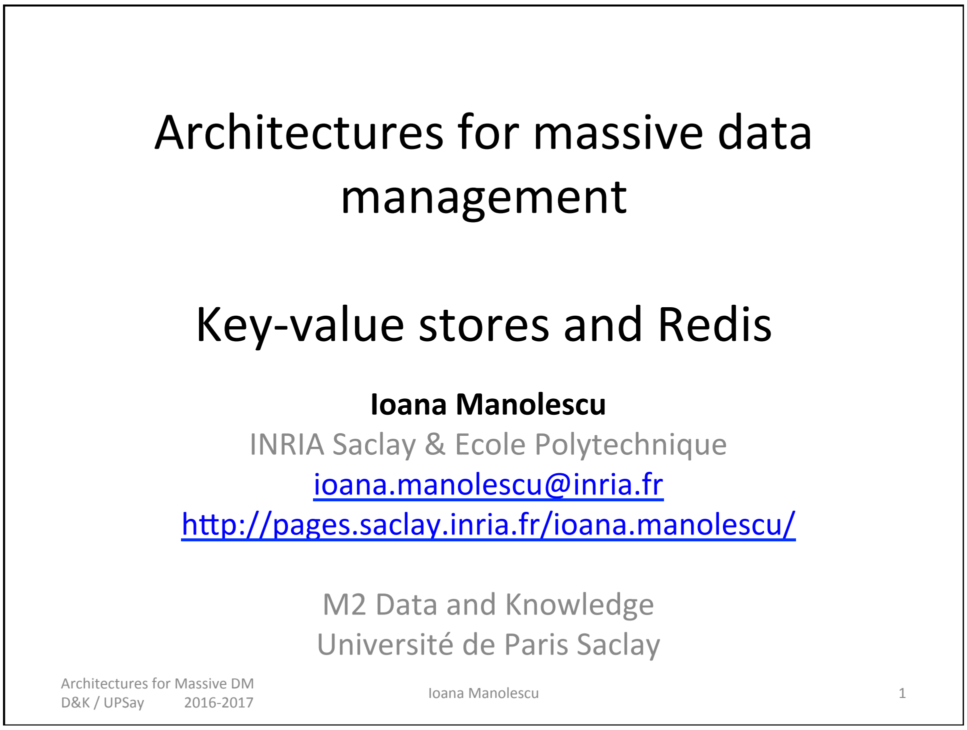

Architectures for massive data management

Key-value stores and Redis

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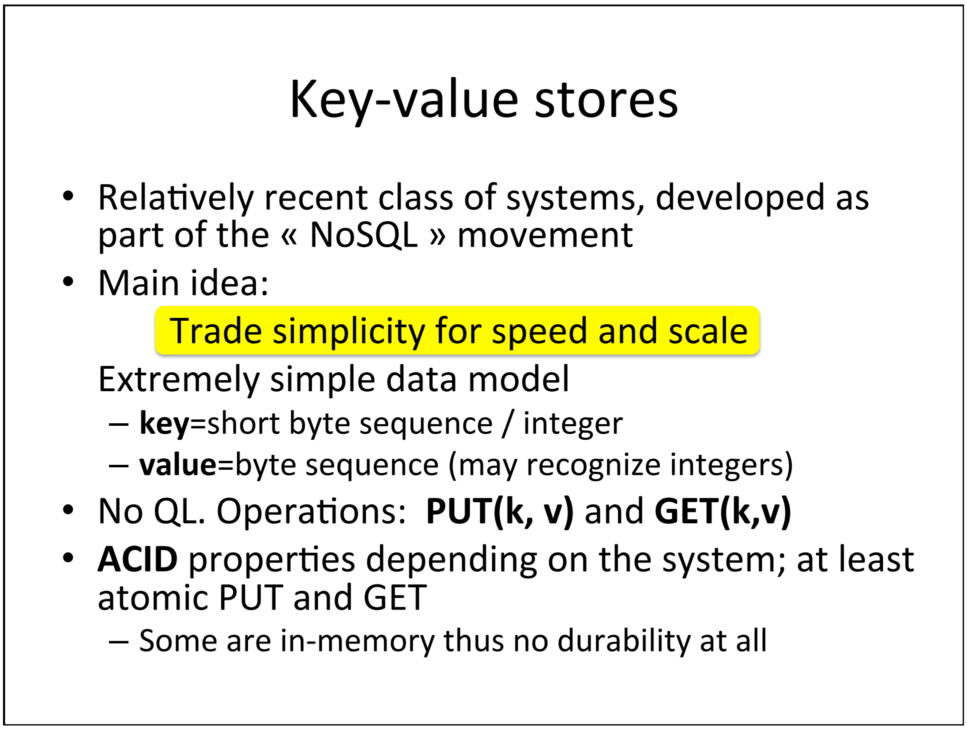


Key-value stores

- Relatively recent class of systems, developed as part of the « NoSQL » movement
- Main idea:

  Trade simplicity for speed and scale

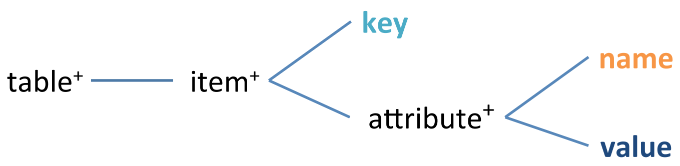
  Extremely simple data model
  - **key**=short byte sequence / integer
  - **value**=byte sequence (may recognize integers)
- No QL. Operations: **PUT(k, v)** and **GET(k,v)**
- **ACID** properties depending on the system; at least atomic PUT and GET
  - Some are in-memory thus no durability at all

Key-value data models

- Simplest model:
  - One key – one value
- Extensions:
  - **Organization**: key-value pairs belong to « collections » or « databases » or « tables »
  - **Multiplicity**: set or list of values
  - **Internal tructure**:
    - One key – a list of *attributes*
    - Each attribute has a *name* and a *value* / *set of values*

Sample key-value data model: DynamoDB

- Provided by Amazon Web Services (AWS)



- Naming may vary (there is no standard). See doc.
- Although it is called « table », *items in the same table may have nothing in common*!
- The interface is very similar to the so-called « Big Tables » (to be seen)

Redis: one of the most popular key-value stores

- Data model:
  - Hash (a set of key-value pairs on the same key)
  - List
  - Set
  - Values cannot be lists nor sets (no nesting!)
  - Databases
- Operations
  - Put, get
  - Set operations (union, intersection)
  - List operations: left/right push/pop (→queue / stack)
  - Arithmetic operations (attempts type conversion to integers)

Redis: first lab

- Install Redis, launch it
- Follow the tutorial
- Write in Redis a toy application of a database of books which can be borrowed in a library.
  - All books have an ISBN, a title and an author.
  - Books may also have other properties, e.g. language, publcation year, edition...
  - Make books expire after a while (if no one borrows the book)
  - Make a Redis client subscribe to books by a certain author
  - With the help of a programming language interface to Redis, index a newly published item by the words in its description. Make a Redis client subscribe to items having certain keywords.