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Computer Organization Teaching Materials Development

It is often challenging to provide students with hands-on experience in low-level computer science concepts. Developing engaging, experiential course materials for Computer Organization can be particularly demanding, yet such approaches are highly effective in increasing student interest and understanding. Student engagement is frequently hindered by difficulties in setting up experiments across diverse hardware platforms, limited access to specialized resources, and the lack of immediately visible results. To address these challenges, we developed six instructional, hands-on laboratory modules based on two widely used textbooks in computer organization and digital design. To create a more user-friendly learning environment for RISC-V architecture, two browser-based platforms were adopted: the Venus Instruction Set Simulator and the Surfer Waveform Viewer. The use of web-based tools eliminated compatibility issues and significantly improved accessibility, while the inclusion of waveform visualization enhanced the visibility of execution results. Students completed programming tasks in Venus and analyzed execution behavior using Surfer, an approach they found both challenging and engaging. These outcomes demonstrate the effectiveness of integrating web-based, hands-on materials to enhance learning in computer organization education.

Academic or Professional Status

Undergraduate Student

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