CS519: Multi-core Performance/Power Visualization
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1. Introduction
Project description:
- Analysis of an embedded system.
- Modeling a real world application (biomedical).
- Goal of increasing performance while reducing power.
  - Increase battery life for wearable health devices.
- Targeted for system architect.

Data:
- Generated from simulations [1].
- Records a number of variables: Power consumption, cache hit/miss rates, memory bandwidth utilization, ALU utilization, etc.
- Complete simulation log is too large to parse.

Project Focus:
- Improve designers comprehension of data.
- Identify patterns quickly.
- Increase speed of data analysis.

2. Questions From a User
Where is all the power going?
- What components are being used?
- Where are the bottlenecks?
- Where are we wasting power?

What effect does the algorithm running have on utilization?
- Where are changes in utilization and power?
- What are the quantitative changes?

What happens when we change our power profile?
- What changes when component x is scaled?
- What is the change in power when component x is scaled by factor y?

3. Proposed Design

4. Design Support
Encoded Variables:
- Power
  - Shading of each component indicates power consumption.
  - Relative powers are of importance, not absolute so color encoding is feasible.
- Utilization
  - Tracked as the number of events originating occurring in this component (for a given short time period).
- Network Configuration
  - Shown by the layout of components (and the lines/connections between them).
  - This is one of the key pieces of information about a computer architecture, keeping this as the focus for the visual display helps the user keep context on what the powers and utilizations mean.

Design Structure:
- The visualization was designed with the overview+detail model. The overview of the multicore processor is first provided, then detailed information about each component can be obtained by clicking on that component. Interaction allows for the user to gain insights into the sections of the system they are most interested in.
- Abundant use of sparklines allows for quick overviews of the system behavior and history to be obtained at a glance.

5. References