The formative impact of DOMA lab on my academic path to Computer Science

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A few words about my path

BSc and MSc @ University of Athens, Greece

PhD @ EPFL, Switzerland

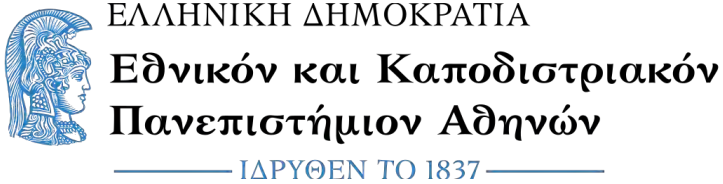
Research Intern @ IBM Research Watson, NY

Postdoc @ Harvard University

Visiting Lecturer @ Tufts University

Assistant Professor @Boston University

Visiting faculty @ Meta



With two excellent mathematicians already at home …

Too much competition!

I decided to follow a “very different” discipline!


Computer
Science

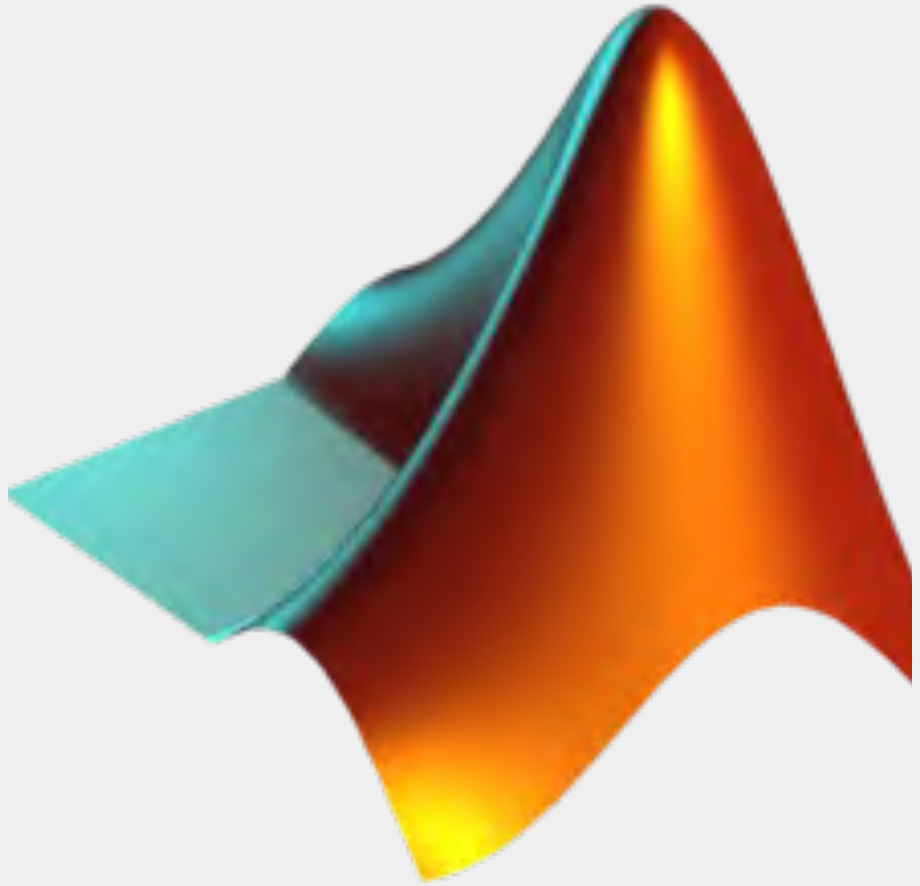
How did DOMA influence my path?

Significant computational tools were used

Silicon Graphics Super-Computer Indigo
was used for solving complex computational and simulation problems in DOMA around 1995

(photo from Wikipedia)

Expertise on highly-specialized tools like MATLAB was built as early as early-1990s



DOMA fostered deep interest
for both **research** and **education (i.e., people!)**

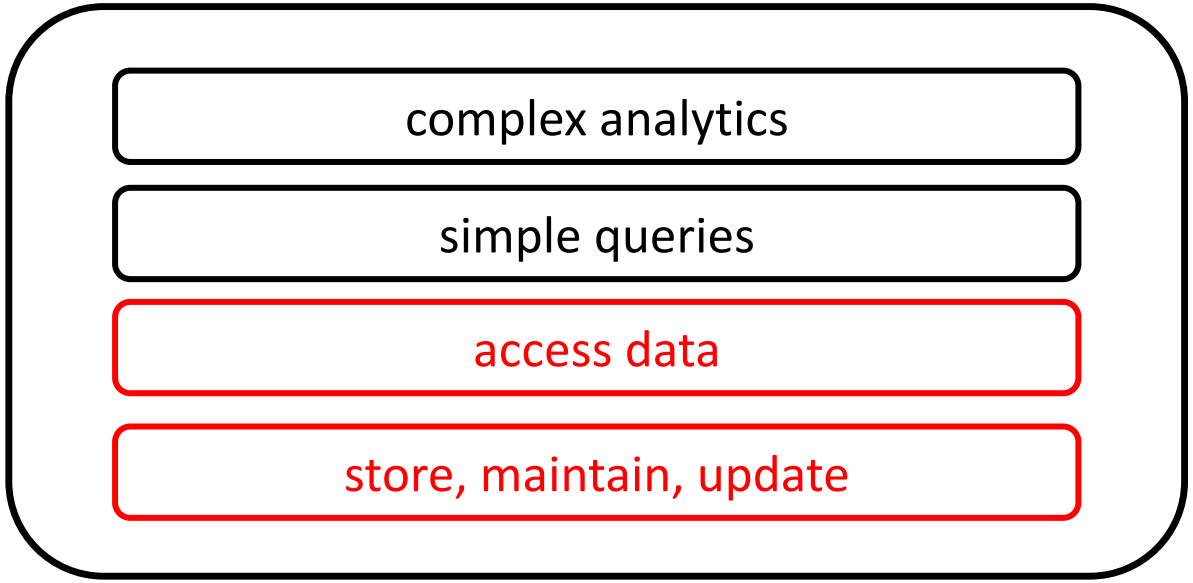
One of these **wonderful people** was my first computer science mentor!

Thodoris Gerostathis (now Professor at Univ. of West Attica) introduced me to **algorithmic**-thinking, **programming**, **databases**, and crucially (for most of my research career) to **C++ pointers**!

In the 5 (formative, during high-school) years we worked together he prepared me very well in many ways for a computer science degree!

To highlight the impact of this first encounter with CS, my current research focuses on the implementation and tuning of data systems!

Database Systems



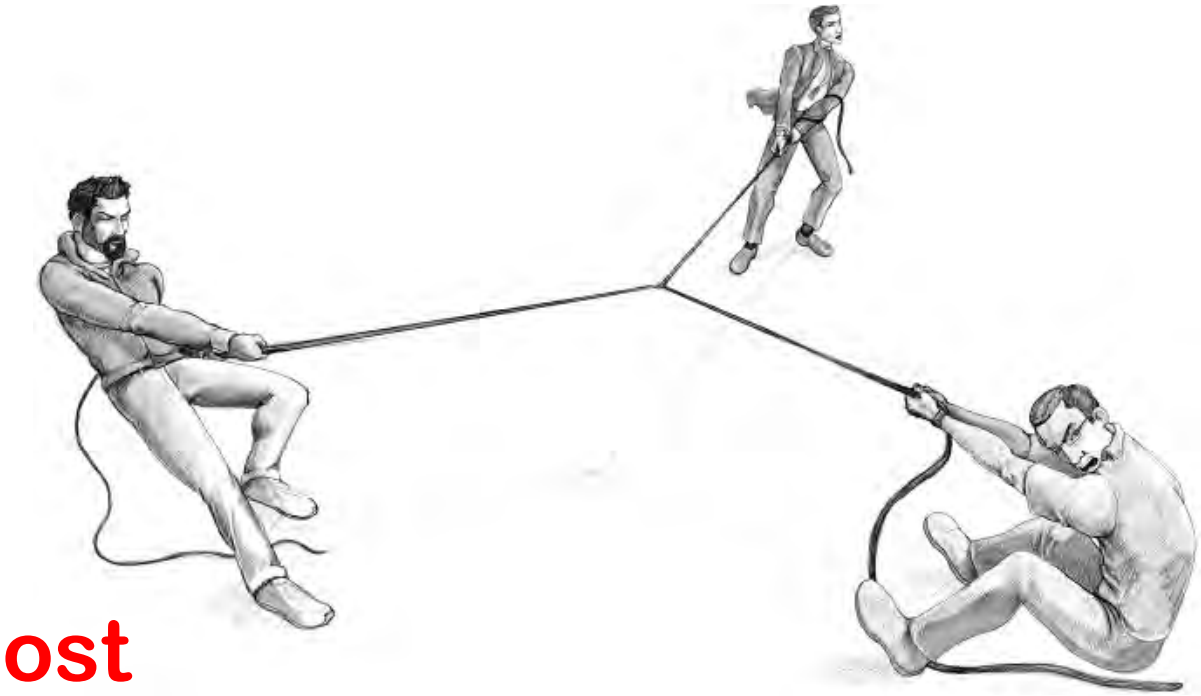
access methods*

***algorithms** and **data structures** for organizing and accessing data

How to use new storage and compute hardware in the data management software stack?

store, manage, & maintain data

update cost

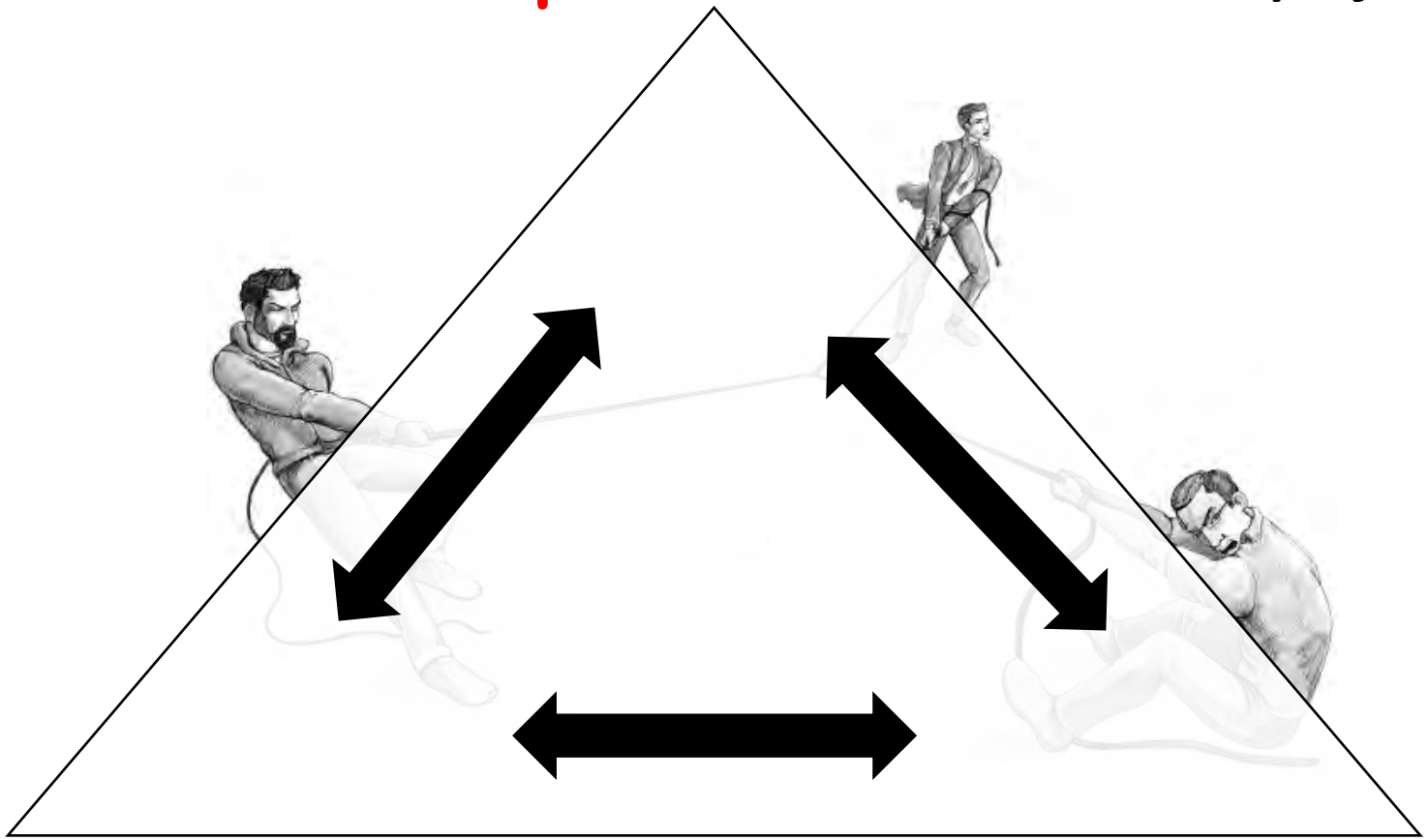


read cost

space utilization

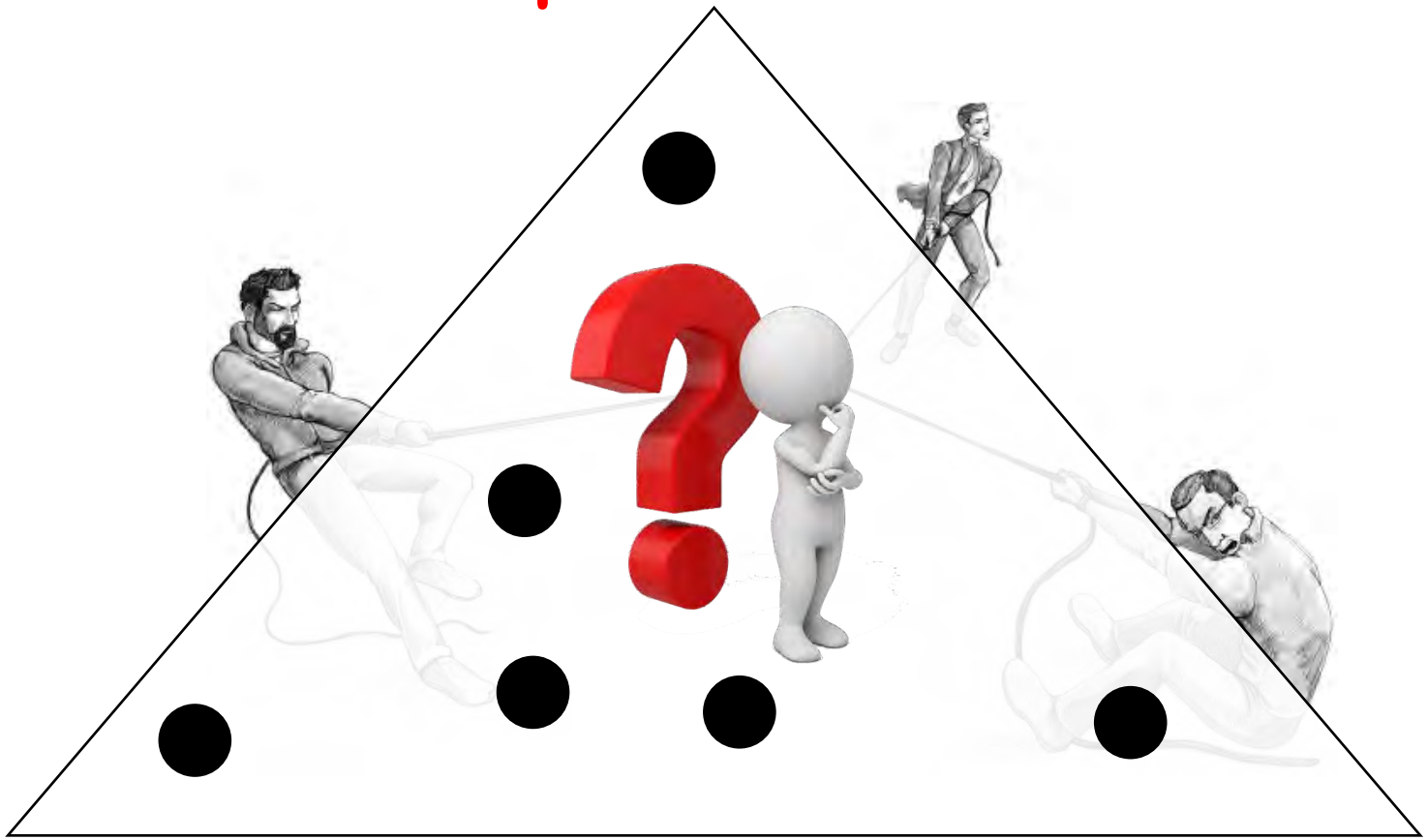
store, manage, & maintain data

*data systems that **navigate** the **performance tradeoffs***



store, manage, & maintain data

how to choose which system to use?



Tuning Data Systems

(how to design and decide the values of tuning parameters of systems)

complex workloads
(that might dynamically change)

hardware

performance requirements

software engineering

data structures

algorithms

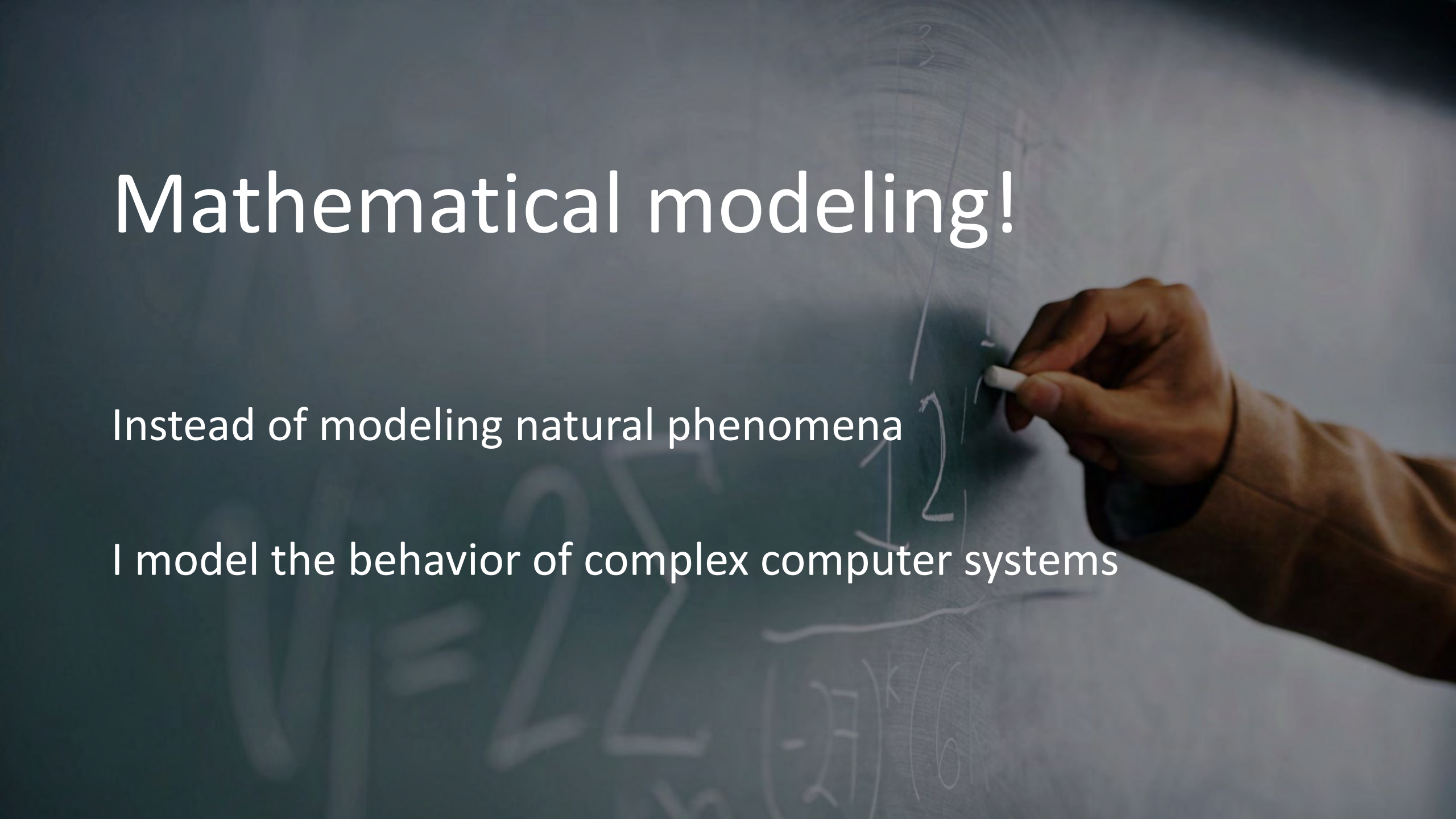
optimization

robust optimization

support a **variety** of **applications** and **access patterns**

While Computer Science is not the main research discipline of DOMA …

I frequently request advice for a well-known topic.



Mathematical modeling!

Instead of modeling natural phenomena

I model the behavior of complex computer systems

Putting mathematical modeling of data systems in action!

Optimal Bloom Filters and Adaptive Merging for LSM-Trees
ACM Transactions on Database Systems, 2018

- use Lagrange multipliers to optimally allocate main memory across a constellation of Bloom filters
- use a hand-tuned Newton-Raphson method to optimally split memory between Bloom filters and the buffer

awarded as one of the most influential papers in ACM SIGMOD 2017 and affected practical systems

Optimal Column Layout for Hybrid Workloads
Proceedings of the VLDB Endowment, 2019

- model horizontal data partitioning in database systems as a binary integer problem
- build a divide-and-conquer approach to reduce complexity

https://disc.bu.edu

But DOMA has been more than that …

An extension of family!

(photo from the baptism of the first grandson of Prof. Athanassoulis)

Three operating principles

A profound **love for knowledge** and **research**

Putting people first: their path and development means more than “results”

Find what you love, so you can **enjoy working hard** to be good at it.

A few more memories

Δουλεύοντας στο Δώμα


arion.naval.ntua.gr
Digital Design
(my contribution!)


Fascination with experimentation

An international presence (Brest)

An international presence (Toulon)

An extended family

Water, Light, Family, and Academic Family

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