Systems Programming

CST-210

Dr. A. P. Mazumdar

Introduction

- System Software
  - Variety of programs that support computer operations
  - Helps user to focus on specific application
    - **Abstraction** of the system
- You have already used many system software
  - IDE, compiler, loader, linker, debugger
  - Assembler, macro processor
  - Operating System (Windows, Linux)

Course Outline

- Overview of System
- Language processor
- Machine Architecture
- Assembly language
- Utility Software
- Shell programming
- Kernel, Device Drivers

Grading Scheme

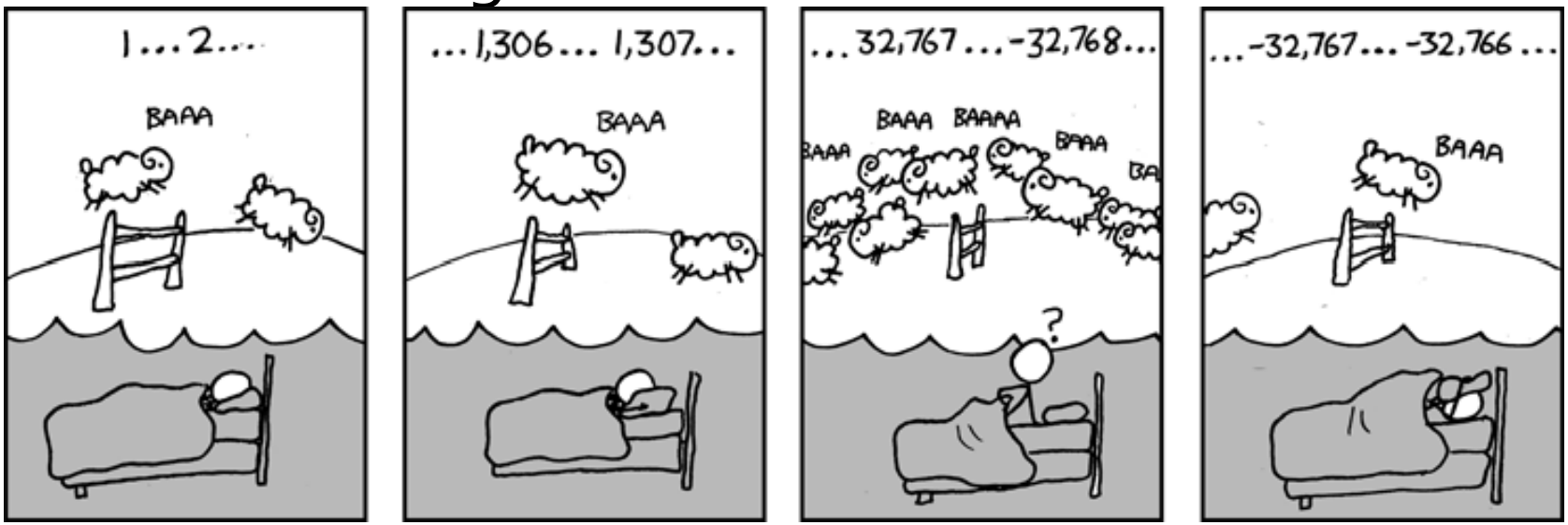
- Mid-term I : 20%
- Mid-term II : 20%
- End-term: 40%
- Assignments, Quiz, Attendance: 20%

Books

1) *D. M. Dhamdhere:* Introduction to Systems Software, TMH
2) *L.L. Beck:* System Software-An Introduction to Systems Programming, Addition Wesley
3) *Rebecca Thomas:* Adv. Programmer guide to Unix system V. MH
4) *Glingaert:* Assemblers, Loaders and Compilers, Prentice Hall
5) John R. Levine: Linkers and Loaders, Harcourt India
6) *Kanetkar:* Unix Shell Programming.

Motivation #1

- Are INTs integers?



- +32767 to -32768
- Floats also have limitations

Motivation #1 *(contd.)*

- All mathematical properties can not be assumed
  - Machine finiteness
- Observation
  - Need to understand which abstractions apply in which contexts
  - Important issues for compiler writers and serious application programmers

Motivation #2

- Need of knowing assembly
  - Behavior of programs in presence of bugs
  - Tuning program performance
  - Implementing system software
  - Creating / fighting malware

Motivation #3

Memory Matters

- Memory is not Infinite
- Memory Referencing Bugs
- Memory performance is not uniform

Motivation #4

Asymptotic Complexity Analysis is not Enough!

- Constant factors are also important
- Exact operation counts do not show Performance
- Understand system to optimize performance

Motivation #5

Fast Execution is not Enough!

- Data IN & OUT
- Communicate over Network