Fahad Naeem **Khan**

SENIOR STAFF SOFTWARE ENGINEER

San Jose, CA

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Summary

Passionate about designing and developing scalable, highly available (HA), fault-tolerant and distributed systems

Work Experience

Equinix   *Redwood city, CA*

SENIOR STAFF SOFTWARE ENGINEER   *March. 2021 - Present*

- Contributed to design of Equinix Network Observability platform (ETO) from picking the tech-stack to deployment on k8 using ArgoCD
- Fixed bugs in opensource softwares that were used in ETO e.g. gNMIC-server
- Integrated ETO with TRIX (which provides newtwork observability equinixmetal) by which ETO got graphQL API interface
- Extended TRIX to work with Time Series Data Bases (TSDB)
- Added support for Arrcus (new vendor) in TRIX
- Wrote TSDB interface library (in Go) with implementation for mimir, prometheus and influxDB. Interface allows applications to work with TSDBs
- Wrote replay-stats script (in Go) to sync Time Series data b/w prometheus and influxDB.
- Wrote a cache layer (in Elixir) for ETO to correlate business logic
- Lead the design of gnmi sensor test automation platform (in python)
- Worked on open source, programable dataplane Vector Packet Processing (VPP), extended it to support feature like protocol independent NAT, bug fixes etc. All the code is committed back to the project
- Designed and developed Elixir based VPP agent that implements binary message passing protocol exposed by VPP. Agent exposes gRPC based northbound interface that is used by SDN controller to program VPP. Agent also listens to VPP events like interface state changes and takes appropriate action defined e.g. notify SDN controller etc
- Helped dataplane team in various VPP related blockers. Also helped the team with the right tooling for the project.
- Worked with dataplane team on various POCs e.g. VPP as L2 bridge connecting two KVM VMs, service chaining in VPP using VPP graph node abstraction i.e. ACL -> NAT -> Routing, VPP and hugepages configuration for performance tuning
- Briefly worked on P4 programable SmartNIC by Pensando for the POC of IPSEC offload
- Implemented Vault based mTLS authentication for one of the REST services

Equinix   *Sunnyvale, CA*

STAFF SOFTWARE ENGINEER   *December. 2018 - March. 2021*

- Leading team of 4 to 6 developers to provide software solutions on different problems
- Designed and developed test automation framework that helps Equinix certify different products like Equnix Fabric (EF), Network Edge (NE)(python)
- Developed execution portal for the framework to help team run the automation easily. Portal is written in Elixir using Phoenix LiveView
- Setup CI/CD for test automation framework

Equinix   *Sunnyvale, CA*

SOFTWARE ENGINEER   *July. 2017 - December. 2018*

- Implemented driver for Ciena WaveServer and OpenLineSystem (OLS) controller MCP in ONOS. All the code is committed back to ONOS open-source community.
- Extended many components in ONOS e.g. CLI, Optical Intent Compiler, OAuth2 authentication for REST protocol etc.
- Developed alarm-handler ONOS app. The app takes well defined actions base on the alarm e.g. installation/removal of intents if port is down. (This app is not part of ONOS repo)

Cisco System.Inc   *San Jose, CA*

SOFTWARE ENGINEER   *March. 2015 - July. 2017*

- Designed and Developed automation framework in python. Framework is written in python using open source libraries which makes it easier for the customer to deploy. It has been developed using OOP techniques which allows end user to build platform independent and protocol agnostic test automation.
- Wrote backend libraries for the infra.
- Developed service model for Open DayLight (ODL) using YANG as data model, NETCONF and RESTCONF as transport protocol. RESTCONF is used as northbound and NETCONF as southbound protocol.
- Code reviews.

Open Networking Laboratory *Melo Park, CA*

MTS - Intern *May. 2014 - March 2015*

- Worked on two open source SDN products OpenVirteX (OVX) and Open Networking Operating System (ONOS).
- Developed new features for OVX like VirtualIPAddressing, link and route recovery etc.
- Designed and developed OVXTesting Framework under the guidance of Ali Al-Shabibi.
- Developed CLI and APIs for ONOS-SegmentRouting under the guidance of Saurav Das.
- End to end Integration of packet-optical use case of ONOS.
- Learning Erlang, bug fixes and adding new feature to Linc-oe.
- Added features in Mininet to support Optical components.

Research Experience

Wichita State University *Wichita, KS*

MS-Thesis *Aug. 2013 - Dec. 2014*

- Innovation in SDN and Throughput Optimum Scheduling Algorithm

National University and Engineering & Technology (NUST) H-12, Islamabad *Islamabad, Pakistan*

Research Assistant *Aug. 2012 - July. 2013*

- Learned SDN, OpenFlow and related technologies during the research work and gained experience on OpenFlow specification v1.0.
- Wrote many mininet scripts using mininet python API to implement different network topologies
- Programmed Pox controller to implement desired functionality such as load balancer, firewall and etc.
- Learned Pyretic and PyResonance under Nick Feamster online course as part of my research requirements and Implemented firewall using Pyretic.
- Worked on Open vswitch 1.7.1, using Socket programming (in C/C++) wrote server/client program that runs on two different (mininet virtual) hosts connected to Openvswitch (for the communication purposes).

National University and Engineering & Technology (NUST) H-12, Islamabad *Islamabad, Pakistan*

Final Year Project Research (Undergrad) - FYP *Aug. 2011 – Aug. 2012*

Mobile Visualblock Programing (MVP) is a drag and drop tool for the development of iPhone application. User just drag and drop puzzle like object and connect them to implement their logic and at the backend our tool generates its Objective-C code for the iPhone. It helps new developer to concentrate more on logic then the complex syntax of Objective-C. We as member of two successfully implemented this as our Final year Project. The project was implemented using Java, XML, apple scripting and Objective C. Initially Java library "open blocks was used to implement the interface, XML file is created by open blocks which is used to generate objective-C code. We also wrote XML to Objective C converter. We modified open blocks to create desired XML files an part of implementation. Using apple script we automated code compilation through Xcode.

Technical Skills

Programming Python (Expert), Elixir (Expert), Erlang (Intermediate), Go (Intermediate), Java (Basic), C/C++ (Basic), Bash (Basic)

Databases **Relational** (MySQL, SQLlite, Postgres), **OLAP/Columnary** (Apache Druid, ClickHouse), **TimeSeries** (Prometheus, Mimir, InfluxDB), **Graph** (Neo4j)

Networking gNMI, NETCONF, RESTCONF, YANG, gRPC, Openflow, ARP, TCP/IP, UDP, HTTP/HTTPS, DHCP, DNS, NAT, VPP

Other Linux, Kubernetes, ArgoCD, Docker, Wireshark, Grafana, gNMIC, Git, REST, Ansible, graphQL

Education

National University and Engineering & Technology (NUST) *Islamabad, Pakistan*

Bachelors in Information and Communication System *Nov. 2008 - Aug. 2012*

- FYP: Mobile Visualblock Programing (MVP).

Wichita State University *Wichita, KS*

Master of Science in Computer Networking *Aug. 2013 - Dec 2014*

- Thesis: Innovation in SDN and Throughput Optimum Scheduling Algorithm.

Open Source Contribution

2024	**gNMIC,** https://github.com/openconfig/gnmic/pull/321	*bugfix*
2023	**gNMIC,** https://github.com/openconfig/gnmic/pull/305	*bugfix*
2023	**gNMIC,** https://github.com/openconfig/gnmic/pull/288	*bugfix*
2023	**VPP,** https://gerrit.fd.io/r/c/vpp/+/39591	*improvement*
2022	**VPP,** https://gerrit.fd.io/r/c/vpp/+/36112	*PNAT improvement*
2022	**VPP,** https://gerrit.fd.io/r/c/vpp/+/35873	*Vhost v2 API bugfix*
2021	**Phoenix Swager,** https://github.com/xerions/phoenix_swagger/pull/265	*improvement*
2021	**xlsxir,** https://github.com/jsonkenl/xlsxir/pull/102	*bugfix*
2021	**sshex,** https://github.com/rubencaro/sshex/pull/23	*bugfix*
2017	**ONOS,** https://gerrit.onosproject.org/q/owner:fahadnaeemkhan%2540gmail.com	*CienaWebServer*
2014	**ONOS,** https://gerrit.onosproject.org/q/owner:fahad%2540onlab.us	*Optical*

Others

2022-23	**Badge - FD.io Contributor 2022,** link	*Online*
2012-13	**Certificate,** Software Defined Networking (SDN) with Distinction from Georgia Institute of Technology	*Online*
2014-15	**Blog,** `https://www.opennetworking.org/?p=1417&option=com_wordpress&Itemid=316`	*Online*