

Accepted Manuscript

EDOM: Improving energy efficiency of database operations on multicore servers

Yi Zhou, Shubbhi Taneja, Xiao Qin, Wei-Shinn Ku, Jifu Zhang

PII: S0167-739X(17)30302-3

DOI: <http://dx.doi.org/10.1016/j.future.2017.02.043>

Reference: FUTURE 3361

To appear in: *Future Generation Computer Systems*

Received date: 16 May 2016

Revised date: 3 October 2016

Accepted date: 24 February 2017

Please cite this article as: Y. Zhou, S. Taneja, X. Qin, W.-S. Ku, J. Zhang, EDOM: Improving energy efficiency of database operations on multicore servers, *Future Generation Computer Systems* (2017), <http://dx.doi.org/10.1016/j.future.2017.02.043>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



EDOM: Improving Energy Efficiency of Database Operations on Multicore Servers

In this paper, we propose a toolkit called *EDOM* facilitating the evaluation and optimization of energy-efficient multicore-based database systems. Two core components in *EDOM* are a benchmarking toolkit and a multicore manager to improve energy efficiency of database systems running on multicore servers. We start this study by analyzing the energy efficiency of two popular database operations (i.e., cross join and outer join) processed on multicore processors. We investigate cross and outer joins, because these two operations are common components of database applications. We describe the criteria and challenges of building an energy efficiency benchmark for databases on multicore servers. We build a benchmarking toolkit, which is comprised of three parts, namely, a configuration module, a test driver, and a power monitor. The workload generator facilitates the configurations of the PostgreSQL database system. We leverage this generator to set up tables and populate data records into the database. The test driver automatically issues operations to the database system in accordance to access patterns created by the workload generator. The power monitor keeps track of energy efficiency and performance of the multicore database system processing the operations driven by the test driver. We develop a multicore manager to optimize the number of cores, thereby making the best tradeoff between performance and energy efficiency in multicore database servers. At the heart of the multicore manager is a memory usage model that estimates memory utilization from queries and database characteristics (e.g., table and record size). An appropriate number of cores is determined using the estimated memory usage to avert unnecessary memory swapping, which induces high energy consumption overhead. We make use of the proposed benchmark toolkit to quantitatively evaluate the performance

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات