**Pavan Kumar K**

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**Summary:**

9+ years of total experience in software development, including firmware, cloud platforms, and applications and middleware for embedded devices. knowledgeable about a variety of programming languages, such as TSQL, PLSQL, Perl, C, C++, and.NET. knowledgeable about productivity tools, corporate CRM, and financial systems for high frequency trading and low latency.Designed and implemented HMI applications for industrial automation using Qt/QML, improving real-time monitoring and user interaction. adept at multithreading and complex programming principles, and skilled at using SaaS solutions to lower software ownership costs. I have a history of meeting deadlines and budgets, and I have strong communication and people skills. System analysis, device driver development, Agile/Waterfall methodology, and debugging embedded systems are among my areas of expertise.

creating multi-threaded and real-time embedded client/server applications with C, C++, and Python for Linux, Windows, RTOS, and non-RTOS operating systems.

Experienced in developing AUTOSAR-based software components, including RTE, BSW, and MCAL integration for automotive ECUs using tools like DaVinci Developer, EB tresos Studio, and Vector CANoe.

Experience with VxWorks RTOS for embedded systems development, including memory management, scheduling, and device driver integration

Strong multithreading, memory management, function pointer, and performance tweaking abilities for high-performance embedded systems in both general-purpose and RTOS settings.

Experience with distributed tracing and observability using OpenTelemetry to monitor and optimize application performance.

Experienced in using Agile tools such as Jira for sprint planning, task tracking, and progress monitoring

Developed and maintained graphical applications using Wayland and X11, enhancing compatibility and performance across Linux-based display servers.

Configured CMake build systems for large-scale C++ projects, improving build times and maintainability across multiple environments.

adept at the entire software development lifecycle (SDLC), with a particular emphasis on Agile approaches, scalable platform architecture, object-oriented programming (OOPs), and design patterns.

knowledgeable about synchronization strategies, multithreaded programming, and debugging for both RTOS and non-RTOS embedded systems.

extensive knowledge of creating, testing, and debugging embedded applications using RTOS-specific debuggers, VC++ Debugging Tools, and GNU GDB.

Integrated OpenTelemetry with various platforms to collect, process, and visualize telemetry data, improving system reliability and troubleshooting efficiency.

thorough understanding of IPC (UNIX/Linux Inter-Process Communication) using Semaphores, Message Queues, Pipes, and Shared Memory.

expertise in creating client-server applications in both RTOS and non-RTOS contexts using socket programming (TCP/UDP).

adept at using PL/SQL for database development, including building Oracle views, triggers, functions, and stored procedures.

familiarity with UNIX shell programming for automation activities including cron jobs, file management, FTP automation, and data validation.

strong foundation in developing embedded GUI programs with C++, Qt, and MFC; expertise in developing HMI solutions for industrial and automotive applications.

Developed cross-platform GUI applications using Qt, implementing custom widgets and integrating with hardware interfaces for embedded systems.

Proficient in GPU programming using CUDA and OpenCL for parallel computing and high-performance applications, optimizing embedded and cloud-based systems

**TECHNICAL SKILLS:**

Strong in C++ Programming on Windows, Linux and UNIX Based Platform covering OOPS, Algorithms, Data Structures, Design Patterns, Multithreading and STL Patterns with Perl/Socket Programming and Bash Scripting with Oracle Database (PLSQL) Proc CUDA, OpenCL, Parallel Computing, GPU Acceleration

| Programming Languages | C, C++, .Net, Perl & Socket Programming, VC++, C#, Python, Shell Scripting, OpenGL, PLSQL, OpenCV, QT 4/5, Embedded/Objective C, MATLAB, FORTH, Symbian C++, JNI, Java and Oracle Infranet Languages |
| --- | --- |
| Operating Systems | Unix, Linux and Windows (Non-RTOS), and Real-Time Operating Systems (RTOS) like Embedded Linux, Android, Windows CE, Symbian, VxWorks OS, QNX, FreeRTOS |
| RTOS | Embedded Linux, Android, Windows CE, and Symbian, Win driver, VxWorks OS(Device Driver Development, BSP Customization, Multithreading, Memory Optimization) |
| Domain Expertise | Retail, Cisco Setup Box, Sony PlayStation Console, and Health Care, Full Stack Application Development, RTOS and non-RTOS Embedded Systems, Real-Time Communication Protocols (RTSP, RTP, LSCP, MQTT) |
| Protocols | XCP, XCP over CAN, XCP over Ethernet, XCP over USB, IMAP4, POP3, SMTP, HTTP, SSL, SIP, HTTP, TLS, UDP/TCP |
| Communication Servers | Linux server v5.0, XAMPP server v1.8.1, Communigate Pro v6.0, Microsoft Exchange server 2006. |
| AUTOSAR | AUTOSAR Classic Platform, RTE, BSW, MCAL, DaVinci Developer, EB tresos Studio, Vector CANoe, UDS, XCP, CAN, Ethernet |
| Compiler/IDE/ Debugger | VB, MS Visual Studio 2019, GCC/GDB, Eclipse INDIGO, Carbide C++ 3.1.0, QT Creator, Wind River Workbench for VxWorks development and debugging. |
| Requirement Management Tool | DOORS |
| Defect Tracking Tools | Bugzilla, Team Track, IBM Rational Change, and Rational Clear Quest |
| SCM Tools | TFS, SVN, Git, Synergy 6.5 SP2-01, Perforce 6.0, Rational Clear case, CVS, and VSS |
| RDBMS | SQL, SQLite and Oracle Infranet and opcode. |
| Observability Tools: | OpenTelemetry, Prometheus, Grafana, Jaeger |
| Logging and Monitoring: | Implementing telemetry collection for metrics, traces, and logs in distributed systems |

**WORK EXPERIENCE:**

**Client: T-Mobile US - Frisco, TX Nov 2022 – Present**

**Role: Sr. Embedded Software Engineer**

**Responsibilities:**

* Working as Sr. Application Developer to develop/support and maintain POS Application/Project which runs on Windows for retail research and marketing purpose.
* Work with software team and hardware team to design the middleware architecture, data structure, interfaces, and communication protocols, and implement them into product software system.
* Designed and Witten Embedded Software as per the requirements of the client with Oracle Store procedure and PL/SQL script.
* Developed custom Qt plugins and modules to extend the functionality of Qt applications, providing specialized UI components and backend services
* Optimized Qt-based UI performance by reducing memory footprint and improving rendering efficiency using QML and OpenGL.
* Developed touchscreen-friendly interfaces for embedded systems, integrating real-time sensor data visualization and user controls.
* Designed the various patterns in payment domain using Multithreading OOPS Concepts like encapsulation abstraction and polymorphism methods.
* Develop and integrate firmware components for various payment domain patterns using Multithreading and object-oriented programming concepts.
* Developed and integrated AUTOSAR-compliant software modules for embedded automotive platforms, including COM stack and diagnostic communication protocols (UDS, XCP)
* Configured and implemented OpenTelemetry SDKs and collectors for distributed tracing across microservices.
* Developed multi-threaded Qt applications leveraging QThread and Linux threading libraries to improve application responsiveness and handle concurrent tasks efficiently.
* Developed and optimized device drivers for embedded systems running on VxWorks OS, ensuring efficient hardware-software interaction.
* Developed and optimized high-performance algorithms using CUDA and OpenCL to leverage GPU capabilities for parallel processing.
* Used DaVinci Developer and EB tresos for configuring and validating AUTOSAR software components and BSW modules.
* Engineered GPU-accelerated solutions using NVIDIA libraries (CUDA, cuDNN) to enhance machine learning model training and inference speeds in embedded environments.
* Optimized embedded system performance by integrating NVIDIA Jetson platforms for real-time video analytics and sensor data processing.
* Implemented CUDA kernels for data-intensive operations, enhancing throughput and reducing processing time for embedded applications
* Worked on VxWorks-based embedded applications, focusing on real-time data processing and inter-process communication using message queues and shared memory.
* Worked on Using Multithreading Concept for the features to replace class inheritance for interface and Package system. Also worked on concurrency: go routines and channels for library support.
* Designed and developed software components for the POS system, ensuring scalability, performance, and reliability in both RTOS and non-RTOS environments.
* Instrumented code in C++/.NET/Python to generate telemetry data, enhancing system insights and performance tuning.
* Integrated CUDA-based parallel processing solutions within real-time applications, ensuring seamless interoperability with Linux and VxWorks RTOS platforms.
* Worked on Real-Time and Non-Real-Time applications, optimizing software for Embedded Linux, VxWorks, QNX (RTOS) as well as standard Linux and Windows (Non-RTOS) platforms
* Integrated OpenTelemetry with existing monitoring solutions (e.g., Prometheus, Grafana) to visualize application health and performance metrics.
* Designed, developed, and debugged CUDA kernels to optimize matrix operations, image processing tasks, and high-volume data analytics workflows.
* Changed the existing systems which are responsible for interpreting the requirements that are needed in the software and developed specifications through STL and discuss it with the senior developers.
* Analyzed trace data to identify bottlenecks, latency issues, and optimize service-to-service communication.
* Review the implemented system, understand, and interpret the error reports from internal staff and external clients, troubleshoot and debug them in the embedded environment and provide instant fixtures for the same
* Maintain and document the software programs and resolutions given for the technical issues and any other relevant data that may be of importance
* Work in close association with the clients to understand their needs and to address the issues related to the process
* Modified the application code in C/C++ 11 with production and Linux development environment to make the POS Software compatible to use on the existing executable file.
* Developed Windows API for the Phoenix in .NET to transfer and receive data from POS to Server in ISO Msg Format.
* Interaction with PLSQL on defect assignment, resolution and tracking the data encapsulation occurred in development.
* Activities done for deployment/production in the end of project with all smoke testing needed for the successful release of application.
* Building Jenkins with the latest code pulling and pushing into master branch and with that downloading the latest exe.
* Implemented CI/CD pipelines using Jenkins and GitHub Actions to automate builds, testing, and deployment, reducing release cycle time.
* Integrated GCOV with the complete source code and delivered on time patches for critical issues
* Worked on different content storage architectures- Virtual video architecture, Integrated Service Architecture which involves storing content on local and central market sites
* Optimized rendering pipelines by leveraging Wayland protocols and X11 extensions, improving application responsiveness on embedded systems.
* Developed Content migration script, using STL and log analyzer scripts, Bash scripts to generate SNMP alert
* Gained experience in **Yocto** to customize and build embedded Linux distributions, ensuring compatibility and performance for POS systems and embedded devices, optimizing the application’s footprint and capabilities.

**Environment:** C++, VC++, Yocto, .Net, MFC, WIN32, Socket programming, PLSQL, VSS, XML, VxWorks OS, WinGDB, Perforce streams, VMware. , RTOS (Embedded Linux, VxWorks, QNX, Windows CE), Non-RTOS (Linux, Windows, UNIX).

**Client: Charter Communications - Stamford, CT Dec 2020 – Sep 2022**

**Role: Embedded Systems Engineer**

**Responsibilities:**

* Developed controls for complex machinery with distributed IO systems, multi-tiered / multi-platform control AI.
* Developed embedded Linux systems using Yocto to create custom firmware for specialized hardware platforms, enabling optimized audio/video streaming and security graphics processing.
* Implemented **state machine designs for timer/retry mechanisms**, handling retransmission of audio/video data packets in the event of failures or packet loss, ensuring reliable communication between client and server.
* Integrated Yocto build systems with multimedia handling, ensuring the reliable functioning of state machine designs and timer/retry mechanisms in the embedded environment.
* Integrated **state machine logic** for **fragmentation and reassembly** of multimedia data (audio and video packets) to manage packet sizes and optimize data transfer over unreliable networks, using protocols such as RTP, LSCP, and RTSP (TCP/UDP).
* Integrated NVIDIA GPU acceleration techniques to optimize real-time POS applications, achieving significant performance gains.
* Implemented networking protocols and memory management techniques in VxWorks-based embedded platforms.
* Developed code in **Multithreading C++** to transmit **audio** and **video** packets using **STL and RTP/LSCP/RTSP** (TCP/UDP) from the client to the server and vice-versa.
* Designed, tested, and optimized **state machine transitions** for error recovery in both the timer/retry mechanisms and data fragmentation, ensuring robust and real-time data communication for **audio** and **video** streams.
* Worked on the integration of **security graphics** within the video stream for real-time monitoring and security applications.
* Used Jira to track sprint progress, assign user stories, and manage team workflows throughout development lifecycle.
* Participated in daily stand-ups and sprint planning using Jira boards and dashboards.
* Maintained detailed issue tracking and resolution documentation using Jira tickets.
* Implemented **video encoding/decoding** logic for optimized streaming and graphics processing in the embedded environment.
* Developed and tested real-time applications using VxWorks, ensuring performance optimization and reliability.
* Performed various testing including unit testing, integration testing, and performance testing using **VC++** and **C++** to ensure smooth handling of retransmissions and fragmented data for **audio**, **video**, and **security graphics**.
* Created **Unix Shell (Bash)** & **Python** scripts for automating Systems Administration tasks and optimizing workflow processes.
* Collaborated with cross-functional teams to implement NVIDIA GPU-accelerated modules for embedded systems, contributing to lower latency and improved system throughput.
* Reviewed the implemented system, interpreted error reports from internal staff and external clients, and provided debugging and instant fixes in the embedded environment using **VC++ debugging tools** and techniques.
* Maintained and documented the software, including **state machine transitions**, error handling, and fixes provided for technical issues, using **C++ Multithreading OOPS Concepts** on Windows-based applications.
* Developed and used **Qt4 dialogs** for efficient user interaction within the embedded systems, particularly focused on **audio**, **video**, and **security graphics** display.
* Integrated **MLP standard systems** for change, incident, and problem management within **Azure** cloud platforms.
* Wrote detailed design patterns for **multithreading & synchronization** to manage concurrent processes, including handling timer/retry processes, and analyzed memory management issues (heap and memory leaks).
* Wrote **unit tests** for the code developed and reviewed code changes done by the team in the sprint.
* Implemented a **Test-driven development (TDD)** approach to write unit tests using **Python UnitTest** and ensured that state machine functionality was thoroughly tested.
* Developed **Event Handlers** for receiving and sending play events, including management of retry logic for reliable event handling.
* Analyzed data packets using **Wireshark** and other tools to diagnose and resolve critical issues related to data transmission, fragmentation, and retransmissions.
* Managed high-severity customer escalations by implementing solutions based on **Encapsulation** and **Abstraction** using **OOPS Concepts**.
* Delivered products on time to **QA** with minimum defects, maintaining strong communication and rapport within the team.
* Documented **SFS, FSD, and Test plans** for the development of features involving state machine logic for data handling.
* Developed the **Arcticize EFD application** using **C++**, **Python**, and **PLSQL**, which involved designing robust error recovery and retry mechanisms based on state machines.
* Redesigned and enhanced **room and lobby functionalities** with careful integration of **timer/retry and fragmentation/reassembly** state machines for data handling.
* Conducted code reviews through **Git/Gerrit**, ensuring all new code adhered to best practices, including the design of reliable **state machine implementations**.
* Facilitated **code walkthroughs** for all new features, ensuring that **STL Containers** and **state machine logic** were effectively utilized for optimal performance.
* Implemented monitoring and management infrastructure for **availability** and **performance** within **Azure**, including the use of state machine logic for retry mechanisms.
* Participated in **Unit and API testing**, reviewed testing tools like **DDIST and CPP** for unit tests, and ensured proper testing of **timer/retry** and **fragmentation/reassembly** functionality.
* Worked on fixing critical issues related to **payment terminal domains** like **VeriFone** and managed **extensions DLLs** using **STL** containers.
* Participated in **Management Meetings** and **Developer Forums** organized by the **Sony Leadership Team**.
* Utilized Yocto to streamline the deployment and maintenance of software for different hardware configurations, ensuring consistent updates and compatibility across platforms, particularly for complex machinery and distributed IO systems.

**Environment:** C++, VC++, MS Azure, MFC, STL, Socket Programming, Perl Scripting, TFS Diff Tools, **State Machine Design Patterns, Timer/Retry Mechanisms, Fragmentation/Reassembly, Audio/Video Streaming, Security Graphics, Multithreading.**

**Client: Boston Scientific – Marlborough, MA Jan 2019 – Sep 2020**

**Role: Embedded Software Engineer**

**Responsibilities:**

* Worked with Microprocessors and Microcontrollers for integrating Laser Etching Machine to Software Controlled with data/information provided from DELMIA DNC.
* Worked on C++ for Laser Cad which is for fetching the data on medical devices also Using XML with Qt4
* Implementation of a middleware layer for data transformation and integration using C++ and XML.
* Design and implementation of a middleware layer for data management and integration using C++ and SQL.
* Designed the Application design document based on Multithreading design principle and Rhapsody UML diagrams with STL Pattern principal libraries with containers in source code
* Leading a Team of 5 members, mentoring the Team, Assigning the tasks and Review design document and source code.
* Work in close association with the clients to understand PKI Technology to address issues related to the procedures needed to create, manage, distribute, use, store and revoke digital certificates and manage public-key encryption.
* Optimized Qt applications forperformance on embedded Linux devices, focusing on memory footprint, power consumption, and real-time processing.
* Modified the application code in C/C++ with production and development environment to make Software compatible to use on the existing executable file.
* Converting functional requirements to technical requirements with Coding/programming to implement the features.
* Designed and implemented a framework for different kind of matching techniques for Chat components.
* Implemented a create room and leave room functionalities
* Implemented a call from lobby feature based on Sony defined VOIP and SIP libraries.
* Design and develop Oracle Store procedure and PL/SQL script
* Modified/redesigned a room and lobby functionalities
* Designed and implemented RESTful web services for secure data exchange with external APIs.
* Consumed third-party SOAP-based services to fetch identity and verification documents.
* Developed APIs with proper request/response structures using JSON/XML formats.
* Performed end-to-end testing of web services using Postman and Swagger tools.
* Analyzed Application Requirement and Work Package through TFS, Builder and Legacy Code of NCR POS-System
* Gate keeping and reviewed all my team members code through Git/Gerrit.
* Managed and organized code walkthrough for all new features in STL, C++ and Multithreading features
* Involved in Unit and API testing for all new features, reviewed DDIST and CPP test tool for unit testing.
* Involved in Management Meetings and Developer forums organized by Sony leadership team.
* PaaS providers include Heroku, Google App Engine, and Red Hat’s OpenShift. PaaS is built on top of virtualization technology. PaaS functions at a lower level than SaaS, typically providing a platform on which software can be developed and deployed.
* IaaS providers offer these cloud servers and their resources via dashboard and/or API. Enabling Users of IaaS outsource and build “virtual data center” in the cloud and have access to many of the same technologies and resource capabilities of a traditional data center without invest in capacity planning or the physical maintenance and management.

**Environment:** C++, Linux, Perl Programming, Python, SDLC, Agile Development, Unit Testing, Integration Testing, Functional Testing, Database, PL/SQL

**Role: Pegasystems – Cambridge, MA Nov 2017 – Nov 2018**

**Role: Software Engineer**

**Responsibilities:**

* Worked as Sr. Software Engineer to develop/support Video Storage and QAM based Streaming Applications with high resiliency, robustness, scalable and cloud-based streaming, caching, and storage platform for the content and SP
* Developed Multi-Thread Segment Download Managerproject to organize large number of segmented downloads by supporting HTTP, FTP and YouTube downloads
* Modified the application code in C++ with Linux/Unix environment to make the Software compatible to use on the existing platform
* Developed 3D graphics applications using OpenGL, including modeling and rendering of objects and environments.
* Worked on optimizing and profiling the performance of the 3D graphics applications by utilizing OpenGL best practices and debugging tools.
* Integration of multiple systems using C++ and the Qt5 framework, including Qt5 Network for network programming and Qt5 SQL for data management with the use of middleware.
* Worked to develop/support and maintain **CASE (Consumer and Shopper Explorer)** Application/Project which runs on Windows 2017 for research and marketing purpose.
* Developing controls for complex machinery with distributed IO systems, multi-tiered /multi-platform control architecture
* Worked on Using ActiveX from Qt5 applications and on Using Qt5's finite state machine classes
* Developed code in C++ to transmit audio and video packets using Concepts from Multithreading RTP/LSCP/RTSP (TCP/UDP) from the client to the server XML and vice-versa
* Perform different testing like unit testing, Integration testing, performance testing & Developed Unix Shell (Bash) & Python scripts for various Systems Administration tasks to automate repeated processes.
* Used Test driven approach for developing the application and implemented the unit tests using Python Unit test framework, Support for field/market reported issues
* Implemented User Interface through MFC dialog-based application.
* Integrated source code with Git repositories for version control and code collaboration.
* Worked with Jenkins to configure CI pipelines for automated build and deployment.
* Used Maven for dependency management and build automation in Java-based modules.
* Participated in setup of Docker containers for test environment simulation.
* Collaborated with DevOps engineers to troubleshoot build and release pipeline issues.
* Writing the PROC files for managing the database Adaptive Sybase structure with PLSQL and source code in C++
* Implemented Limit and Result files open dialog with an MFC based Perl and Socket Programming with file extension filters.
* Implementing, monitoring, and maintaining Microsoft Azure solutions, including major services related to Compute, Storage, Network and Security.
* Worked on function generators, DMM’s and signal simulation in modifying the libraries (STL)
* Implemented all MATLAB based data structure used in API input and output parameters.
* Implemented appropriate MEX function for data integrity and compatibility in C++ and MATLAB interface.
* Using Qt5 Linguist to internationalize your Qt5 application and Qt5's containers, iterators, and other tool classes
* Implemented and Applied signal processing methods such as peak detection, noise filtering, and linear/non-linear control loop compensation
* Making GUI applications with API’S, C++ 11 based MFC, likeWinAPI is the best on Windows as coding is bit difficult, but after making few apps not so rusty. I like it, because we can do almost everything with it (in windows). The only bad thing is, that you cannot make applications for Linux with it.
* Developed an App which is very simple with random number generator with two buttons (Generator/Reset), 7 Labels for the display of the random numbers with a Picture Box.

**Environment:** C++ 11, OpenGL, Azure, Sybase/PLSQL, Python Scripting, Unix, VC++, MATLAB, Perl and Socket Programming

**Client: Zenoti, Hyderabad, India Jun 2014 – Mar 2017**

**Role: Programmer Analyst**

* **Responsibilities:**
* Participated in meetings with stakeholders to gather software requirements.
* Contributed to the development of high-level and detailed design documents.
* Developed the front-end user interface using HTML, AJAX, JavaScript, and jQuery.
* Re-engineered existing software modules to implement changes and improve system efficiency.
* Developed a rich UI web application utilizing JavaScript libraries like jQuery UI, DataGrid, JS color, and high
* charts.
* Designed and developed software components using Python with the Django framework. Utilized Python
* code to retrieve and manipulate data.
* Implemented database access using Django ORM and MySQL as the backend database. Used Python&#39;s
* MySQL dB connector to interact with the MySQL server.
* Utilized Restful APIs to access data from various suppliers.
* Implemented graphics, XML processing, data exchange, and business logic using Python and Django.
* Worked with Restful APIs to gather network traffic data from servers.
* Supported the Apache Tomcat web server on a Linux platform.
* Assisted in configuring, testing, executing, deploying, and monitoring software scripts.
* Conducted user acceptance testing as part of the test plan.

**Education Details:**

* Bachelors in Computer Science, 2014, Andhra University.
* Masters in Computer Science, 2018, Rivier University.