



Implementation and Analysis of Baseband Kernels on Vector Processor

Studienarbeit/Project Work

Problem Statement

- Understanding the performance and efficiency of DSP baseband kernel algorithms on vector processors is essential for optimizing signal processing systems. For this project, we aim to implement and analyze these algorithms on the ARA vector processor, an open-source processor implementation. By comparing the actual kernel performance with the ideal case, we seek to identify inefficiencies and suggest potential optimizations. This will enhance the understanding of how vector processors can handle DSP workloads and the potential trade-offs involved in real-world applications.

Tasks

- The task includes analyzing and implementing DSP baseband kernel algorithms on the ARA vector processor model. The student will assess the execution of various kernels, identify any performance bottlenecks, and suggest improvements based on the analysis.
- The analysis involves evaluating the computational performance of the DSP kernels, comparing them to ideal performance metrics, and pinpointing inefficiencies or suboptimal behaviors in the code.

Expected Skills

- Familiarity with digital signal processing (DSP) algorithms.
- Experience in processor architecture and programming.
- Proficiency in analyzing and optimizing code performance.

Contact Person

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- Please include a recent transcript of your grades when getting in contact

Recommended References

- Book: Computer Architecture by Hennessy and Paterson
- Research Paper: Ara: A 1-GHz+ Scalable and Energy-Efficient RISC-V Vector Processor With Multiprecision Floating-Point Support in 22-nm FD-SOI
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