Vinodh Balakrishna

Software Engineer | C/C++ Programmer | GNU/Linux Entusiast

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Passionate Software Engineer with 2 years of experience developing custom Linux firmware for embedded systems. Proficient in C/C++, Python, Rust, and shell scripting, with a strong expertise in GNU/Linux systems. Interested in optimizing system performance and security through low-level programming and innovative problem-solving.

Technical Skills

Programming Languages: C/C++, Python, Shell Scripting, Java, Rust, Assembly(Basic)
Operating Systems: GNU Linux/Unix Systems, Embedded Linux Firmware
Networking: TCP/IP, UDP, SNMP, Networking Protocols
Tools and Technologies: Yocto Project, RDK, Data Structures, CMake, GDB, QEMU, OpenSSL, Wireshark, Jenkins, Git, Splunk, Vim

Experience

Comcast — Chennai, India
Embedded Software Engineer | Platform Security Team (TPX) — Dec 2021 - July 2023

- Utilized the Yocto Project build system to design, develop, and maintain custom Linux firmware based on the RDK software stack for over 1 million CPE devices including set-top boxes, routers and TVs.
- Enhanced security in the custom WalledGarden Shell by implementing command logging and blocking unauthorized commands, significantly improving secure SSH access to CPE devices.
- Implemented a Tab Completion feature to the WalledGarden Shell using the readline library, employing a multi-threaded approach,improving the efficiency and usability of the shell.
- Integrated Software Bill of Materials (SBOM) functionality into the build system by meticulously tracking all software components,enhancing supply chain security and ensured comprehensive transparency in the final product's software inventory.
- Enabled firmware security feature Address Space Layout Randomization (ASLR) for multiple RDKB devices by implementing position-independent code, which significantly reduced memory-related security vulnerabilities.
- Maintained and renewed XPKI certificates for TLS communications within various internal components, enhancing data protection and ensuring reliable, encrypted interactions between system components.
- Securely removed the video analytics module from RDKB devices, optimizing firmware performance, improving system efficiency, and reducing maintenance overhead.

Education

University of Central Missouri | Masters - Computer Science | — Aug 2023 - Present
Bharath Institute of Higher Education and Research | B.Tech - Computer Science Engineering | *Grade:* 8.4 / 10.0 — 2017 - 2021

Projects

Vshell | *Source Code:* https://github.com/v1n0dh/vshell

- Developed a custom shell in C++, inspired by a coding challenge at codingchallenges.fyi, closely resembling bash.
- Incorporated key shell features, including command execution, I/O redirection, and pipes, facilitating efficient user interaction with the system.
- Integrated tab completion for files and command history, enhancing user experience and productivity.
- Successfully used by developers in testing environments, showcasing effectiveness in managing command-line tasks.

System Metrics Display for dwm | *Source Code:* https://github.com/v1n0dh/dwmstatus

- Created a custom status bar for the dwm window manager using C programming, displaying real-time system metrics such as network speeds, Wi-Fi network, CPU temperature, RAM usage, battery status, and clock.
- Gathered system statistics directly from low-level file structures like */sys/class* for battery and network information, and used X11 library to dynamically update the status bar.
- Integrated network speed calculation by monitoring changes in RX/TX bytes and implemented Wi-Fi network detection using shell commands.
- Optimized system resource usage by writing efficient C code, providing critical information without relying on external tools or scripts.

Bencode Parser | *Source Code:* https://github.com/v1n0dh/Bencode-Parser

- Developed a parser that converts Bencoded data (used in torrent files) into a human-readable JSON format.
- Built in C++ utilizing the Jsoncpp library for JSON object handling, creating an API making it handy for handling Bencoded data, enhancing compatibility.

Certifications

- Rust Essential Training by Barron Stone | Certificate Link
- Linux Device Drivers by Kevin Dankwardt | Certificate Link