Vadivel Murugan

Engineering solutions and Cloud network stack developer. 20+ years in networking, cloud and multi-core linux kernel

Masters, Electrical Engineering,
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Linkedin profile
Open source projects
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Proof-of-concept, Development and Optimizations in Cloud Networking and Network Edge.

- **Successfully bootstrap series funded startup to integrate and deploy 12.8T Tofino Switch.**
- Lead solutions to **programmable data plane** for cloud data center unicast and multicast traffic flows.
- Solutions for Spine and Leaf network routing with L2/L3, TCAM ACL and Exact Match Table Lookups.
- Solutions to integrate **GENEVE IPV6** Tunnels and **Network packet broker** Switch INT telemetry.
- Software optimizations of programmable pipeline with **P4, SAI/Sonic and GRPC**.
- Pioneered **1588 ptp** and 5G Telecom ITU 8275.1 for **L2, Vlan and L3 Multicast** based boundary clocks.
- Broadcom SDK development for Broadcom Xgs pipelines, **Trident2 and Triumph3 ASICs**.

Cloud Infra development with Openstack and Docker Containers.

- Networking infra development for Ericsson Cloud Platform with **Docker Containers, Openstack neutron and Nova.**
- User Plane(UPF) development with **Data Plane Development Kit (DPDK) for Kubernetes and Openvswitch.**
- Development of **Virtual Function (VF)** interfaces using SR-IOV to access Data plane fabric.
- Hyperscale PMD threads with **NUMA** awareness for **Intel SmartNIC Fortville and Mellanox ConnectX**.
- OpenStack Forwarding Plane programming skills with **SAI, Openflow and P4.**
- DPDK/Openvswitch **Vxlan and Vlan traffic** flows with Exact match cache and megaflow cache.

Linux Kernel hacks for Multicore platform

- **Linux** Kernel Instrumentation, interrupt and exception redirects for ARMv6 and X86_64 Multicore.
- WindRiver Linux and Vxworks **Multicore operating system and hypervisor** services.

Programming expertise in C,C++,Python and P4.

- **OpenSource development** for deep inspection of python stack with Inspectshow, CallTree and apiParse

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Intel Corporation, San Jose, CA - Technical Architect, Customer Engineering — May 2021 - Current

Accomplishments

- **Successfully bootstrap series funded startup to integrate and deploy 12.8T Tofino Switch stack.**
- Lead solutions to Cloud Data Center and Network Edge Unicast and Multicast Traffic flows.
- Software Optimizations of programmable data pipeline with P4 language, SAI/Sonic and GRPC.
- Lead support for Network Packet Broker Switch INT Telemetry.

Contributions

- Significant contributions to Spine and leaf Network Routing with L2/L3, TCAM ACL and Exact Match Table lookups.
- Resolve issues around tunneling with GENEVE, MPLS, VxLAN and GTP.
- Integration of PTP and clock synchronization, Filtering and Packet Truncation and IPv6 NAT.

Cisco Systems Inc, San Jose, CA — *Engineering Technical Leader* — June 2018 - May 2021

Accomplishments

- **Pioneered IEEE 1588 ptp design with kernel timestamping for L2, Vlan and L3 Multicast based boundary clocks.**
- Achieved < 200 nano seconds with 1000+ ptp sessions with Broadcom Jericho based platform.
- Achieved Class B Timing (<40ns) with Servo controller and Time synchronization algorithm.

Contributions

- Designed mechanisms to profile longevity clock performances, and statistical analysis for PTP correction outliers.
- PTP Ipv6 Stack and Integration with 5G Timing for Telecom boundary clock (ITU 8275.1)

Ericsson Inc, Santa Clara, CA — *Technical Lead* April 2013 - May 2018

Accomplishments

- **Accelerated OpenVswitch/DPDK performance with vEPG Apps by 40%** with hyperscaling PMD threads and rte ring buffers. Aligning CPU Pinning and NUMA awareness for Intel Niantic 10G and Fortville 25G.
- Provisioning of **Kubernetes and open vswitch** interfaces with openflow ACLs.
- Developed Virtual Function (VF) and Physical Function (PF) interfaces using **SR-IOV** to access Data plane fabric.

Contributions

- Bootstrap Control Plane Processor, Data Plane Spider NPU, and Switch Fabric of 40x10G/4x100G line card.
- Integration of uboot, mini-kernel, linux drivers, and Configuration of Non Transparent PCI Bridge, FPGA, core and serdes PLL, power and fantray modules.

Broadcom Corporation Inc, San Jose, CA — *Sr. Staff Engineer* October 2010 - April 2013

Accomplishments

- Improved efficiency of memory table reads and writes with design and implementation of chunked Memory support.
- Add regex compiler optimizations and configurations of Deep Packet Inspection (DPI) flow table.

Contributions

- Design and Development of **1588** one-step and two-step time stamping and synchronization modules.
- Development of L2 Tunneling Protocol for **MAC-in-MAC, TRILL and GRE**.

Wind River Systems, Alameda, CA — *Sr. Software Engineer* December 2006 - October 2010

Accomplishments

- Design and Implementation of ARMv6 and x86_64 dynamic instrumentation with trap and jmp for linux kernel.
- Design and Development of ARMv6 and MIPS Linux Kernel exception redirects.
- Memory atomicity and optimizations for dynamic memory pool stack and replenishment

Contributions

- Development of exception redirect handler for PPC and X86_VT Hypervisor.
- Development of MIPS and ARM static/shared library loader to load instrumented binary stubs.
- Maintenance of ARM and MIPS stack walk, trace back mechanisms.

WIPRO Technologies, Bangalore, India - *Sr. Software Engineer* May 2000 - November 2006

- Design and Development of L2 switch, STP Protocol for Wireless LAN Access point.
- Developed Windriver Vxworks BSP for ARMv6 based network boards.

Embedded Resources Private Limited, Pune, India - *Software Engineer* Jan 1999 - November 2000

- Development of Solaris, pSOS Network DPLI Device Drivers with promiscuous and multicast features

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Academic Projects

Master of Science (MS) Electrical Engineering, 2010 – 2012
San Jose State University, San Jose, CA

- Development of Zigbee Down conversion Receiver with LNA, Filter, Balun and Mixer modules which operated between 2.4-2.483Mhz for channels 11-26.

Bachelor of Electronics Engineering, 1994 – 1998
Shivaji University, Kolhapur, India

- Development of neural and fuzzy logic based controllers for industrial pH and temperature sensing