Amirhossein Najafizadeh

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Research Interests

Distributed Systems	Virtualization	Computer Networks	Systems Security

Education

Ph.D. in Computer Science, **Stony Brook University**	2024 – Present
B.Sc. in Computer Engineering, **Amirkabir University of Technology**	2018 – 2023

Skills

Languages: Go (4 years), Python (4 years), JavaScript (3 years), C/C++ (3 years), Java (1 year), Rust (6 months)

Containerization & Virtualization: QEMU, Docker, Kubernetes, OpenShift, OpenStack, Operator SDK, Kubebuilder

Monitoring & Debugging: GDB, Ptrace, Pintool, Elasticsearch, Kibana, Logstash, Prometheus, Grafana, Thanos

Version Control & Configuration : Git, Ansible, SSH, Helm Charts, Operator Lifecycle Management, Gitlab CI, ArgoCD

Network & Security : Wireshark, WebRTC, gRPC, , Nginx, HAProxy, Nmap, LSM, eBPF, Cilium, Keycloak, Istio

Databases: SQL, MySQL, PostgresQL, MinIO, Ceph, CassandraDB, MongoDB, Redis, ETCD, Harbor Image Registery

Distributed Systems: RAFT, Paxos, Multi-Paxos, PBFT, Blockchain, EMQX, Kafka, RabbitMQ, NATS

Research

PTaaS (Penetration Testing as a Service)　　　　　　　　　　　　　　　　　　　　　　2024 - AUT
For my bachelor's thesis, I developed a distributed system to automate penetration testing for cloud-native applications. This system improved cloud security and reduced the costs of manual testing.

QJUMP over Linux Network Interface Card　　　　　　　　　　　　　　　　　　　　　　2023 - AUT
Under the supervision of Dr. Javadi, I conducted a research project using eBPF in Linux to prioritize network packets, filter irrelevant traffic, and dynamically rebalance network queues during high-traffic periods.

Jump Go Channels　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　2023 - AUT
Under the supervision of Dr. Javadi, I conducted a research project to enhance Golang channels by integrating priority queue support. This enabled more efficient rescheduling of items based on priority levels, improving overall performance.

MQTT Blackbox Exporter　　　　　　　　　　　　　　　　　　　　　　　　　　　　　2022 - Snapp
As part of a group project at Snapp, we developed a cloud-native system using the Go programming language to integrate with EMQX real-time clusters, enhancing monitoring and troubleshooting capabilities.

NATS Benchmarking using T-test　　　　　　　　　　　　　　　　　　　　　　2024 - Snapp-Cloud
As a project at Snapp-Cloud, I benchmarked the NATS message broker using hypothesis testing to assess its performance under various configurations, such as replication, queue size, stream replication, and delivery policies.

Professional Experience

Research Assistant at FSL　　　　　　　　　　　　　　　　　　　　　　　　　　　　Jan 2025
I am serving as a research project assistant in the File systems and Storage Lab under supervison of Prof.Erez Zadok. My projects focus on reliable and secure distributed file systems, storage solutions, cloud storage, and cloud-native apps.

Cloud Engineer at Snapp-Cloud　　　　　　　　　　　　　　　　　　　　　Jan 2023 - Aug 2024
I was a member of the Platform and App Delivery teams, responsible for managing OpenShift clusters and Kubernetes operators. My tasks included managing virtual machines using OpenStack, and implementing logging and monitoring systems like Prometheus and Thanos. I also supported continuous delivery through Gitlab runners and ArgoCD.

Software Engineer Intern at Snapp　　　　　　　　　　　　　　　　　　　　Jun 2022 - Dec 2022
I worked as a back-end development intern, responsible for maintaining VoIP, in-app chat, and CMQ services. My tasks included managing real-time services such as Kafka, NATS, and EMQX.

Projects

Stallion: Developed a high-performance message broker using the Go programming language, leveraging channels as queues to deliver messages with low latency for stateless applications.

Cloud Provider: Implemented a local VM-as-a-Service system using Python, QEMU, and the RabbitMQ message broker to set up UNIX virtual machines for AUT students use.

Safex: Built an application sandbox using C and ptrace to block unauthorized file access in Linux and redirect write operations to temporary files, enhancing system security against malicious applications.

APAXOS: Built a distributed block transaction management system using a modified Paxos protocol to scale transaction processing across multiple nodes.

PBFT: Implemented distributed transaction management for unsafe environments using Paxos and BFT to replicate transaction management in untrusted settings while scaling the system.

Sanjab: Built a Kubernetes operator using Golang and Kubebuilder to store K8S objects in Ceph storage, serving as a persistent backup in case of ETCD failures.

Ghoster: Implemented a serverless distributed system using Golang and MongoDB to execute Go programs seamlessly, without the need for Dockerfiles or Kubernetes manifests for deployment.

Blocker: Used eBPF and LSM to block file, program, and network access for applications in Linux, enhancing security and monitoring when running malicious applications.

CAAAS: Built a central authentication and authorization service using Golang and PostgreSQL for managing Kubernetes users, roles, teams, and namespaces.

Jetstream Mirroring: Securely mirrored NATS input traffic to different clusters using Benthos, replicating the NATS message broker across multiple geographical locations.

Strago: Implemented a fast distributed traffic controller using Golang to load-balance traffic between different applications, enhancing the system's fault tolerance.

Soteria: Developed a plugin in Golang responsible for authenticating and authorizing every request sent to EMQ, securing EMQX clusters at the application level.

Teaching Assistant

Operating Systems, Prof. Stark	Fall 2024 - SBU
Web Engineering, Prof. Alvani	Fall 2023 - AUT
Cloud Computing, Prof. Javadi	Spring 2023 - AUT
Computer Networks, Prof. Sadeghian	Spring 2023 - AUT
Operating Systems, Prof. Javadi	Fall 2022 - AUT
Database Design, Prof. Momtazi	Fall 2022 - AUT

Teaching Experience

Software Engineering — Spring 2024 - AUT
Teaching the concepts of continuous integration and delivery using GitLab CI and Jenkins.

Web Engineering — Fall 2023 - AUT
Teaching web development and security policies for building secure web apps and ensuring the trustworthiness of them.

Cloud Computing — Spring 2023 - AUT
Teaching the fundamentals of containers in Linux and their use in Docker container orchestration. Teaching the concepts of the QEMU, and its role in creating virtual machines.

Honors & Volunteers

Awarded a one-year full scholarship at Stony Brook University for being among the top applicants.	2024
Graduated in the top 10% of the Computer Engineering department's students of AUT.	2024
Co-founder of the ResearchCamp organization, focused on projects in distributed cache systems.	2021 - 2023
The main secretary and organizer of the 13th Linux & Open-source Festival at AUT.	2022
Member of the 2022 ICPC organizers for the West Asia first round competition in Iran.	2022
Member of the 16th term of the Scientific Association of the Faculty of Computer Engineering at AUT.	2021 - 2022