LeanBigData

LeanBigData has built an ultra-scalable real-time big data platform combining in the same database operational and analytical capabilities and integrating an ultra-efficient NoSQL key-value data store, a distributed data streaming/CEP system & supporting end-to-end big data analytics.

AT A GLANCE

Project title:
Ultra-Scalable, Ultra-Efficient Integrated and Visual Big Data Analytics

Project coordinator:
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Partners:
Universidad Politecnica de Madrid (ES), INTEL (IE), Computer Associates (ES), Foundation for Research and Technology - Hellas (GR), Institute of Engineering Systems and Computers (PT), SyncLab (IT), Atos Spain S.A. (ES), Institute of Communication and Computer Systems (GR), Portugal Telecom (PT), LeanXcale (ES)

Duration:
36 months

Total cost:
€6,15 M

Programme:
ICT-2013.4.2 Scalable data analytics

Further information:
http://www.leanbigdata.eu

Why LeanBigData?

While over the last years there has been a lot of progress on the scalability of big data analytics, the processing techniques are extremely inefficient, *consuming a tremendous amount of resources*, and thus resulting in a very high total cost of ownership (TCO). Besides the cost, the resources used to process data is becoming an important concern due to the fact that public cloud data centres are becoming one of the biggest consumers of energy (world-wide data centres consume about 1.3% of the electricity produced).

What is more, *integration of different data management technologies* requires a large effort, while it is an ad-hoc process that increases development cost for analytics. These technologies are usually integrated via an extraction-transform-load (ETL), which however affects the QoS of the production database and it is extremely costly. In some sense, although scalable, big data analytics tend to operate mostly in batch mode resulting in poor support for business processes.

Finally, the *end-user of big data analytics* is facing today long cycles across the data analysis lifecycle: from discovering relevant facts (such as issues or alarms), to obtaining the results of large analytical queries, visualizing the result of ad-hoc queries, and interaction with the visualizations.

What makes LeanBigData unique?

LeanBigData will "***do it faster with less resources***".

LeanBigData has focused on core data management technologies, by architecting and developing **three resource-efficient big data management systems**: a novel transactional NoSQL key-value data store, a distributed complex event processing (CEP) system, and a distributed SQL query engine. **Ultra-efficiency** has been achieved through enhanced key innovations eliminating the overhead of multi-threading such as context changes and thread synchronization, the cost of multi-versioning for attaining multi-version concurrency control, leveraging hardware advances such as vectorial processing and exploiting efficiently modern NUMA architectures.

Furthermore, LeanBigData has delivered an **integrated big data platform** with these three main technologies used for big data, NoSQL, SQL, and Streaming/CEP that improve response time for unified analytics over multiple sources of data avoiding the inefficiencies and delays introduced by existing ETL-type approaches. To this end, LeanBigData uses fine-grain intra-query and intra-operator parallelism that leads to sub-second response times for queries over static and streaming big data.

Accelerating the data analysis cycles are achieved through LeanBigData by supporting an **end-to-end big data analytics solution** that removes the four main sources of by using: 1) automated discovery of anomalies and root cause analysis that will provide end-users with a starting point at time 0; 2) incremental visualization of results of long analytical queries to allow discarding inappropriate queries without waiting until the results are delivered hours or days later; 3) drag-and-drop declarative composition of visualizations. Additionally a gesture based interface has been developed to interact with visualizations that has been exercised for the 3D visualization of data centre monitoring.

Value proposition

LeanBigData delivers a Big Data platform that is ultra-scalable and provides support for an operational database and analytical queries over the operational data. The new key-value data store is ultra-efficient and improves today's systems by an order of magnitude in efficiency, reducing the amount resources required to process a set of data. LeanBigData **scales efficiently to 1,000s of cores** and enables **unified processing in real-time** of millions of streaming events per second and big data queries with online response times.

Demonstrators

The LeanBigData outcomes has been validated through four real industrial use application scenarios: ***Cloud Data Centres Monitoring***, to monitor and correlate application performance, hardware and data centres utilization and predict failures; ***Targeted Advertisement*** to maximize impact and return through real-time queries with respect to advertisements; ***Alignment of Financial Direct Debit Transactions*** to detect direct debit frauds in a timely and efficient way; and ***Social Network Analytics*** to analyse at real-time and visualize social media graphs.