



ASUGMEX

Asociación de Usuarios de SAP en México A.C.

C O N F E R E N C I A A N U A L

ASUGMEXICO 2016

Revoluciona la Experiencia y descubre lo que la Transformación Digital puede hacer por ti





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HOW SPEED TRANSFORMS YOUR DIGITAL BUSINESS



Introduction

- Hasso Plattner Institute, Potsdam, Germany
- Founded by SAP chairman Hasso Plattner in 1999
- Not a part of SAP – this talk is from an HPI perspective



Introduction

- 500 Students, 12 Professors
- Research Group of Prof. Plattner:
Enterprise Plattform and Integration Concepts
- In-Memory Data Management
- Tools & Methods for Design and Engineering
- In-Memory Life Sciences



CHAPTER 1: SPEED IS EVERYTHING



The statement that “In the past it took two days to get an answer to a question that now is given in fifteen minutes” means, perhaps, an increase in *operating* efficiency for the system, but does not in itself materially change the cognitive (psychological) behavior of the person getting the information.

How long is your attention span?



Response Times: The 3 Important Limits

by **JAKOB NIELSEN** on January 1, 1993



0.1 seconds: feels **instantaneously**



1 second: keeps the **user's flow of thought uninterrupted**



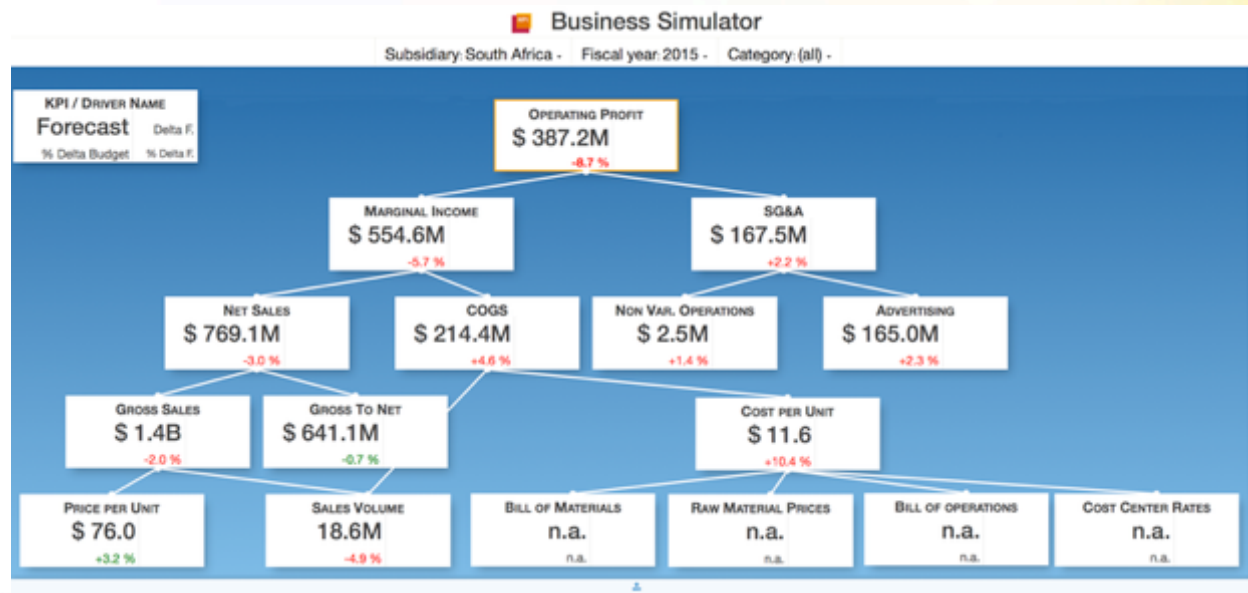
10 seconds: keeps the **user's attention**

- Long wait times makes your users lose focus
- Immediate answers encourage users to explore further and ask questions they would not ask otherwise

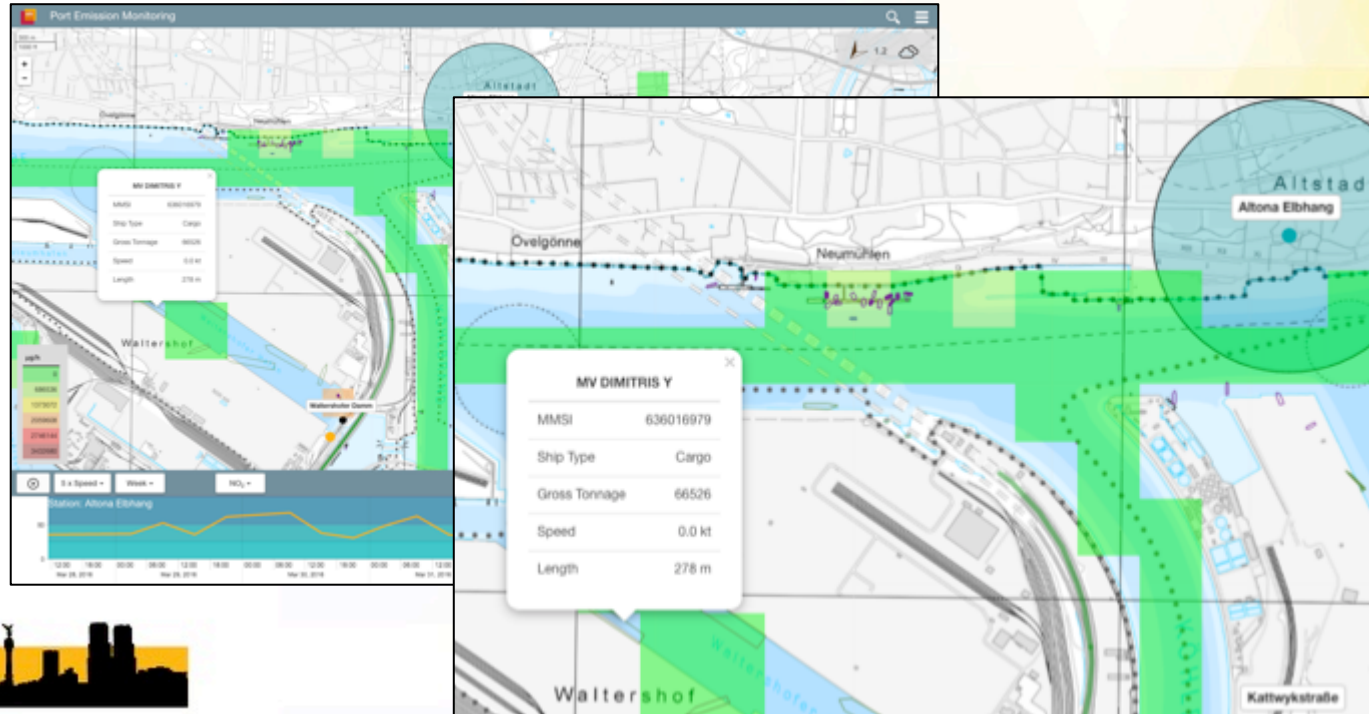
- Digital Transformation is not (only) about taking your current approach and making it faster
- Do not take a fast database and only use it to make your applications run faster
- **Reimagine your applications**



Case Study: Business Simulation



Case Study: Environmental Monitoring



Take Aways from Chapter 1

- A fluid user experience needs response times < 10 s, or better < 1 s
- New technologies can help you achieve this goal
- But, more importantly, they also enable new, interactive applications



CHAPTER 2: FAST DATABASES

Hardware Developments

25 YEARS AGO



MEMORY

1 GB

CPU

4 x 50 MHz

x 48000

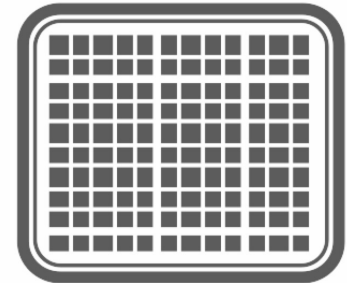
MEMORY

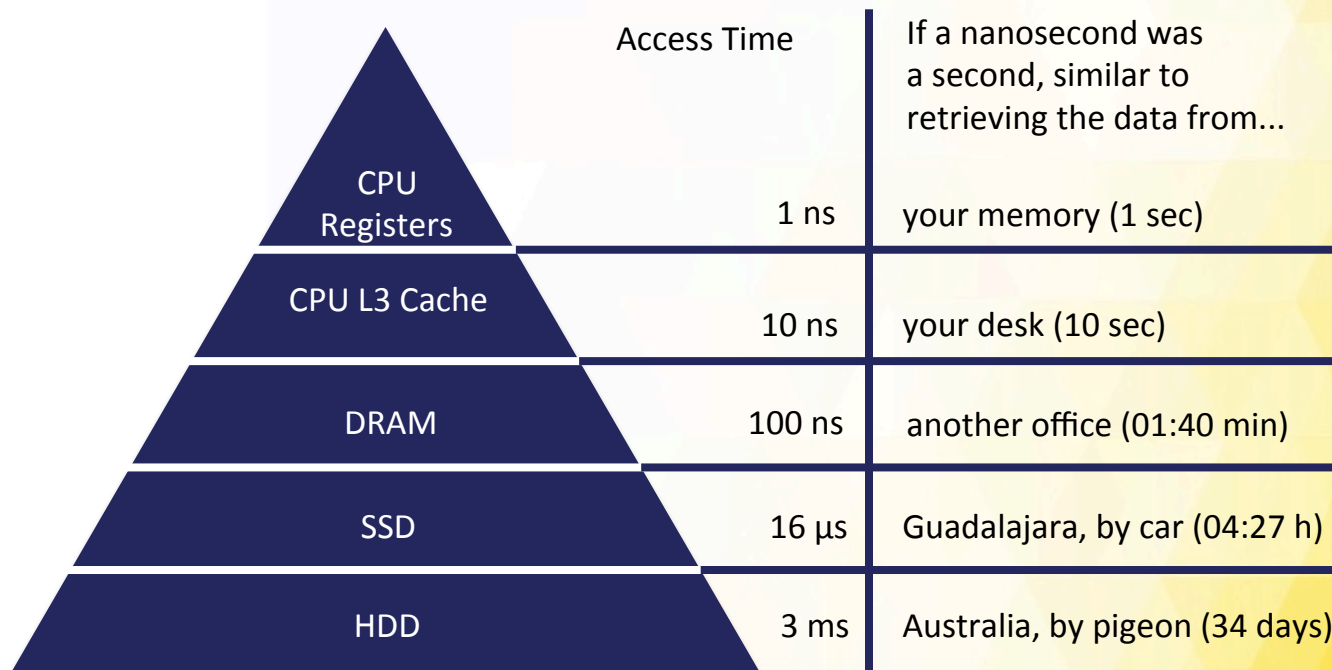
48 TB

CPU

480 x 3.4 GHz

TODAY





- We said that we have one second to keep the user's flow of thought uninterrupted
- In one second, a single modern processor can process up to 100 GB worth of data
- Our database must be able to handle this

Deep Dive: In-Memory Databases

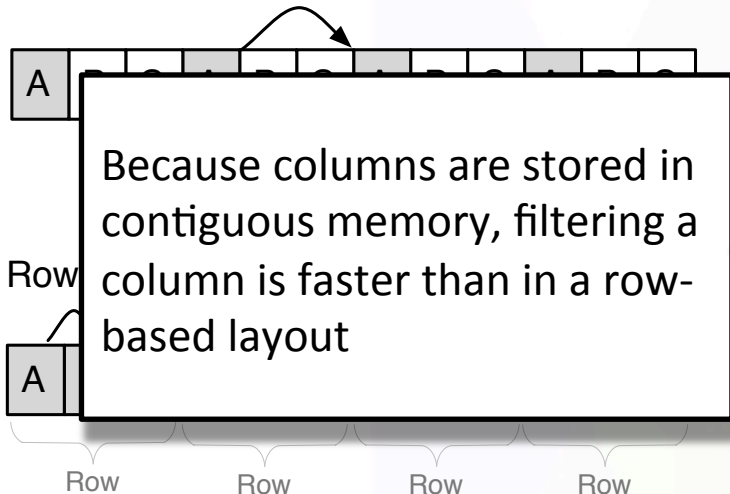
	Col ₁	Col ₂	Col ₃
Row ₁	A	B	C
Row ₂	A	B	C
Row ₃	A	B	C
Row ₃	A	B	C

How do we store a table in memory?

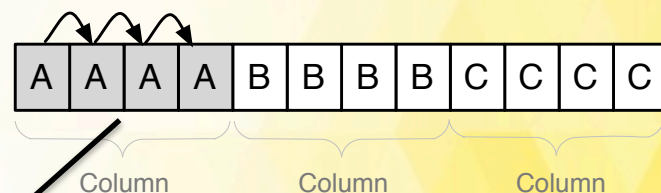
Turns out that this decision has major performance implications

Row Layout vs Column Layout

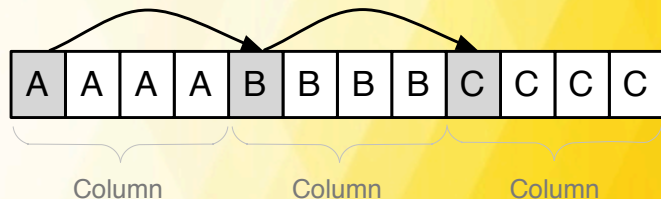
Column Operation



Column Operation



Row Operation



Checking Account with Pre-Aggregation

Account #	Business Partner	Memo	Date	Amount
1	4 Jul 2016	\$ 3714.27
1	6 Jul 2016	\$ -681.28
2	9 Sep 2016	\$ -485.42
1	...		8 Oct 2016	\$ 12.55

Date	Balance
Jul	\$ 3032.99
Sep	\$ -485.42
Oct	\$ 12.55

Account	Balance
	\$ 3045.54
	\$ -485.42

Reducing Complexity

When we aggregate a column in fractions of a second, we can get rid of materialized aggregates and index tables

Accounting Documents

BKPF

BSAD

BSAS

BSIK

BSEG

BSAK

BSID

BSIS

Dunning

MHNC

MHND

Changes

CDHDR

CDPOS

Sums

GLT0

KNC1

LFC1

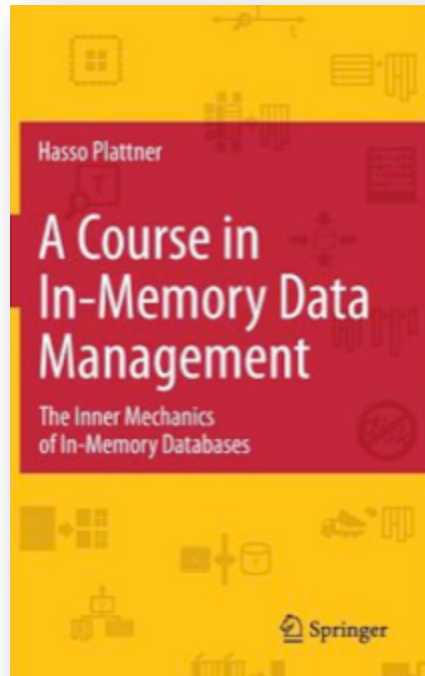
Advantages of a Simplified System

- Footprint reduction
- Faster transactions, especially for queries we have not thought about
- Easier development → New applications

Further Concepts used

- Insert-only
- Dictionary Compression
- Write-optimized storage
- Replication
- Actual/Historical-Storage
- ...

Interested in learning more about In-Memory Databases?



In-Memory Data Management 2015

Prof. Hasso Plattner



7. September 2015 - 2. November 2015



English

The „In-Memory Data Management“ MOOC in 2015 is the fourth iteration of Prof. Hasso Plattner's successful introduction into the inner

Take Aways from Chapter 2

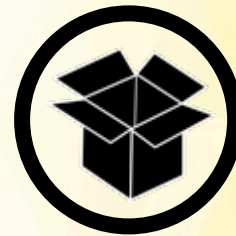
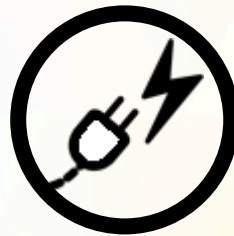
- Database Performance depends on a good understanding of the underlying hardware
- In-Memory Databases are not only faster, but also drive system simplification



CHAPTER 3: OUTLOOK

Non-Volatile Memory

- Main Memory makes all this possible, but it is not perfect



Non-Volatile Memory

Intel Details 3D XPoint Memory, Future Products

AUG. 23, 2015, 8:30 A.M.

[f](#)
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[in](#)
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storage.

IBM THROWS WEIGHT BEHIND PHASE CHANGE MEMORY

May 17, 2016 Timothy Prickett Morgan

ars TECHNICA UK 🔍 BIZ & IT **TECH** SCIENCE POLICY CARS GAMING & CULTURE FORUMS ☰

DIGITISING BUSINESS —

Thanks for the memory: How cheap RAM changes computing

In-memory data processing brings huge speed boosts, but the future looks non-volatile.

ADAM BANKS - 17/10/2016, 07:32

Non-Volatile Memory

- NVM is almost as fast as DRAM, but
 - significantly cheaper,
 - persistent,
 - without energy consumption in standby, and
 - has a higher capacity

Non-Volatile Memory

- Can we build a database without traditional storage?
- Can we save money and build bigger databases at the same time?

Offloading and Accelerators

- CPUs are great at performing all types of different tasks
- Some applications can be performed faster by specialized hardware
- Think Machine Learning on GPUs or Google's Tensor Processing Unit

Offloading and Accelerators

- We see an increasing movement towards specialized hardware
- Intel's Acquisition of Altera, manufacturer of FPGAs
- CCIX / OpenCAPI / Gen-Z

Offloading and Accelerators

How can we improve database performance and reduce TCO by offloading to certain accelerators?

Take Aways from Chapter 3

- Non-Volatile Memory will disrupt the storage hierarchy
- Accelerators might bring further performance improvements
- Our research helps at understanding these changes and preparing us for the next generation of hardware

The database is there – what new applications can you think of?

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