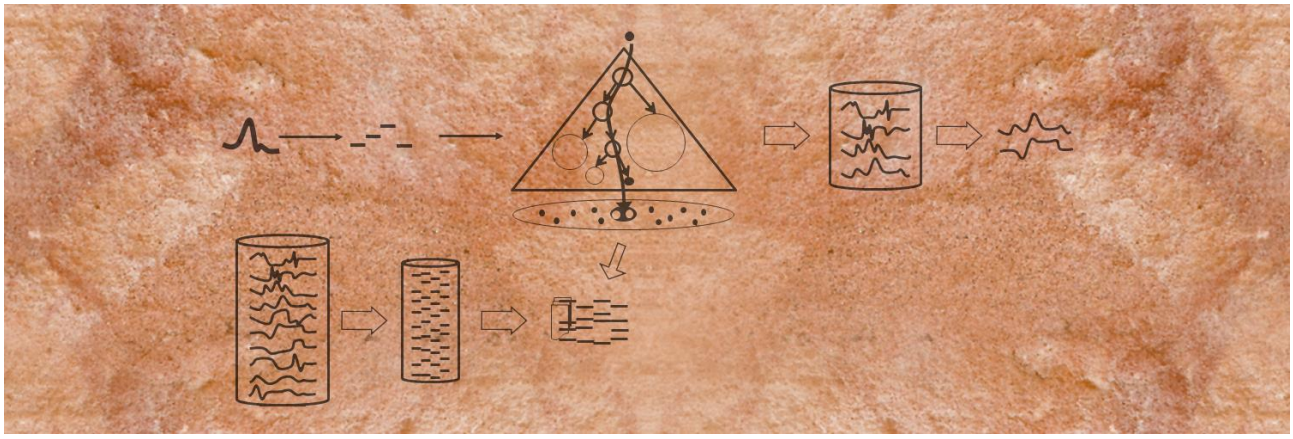
PLATON - Platform-aware LArge-scale Time-Series processing

https://platon.mi.parisdescartes.fr/index.html

Press Release, October 2022



PLATON (Platform-aware LArge-scale Time-Series prOcessiNg), a research project funded by the European Commission in the context of Marie Skłodowska-Curie Individual Fellowships (MSCA-IF), has completed successfully. PLATON aimed at harnessing the difficulties of large-scale data series processing by realizing the data series processing performance and scalability goals. This is one of the most pressing issues in data series processing, as recent advances in the development of modern scientific instruments and the dominance of the Internet of Things have resulted in an unprecedented growth in size of modern data series collections.

PROJECT INFO

PLATON
Grant agreement ID: 101031688

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Coordinated by: UNIVERSITÉ PARIS CITÉ

France

Fact-sheet of the project

https://platon.mi.parisdescartes.fr/

www.linkedin.com/groups/14013902/

Main Results Achieved

1. PLATON developed a framework providing new algorithms and techniques for highly-efficient data series processing in a multi-node setting. This encompassed the design and implementation of 1) **low-cost, data-aware** data partitioning and mapping techniques for answering queries on large collections of data series in heterogeneous computing platforms, as well as 2) low cost **load balancing and communication solutions** for multi-node query processing that resulted in much better performance and high scalability in large-scale data series processing.

   In the context of the project, we have built a new powerful index that facilitates processing of datasets whose size is at least an **order of magnitude** larger than the current datasets tested by

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state-of-the-art indexes. It is a holistic data series indexing solution, which utilized all the computational resources provided by heterogeneous computing platforms, achieving to be orders of magnitude faster and more scalable than current state-of-the-art approaches.

2. PLATON developed a new multi-threading index and query processing scheme, called Fresh, for large data series collections which is highly **fault-tolerant,** at no cost when compared to existing parallel solutions[1,2,3] which use locks, and thus they do not provide any fault-tolerance (i.e., they are blocking).
3. PLATON achieved enhanced performance by combining the power of general-purpose CPUs with **accelerators**, such as Graphical Processing Units (GPUs). The main outcome in this direction is SING, a parallel index that ensures 5x better performance than state-of-the-art parallel solutions which utilize only multi-threading.

Through a wide range of configurations and using several real and synthetic datasets, the experimental analysis performed in PLATON demonstrated that the designed software achieves all the challenging goals of the project. As multiple scientific and industrial fields are currently in need of such software components to handle their massive collections of data series, the developed modules and tools have the potential of important economic and social impact in Europe (and across the globe).

CONTACT INFORMATION

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[1] B. Peng, T. Palpanas, and P. Fatourou, "Messi: In-memory data series indexing," ICDE, 2020.
[2] B. Peng, T. Palpanas, and P. Fatourou, "Paris: The next destination for fast data series indexing and query answering," IEEE BigData, 2018.
[3] B. Peng, T. Palpanas, and P. Fatourou, "Paris+: Data series indexing on multi-core architectures," TKDE, 2020.

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