

UTKARSH BATHAM

M.Sc. Applicant 2027 · Cloud Security · Security Automation · Distributed Systems Defence
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EDUCATION

B.Tech. Computer Science Engineering

2022 – 2026

Cloud Technology & Information Security · ITM Vocational University, Gujarat

CGPA: 9.44/10 · GATE 2026: 522 — 97th percentile (AIR 6271 / 211,020) · IELTS 7.5 Academic (April 2026, IDP Ahmedabad)

Relevant Coursework: Cloud Security · Cryptography & Ethical Hacking · Database Security · Security Threats & Trends · Information Security · Distributed Systems · Theory of Computation · Cloud Deployment & Management (AWS) · Principles of Virtualisation · Computer Networks · Operating Systems · High Performance Computing

RESEARCH INTERESTS

Formal Verification of Security Policies · Cloud Security & Posture Management · Distributed Systems Security · Policy Enforcement in Cloud-Native Architectures

RESEARCH EXPERIENCE

Security Invariants in Distributed Cloud Systems

2025 – 2026

Independent Research Preprint · Self-directed (published on Zenodo)

- Defined three formally specified security invariants (RPS, TAR, APC) over a distributed RBAC and transaction system; constructed explicit TLA⁺-style violation traces showing how standard concurrency conditions break system-level guarantees despite per-service correctness
- Proposed and validated architectural fixes via BFS model checker (TLC-equivalent) across 1,851 reachable states (complete state space); verification revealed TAR requires atomic revocation propagation — a finding that tightened the fix specification beyond the original argument
- Published as Zenodo preprint: doi:10.5281/zenodo.20099386 (May 2026)

PROFESSIONAL EXPERIENCE

Cloud Computing Intern — TEJASKP AI SOFTWARE

Jan 2026 – Jul 2026

On-site · 6 months · AWS · Terraform · Kubernetes · Docker · GitHub Actions

- Audited and hardened 12 production IAM roles; documented blast-radius exposure, replaced with least-privilege alternatives, and enforced encryption at rest and CloudTrail audit logging via Terraform IaC
- Isolated a VPC endpoint misconfiguration routing Lambda–S3 traffic outside the intended network boundary via X-Ray distributed tracing in under 30 minutes; proposed automated drift-detection check adopted as standard practice
- Designed unified security-and-performance observability dashboards in CloudWatch; structured log groups so authentication failures and anomalous API call volumes surface alongside latency metrics
- Enforced continuous policy compliance across full infrastructure lifecycle, reducing overly permissive access configurations to zero

SECURITY-FOCUSED PROJECTS

CSPM — Cloud Security Posture Management

2025

Python · Lambda · EventBridge · SNS · S3 · CloudWatch · CloudTrail · Terraform · GitHub Actions · github.com/UTKARSH698/CSPM

- Automated CIS Benchmark v1.5 compliance scanning across IAM, S3, EC2, and CloudTrail; hourly EventBridge schedule with critical-finding → SNS alert latency under 5 s

- Implemented dependency-ordered auto-remediation: corrections crossing more than one control boundary per cycle are deferred to prevent collectively unsafe intermediate state
- Identified open formal-completeness question — whether dependency-ordered remediation is complete under all concurrent misconfiguration states — motivating graduate research

CloudFlow — Distributed Order-Processing System

2025

Python · Step Functions · DynamoDB · SQS · Lambda · AWS CDK · LocalStack · X-Ray · github.com/UTKARSH698/CloudFlow

- Built serverless SAGA orchestration system with automatic compensation; idempotency enforcement serves as replay-attack prevention primitive across four failure and security modes
- 50 unit and integration tests; load-tested at 1,100+ req/min across 50 concurrent threads with P99 < 120 ms

CloudPulse — Real-Time Analytics Platform

2025

Python · Kinesis · S3 · Athena · DynamoDB · Terraform · React · Cognito · AWS Glue · github.com/UTKARSH698/Cloud_Pulse

- Implemented Lambda Architecture with Kinesis speed layer and SQS batch path into partitioned S3 data lake; Cognito authentication and IAM least-privilege policies enforce security at every layer
- 24 h TTL DynamoDB counter store with SQS dead-letter queue; entire stack within AWS Free Tier limits

WikiQA RAG — Retrieval-Augmented Question Answering

2026

Python · FAISS · Sentence Transformers · Cross-Encoder · Pinecone · LLM-as-Judge

- Built full RAG pipeline with bi-encoder retrieval (FAISS / Pinecone), cross-encoder re-ranking, and source diversity enforcement to prevent answer collapse to a single document
- Implemented faithfulness evaluation using LLM-as-judge framework; demonstrated end-to-end ML engineering depth across retrieval, ranking, and answer quality assessment

AgriFuture India — AI-Powered Agricultural Marketplace

2024

Node.js · JWT · RBAC · REST APIs · PostgreSQL · Gemini AI · Razorpay · PWA

- Designed JWT-based authentication, OTP verification, and multi-role RBAC for a 4-person team marketplace; concurrent-order race conditions identified as a distributed-state integrity problem — the observation that directly motivated the formal research work
- 12,550+ LOC; 6 Gemini AI modules; Razorpay payment integration; PWA with offline support; 7 Indian language localisations; live on Render

TECHNICAL SKILLS

Security Cloud Security Posture Management · CIS Benchmarks · IAM Policy Enforcement · Cryptography (AES, RSA, SHA, HMAC) · PKI · Vulnerability Assessment · Ethical Hacking · Zero Trust · DevSecOps · STRIDE Threat Modelling

Distributed Sys. SAGA Orchestration · Circuit Breakers · Idempotency & Replay Prevention · Event Sourcing · Lambda Architecture · Eventual Consistency · TLA⁺ Formal Modelling

Cloud & IaC AWS Lambda · Step Functions · DynamoDB · Kinesis · S3 · SQS · SNS · Athena · EventBridge · CloudWatch · X-Ray · Cognito · IAM · CloudTrail · Glue · API Gateway · Terraform · AWS CDK

ML & Retrieval FAISS · Sentence Transformers · Cross-Encoder Re-ranking · RAG Pipelines · LLM Evaluation · Pinecone

Languages Python 3.11+ · TypeScript · JavaScript · SQL · Bash

Dev & Testing Docker · Kubernetes · LocalStack · GitHub Actions · pytest · moto · Structured Logging · Load Testing

Scores GATE 2026: 522 — 97th percentile (AIR 6271) · IELTS 7.5 Academic (April 2026, IDP Ahmedabad) · GRE: June 2026