A Review of Designing Power Efficient Hypermedia Processors

1) Aryan Langhanoja
2) Jay Mangukiya
Department of Information and Communication Technology
Marwadi University
Rajkot , India

Abstract—

The paper presents a framework that utilizes advances in compiler technology and architectural enhancements to address the need for synthesis of low power hypermedia processors. The authors explore the low power system design space for a hypermedia application under area and throughput constraints. They develop heuristic algorithms for the low power hypermedia processor and use a simulated annealing based algorithm to allocate resources given area and performance constraints. The results show that the framework is valuable in making early low power design decisions such as architectural configuration trade-offs.

Keywords— *Low power hypermedia processors, compiler technology, architectural enhancements, system design space, heuristic algorithms, simulated annealing, performance constraints, architectural configuration trade-offs.*

Introduction—

The development of low power hypermedia processors is a crucial area of research in the field of computer engineering. In this technical review, we will examine the research paper titled "Designing Power Efficient Hypermedia Processors" by Chunho Lee, Johnson Kin, Miodrag Potkonjak, and William H. Mangione-Smith. This paper presents a novel approach to low power system design space exploration for distributed hypermedia applications.

Body—

The paper begins with an introduction to hypermedia and its unique challenges for system designers. The authors explain that most media tasks are computation-intensive and run in parallel side by side. They then introduce their framework for low power system design space exploration for distributed hypermedia applications. The framework utilizes advances in compiler technology and architectural enhancements to address the need for synthesis of low power hypermedia processors.

The authors then present their problem formulation, which involves collecting run-times and cache performance of benchmarks on 175 different machine configurations. They use simulations to compute the energy based on the power model. The simulated power consumption measurements are made with two levels of the shutdown technique: component consumption by applying voltage scaling. They assign tasks to processors in such a way that the sums of the assigned tasks' power consumption measurements obtained using the shutdown technique should be as close to each other as possible.

The paper then presents the synthesis algorithm, which involves developing heuristic algorithms for the low power hypermedia processor. The authors use a simulated annealing based algorithm to allocate resources given area and performance constraints. Allocated processors are then used by a force-directed heuristic to assign the set of hypermedia tasks.

The results of the extensive exploration of low power system design space for a hypermedia application under area and throughput constraints are presented. The authors show that the framework is valuable in making early low power design decisions such as architectural configuration trade-offs including the cache and issue width trade-off under area and throughput constraint, and the number of branch units and issue width. The results also show that the framework is effective in reducing power consumption while maintaining performance.

The paper concludes by summarizing the contributions of the research. The authors developed an effective framework and efficient algorithms and tools to rapidly explore low power hypermedia processor design space. They conducted an extensive exploration of the low power design space under area and timing constraints. The framework addresses the need for low power hypermedia design by exploiting the ILP found in media applications by ILP compilers that target multiple-instruction-issue machines. The algorithms and tools developed in this paper showed impressive results and can be very valuable in making early design decisions such as power and architectural configuration trade-offs

Conclusion—

In conclusion, the paper "Designing Power Efficient Hypermedia Processors" presents a novel approach to low power system design space exploration for distributed hypermedia applications. The authors developed a framework that utilizes advances in compiler technology and architectural enhancements to address the need for synthesis of low power hypermedia processors. The results of the extensive exploration of low power system design space for a hypermedia application under area and throughput constraints show that the framework is effective in reducing power consumption while maintaining performance. The algorithms and tools developed in this paper can be very valuable in making early design decisions such as power and architectural configuration trade-offs. Overall, this paper makes a significant contribution to the field of low power hypermedia processor design.