In-Memory Data Management for Enterprise Applications

Status Quo

- Systems are **traditionally separated** into **transactional** (OLTP) and **analytical** (OLAP) data management systems

- This separation has many drawbacks

  - OLAP system does not have the latest data and relies on pre-fabricated data

  - Cost-intensive ETL process to sync both systems

  - Fortune 500 companies need a team of 20 people to manage the redundancy

The Vision

- Build an enterprise system **combining OLTP** and **OLAP** in one single database

- This approach enables **real-time analytics** and a **simplified** application and database architecture

- Business questions can be answered in **less than one second**
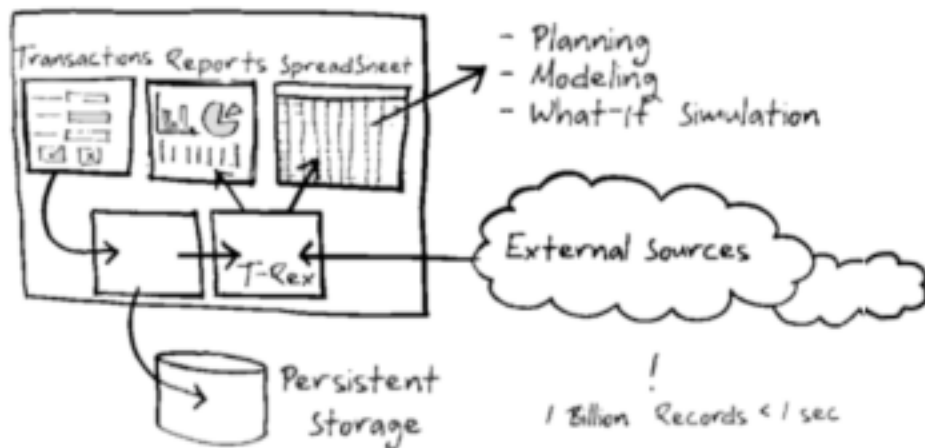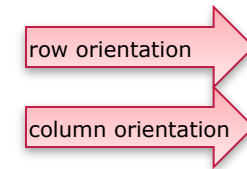

- Recent trends in hardware support this vision

  - Massively **increasing main-memory capacity** at a **lower TCO** (up to 4 TB/server)

  - **Multi-core CPU** architectures (up to 64 cores)
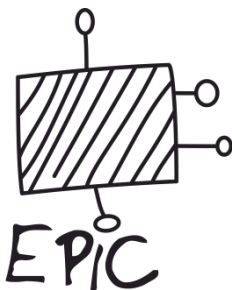
Technology

- **Column orientation** instead of row orientation

Id	Name	Salary
1	Miller	4.000
2	Jones	3.000

row orientation → 1, Miller, 4.000; 2, Jones, 3.000;

column orientation → 1, 2; Miller, Jones; 4.000, 3.000;

- **Compression** of business data saves memory and speeds up processing (up to a factor 10)

- **Partitioning** allows for massive parallelization

Research Results

- **Validated** in-memory column-oriented database technology **with real customer systems**

- Removed secondary indexes, pre-calculated and materialized sum tables, reduced complexity in application

- **Improved** dunning run **from 20 min down to 1 s** (1200-times faster than before)

- Work in progress

  - Parallelizing **planning processes**

  - Augmenting **Available-to-Promise** with real-time analytics and flexible order fulfillment

  - Provisioning **multi-tenant** analytics through a **cloud-based infrastructure**

  - Combining **row** and **column** storage in a **hybrid** system

Research Group of Prof. Plattner: Enterprise Platform and Integration Concepts (EPIC)

Martin Faust, Jens Krüger, Martin Lorenz, Stephan Müller, Jan Schaffner, David Schwalb, Christian Schwarz, Christian Tinnefeld, Johannes Wust
hana-epic@hpi.uni-potsdam.de

HPI Hasso Plattner Institut

IT Systems Engineering | Universität Potsdam