Prem **Mallappa**

Prem Mallappa - CV (2-page) Software Architect • System & Embedded Software

Bengaluru, India

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Seasoned Software Architect with extensive expertise in designing and developing high-performance embedded systems, system software, Linux kernel drivers, and virtualization technologies. Proficient in a wide range of programming and scripting languages, with a proven track record of delivering robust, scalable solutions in complex technical environments.

A highly analytical and collaborative team player, recognized for strong problem-solving abilities, logical thinking, and a passion for mastering emerging technologies. Committed to driving innovation and excellence through clean architecture, optimized code, and best-in-class engineering practices.

Skills

Leadership	Over 22 years of multidisciplinary team and project leadership experience; Software Architecture and Design.
Communications	Excellent written and spoken communication skills.
Technology	Broad and deep IT expertise, including cloud computing, computer security, operating systems, embedded systems, software & services development, programming languages, etc.
Computer Security	Cryptography; virtualization and cloud computing security architecture and implementation; risk management and compliance; intrusion detection and prevention; software security and secure software development.
Programming Languages	C, Assembly (x86, ARM, MIPS), Rust, Python, C++, Go, BASH
Operating Systems	Linux, FreeBSD, QNX, VxWorks, Symbian
Architecture	x86, ARM - v6,v7,v8, MIPS64, PowerPC, RISC-V
Development Tools	GCC, Clang, Git, Make, CMake, ARM Development Tools, Keil, JTAG, Docker,
Specialized Skills	Linux Kernel Development, Device Drivers, Embedded Systems, System Software, Performance Optimization, Cryptography, Filesystem Development

Education

Masters (Computer Science)

Pilani, Rajasthan, India

BITS Pilani

2016

Bachelors (Computer Science)

Adichunchangiri Institute of Technology, Karnataka, India

Visvesvaraya Technological University (VTU)

2002

Open Source

QEMU (**Link:** Project) *2014-2016*

- SMMUv3 (IOMMU) emulation support for ARMv8
- Designed and implemented SMMUv3 model merged into mainline
- Added support for Stage1, Stage2, and nested virtualization
- Implemented command queue processing and page table walk

Linux Kernel (**Link:** Project) *2011-2016*

- MIPS Kexec/Kdump port and IOMMU subsystem
- Developed MIPS64 port of Kexec and Kdump (merged upstream)
- Fixed critical bugs in KEXEC for Cavium Octeon platforms
- Contributed to IOMMU/SMMUv3 driver development

GLIBC (**Link:** Project) *2018-2020*

- Performance optimizations for AMD processors
- Fixed memcpy behaviour on AMD processors
- Optimized string functions for $x86_{64}$ architecture
- Performance improvements for memory operations

AMD LibM (**Link:** Project) *2018-Present*

- Open source math library for AMD processors
- Core contributor to open sourcing AMD Math Library
- Optimized transcendental functions (exp, log, pow, trig)
- Implemented SIMD/FMA optimizations for vector operations

Experience

Principal Engineer

AMD Ltd.

Bengaluru, India *Feb. 2018 – Present*

- Architected and developed high-performance mathematical libraries optimizing exponential, power, logarithmic, and trigonometric functions for AMD EPYC and Ryzen processor families
- Achieved 30% performance enhancement in exp() and log() operations through advanced optimization techniques including vectorized look-up tables, Estrin's polynomial evaluation, and optimized integer conversion pathways
- Led development of cryptographic primitives library implementing AES, SHA, and PKCS algorithms optimized for AVX2, AESNI, and SHANI instruction sets
- Engineered runtime-adaptive algorithm dispatcher utilizing CPUID-based feature detection for optimal code path selection
- Delivered 3x performance improvement in parallel CFB decryption through innovative algorithm parallelization

Principal Engineer

Broadcom Ltd.

Bengaluru, India *Jan. 2014 – Oct. 2016*

- Architected foundational software stack for Broadcom Vulcan, a multicore-multithreaded ARMv8 64-bit server processor
- Engineered complete SMMUv3 (System Memory Management Unit) driver infrastructure supporting advanced IOMMU virtualization
- Developed and contributed SMMUv3 emulation model to QEMU mainline, enabling early platform validation and ecosystem enablement
- Implemented comprehensive virtualization features including command queue processing, STE/CD descriptor parsing, multi-level page table walks, and stage-1/stage-2 address translation

Tech Lead

Cavium India Pvt. Ltd.

Bengaluru, India

May. 2011 – Dec. 2013

- Led low-level software development for Cavium Octeon III (MIPS64) multicore network processors
- Resolved critical KEXEC kernel bug and developed complete MIPS64 port of Kexec/Kdump crash dump infrastructure, successfully merged into Linux mainline
- Engineered bare-metal core dump generation framework with host-resident daemon enabling post-mortem GDB analysis
- Designed and implemented CavHv hypervisor for MIPS64 architecture leveraging experimental hardware virtualization extensions

Sr. Development Engineer

ARM Ltd.

Bengaluru, India

Aug. 2005 – Jun. 2009

- Executed comprehensive OS porting initiatives for emerging ARM architectures including ARM1176JZFS with TrustZone security extensions and Cortex-A8 application processor
- Developed production-grade touchscreen driver for Symbian OS with automated validation framework using Python
- Designed precision interrupt latency measurement infrastructure for quantifying TrustZone secure-world context switching overhead
- Ported L4Ka::Pistachio microkernel to ARM architecture enabling virtualization research and proof-of-concept implementations

Sr. Software Engineer

Sasken Communication Technologies Ltd.

Bengaluru, India

Aug. 2004 – Aug. 2005

- Architected and maintained Extended File System (EFS) for VxWorks-based UMTS base station infrastructure
- Engineered reset-resilient filesystem with advanced wear-leveling algorithms ensuring data integrity across unexpected power cycles
- Designed Flash-optimized flat file tree structure minimizing write amplification and extending device longevity

Software Engineer

Global Edge Software Ltd.

Bengaluru, India

Jun. 2003 – Aug. 2004

- Designed and implemented comprehensive SDIO host controller driver for Linux on Intel StrongARM embedded platforms
- Engineered high-performance 4-bit SDIO driver for Marvell 802.11g WiFi chipset achieving maximum theoretical throughput
- Optimized DMA transfers and interrupt handling to minimize latency and maximize wireless data transfer efficiency

Short Stints

VSPL Ltd.

Bengaluru, India

Software Architect

Nov. 2016 – Jan. 2018

Cisco Ltd.

Bengaluru, India

Software Engineer

Oct. 2010 – Apr. 2011

B-Labs, London UK

Bengaluru, India

Sr. Engineer - Contractor

Nov. 2009 – Sep. 2010

Harman International

Bengaluru, India

Engineer

Jul. 2009 – Nov. 2009