

Paper Review: EnerJ – Approximate Data Types for Safe and General Low-Power Computation

Summary

Similar to the previous paper we read, this paper addresses the growing concern about energy consumption in HPC systems. Particularly, they focused on how to separate the program into parts, identify which parts of the program have to be precise and which ones can be approximated, and then isolate them accordingly so that the program still works and energy can be saved simultaneously. A new method is proposed where type qualifiers identify which data can be approximated. The study provides significant energy savings with very little loss in accuracy.

Strengths

I thought they did a good job of providing enough technical details without making it too cumbersome to read the paper. I like that they included some code snippets to help us understand how EnerJ builds on Java to flag data as either precise or approximate. I think this is a really interesting concept that I had not really considered before, and this paper does a good job of explaining how it works and why it's important. I found that the figures in the results section were easy to understand and minimal enough to get the information across without being overwhelming.

Shortcomings

Improvements

Question(s) for Presenter

I didn't have a clear understanding of how EnerJ impacts reliability. Could you explain that further?

Additional Questions

- What is EnerJ, and what problem does it solve? Explain.
 - EnerJ is an extension to Java that adds approximate data types. Instead of choosing between approximation and precision, EnerJ separates a program into different sections and specifies which ones can be approximated. This allows us to maintain an acceptable level of precision while also saving energy.
- What are the levels of approximation considered by EnerJ? Give an example of each level.
- If a system were built on the EnerJ idea, would you buy and use it?
 - Depends on the price. If I felt the energy savings would pay back the initial investment faster compared to a non-EnerJ system, I'd be willing to give it a shot.