

# AJAY KUMAR GUPT

## Software Engineer

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**Results-driven Software Engineer** with 4+ years of experience designing and optimizing **high-performance distributed and backend systems** using **C, C++, Java, and DPDK**. Skilled in building **low-latency microservices** and **scalable data pipelines** leveraging **Redis, Kafka, and Aerospike**, achieving measurable **throughput and latency improvements** across production-grade platforms. Strong foundation in **system design, concurrency, and performance optimization**, with a proven record of **delivering fault-tolerant, large-scale services**.

## Education

**Indian Institute of Technology (BHU), Varanasi**

June 2017 – June 2021

Bachelor of Technology: Electronics Engineering – CPI: 8.31

## Technical Skills

- **Programming Languages:** C, C++, Java, Python, Shell Scripting, SQL
- **Core Technologies:** DPDK, Kafka, Redis (Cluster), Aerospike, REST APIs, HTTP/HTTPS
- **Platforms & Tools:** Linux, Docker, Git, Kubernetes, Wireshark, CI/CD
- **Focus Areas:** Distributed Systems, System Design, Microservices, Data Structures, Algorithms

## Work History

2021-06 - Current

### JIO Platforms Ltd.

Manager - Software Engineer, Navi Mumbai

- **Designed and developed** a **scalable, high-performance backend system** for **URL filtering and threat intelligence**, enabling **real-time domain classification and deep packet inspection** with **C/C++, DPDK, and Kafka**.
- **Integrated ENEA SDK** for **application-level DPI and signature-based detection**, supporting whitelisting/blacklisting and **multi-protocol application identification** across distributed nodes.
- **Developed a real-time malicious URL aggregation and classification service**, introducing **bitmask-based tagging** for multi-category threat analysis using **Java, Aerospike and Kafka**.
- Contributed to **IoT SCEF** development, optimizing **caching and scalability** using **Redis and Java** for high-throughput IoT traffic.
- **Designed and implemented** a **Java-based distributed Redis Cluster management system** for automated scanning, synchronization, and rule-based cleanup using **hash slot-aware parallelism**, improving cluster maintenance speed by **3x**.

**Key Technologies:** C/C++, Java, DPDK, Hyperscan, Wireshark, Redis Cluster, Aerospike, Linux, Docker, Kafka, REST APIs, HTTP/HTTPS

2020-05 - 2020-07

### Samsung R&D Institute Noida

Student Trainee (Intern), Noida

- **Developed an Android application** integrating **Augmented Reality (AR)** and **Machine Learning** for **real-time self-expression detection** (facial gestures, emotions) with 85% accuracy.
- Utilized **Google MediaPipe-inspired techniques** for **face mesh generation, gesture tracking, and AR overlays**, improving responsiveness for live interactions.

## Projects

### IoT SCEF (Service Capability Exposure Function)

- **Developed and optimized multiple core features** of the **SCEF node** compliant with **3GPP specifications**, enabling secure exposure of IoT service capabilities to external applications.
- **Implemented high-performance caching and retrieval** using **Redis**, improving system **throughput by 40%** and reducing **average latency by 25%**.
- **Engineered scalable backup and restore procedures** across distributed SCEF clusters to ensure **high availability and fault tolerance** in live networks.
- **Conducted comprehensive load and stability testing**, validating **latency, concurrency, and recovery performance** under simulated 4G LTE traffic.

**Tools & Technologies:** Java, Redis, 4G LTE, Jetty, Http/Https

## URL Filtering Engine (Secure Access Service Edge Platform)

- **Developed a high-performance URL filtering and DPI engine** combining **DPDK** for user-space packet parsing and **ENEA SDK** for application and content detection, achieving **~40 Gbps throughput** and **8.5M packets/sec** under sustained load.
- **Implemented inter-node communication and data synchronization** using **Kafka and Aerospike**, enabling distributed exchange of **subscriber, whitelist/blacklist, and malicious URL data** across SASE nodes.
- **Optimized DPDK pipelines** (Rx queues, worker distribution, memory pools, flow-rule optimization) and **tuned DPI thread scheduling**, sustaining **25 Lakh TPS for SIP** and **20 Lakh TPS for HTTP** traffic with consistent low latency.
- **Benchmarked performance trade-offs** across packet size, attribute count, and worker concurrency, achieving **25% throughput gain** and stable operation under continuous high-load tests.

**Tools & Technologies:** C/C++, DPDK, Hyperscan, ENEA SDK, Kafka, Aerospike, Wireshark, Linux, Docker, pktgen

## Accomplishments & Activities

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- Filed two patent applications for innovations developed at Jio Platforms:
  - *Bitmask-based Malicious URL Classification System* for **real-time multi-category threat intelligence and detection**.
  - *Distributed Redis KeyDB Cluster Management Framework* enabling **automated node synchronization and fault-tolerant operations** across large-scale environments.
- **Secured 1st Rank** in *Telescon'18*, the annual Astronomical event of **IIT (BHU) Varanasi**.
- Mentored teams in Robotron'18 & Telescon'18 annual events of **IIT (BHU) Varanasi**.