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Peak power modeling for join algorithms in DBMS.

Summary: Accurate peak power evaluation of query processing is fundamental to a power-aware DBMS running in large data centers. To estimate the peak power of the core operator join in query processing, the concept of CPU-boundedness was introduced, i.e., the ratio of CPU-intensive operations in unit time. The power prediction models were constructed with the piecewise and continuous fitting methods; and the multivariate model was further developed by incorporating both CPU-boundedness and CPU-frequency into the model via surface fitting. A non-runtime peak power estimation method is proposed for four most commonly used join algorithms in DBMS. To the best of our knowledge, our work is the first attempt towards modeling and estimating the peak power of query processing. Extensive experiments have demonstrated the effectiveness of our proposed methods with acceptable mean relative errors.

Keywords: peak power; CPU-boundedness; join algorithms; power-aware DBMS; data center
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