

Swarup Ghosh

Software Engineer

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WORK EXPERIENCE

Red Hat India Pvt Ltd

Senior Software Engineer

OCTOBER 2024 - PRESENT

- Leading the design and development of a new Kubernetes operator by proposing and implementing security enforcements that prevent privilege escalation through automatic **RBAC hardening**, **security context constraints**, and other security measures for routing MCP servers.
- Led the design and implementation of **Kubernetes KMSv2** resource encryption for enterprise OpenShift, a critical component of the platform's **security posture**. This involved rewriting the entire control plane **encryption controller distributed state machine**, ensuring compliance with **EU FSIs** and **EU+US Telcos**.
- Co-led the reviews of architecture, design and implementation for strategic investments into new operators for **secrets management**, **zero-trust workload identity management** involving SPIFFE/SPIRE, driving technical direction targeting **OpenShift's top 50 mega-customers**.
- Maintainer and **Engineering Product Owner** of **cert-manager operator for Red Hat OpenShift**, responsible for **security and bug fixes**, release activity leadership, and the development of new features which includes managing the entire lifecycle of the operator, from development to deployment and maintenance.

Red Hat India Pvt Ltd

Software Engineer

OCTOBER 2022 - SEPTEMBER 2024

- Release lead for the **OpenShift cert-manager operator** (Kubernetes managed X509 certificate PKI), responsible for quarterly releases, led the development to GA, **15+ bug fixes**, **3+ critical CVEs** and **10+ features**.
- Implemented various cross-component features for the OpenShift platform including writing **various controllers from scratch** for control-plane, different Golang operators, cloud infra, etc.

Red Hat India Pvt Ltd

Associate Software Engineer

OCTOBER 2021 - SEPTEMBER 2022

- Developed an improvised **cluster stability feature** for high-latency networks by implementing Worker Latency Profiles for OpenShift clusters enhancing the responsiveness of clusters at the edge; designed a state machine from scratch.
- Actively involved with the **Kubernetes sig-node community** to **enhance Kubelet pod relisting implementation** that now uses an evented mechanism; replacing polling with **evented gRPC streaming**, pod density could increased **4x** on large clusters.

EDUCATION

- 2023 - 2025

Master of Computer Science (MCS)
University of Illinois Urbana-Champaign, IL
- 2017 - 2021

Bachelor of Technology - B.Tech. (CSE)
GD Goenka University, Gurgaon
- 2017

Indian School Certificate - ISC (Science)
Delhi Public School, Newtown, Kolkata

TECHNICAL SKILLS

AREAS	Distributed Systems, Cloud-Native Security, Automated Site Reliability Engineering (SRE), Open Source, Containers, Hybrid Cloud, Micro Services, DevOps.
LANGUAGES	Go, Python, C, C++, JavaScript, Swift, PHP
FRAMEWORKS	Kubernetes, TensorFlow, PyTorch , controller-runtime.
TOOLS	Model Context Protocol (LLMs), controller-runtime, operator-sdk, cri-o, podman, docker.
PLATFORMS	Linux, Kubernetes , CUDA, Google Cloud TPUs, GKE, Microsoft Azure, Amazon Web Services, IBM Cloud: P/Z.
DATABASES AND STORAGE	etcd, MongoDB , CSI, Ceph, AWS S3, GCS, MySQL, PostgreSQL, M3DB.

ACTIVITIES

- OCTOBER 2024

Container Days Conference Hamburg
Tech Talk on Securing Kubernetes Edge Traffic using TLS Encrypted Gateway
- JULY 2023

Kubernetes Community Days Chennai
Tech Talk on Encrypting Secrets in k8s Clusters using KMS

- Involved in fixing **5+ high-priority customer-facing bugs** related to different Kubernetes components, including CRI-O, Kubelet and OpenShift Machine Config Operator (config updates to nodes under Containerized OSes).
- Reduced label cardinality by **at least 10x** (multiple orders of magnitude in larger clusters) for CRI-O metrics by **introducing new metrics** that follow Prometheus best practices.

MAY 2021 - OCTOBER 2021

Semut Technologies Pte Ltd *Software Development Engineer*

- Responsible for maintaining the metrics stack for the cloud platform, collecting, storing, and querying **3+ million metrics** for internal use. Implemented Prometheus exporters for telemetry from multiple distributed system components and deployed them efficiently in a large-scale setting and while working on fixes and improvements for an internal legacy project used for auto-scaling **20+** compute cluster nodes.
- Designed and developed backend components for APIs providing certificates, notifications, container images, secrets, metrics, etc., as different micro-services.
- Responsible for deployment and operations of **various multi-replica services** like HashiCorp Vault, Uber M3DB, Percona XtraDB Cluster, etc.

JANUARY 2021 - MAY 2021

Semut Technologies Pte Ltd *SDE Intern*

- Fix and implement various features of the Semut Cloud Platform using the Kubernetes API and various other frameworks, aimed at providing developers with the ability to create applications that can be globally scalable by developing low latency JSON REST APIs using go-kit for use with **10+ microservices** for multi-tenant workloads. Responsible for redesigning and refactoring a seamless yet performant MySQL Cluster as a Service for the Semut Cloud Platform

SEPTEMBER 2020 - DECEMBER 2020

DigiPathshala Pvt Ltd *Data Science Intern*

- Responsible for creating an API that could generate student reports identifying their strengths and weaknesses using SQL-based pipelines. Worked on applying analytics on structured data at a **5 million scale** to derive actionable business insights and drive client-facing interactions and participated in product design sprints to help ideate data-driven personalization initiatives for an EdTech platform.

JUNE 2020 - AUGUST 2020

Google Summer of Code *Student Developer (TensorFlow)*

- Systematically studied and implemented data adaptive image augmentation techniques to enhance the classification performance of modern CNN architectures.
- Worked on **3+ PRs** and a repository of reusable components for the TensorFlow ecosystem.
- Implemented **RandAugment** and **AutoAugment** using TensorFlow 2 ops.
- Developed various image processing functions and a high-level API to help construct pipelines that can well support various image data augmentation strategies.

- JUNE 2023 **Kubernetes Community Days Bengaluru**
Lightning Talk about *Kubelet Evented PLEG*
GD Goenka University Coders Club
- OCTOBER 2019 Workshop on *API Development using Node.js*
- FEBRUARY 2019 Workshop on *Git and Open Source*
- AUGUST 2017 **Christ University Tech Fest**
Full Stack Dev for a *Virtual Trader Web App*

ADDITIONAL PROJECTS

September – October 2019 **DeepFace**

- Developed a **tf.keras**-based implementation of the DeepFace paper; no other open-source versions existed at that time, trained on **Cloud TPU** accelerators with **3+ million** face images using efficient **tf.data** ETL pipelines.
- Achieved **91%** validation accuracy on VGGFace2 compared to **97.35%** on LFW benchmark reported by Taigman et al.

September 2018 – December 2019 **Attendance using Facial Recognition**

April 2018 – October **Spatial Micro-climatic Dashboard**

- Built an IoT-based Raspberry Pi sensor network to collect micro-climatic parameters (e.g., soil moisture, air gas levels) with a Google Maps API dashboard on MongoDB backend for real-time visualization of geo-tagged data.

July – August 2017 **Stock Exchange Simulator iOS App**

- Implemented a CoreGraphics-based plotting engine capable of rasterized 2D and line plots on iOS views.
- Built a full-featured iOS + web app simulating a stock exchange, used by **15+ teams** at a school fest.
- Awarded a Letter of Appreciation by Delhi Public School Newtown.