallel Computer structure<br>  1.1.2  Motivation of parallelism<br>  1.1.3  Moore's law<br>  1.1.4  Grand challenge problems<br>1.2  Types of Parallelism<br>1.3  Instruction and Thread  Level Parallelism<br>1.4  Data and Memory Level Parallelism<br>1.5  Granularity<br>  1.5.1 Fine-grained parallelism<br>  1.5.2 Coarse-grained parallelism<br>  1.5.3 Medium-grained parallelism<br>1.6  Performance of Parallel Processor<br>1.7  Speed up Performance Law<br>  1.7.1 Amdahl's Law<br>  1.7.2 Gustafson's law | **10 Hrs** | | |
| 2 | **Processor Architecture** | 2.1   Uniprocessor Architecture<br>2.2   CISC and RISC Architecture<br>2.3   Parallel processing mechanism for Uni-processor<br>  2.3.1 Parallelism and Pipelining within CPU<br>2.4   Multiprocessor and Multicomputer Model | **14 Hrs** | | |

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|---|---|---|---|---|---|
| | | 2.4.1   UMA Model<br>2.4.2  NUMA Model<br>2.4.3  COMA Model<br>2.4.4  NORMA Model<br>2.5   Flynn's Taxonomy<br>2.6   Feng's classification<br>2.7   Distributed Memory Multi-computers<br>2.8   Shared Memory Multi-processors | | | |
| 3 | **Fundamental Concept of Distributed System** | 3.1   Introduction to Distributed Systems<br>3.2   Distributed Systems over Centralized Systems<br>3.3   Client/Server System<br>3.4   Peer-to-peer System<br>3.5   Examples of Distributed Systems<br>3.6   Main Characteristics of Distributed System<br>3.7   Advantages and Disadvantages of Distributed System<br>3.8   Design Goals of Distributed System<br>3.9   Main Problems of Distributed System<br>3.10  Models of Distributed System<br>3.11  Resource Sharing and the Web Challenges<br>3.12  Types of Distributed System: Grid, Cluster, Cloud | **12 Hrs** | | |
| 4 | **Distributed File System** | 4.1 Introduction to Distributed File System<br>4.2 File Service Architecture<br>4.3 Introduction to Name Service<br>4.4 Name Services and Domain Name System<br>4.5 Google File System<br>4.6 Comparison of Different Distributed File System | **6 Hrs** | | |
| 5 | **Case Study** | 5.1 CORBA<br>5.2 Mach<br>5.3 JINI | **3 Hrs** | | |
| 6 | Practical | | | | |

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|------|--------|----------|-------|----------------|-------|
| | Lab 1: | Implementation of Multithreading Concept. sockets and streams | | | |
| | Lab 2: | Implementation of client-server systems including networking with | | | |
| | Lab 3: | Domain Name System Configuration on Windows/Linux OS | | | |
| | Lab 4 and 5: | Simulation of Google File System using Google File-system Simulator | | | |

## Reference:

1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design", Third Edition, Pearson Education.
2. A.S. Tanenbaum, M. VanSteen, "Distributed Systems", Pearson Education.
3. W. P. Petersen, P. Arbenz - Introduction to parallel computing_ [a practical guide with examples in C] (2004, Oxford University Press)
4. Hesham El-Rewini, MostafaAbd-El-Barr - Advanced Computer Architecture and Parallel Processing (2005, Wiley-Interscience)
5. A. Grama, A. Gupta, G. Karypis and V. Kumar. Introduction to Parallel Computing (2nd edition), Addison Wesley (2002).