Abhimanyu Rawat

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Researcher in Systems and Networking domain. Ex-Software Engineer at EMC^2 (now DellEMC), Pune in DDOS(Data Domain Operating System) team. Passionate about Computer Networks, Cloud networking, Distributed Computing and Software Verification, with strong technical, problem solving, leadership and interpersonal skills for working in a team.

Experience

- **Research Assistant at Linkoping University** — **Linkoping, Sweden**
  Computer Networks and Operating Systems — *February 2019 – Present*

- **Software Engineer at EMC(Now DellEMC)** — **Pune, India**
  Protocols Engineer, Data Domain Operating System — *July 2017 – January 2019*

- **Google Summer of Code Intern - Ste||ar Group (HPX)** — *May 2017 – July 2017*
  Mentored by: Bryce Adelstein Lelbach, Researcher and Software Engineer, Lawrence Berkeley National Laboratory, CA, USA

- **Software Engineering Intern at EMC** — **Pune, India**
  Mentored By Somnath Gulve, Director, Software Engineering — *January 2017 – June 2017*

- **Application Developer Intern at Navayuga Info. Spatial** — **New Delhi**
  Mentored by Gaurav Gandhi, VP Software Engineering — *May 2013 - June 2013*

Education

- **Birla Institute of Technology and Science (BITS Pilani)** — **Pilani Campus**
  Master of Engineering, Computer Science , First Division(8.03 CGPA) — *2015 - July 2017*

- **Apeejay College of Engineering, Sohna** — **Gurugram**
  Bachelor of Technology, Computer Science , Honored First Division — *2009 - 2013*

Online MOOCs

- **Cryptography - Stanford** — **Coursera**
  By Dan Boneh,

- **Cloud Networking** — **Coursera**
  By Ankit Singla(ETH Zurich) and Brighten Godfrey(UIUC) ,

Publication and Seminar

- Decentralized Firmware Attestation for In-Vehicle Networks, 5th ACM Cyber-Physical System Security Workshop (CPSS 2019), Mohammad Khodari, Abhimanyu Rawat, Andrei Gurtov, Mikael Asplund (Paper Accepted - To appear)
- A Novel Energy Optimization Approach for Artificial Intelligence-enabled Massive Internet of Things, SummerSim 2019, International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS), Ali Hassan Sodhro, Mohammad S.Obaidat, Sandeep Pibhulal, Gul Hassan Sodhro, Noman Zahid and Abhimanyu Rawat (Paper Accepted - To appear)
- Evaluation of an Online Anxiety Intervention for College Students in India: A feasibility study, International Journal of School Educational Psychology 2018 (Under Review)
- Hybrid Data-centre Scheduling, by Abhimanyu Rawat and Arpit Srivastav, Research Seminar Dec. 2016, BITS Pilani Campus, Under Assist. Proff. Kuldeep Kumar (Ph.D. NUS Singapore)

Ongoing Masters Thesis Supervision

- Vendor-Independent Software-Defined Networking - Santiago Pagola Moledo, Ericsson
- Time Distribution in Secure Systems - Daniel Mansson, SAAB Systems
- Implementation and evaluation of the ACE-protocol stack over 6LoWPAN - Jaocb Johansson, Attentec AB
- Co-supervising two independent research studies on IoT trends on Industrial Control Systems

Academic Achievements

- Stood in top 40 students among 10000 students appeared for BITSAT Higher Degree entrance exam 2015
- Merit Scholarship cum. 40% Fee Wavier, BITS Pilani, offered only to 5% of the higher degree students
- National Eligibility Test (NET-exam) qualified in first attempt, Eligible for lecturership and Ph.D.(Govt. Sponsored) in any university across India, Only 6% of students qualify, GATE Qualified 2015
- Awarded sponsored studentship to represent online intervention platform at Sangath Conference held in Goa India on 10-11 December 2016, developed under HoD Dr. Rahul Banerjee(BITS Pilani) and Dr. Barr C. Taylor(Stanford)
- ACM International Collegiate Programming Contest(ICPC) - Honorable mention, 2013 organized by IIT Kanpur, Finished 3rd in Codility Titanium 2016 coding Challenge, Semifinalist in HackerRank University World Cup 2015
- Identified bug in payment processing portal of Flipkart.com, TheMobileStore.in and ccavenue.com, that lets you shop for thousands of dollars, the bug showed discrepancy with the bill amount which you can control through parallel payment page of the same website.
- First prize in Debugging contest and Junkyard wars at Contrivance, Technical College Festival(20+ colleges) at Apeejay College of Engineering, Gurugram, India

Other Relevant Experience

- **Course Instructor - Know your OS** **Pilani Campus**
  Designed and taught semester wide Operating System course, SDET Unit , August 2016 – December 2016
  Special evening course for Bachelor students from 1st to 3rd year of college, received on roll pay apart from institute and departmental scholarships

- **Lab Instructor - Computer Networking Course** **Pilani Campus**
  Chief Lab Instructor of Computer Networking course, *January 2016 – May 2016*
  Conducted biweekly lab sessions of Bachelor of Computer Science class(strength 80) as a part of their ongoing semester's Computer Networks course. Sessions based on work based on Mininet, ns-2, wireshark, tcpdump, DNS server, ftp server etc.

- **Teaching Assistant for various On and Off campus courses** **Pilani Campus**
  TA Theory of Computation, Computer Network(off-campus) , *August 2015 – May 2016*
  Regular course work for Theory of Computation - Autumn 2015 and correcting answer sheets Computer Network course(WILP off-campus)

Academic Interests

- Computer Networks - Cloud Networks, Security, Distributed computing
- Internet Architecture
- Operating system - HPC infrastructure and systems
- Data Science

Computer skills

- **Programming Languages:** Proficient in: C, C++, Python, Git, bash, TeX
  Also basic to Moderate ability in: Lisp, Java, JS, R
- **Industry Software Skills:** Wireshark, mininet, ns-2, Omnet++, Django, Flask, Android SDK, MySQL, MongoDB, Docker, Raspberry Pi and more
- **Operating Systems:** Linux, Windows, iOS

Extra-Curricular and Interests

- Certified Scrum Master, by Scrum Alliance Certificate ID 000837249 .
- Professional Assistant, ARCD (Academic Registration and Counselling Division) BITS Pilani. Developed Database Management tool and maintained department Website.Resolving conflicts during academic registration period
- Qualified multiple Government of India's group A service exam.
- In-charge of HCI(Human Computer Interaction) Lab at BITS Pilani
- Developed university festival websites, Organizer cultural and technical festival, Apeejay College.
- Fast Sudoku and Rubik's cube solver for fun, big sitcom fan, avid reader, culinarian, currently mentoring 4 students from colleges across India.

OVERVIEW OF PAST WORK

Protocols Engineer, EMC (DellEMC), Pune, India.....

Developer of CIFS protocol based features, supports SMB 1,2,3 and internal implementations for some other modules. Maintainer of the Protocols section upgrade infrastructure and authentication service backed

by Kerberos and Active Directory. Focus on delivering customer impacting features more on a daily basis. Implementing the scale-out feature for CIFS protocol.

Project Information

- **DDOS Protocols:** Data domain operating system is the propriety operating system which runs on top of CentOS patched accordingly as per the product needs. DDOS tenants multiple network file sharing services like NFS, CIFS and BOOST(in-house). I handle CIFS related features like making sure it supports the scale-out feature from the scratch, with initial work around features. In the midst, I learned the whole upgrade infrastructure(software side). Patched the SMB1 vulnerability for the product. I find occasional fun uncovering/filing product bugs (20+ so far).
- **Agile Development - Scrum Master :** At DellEMC we follow the agile methodology in development, I am also the Scrum Master, responsible for sprint planning i.e. creating the development stories/tasks which aligns with our future development strategy to meet our business ends. At daily stand ups I account each developer for the work they have done and accordingly set the coming targets. Eventually after each spring I give presentations to the engineering-managers and draft the future development direction.

Google Summer of Code - Ste||ar Group (HPX)

My project goal was to develop a solution to detect stack-overflow in HPX threads that can be used in any general run-time use case. I wrote wrappers via which libsigsegv can be included in the HPX code base. It enabled a user space run-time solution as a system level solution can be done in Linux kernel. Left project early to join the full time job as a Protocols engineer.

Project Information

- **HPX Runtime System:** In current Linux systems, stack overflow is considered as a segmentation fault, while windows platform has implemented a solution where they can distinguish between a stack overflow and segmentation fault. Former is the case with HPX and thus reported as SIGSEGV, which is undesirable in HPX runtime.
- **Guard Pages:** Its a memory page which is read and write protected, appended at the end of stack space for user thread, as HPX thread are fine grained, when size increases guard page is accessed and with the help of proper signal handlers stack-overflow will be handled. Libsigsegv already supports this.

EMC - (Master's Thesis work)

I developed a service which runs on Data Domain Operating System, works in parallel with client side infrastructure, making sure that each and every service i.e. protocols, DNS, LDAP, Kerberos etc is running correctly. On client side, there are supplementary machines for DDR box such as DNS, Kerberos, NIS, AD server etc., which needs to work correctly all time with dynamic settings. I solely developed this tool from scratch, with my mentor and Professional Services people who gave me customer data such as system logs, core dumps, bugs etc. and I found the most frequent bad configurations. I used open-source tools such as Paramiko for connecting hosts, I integrated the tools to work with python framework, learned about the protocols, found out some annoying features of some libraries which are mostly hidden/undocumented and makes system buggy. In the whole process I filed a few bugs in the DDOS(EMC propriety Operation system). Service now works with DD boxes shipped across the globe.

Project Information

- **DDOS:** Data Domain Operating System, which sits on client side for data backup, recovery and archiving. It supports various protocols through which data is flushed in to de-duplicate and then make backup copy. Protocol such as NFS, CIFS and EMC's protocol. Often in the ever dynamic environment these settings changes all the time, and often arises problems. I narrowed down the points of failure and developed efficient work-flow to check all the possible scenarios which can affect the system.
- **Operational dependencies:** Working with thousands of client side hosts in multiple domains and user

groups, the need to setup the correct configured deployment is absolutely necessary. Any failure can be catastrophic on the overall system. I developed an adaptive solution as if one essential feature fails for a particular host then all depending checks will be excluded for that entity. Leaving a complete status of the host in order to report what went wrong and how to locate/fix it.

- **Command line Interface, GUI and multi-OS compatibility:** As deliverable, a Command line Interface with advanced logging facility to run analytic on and a human-readable web report is integrated. Used PyIntaller for packaging and Flask as a unit server for portable binaries. Executable for both Linux and windows are developed.

Navayuga Info. Spatial

Developed a hybrid mobile application for company's internal inventory management system. I developed an Android application, through which all inventory data can be logged and fetched at various company's storage/outlets. I worked directly under VP of Engineering(Gaurav Gandhi), we locked the initial design and development. Getting required specifications in a timley manner and developing by blocks turned out to be more convenient once I developed the back-end interaction module. Used company's existing database design and store.

- **Hybrid Application:** Hybrid application design provides the liberty to include content rich and responsive web designs. I designed and developed the project from scratch in Java - Eclipse in less than a month and along with integration team developed its back-end modules.
- **Design Implementation:** The aim to develop an application with web view like design is little challenging as existing window creates a little delay and indentation. So keeping page size small and content components at a flexible margins required more effort. During this period, weekly meetings with senior engineers and VP proven out to be very helpful in locking the end design and eliminating development challenges to avoid structure like tables.

Selective College Projects

In college I worked on diverse set of projects, involving Cloud Computing, Web platforms, Operating system, on-going campus research projects etc. The learning experience not only enhanced my technical knowledge but also leadership skills. I have experience both managing up, working with head of the departments, advising professors, project directors etc., as well as managing down, leading a team of software developers. Details of some of my major projects (involving software design and development) are given below:

- **Mana Maali : A Stanford-BITS initiative:** *'Online Mental Health intervention platform'*

  An online platform for conducting mental health interventions for University students worldwide. It is a joint project in association with Stanford University and BITS Pilani(Development centre), with stakeholder from Palo Alto University, Penn. State, White Swan foundation and Sangath. Platform is build on Django, MySQL and MongoDB. Platform has adaptive sessions for students with interactive features and an upcoming secure end-to-end chat module. Authorization tool for administrator, managing control over the content and people associated.

  I lead the product development team of 7 students/software developers under the supervision of Dr. Rahul Banerjee (Head of Department Computer Science, BITS Pilani). We developed this project from scratch, and continuing it's development for next phases.

- **Introduced efficient Certificate Revocation List(CRL) mechanism**

  For VANET devices introduced an efficient schema for CRL list through bloom filters, and proposed a new idea to save data using directional meta-data tag on data packets to vehicular devices in ongoing research project on Intelligent Transportation System(ITS) at Networking and pervasive lab, BITS Pilani

- **Data-Center Scheduling using Hybrid approach**

  Improved the efficiency of the Data Centre scheduling Algorithms HAWK and Mercury, using the variable Cluster size and Task size of classifying it as short or long job. Observed a 10 percent time efficiency than previous approaches.

- **Semi-Autonomous bot using Raspberry Pi**

  Built a semi-automatic bot for real-time video streaming on college LAN network and detecting faces using open CV

- **Correlation analysis between text document using Hadoop Map-Reduce and OpenMPI**

  Developed Hadoop and OpenMPI job to read large set of text document, find the keywords in documents, then create a weighted graph for common keywords in document which was used for correlation analysis of the document corpus.

References

- Prof. Rahul Banerjee, Director LNMIIT, Jaipur, India
  ex-Head of Computer Science Department, BITS Pilani, India
  Email: rahul.banerjee@lnmiit.ac.in
- Ranjeeth Kumar Dasineni, Engineering Manager(Network Engineering Team), Facebook - Menlo Park,
  Email: ranjeeth@fb.com
- Prof. Craig Barr Taylor, Stanford University, CA, USA
  Email: btaylor@stanford.edu
- Somnath Gulve, Director, Software Engineering, DellEMC, Pune, India
  Email: somnath.gulve@emc.com