**Introduction**

- Parallelization can help balance energy consumption and performance esp. in multi- and many-core systems
- The interplay between performance and energy and their relationship with parallelization scaling are studied with the help of the reliable operation region (ROR)
- Theoretical and experimental explorations
- Cross-platform analysis through bi-normalization of the ROR
- Online web tool captures the concept of this interplay and finds optimal operating points

**K-scaling**

Perfect k-scaling to theoretical switching power (left) compared to measured data, which pertains to total power (including leakage power).

Perfect k-scaling is not possible as shown by Amdahl’s law on the left, and idle power must also be considered as shown on the right.

**ROR**

Low voltage limit A, high voltage limit B, throughput requirement C, power limit D, and timing reliability limit (TRL) E together form the boundaries of the ROR.

**PER tool workflow**

The PER web tool can be used with pre-installed example data obtained from a number of platforms experimentally, or user-supplied data.

User-supplied data can be either from experimental characterization or from design specifications.

**Tool availability**

URL: [http://async.org.uk/prime/PER/](http://async.org.uk/prime/PER/)