Prabhakar Palanivel

Executive Summary

Full-stack professional with exposure to wide range of projects across the software stack, currently working as “Senior Technical Leader” in Cisco systems.

Linkedin profile: <https://www.linkedin.com/in/prabhakar-palanivel-6602a515/>

Education

**Bachelor in Engineering** (Computer Science), 1996 – 2000 from **NIT Tiruchirappalli, India**

Skills and Technologies

* Container technologies
  + In-depth knowledge on Kubernetes
  + Docker
  + Container networking – Calico
  + Helm
* Kafka, ZooKeeper, RabbitMQ, Redis, GlusterFS
* Microservices based software development
* Cloud technologies – AWS
* Programming languages - C, Golang, Python
* Linux device driver development and good understanding on Linux Kernel
* Exposure to data science technologies:
  + Basic Knowledge on R and statistical models

**Experience**

|  |  |  |
| --- | --- | --- |
| **Organization** | **Date** | **Role** |
| Cisco systems | 2018 – Till Date | Senior Technical Leader |
| Cisco systems | 2014 – 2018 | Technical Leader |
| Cisco systems | 2012 - 2014 | Software Engineer |
| Brocade Communications | July 2008 – March 2012 | Software Engineer |
| LSI (Broadcom) | Sept 2006 - July 2008 | Software Engineer |
| Hewlett-Packard (HPE) | June 2000 –Sept 2006 | Software Engineer |

Key projects’ summary

|  |  |
| --- | --- |
| **Project** | **Technologies involved** |
| PaaS platform for Cisco DNA enterprise management software | Micro-services architecture, Kubernetes, Docker, Calico, Advanced Python (including asyncio), Glusterfs, Redis, RabbitMQ, Kafka |
| NFV based virtual broadband solution (vCPE) | Kubernetes, Docker, LXC, VxLAN, IP networking over Linux |
| Adapter Firmware Development for Cisco UCS Virtual Interface Cards | VxLAN, NVGRE, PCI, SRIOV |
| Multipath IO software for HP storage arrays | Driver development for HPUX |

Project Details (In reverse chronology)

1. **Upgrade Infrastructure for Kubernetes based Platform-as-a-Service infrastructure end-to-end using the artefacts hosted in the cloud**

Working on the Kubernetes based microservices platform on which the Cisco Enterprise management software are deployed (First-Customer-Shipment done in Jan 2018).

**Defensive Publication:** <https://www.tdcommons.org/dpubs_series/1633/>

**Cisco Live:** [Presentation / Recording](https://www.ciscolive.com/global/on-demand-library.html?search=BRKSDN-3029#/session/15320663314630015tml)

My responsibilities include:

* Entire (multi-node) kubernetes cluster is updated at a click of a button
* Designed and implemented cloud based upgrade of the entire platform **at a click-of-a-button from the centralized admin console**
  + Upgrading all the core platform services including Kernel, Etcd, Calico container networking software, Docker
  + Upgrading Kubernetes components
  + All host components running on individual nodes of the cluster.

1. **Automatic discovery and high-availability enablement of Glusterfs Storage which is part of the Kubernetes PaaS infrastructure**

As part of the Kubernetes PaaS, Glusterfs is provided as managed service. This project involves supporting for Glusterfs in a High Availability mode where the new Gluster nodes are automatically discovered and thee volumes are updated based on centralized ETCD registry

My responsibilities includes designing and implementing of this capability

1. **Non disruptive update of the Platform-as-a-Service Infrastructure**

Updating the PaaS infrastructure and the applications without any disruption to the application availability. This requires enhancements across the software stack

My responsibilities includes identifying the changes required, driving the implementation and implementing some of the core components.

1. **Cisco virtual broadband node**

This project involves implementing an NFV based solution as a replacement for the BNG (specialised hardware) based solution. The implementation uses docker containers managed using Kubernetes.

My responsibilities included:

* Implementing the kubernetes driver module which interacts with Kubernetes for managing the lifecycle of the kubernetes objects as per the business logic
* Implementing the Confd based netconf agent and integrated with NSO
* Contributing to the service assurance module - used ELK stack (Elasticsearch/ Logstash/Kibana)
* Initial investigation with Kubernetes/docker to migrate from the existing user-mode-linux to docker running on kubernetes

1. **Offloading NVGRE/VxLAN on Cisco Virtual interface cards**

NVGRE is a network overlay protocol for virtualizing the networks over the existing physical network. Hence it involves encapsulating the virtual network frames in the outer network headers. The regular NICs support the protocol checksum insertion and verification as well as TCP Segment Offloading (TSO) for the outer network headers.

This project is to offload the checksum insertion/verification as well as TSO for the virtual frames which are encapsulated as the payload.

I am responsible for the design and implementation of this VIC Adaptor Firmware. The first version of this feature was released in August 2014.

1. **SRIOV support in VIC cards**

Cisco UCS systems have specialized NIC adaptors which have the Asics to support virtual NICs and virtual HBAs. I was part of the team that developed PCI-E SR-IOV capability for the virtual NICs presented to the host from these UCS adaptors.

* Implemented the dynamic reallocation of vNIC resources so that the NIC resources for SRIOV vnics can be updated at runtime
* Supporting HYPER-V hypervisor

1. **SAS Framework for Brocade Application blades**

This framework provides the means for the ISVs and Storage vendors to develop applications which can run on the Brocade SAN fabric switches. The prominent storage applications using this framework includes EMC Recoverpoint and EMC Invista

**Contributions**

* 1. Involved in the feature enhancements to the framework as part of the product releases
  2. Handled the customer escalations
  3. Point of contact for the Inmage (ISV)

1. **HP StorageWorks SecurePath for HP StorageWorks EVA active-passive Storage arrays for HP-UX**

This product provided multipathing capability to HP-UX hosts for accessing HP StorageWorks EVA Active-Passive Storage arrays. This was a host-based software which ran on HP-UX servers. Its key component was a multipathing driver that interacted with the IO subsystem to abstract the existence of multiple paths to a volume into a single volume. I was involved in the enhancement and bug fix of the multipathing driver module.

Technologies involved: SCSI, FC, HP-UX Kernel internals, HP-UX drivers development, HP-UX crash analysis

1. **Development of the SMI-S interface for the HP StorageWorks EVA arrays and the HP StorageWorks XP arrays**

This project implemented the SMI-S provider for HP StrorageWorks EVA and the HP StorageWorks XP arrays. My responsibility involved designing the SMI-S model for internal components of XP and EVA arrays and implementing the SMI-S providers for them. Also, I was responsible for modeling the lun masking and mapping aspect of these arrays. As part of it, I had the opportunity to contribute to the Lun masking and mapping profile of SMI-S specification.

Technologies involved: CIM/WBEM and SMI-S.

Papers / Disclosures

1. Disclosure: [Upgrading a multi-host platform as a service infrastructure end-to-end using container images hosted in the cloud](https://www.tdcommons.org/dpubs_series/1633/)
2. A paper with title "Implementation and Comparison of Distributed caching protocols” was accepted as poster paper for IEEE International Conference on Networking 2000, September 5-8, 2000. The aforementioned paper has also been accepted for publication in the Computer Communication Journal of Elsevier Science ([www.elsevier.nl](http://www.elsevier.nl))
3. Secure Dynamic Anycasting for "Best" Server Selection Using Active Networks, Computer Communications, volume 24, Issue 18, 1 December 2001, Pages 1819-1827, co-authored with Dr.S.Selvakumar, Asst Professor, Regional Engineering College, Trichy.

Miscellaneous

* Have provided presentations in Cisco Live / Kubernetes meet-ups