Design and Analysis of Algorithms

L01: Overview

Dr. Ram P Rustagi
Sem IV (2019-H1)
Dept of CSE, KSIT
rprustagi@ksit.edu.in

About Myself

- Network/Telecommunication/Systems
  - 30+ years
- Academy
  - KSIT (9+ months)
  - PESIT/PESU (6+ yrs))
  - IITD (non-teaching research faculty)
- Industry
  - Cloud, Telecom, N/W, Systems and Applications
- Current Research Interests
  - Networks, Security, Data Center networking
  - Machine Learning, Cloud technologies
  - Algorithms, Application optimization
  - Experiential Leanring - Networking Technology

About Yourself

- Your background
  - Mix of different streams. a divergent group
  - Basic knowledge of mathematics
- Required focus
  - Logical thinking (out of box)
  - Decent level of programming expertise
- Your expectations
  - Outcome you would like to see
    - After Completion of this course
  - Specific goals to be achieved
  - Teaching style, any other inputs
  - Exploring your tenacities

Knowledge and Wisdom

- The course is about learning & experiencing
- It is not about knowing (mugging) algorithms
- Knowledge is knowing
  - How to do something
- Wisdom is knowing
  - What, why, how, and when to do it.
- Knowledge can be acquired by learning
- Wisdom is acquired only out of experience
- Objective
  - I want to set the ball rolling in your mind.
  - Down the line you should start thinking
  - Use your own independent experience to learn

Your Life & This Course

- Teaching belief
  - Nothing to teach something how to use it
    - Before experiencing it myself
- As a human
  - You are bound to make errors
  - Get used to it
  - Learning: be patient
    - Things have its time and don't force things
- Your assignments are as a group/team
  - Story of 4 people

Story of work

- Story of team of four people
  - *Everybody*, *Anybody*, *Somebody*, *Nobody*
- An important work was to be done
  - Team was asked to do it
  - **Everybody** thought **somebody** would do it
  - **Anybody** could have done it, but **Nobody** did
- Result
  - **Somebody** got angry as it was **everybody**'s job
  - **Everybody** knew that **anybody** could do it
  - **Nobody** realized that **somebody** wouldn't do it

Story of work

- Summary
  - Job was not done
  - **Everybody** blamed **somebody**
  - **Nobody** did what **anybody** could have done
- Learning:
  - Don't depend on **somebody**
  - Be **anybody**

Apply Commonsense to Complex Problems

- A story between Car customer and Customer care executive
  - Luxury Division of Car manufacturer received a crazy complaint
- Background
  - Customer goes for ice cream after dinner each day
  - Eats different ice cream depending on the mood
- Customer buys a new Luxury car
  - Goes in the new car to ice cream shop
  - When he buys vanilla ice cream, car won't start
  - For other ice creams he buys, car starts just fine.

Commonsense to Complex Problems...

- Car manufacturer finds it a funny complaint but sends supports engineer
  - With lot of skepticism
  - Engineer goes with the man to ice cream shop
  - Buys vanilla ice cream finds it does not start
  - Next day buys chocolate ice cream, it starts fine
  - Next day buys other ice cream, flavor, car starts fine
  - Next day buys vanilla again, car won't start
- Diagnosis: Vapor Lock in engine
- Summary: **What Really matters is attitude and perception**

Resource Material

- Text Books:
  - T1: Design and Analysis of Algorithms - Levitin
  - T2: Computer Algorithms/C++
    - Horowitz, Sahani, Rajsekharan
- RPR slides and other materials
  - https://github.com/rprustagi/2019-17CS43-DAA.git
  - https://www.dropbox.com/sh/c71jdh0933leooa/AACXQxPhdjx881Qtna3uNX8Za?dl=0
  - no notes
- Other resource material
  - Google guru
  - NPTel
  - Udacity
  - Coursera etc.

Goals

- Complete your course with flying colors
- Key course to get a decent job
  - (or higher studies abroad)
- Steps to achieve your goals
- Do lot more than statutory (exam, lab) work
  - Don't mug up, understand, be creative/innovative
  - Ensure implementations work in all conditions.
  - No external parameters should crash it
  - Avoid the excuse "It works for me on my PC"

Goals...

- Debug and understand your programs/configuration/deployment
- Discuss with your colleagues
  - Take initiative in explaining
  - Best way to learn is to teach
  - Do your work yourself
- Be interactive & responsive
  - With teachers, colleagues, other resources
- Have fun while studying this course
  - Enjoy the sweet successes while overcoming failures

Learning

- Work hard to know your limits
  - Regularity pays well
  - It takes time for new things to sink in
- Marks are not the end
  - These are just the beginning
  - Doesn't really matter after a while
- Self gain
  - Acquire surrounding, relevant knowledge
  - Expertise in required tools
    - Know to exploit these
- Challenge the teachers
  - Force them to be provider of recent trends

SWOT (/SWOC) Analysis

- What is SWOT (/SWOC)
  - Strength
  - Weakness
  - Opportunity
  - Threats (Challenges)
- Explain with a fun joke

Learning...

- Clarify your doubt
- Don't **ASSUME**
- If you do assume, following happens

  ASS

  U

  ME

- **Stop not, allowed to go,** or
  Stop, not allowed to go

Be Alert

- Following words have same letters.
- Arrangement of letters makes all the difference
  - **LISTEN**
    - **SILENT**

- **TEACHER**
  - **CHEATER**

Evaluation Methodology

- Exams
  - External: as per VTU
  - Internal:
    - 30 marks: Assignments (4+)
    - 10 marks: ISA3 (based on VTU, full course)

- Assignments
  - These are programming assignments
    - To be done in team of size 2 or 3
    - Any team member can be asked to explain
  - Submissions online (KSIT Centos server)
    - Program should run on server
  - Plagiarism will get 0 marks

Course

- Approach
  - Interactive and inquisitive
  - Ask lots of questions
  - Extra material, information

Classroom Management

- Absence may be costly (or beneficial?)
  - May miss out on understanding the concepts
- Would like to have **outstanding** students
  - Not (Out)-Standing students
    - Class doors will be closed (after 5 mins)
  - Be in time in class
  - Late comers disturbs the class hygiene
    - (Adhere to Swachh Bharat)
  - Can move out of class any time
- Learn to have class discipline (no cross talks)
  - Will be given time to discuss during exercises

Classroom Management

- Have interactive sessions
  - Be inquisitive
  - All questions, comments are intelligent
  - When in doubt, open your mouth
  - Don't hijack the session

Classroom Management

- Instructor availability
  - My office in Dept
    - During tea break
    - Lunch break??
    - Non-class hours
  - After college hours (till 5:00/5:30pm)
    - CSE Research center
  - On email only
    - Unlikely on social media
    - Whatsapp, Facebook, Twitter, Linkedin etc.

Course Plan

- Excel sheet provides details
- May deviate few times.
- At times will cover more material than needed
- Concept consoliation
  - Will try to suggest exercises beyond labs.
  - Need to know your interest.
  - Will be done after class hours

Concept Consolidation

- Be comfortable with Linux
    - The default deployment server for most companies
- Work out the exercises (at the end of chapters)
    - Helps you consolidate the subject
- Learn programming / java extensively well.
    - Write lots of programs
        - (lot more than mandatory), Labs, assignments
    - Hone up debugging skills
    - Learn to use IDE (Netbeans, Eclipse)
- Enjoy the roller coaster ride
    - Fasten your seat belts

Some Challenges

- Verbal Accent
  - Incomprehensible, fast
  - Ask to repeat, slow down
  - Maintain silence to be audible
- Need to take care - Bottom of pyramid

Prerequisiters

- Prerequisites for this course
  - Review and overhaul of Data Structure course
    - This course heavily depends upon it.
    - Spend time to understand all the concepts.
    - Do your lab programs without digging into memory repository.
  - Willingness to work hard
    - Try out extra exercises

Summary

- Resource material
- Course plan
- Marks and evaluation
- Activities preparedness