

Swarup Ghosh

Software Engineer

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WORK EXPERIENCE

Red Hat India Pvt Ltd Senior Software Engineer

OCTOBER 2024 - PRESENT

- Led the design and implementation of **Kubernetes KMSv2** resource encryption for enterprise OpenShift by rewriting the entire control plane **encryption controller distributed state machine**, ensuring compliance with **EU FSI**s and **EU+US Telcos**.
- Maintainer and **Engineering Product Owner of cert-manager operator for Red Hat OpenShift** responsible for **security and bug fixes**, release activity leadership, consistently delivering features and component development.
- Co-led the reviews of architecture, design and implementation for strategic investments into new operators for **secrets management, zero-trust workload identity management** driving technical direction targeting **OpenShift's top 100 mega-customers**.

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.
- 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.

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, Open Source, Deep Learning, Containers, Hybrid Cloud, Micro Services, Computer Vision, DevOps.
LANGUAGES	Go, Python, C, JavaScript, Swift, PHP, Java
LIBRARIES AND FRAMEWORKS	Kubernetes, TensorFlow, PyTorch, Model Context Protocol, controller-runtime, Node.js.
TOOLS	operator-sdk, cri-o, kubelet, podman, docker.
PLATFORMS	Linux, Google Cloud Platform, Cloud TPUs, Amazon Web Services, Microsoft Azure, 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
- JUNE 2023 **Kubernetes Community Days Bengaluru**
Lightning Talk about Kubelet Evented PLEG
GD Goenka University Coders Club

Semut Technologies Pte Ltd
Software Development Engineer

MAY 2021 - OCTOBER 2021

- 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.

Semut Technologies Pte Ltd
SDE Intern

JANUARY 2021 - MAY 2021

- Responsible for redesigning and refactoring a seamless yet performant MySQL Cluster as a Service for the Semut Cloud Platform using semut's go-sdk (developer toolchain)
- 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.

DigiPathshala Pvt Ltd
Data Science Intern

SEPTEMBER 2020 - DECEMBER 2020

- 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.

Google Summer of Code
Student Developer (TensorFlow)

JUNE 2020 - AUGUST 2020

- 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.

- 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 - **DeepFace**
OCTOBER 2019

- Developed a tf.keras based implementation of the popular DeepFace publication, no other open source implementations exist so far; and trained model on **Cloud TPU** accelerators on **3+ million** face images using tf.data ETL pipelines.
- Proposed network architecture by Taigman et al. reported **97.35%** accuracy on LFW face recognition benchmark, by training the same on VGGFace2 dataset **91%** validation accuracy was obtained.

SEPTEMBER 2018 - DECEMBER 2019 **Attendance using Facial Recognition**

APRIL - OCTOBER 2018 **Spatial Micro-climatic Dashboard**

- Developed an IoT-based miniature sensor network using Raspberry Pi nodes to collect different 2 micro-climatic parameters, (eg. soil moisture, air harmful gas level) using pub-sub messaging periodically into MongoDB, and utilized the Google Maps API to create a web dashboard for visualizing live climatic parameters with geo-tagging.

JANUARY - AUGUST 2018 **Exodus Class Portal**

JULY - AUGUST 2017 **Stock Exchange Simulator iOS App**

- Wrote a programmatic interface from scratch using CoreGraphics that could allow plotting on iOS Views (the graphical plotting component could draw 2D mathematical functions and line plots) implementing rasterization.
- Delivered a production-ready web as well as iOS app simulating a basic stock exchange and a portal to simulate market updates and was awarded a Letter of Appreciation by Delhi Public School Newtown as the app was used by **15+ participating teams** at the school fest.