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EDUCATION

Indian Institute of Technology, Bombay, India
Bachelors of Technology in Computer Science and Engineering — Aug 2011 – Aug 2015
Cumulative GPA of 8.95/10.0

INTERESTS

My research interests lies in the area of Systems, with a particular interest in Networks and Virtualization. My explorations have led me to be fascinated by Software Defined Networks and its intersection with Cloud Computing and Datacenter Networks. I am also interested in Network Function Virtualization combined with SDN. I am also interested in Network Security, particularly in correlation with SDNs.

RESEARCH PROJECTS

Using SDNs in Cloud Environments
Undergraduate Thesis Project — Jul 2014 – Ongoing
Prof. Purushottam Kulkarni and Prof. Umesh Bellur
Studying open research problems in clouds where Software defined Networks can be applied to. Current work involves classifying SDN research areas and exploring problems in existing research works.
Exploring on problems in network provisioning in clouds, providing QoS guarantees : one example is VM-to-VM bandwidth guarantees using the Software-defined Networking paradigm. Studying network monitoring and traffic engineering as sub-problems to provide guarantees.
Explored functionalities provided by the data plane elements, namely OpenFlow switches and various VM network virtualization techniques(eg. SRIOV). Another aspect we are exploring is data plane optimizations to overcome limited TCAM space in OpenFlow switches.
Deploying OpenStack (with Neutron) and using VMware's NSX and OpenDaylight to explore the current functionalities provided by the cloud management platform for networking and implement extensions.

File Transfer Using Wireless Multicast in Classroom Environments
Research and Development Project — Jan 2014 – Ongoing
Prof. Kameshwari Chebrolu
Working on video streaming to Android smartphones/tablets in a classroom using wireless multicast and propose efficient and reliable techniques to transfer files in this environment.
Conducted various experiments in a classroom environment varying the wireless data rates, RSSI and different modes to measure throughput and loss rates, to analyse the feasibility of data transfer using WiFi. Developed a prototype Android application to send a file reliably from a server to multiple clients.
Analysing the performance issues in multicast, we have developed a framework in Android to transfer files reliably using multicast. Various factors to consider in the framework is total time taken to complete file transfer, feedback suppression and forward-error correction techniques.

RESEARCH INTERNSHIPS

Distributed Memory Systems
Fraunhofer ITWM, Kaiserslautern, Germany — May 2013 – Jul 2013
Dr. Mirko Rahn
Implemented a Distributed Hash Table for Fraunhofer's communication middleware GPI which including program analysis, program specification, testing and reporting.
Used MIT's Chord distributed lookup protocol, which maps nodes to keys. Implemented methods for distributed put and get functions and node joins for a n-node parallel cluster. Also implemented a barrier to detect distributed termination detection. Coded in C++ using GPI, a parallel programming library which provides sychronized and asynchronized communication across multiple nodes.

Hadoop Optimizations
Samsung Software R&D Center, South Korea May 2014 – Jun 2014
Dr. Jeongshik In and Dr. Jaehoon Ko
Proposed four Optimizations for Hadoop's Distributed File System. Analysed and modified the source code of HDFS to find the performance bottlenecks and add features using Java.
Replicator : Independent module to find frequently accessed files in a cluster and increase its replication factor.
Disk Access Optimization : Analysed the bottleneck in read operations at a datanode and implemented a memory-buffered read to reduce disk seeks. Achieved a 6 percent improvement for a single datanode benchmark.
Balanced Block Placement Policy : Modified Hadoop's default block placement policy to create a balanced cluster by accounting memory usage of nodes and racks while choosing a node to place a replica.
Block-level Caching and Pre-fetching : Extended HDFS's file-level caching mechanism to a finer block-level caching and performed pre-fetching of blocks in a read operation. Achieved a 6 percent improvement in a 4-node cluster.

Virtual Network Diagnosis using SDN
DIANA Labs, INRIA Sophia Antipolis, France May 2015 – Jul 2015
Dr. Theirry Turtelli
Mechanism to identify origins of network failures in virtualized environments.
Will be working on a API to link the overlay system and the underlying infrastructure and implementing a fault measurement plane to detect failures in bounded time with minimum signaling overhead.

ACADEMIC HONORS & AWARDS

Secured All India Rank 87 in IIT-JEE 2011 out of 485,000 students.

Secured All India Rank 3 in 10^{th} CBSE Board Examination. Was invited by the PM's Office to witness the Republic Day Parade from the Prime Minister Box in New Delhi in 2010.

Awarded Certificate of Merit for being among National top 1% students in Indian National Physics and Chemistry Olympiad and selected for the 2nd level in both.

ACADEMIC PROJECTS

Virtual Memory Management
Prof. Dhananjay Dhamdhere Spring 2014
Implemented a virtual memory manager for a simplified operating system running on top of Linux.
Implemented page-in, page-out operations involving memory, swap space of processes, mechanisms to allocate non-contiguous pages, TLB cache and second chance page replacement policy clock algorithm.

Spammer Botnet
Prof. Bernard Menezes Autumn 2014
Implemented a botnet which can be commanded to send spam and execute DDoS attacks.
Studied various botnets which used peer-to-peer protocols and implement a peer-to-peer botnet architecture as a PoC which can perform TCP SYN flood attacks. Designed a basic botnet intrusion detection system.

Live Gesture Recognition
Institute Technical Summer Project June 2012
Developed a software program, in a team of four, which enables the user to control basic operations using gestures.
It is a combination of live motion detection and gesture identification. Implemented using the OpenCV library in C++, for processing the input of the webcam and identifying the gesture made by the user.

Query Optimizations for In-Memory Databases
Prof. Umesh Bellur Autumn 2013
Created a basic in-memory SQL database processing and execution engine with query optimisations.
Built a SQL parser which converts a SQL query into a execution plan. Performed query tree reordering and join-order optimisations using statistical sampling of table data for cost estimation to find optimal query execution plan.

Web Search Engine
Prof. Varsha Apte Autumn 2012
Search program for keywords in a given dataset of web pages and displays the results according to their priority
Parsed the web pages into a standardized XML template to make searching and formatting easier. Implemented the Google's PageRank algorithm for ranking pages based on the directed links.

Talks and Seminars

A Survey on Existing Distributed Hash Table Implementations — May 2013
Presented a talk to my research group on existing DHT implementations (Chord, CAN etc.) and discussed the best implementation suited for Fraunhofer's GPI library based on complexities.

Turing's Test — Apr 2014
Presented a seminar on Turing's Test where we explained the test proposed by Turing, the different critiques to it, the Chinese Room argument, the reverse Turing's Test and CAPTCHA.

A Talk on Software-Defined Networking — Oct 2014
Presented a talk on Software-Defined Networking to my research group, explained the basic concepts, proposed classifications and discussed existing research in these sub-fields.

Positions Held

Mentor, Institute Student Mentorship Programme — 2014-2015
Mentoring a group of 12 freshmen and easing their transition to the academic and social aspects of institute life. Also serving as a Department Academic Mentor to 12 sophomores, guiding them about CS academic aspects.

Internship Coordinator, Placement Cell — 2013-2014
Involved in the communication and scheduling of various companies as well as universities and assisting them in the process of recruiting of students for internships. Awarded Certificate of Appreciation by Dean, Academic Affairs for exemplary work during the tenure.

Technical Skills

Proficient in C++, Java.
Familiar with Android, Python, Latex, Assembly, Hadoop, POX OpenFlow controller.

Courses Undertaken

Networks : Computer Networks and Lab, Network Security and Cryptography
Systems : Topics in Virtualization and Cloud Computing, Operating Systems and Lab
SDN : Software Defined Networking by Nick Feamster(Georgia Tech) on coursera.org

References

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