Cameron McDougal

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Education

Bachelor of Science in Computer Science May 2024
University of Central Florida Orlando, FL

Projects

SWIM (Simple Web Interface for eMulation)

- Web-based emulator supporting **MIPS and RISC-V** architectures, designed as an educational resource.
- Integrated **RISC-V support** to enhance usability for modern architectures.
- Enhanced the emulator with a **multi-threaded architecture** for better performance and responsiveness.
- Expanded the parser to support **RISC-V instruction encoding** and **pseudo-instruction expansion**.
- Added support for **console I/O**, enabling real-time interaction and facilitating program debugging and execution.
- Incorporated **visualized datapath** support for RISC-V to track instructions through each stage of the datapath.
- Built an **interactive hex editor** with **stack segment** and **stack frame** views for program memory.
- Introduced **breakpoint support** for effective debugging during emulation.
- Compiled the project using **Rust** and **WebAssembly** to create a browser-accessible, fast, and user-friendly tool.
- Configured **CI/CD** with **Github Actions** to build and deploy the emulator on Github Pages.
- Followed the **Scrum methodology** as part of a 4-member team to coordinate sprint planning, daily stand-ups, and retrospectives, fostering collaborative and iterative development.

Windows Driver for System Monitoring

- Created a **Windows kernel-mode driver** to monitor system-level events such as registry operations, thread creation, and process activity.
- Leveraged **Windows kernel APIs** and **IRPs (I/O Request Packets)** to track system events in real-time with minimal performance overhead.
- Developed a **user-mode application** that communicates with the driver using **IOCTL (Input/Output Control) codes** to retrieve real-time system monitoring data.
- Ensured **security** through input validation, memory safety checks, and thread-safe mechanisms with **mutexes** and **spinlocks**.
- Validated driver functionality using WinDbg and other kernel-level tools.

Mechanical and Aerospace Engineering Management System

- Built a website for the **Department of Mechanical and Aerospace Engineering at UCF** to manage capstone project budgets, group assignments, and order submissions for **300+ students** per semester.
- **Collaborated with professors** to gather requirements, demo progress, and deliver a user-friendly solution.
- Designed features for tracking team budgets, order approval workflows, and real-time status updates for students and staff.
- Implemented **Excel import functionality** for bulk student and group data management.
- Leveraged **Scrum practices** with a 4-member team to align with project milestones, collaborate with stakeholders, and deliver incremental updates that met user requirements.

Skills

Languages: C/C++, Rust, Python, Java, JavaScript, Typescript
Tools: Docker, WinDbg, QEMU, GDB, Visual Studio 2022, Visual Studio Code, Git
Collaboration Tools: JIRA, Confluence, Trello
Databases: MySQL, MongoDB
Operating Systems: Windows, Linux
Methodologies: Scrum, Agile