

Major MTech Projects and Seminar

- **Certification of Python Programs on the basis of Static Information Flow Analysis (Static Tool).**
(M.Tech Project, under the guidance of Prof. R K Shyamsundar)
 - Analyzer: Tracking of all information flows throughout python program using Abstract Syntax Tree.
 - Verifier: Generation of security constraints for all possible information flow in a given python program and testing of constraints using Read Write Flow Model.
- **Virtualization and Power Management in Virtualized Platform (Seminar and Literature Survey).**
(M.Tech Seminar, under the guidance of Prof. Varsha Apte)
 - Surveyed various virtualization technologies and studied comparison among them.
 - Discussed the challenges observed in these Virtual platforms.
 - Surveyed Power Management techniques on a virtualized platform and optimization for reduction of electric power consumption.
 - Studied and reviewed different approaches to reduce power consumption and comparison of them.

Course Projects

- **Simulation Analysis of Web Application** [CS681 Performance Evaluation of Computer Systems and Networks]
(Guided by Prof. Varsha Apte, Spring 2014)
 - Goal : Study the performance of web application through Discrete event Simulation.
 - Technology/Languages/Tools python, tsung, GNUplot.
 - Description This project simulated the behavior of traffic on the web server using discrete event simulation model and then its performance compared with real web server by tuning different parameters such as an arrival rate, departure rate, context switch time, queuing delay, timeout, think time, No. of users.
- **Extraction of information about RSS and WSS of a Process in Linux kernel.** [CS401 Kernel Programming]
(Guided by Prof. Purushottam Kulkarni Spring 2015)
 - Implemented loadable kernel module with logic to find out the size of rss and wss of process by using Paging hierarchy.
- **Analysis of the scheduler of Linux kernel by generating scheduler-level and process-level statistics.** [CS401 Kernel Programming]
(Guided by Prof. Purushottam Kulkarni, Spring 2015)
 - Implemented loadable kernel module and hooks to extract information related to scheduler and process.
 - Scheduler level statistics Experiments: Load vs Context Switches, Run Queue length distribution per CPU, Number of Migrations across CPUs, Experiment with scheduling priorities, context switches vs time, number of migration.
 - Process level Statistics : Number of context switches, Variation in dynamic priority of the process, CPU mapping distribution of process, Experiments with CPU affinity of process.
- **Analysis of TCP Congestion Control.** [CS641 Advanced Computer Network] (Guided by Prof. Mythili V.)
 - Used ns-3 Simulation for collecting data about TCP NewReno and Tahoe.
- **Automation of ns3 simulation and graph generation** [CS699 Software Lab]
(Guided by Prof. Bhaskaran Raman, Autumn 2014)
 - Project based on : to automate ns3 simulator runs and to make graphs of data which is obtained by parsing of pcap files. It is related to networking, but the main task is automation of the various components of a simulation .

- Technology used: Bash, Awk, Lex, yacc, Python, pyplot, ns3 network simulator, tshark, Makefile, git.

Work Experience: 21 Months in Huawei Technologies India Pvt. Ltd.

• Research and Development work.

- **Proof of Concept work:** Designed and implemented mp4 video preview maker in c++ from scratch.
- Experiments and presentation of TCP Congestion control algorithms (Reno, New Reno, Cubic, BBR).
- Performance analysis of netmap, experiments to get highest possible Packet Per Second Rate.
- eBPF and XDP analysis, presentation and demonstration, application of it in DDOS attack mitigation.
- Simulation results of Multi-path QUIC. Analysis and Presentation for MPQUIC (Alternative of TCP developed by google).

• Development and Formal Release work (IoT: Internet of Things).

- Linux support for RPL (Routing Protocol for Low Power and Lossy Network).
- RFCs implementation for lwip (light weight ip stack). Implementation of IOCTLS. Bug-fixes and modifications in existing open-source code according to requirements.
- Added RPL support in lwip, APIs for adding static default routes and prefixes, Stateless auto configuration of global addresses. Hop by Hop header creation and processing, functionality of enabling/disabling MAC security for a particular flow (TCP/UDP) etc.
- Unit Testing and functional testing using Python and Scappy.
- Flow level testing using Castella framework.
- Quality related tasks: Static tools and CodeDX (Coverity and fortify) issues resolution and analysis.

Protocol for Distributed Network Attached Storage (NAS).

- Optimizations for large IO operations.
- Worked on protocol for distributed cache to accelerate distributed NAS storage.

M.Tech. Courses

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| • Algorithms and Complexity | • Artificial Intelligence | • Performance Analysis of Computer Systems and Network |
| • Kernel Programming | • Mobile Computing | • Development of Mathematics in India |
| • Advanced Computer-Network | • Foundations of Network Security and Cryptography | |

Technical Skills

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| • Programming Languages: C, C++, Core Java, Python, Prolog. | • Scripting Languages: Bash, Awk, Sed. |
| • Web Development: HTML, CSS, Javascript. | • Tools: Vim + tmux + cscope, Eclipse, Android Studio, Gnuplot, Pyplot, ns3 Simulator, CMake, Makefile, Git, Docker, Beamer, L ^A T _E X, MS Visio. |
| • Debugging & Testing: gdb, Wireshark, Scappy, google test, Valgrind, PC-Lint, codeDX (Coverity, fortify). | • Databases: PostgreSQL. |
| | • Operating Systems: Linux, Windows. |

Fields of Interest

Computer Networks, Algorithms, Operating Systems

Positions of Responsibility

• Teaching Assistant-ship, IIT Bombay:

- **CS 305 Computer Architecture:** Prepared Tutorials and solution, evaluated quizzes and midterms.
- **CS 341 Computer Architecture Lab:** Conducted lab sessions.
- **CS 101 Computer Programming and Utilization Lab:** Conducted Lab sessions, guided 14 students, evaluated quizzes, midterm and Endsem. - Supervised 3 teams, Pyramix solver, Air hockey, Carrom.
- **Senior TA CS101:** Managed lab of 90 students and 9 Junior TAs. - Conducted Lab sessions as STA, coordinated Junior TAs, Managed records of students.