Welcome to

DATA STORAGE TECHNOLOGIES & NETWORKS

(CS C446, CS F446 & IS C446)

LECTURE 01 – INTRODUCTION

Introduction

- ## Instructor in Charge

  - ### Dr. Biju K Raveendran

    - Chamber Number: A – 413,

    - Department of Computer Science & Information Systems

    - E-mail: biju@goa.bits-pilani.ac.in

    - Consultation Time: Anytime between 9 A.M to 7 P.M

- ## Class room

  - A - 605

  - No entry after **09:00** A.M

  - Not allowed to leave in between the class

  - Dress properly when you are coming to the class / Presentation

Policies to Follow

- ## Paper Summarization / Presentation
  - Advanced Topic / Paper in the area of Data Storage
  - Maximum 2 students per team
  - Weightage: 10%

- ## Surprise Quiz and Attendance
  - Coverage: Whatever taught till that time
  - Weightage: 10%
  - Best N-1 out of N will be considered

Course Administration

- **Assignments**
  - Once announced, no postponement in deadline.
  - Weightage: 20%
  - Assignments based on
    - IOMeter, DiskSim
    - Implementation of new features in existing file systems
    - Implementation of various algorithms in C
    - Performance evaluation of Disks using C / Java
  - If found copied – We will report to disciplinary committee & -20% will be awarded.

Malpractice Regulations

- Any student or team of students found involved in mal practices in working out assignments will be awarded negative marks equal to the weightage of that assignment and will be blacklisted.

- Any student or team of students found repeatedly – more than once across all courses – involved in mal-practices will be reported to the Disciplinary Committee for further action. This will be in addition to the sanction mentioned above.

- A mal-practice - in this context - will include but not be limited to:
  - Submitting some other student's / team's solution(s) as one's own;
  - Copying some other student's / team's data or code or other forms of a solution;
  - Seeing some other student's / team's data or code or other forms of a solution;
  - Permitting some other student / team to see or to copy or to submit one's own solution;
  - OR other equivalent forms of plagiarism wherein the student or team does not work out the solution and/or uses some other solution or part thereof (such as downloading it from the web).

- The degree of mal-practice (the size of the solution involved or the number of students involved) will not be considered as mitigating evidence. Failure on the part of instructor(s) to detect mal-practice at or before the time of evaluation may not prevent sanctions later on.

Course Administration

- **Tests**
  - **Test 1**
    - Day, Date & Time: Thursday, 04 – 03 – 2014 (8:30 A.M.)
    - Weightage: 15%
    - Mode: Closed Book
  - **Test 2**
    - Day, Date & Time: Thursday , 07 – 04 – 2014 (8:30 A.M.)
    - Weightage: 15%
    - Mode: Closed Book
  - **Make-up Policy**
    - Medical certificate from the doctor (Dr. Ragvendra)
    - Photocopy of the medical reports & Bills
  - **No makeup for relative's marriage, participation of events and writing competitive exams**

Course Administration

- ## Comprehensive Examination
  - ❑ Day, Date & Time:Wednesday,07 – 05 – 2014, FN
  - ❑ Weightage: 30%
  - ❑ Mode: Close Book

- ## Acknowledgement
  - ❑ Prof. Sundar B, BITS Pilani, Pilani Campus
  - ❑ Prof. J. P. Misra, BITS Pilani, Pilani Campus
  - ❑ [Course material of this course is developed by them]

Course Administration

- **Material:**

  http://photon.bits-goa.ac.in/moodle/

- **Text Books:**

  - **T1.** Storage Networks: The complete Reference. Robert Spalding, McGraw-Hill/Osborne, 2003.

  - **T2.** Information Storage and Managements Storing, Managing and Protecting Digital Information. EMC Education Services, Wiley Publishing Inc., 2008.

- **Note: Make it a habit to visit course ftp page. The page will be updated on a daily basis**

Course Layout

1. Storage Requirement and Usage

2. Memory Hierarchy

3. Storage Interfaces & Disk Performance

   ❑ Latency, Throughput, Cache Impact

4. System Level Design

   ❑ Locality, Virtual Memory, OS support, File Systems & I/O

5. High Performance Requirements

   ❑ Capacity, Availability, Reliability & throughput

6. RAID

7. BUS

Course Layout

8. Network Attached Storage (NAS), Network File Systems – access over NAS

   ❑ Access rates, Bandwidth, Scalability, Availability, Reliability

9. Storage Area Networks (SAN), SAN File Systems

   ❑ Architecture, Device Components, Design & Implementation issues, Performance measurements
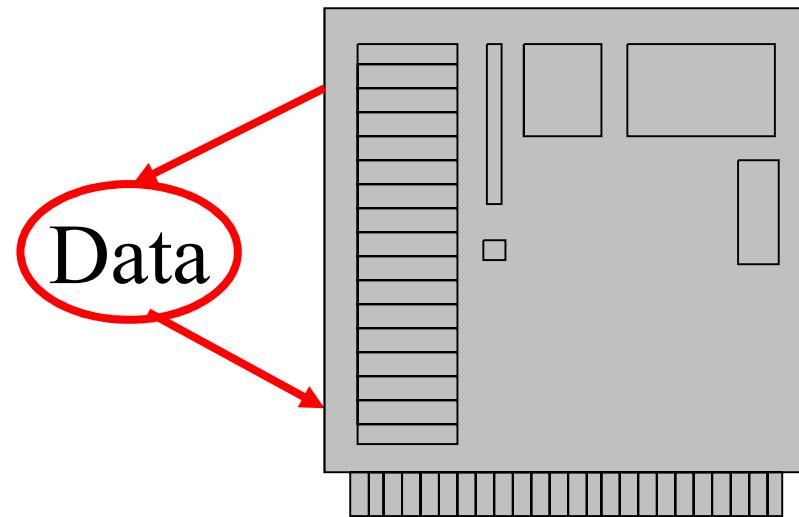
10. SAN & NAS solutions

   ❑ Integration issue, Performance issues

11. Virtualization

12. Case Studies
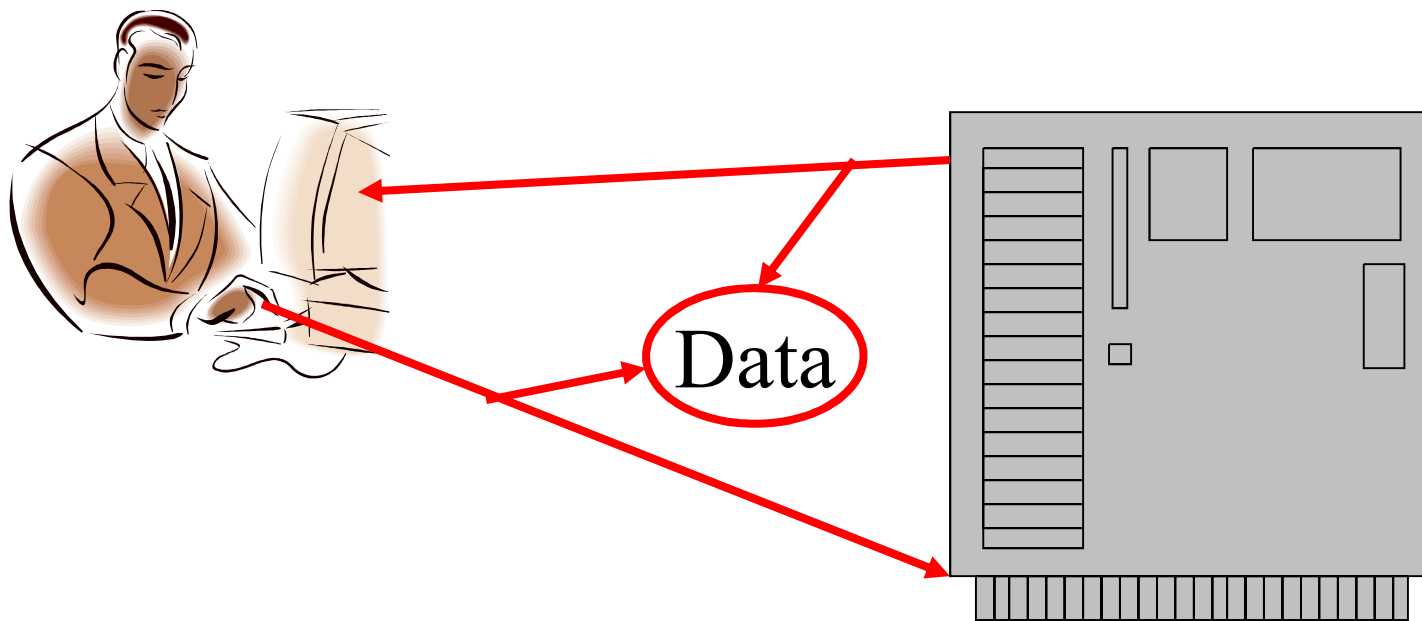
Computing

- Functional Computing (FC) – a.k.a standalone computing
  - E.g. mainframes, supercomputers.

Computing

- Interactive Computing (IC) –variation of standalone computing
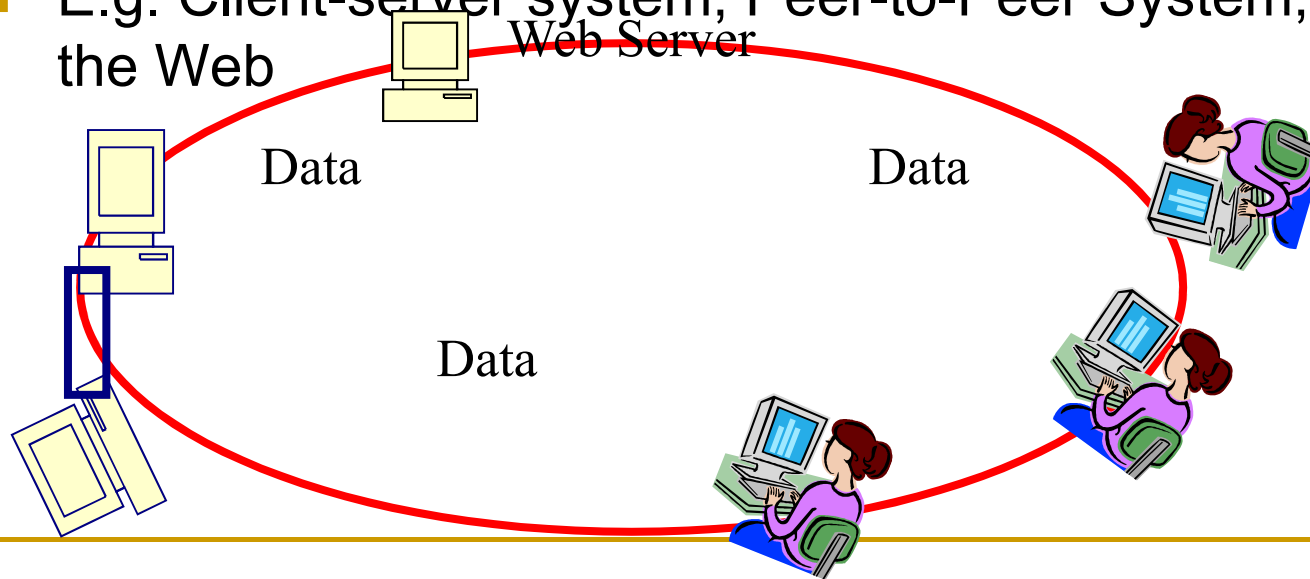 - E.g. PCs.

Computing

- **Distributed Computing (DC)**
  - Computers in a network
    - Basic structure same for individual computers
    - External interaction extended over network connections
  - One or more computers may act as a single coherent computing system
    - E.g. Client-server system, Peer-to-Peer System, Cluster, the Web

Web Server

Data   Data

Data

A Cluster

Computing

- **Reactive Computing (RC)**
  - Computer(s) part of a (physical) system
    - Basic structure still holds
    - Interaction with an external (non-computing) system.
  - Computers are not necessarily autonomous
    - Example: A mobile phone

Rx

incoming call

lookup number

Display name