Mohit Kumar

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Education

Year	Degree/Certificate	Institute	CPI/%
2020-Present	M.Tech (Computer Science & Engg.)	Indian Institute of Technology, Kanpur, U.P	9.0/10
2016-20	B.Tech (Computer Science & Engg.)	Bharati Vidyapeeth College of Engineering, New Delhi	8.97/10
2016	CBSE(XII)	St. Kabir Modern School, New Delhi	89.6%
2014	CBSE(X)	Holy Mossion Sr. Sec. School, Muzaffarpur, Bihar	10/10

Research Experience

- **FFT Communication Optimization|M.Tech Thesis|** Guide : Prof. Preeti Malakar (*May'21-present*)
  - Optimizes communication of **FFTW** and **FFTK** library. Experimenting with profiler to figure out the functions causing bottleneck in communication.
  - Implements **hierarchical** and **non-blocking** version of MPI collective algorithm to reduce the communication time.

Projects

- **Cache Simulator to study the effects of architecture and replacement policies on Hit and Miss Rates**
  Instructor : *Prof. Mainak Chaudhari(Course: CS622A)* *Repository* (*Sept'20-Oct'20*)
  - Implemented a **Cache Simulator** in C++ to collect data on hit and miss rates at different levels of a cache hierarchy.
  - Analysed the effect of Inclusive,Exclusive and NINE inclusion policy on hit and miss rates and effect of Associativity.
- **Collective Algo Optimization**
  Instructor : *Prof. Preeti Malakar(Course: CS633A)* *Repository* (*Feb'21-Mar'21*)
  - Performed optimization of MPI_Bcast(), MPI_Reduce(),and MPI_Gather() Collective Algorithms on IITK cluster of nodes.
  - Designed the optimization by using **Topology-Aware** technique on star topology and analysed the effect on speedup.
- **Multi-Level Cache With Directory Based Coherence Protocol Simulator**
  Instructor : *Prof. Mainak Chaudhari(Course: CS622A)* *Repository* (*Nov'20-Dec'20*)
  - Built a **MESI** 2-level cache with coherence protocol simulator in C++ to collect data on hit and miss rates.
  - Performed and analysed the use of different type of message generated and received by L1 and L2 cache for coherence.
- **Analysis of Parallel Programs Using INTEL PIN Tool**
  Instructor : *Prof. Mainak Chaudhari(Course: CS622A)* *Repository* (*Oct'20-Nov'20*)
  - Generated memory access traces of various parallel programs with the help of **Intel PIN Tool** by using gcc compiler.
  - Analysed the traces for sharing patterns and reuse distance and the effect of **Cache Filtering** on reuse distances.
- **Data Decomposition Simulator**
  Instructor : *Prof. Preeti Malakar(Course: CS633A)* *Repository* (*Mar'21-Apr'21*)
  - Implemented a Data Decomposition Simulator in C for parallel program by using various MPI Collective Algorithms.
  - Analysed the variation of time upon using different process placement strategies on IITK cluster of nodes.
- **Network Packet Analysis**
  Instructor : *Prof. Sandeep Shukla(Course: CS628A)* *Repository* (*Feb'21-Mar'21*)
  - Analysed the network packet by **Wireshark** of sniffing some traffic generated in .pcap extension file .
  - Performed analysis for finding MAC address , IP address ,FTP protocol , domain names and cipher suites supported.
- **Exploitation of Web-based Vulnerability**
  Instructor : *Prof. Sandeep Shukla(Course: CS628A)* (*Mar'21-Apr'21*)
  - Performed attack on websites to find various severe vulnerabilities and to gain information from it.
  - Exploited web-based vulnerabilities by using **SQL** injection attack, **XSS** attack and **CSRF** attack.

Skills

- **Languages** *Experienced*: C, C++, Python. *Familiar*:HTML, CSS
- **Miscellaneous** Numpy, Pandas, MPI, Git, TAU-Profiler, HPC Toolkit, Nmap, Wireshark, LaTeX.

Achievements

- Secured **AIR 222** in GATE CS-2020.

Positions of Responsibility

- **Teaching Assistant :** Introduction to Programming (ESC-101). (*Sept'20-Present*)

Relevant Courses

Advanced Computer Architecture	Parallel Computing	Computer Systems Security	Computer Networks
Database Management Systems	Modern Cryptology	Intro to Machine Learning	Operating Systems