Pallav Agarwal

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Education

July 2014 – Present | **Indian Institute of Technology, Kanpur**, *Bachelor of Technology*, Computer Science and Engineering, CGPA: 9.94/10.

Awards and Achievements

Present | **CGPA 9.9**, *Indian Institute of Technology, Kanpur after 8 semesters*.
2014 | **All India Rank 188**, *Joint Entrance Examination (JEE) Advanced*.
2014 | **All India Rank 475**, *Joint Entrance Examination (JEE) Mains*.
2013 | **All India Rank 255**, *Kishore Vaigyanik Protsahan Yojana (KVPY)*.
2010 | **Scholarship Awardee**, *National Talent Search Examination (NTSE)*.

Work Experience

May 2017 – July 2017 | **Software Engineering Intern**, *Google NYC*, Supervisor: Julio Merino, Philipp Wollermann.
- Built a FUSE file system (from scratch) capable of mounting files and directories in form of an arbitrarily nested tree under a provided mount point.
- Supported mounting with read-only mappings and read-write mappings, needed to isolate the build actions of Bazel (http://bazel.build), the build tool used by Google.
- Supported "on the fly reconfiguration" of the mounted filesystem, for fast sandbox recreation, as unmount-remount cycle is usually too slow.
- Open-sourced under the bazelbuild organization on GitHub (bazelbuild/sandboxfs).

Apr 2016 – Sep 2016 | **Google Summer of Code**, *Gentoo Organization*, Supervisor: Sébastien Fabbro, Nitin Agarwal.
- Created Orca, a continuous stabilization and build system to automatically build and test packages with respect to the Gentoo Operating System.
- Used Docker, Kubernetes to build a parallel and scalable server for the management of build jobs as well as computation of build requirements on the basis of dependency trees.
- Built a job management server for an "opt-in" service for resource heavy jobs which could be used by volunteers to devote computing time for stabilization jobs.

Nov 2015 – July 2016 | **Software Intern**, *Joint Seat Allocation Authority*, Supervisor: Prof. Surender Baswana.
- Created the software to perform allotment of students to respective institutes (IITs, NITs, IIITs, GFTIs).
- Improved over previous year's algorithm to reduce the run time of the algorithm to $(1/7)^{th}$ of original.
- Spent a month at National Informatics Centre Delhi, during the Joint Seat Allocation, where our software was used to allocate seats to 1.2 million students who had written the JEE 2016 exam.

Projects

Aug 2017 – Nov 2017 | **NDFS: Kernel file system spanning multiple disks/partitions**,
Course Project: IIT Kanpur, Supervisor: Prof. Debadatta Mishra .
- Created a fully functional file system for the Linux Kernel that supports spanning multiple physical disks.
- Introduced 'ndfs_ladder', a way to order the disks based on underlying device properties to enable the NDFS file system to optimize data organization based on them.
- Showed proof of concept of optimizations based on properties like different read/write speeds of disks.

Jan 2017 – Apr 2017 | **Tipsy: Tool to provide tips and corrections for MOOC submissions**,
Undergraduate Project: IIT Kanpur, Supervisor: Prof. Amey Karkare.
- Created a tool in Scala to parse, analyze and classify C programs from large programming courses, to help provide suggestions and tips to weak students.
- Reduced C programs to a high level representation, to find shortest distance between 2 programs.
- Classified programs to provide suggestions to students based on programs similar to their submission.

Jan 2017 – **Amigo: x64 Compiler for Golang**, Course Project: IIT Kanpur,
Apr 2017 Supervisor: Prof. Amey Karkare.
- Implemented a compiler for a fully functional subset of the Go language, in C++ and Python.
- Used flex and bison to obtain an AST, which is later translated to a x64 assembly.
- Implemented pointers, multiple return values, deeply nested arrays, structs, among other features; along with some low level optimizations.

Sep 2016 – **YourHonour: A Kubernetes based decentralized judge for programming competitions**,
Nov 2016 Course Project: IIT Kanpur, Supervisor: Prof. Piyush P. Kurur.
- Inspired due to lack of FOSS programming contest judges which are easy and intuitive to deploy.
- Created a fully functional judge which can be deployed instantly on a kubernetes cluster with support for 6 default programming languages, while adding more is as easy as using a docker image.
- Implemented a fully functional GUI, and protection against malicious user given codes.

May 2015 – **Cimulator: Interactive system to teach ESC101 (Fundamentals of Computing)**,
2016 Summer Project, IIT Kanpur, Supervisor: Prof. Amey Karkare.
- Wrote an interpreter for C in python to cover the topics taught in first year programming course.
- Simulate a user's C program visually to help him understand core concepts.
- Help students avoid common errors by using familiar visual cues (similar to those shown in class slides).

2014, 2015 **Code.Fun.Do Hackathon**, Microsoft, Consecutive two time winner.
Multiple small projects done as a part of Code.Fun.Do hackathon organized in campus.
- An application to parse and plot graphs of implicit math functions using C#, for Windows Phone.
- A platform to learn coding for Windows Phone, with a custom online judge written in Node.js.
- A port of Cimulator (see above) for Windows platform to run as a native application.

Oct 2014 – **Badminton playing robots**, ABU Robocon, Supervisor: Prof. Bhaskar Dasgupta.
Mar 2015
- Developed robots to play doubles badminton on a real court against the opponent.
- Involved in programming the robot to predict the trajectory of shuttlecock using computer-vision.
- Used live video feed from Microsoft Kinect to track the shuttlecock.

Publication(s)

Apr 2018 **TipsC: Tips and Corrections for Programming MOOCs**, Co-Author, Poster Paper.
- Selected for presentation at the 19th International Conference on *Artificial Intelligence in Education'18, London* (AIED'18).

Technical Strengths

Languages C++, Go, Python, NodeJS

Tools Git, LaTeX, Vim, Docker, Kubernetes

Relevant Coursework

A^*	Data Structures	A^*	Algorithms	A^*	Compiler Design
A^*	Theory of Computation	A	Computer Architecture	A^*	Computer Systems Security
A	Computer Organization	A	Computer Networks	A	Operating Systems
A^*	Introduction to Programming	A^*	Abstract Algebra	A^*	Discrete Mathematics
A^*	Linux Kernel Programming	A	Advanced Compiler Optimizations	A	Topics in Distributed Systems

A^* - Awarded for outstanding performance

Extra Curricular Activities

2016 – 2017 **Coordinator, Programming Club**, IIT Kanpur.
- Conducted workshops and lectures on various topics, including those on python, linux, and open source.
- Set problems for, and organized programming contests for students on campus.

2016 – 2017 **Coordinator, Association of Computing Activities**, IIT Kanpur.
- Lead the CSE departmental body of the institute in hosting department specific activities like competitions conducted by other companies (Microsoft, Tower Research, among others).
- Coordinated group projects of students by finding mentors from students of different batches and assigning projects ideas to different groups.