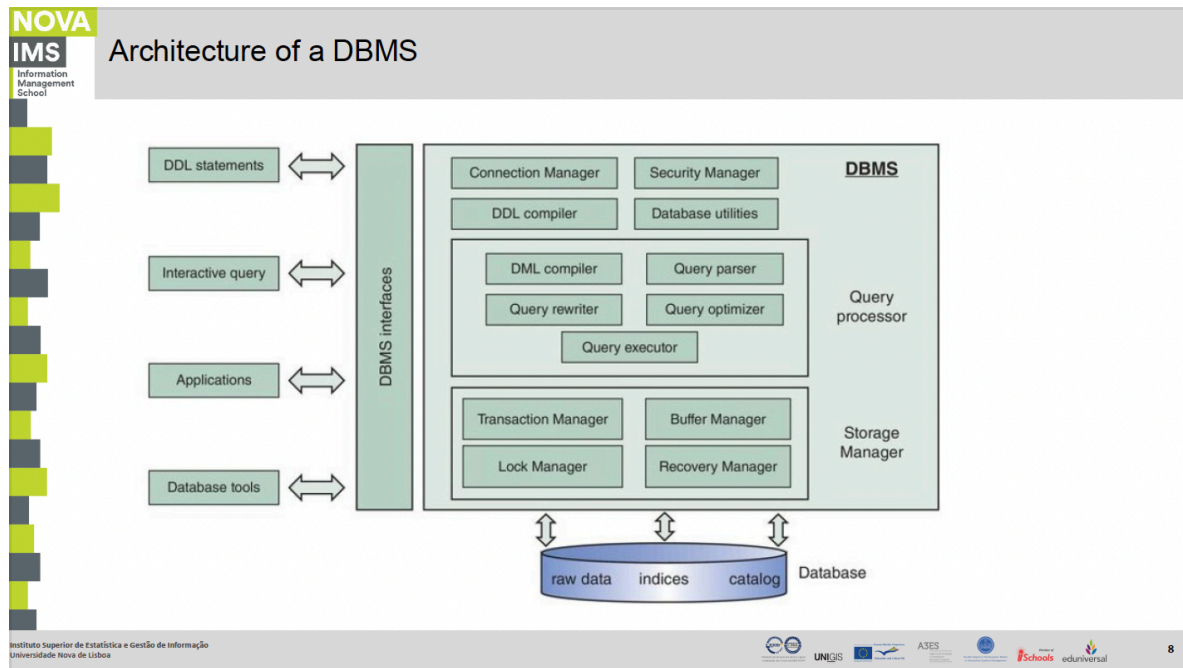# 02 Lecture

Database Modelling

Various ways of interacting with the DBMS. Command line interface, form-base, interface, tools to maintain of fine-tune the DBMS
[DDL Statement- Database tools]

Connection Manager: The **connection manager** provides facilities to set-up a database connection. It can be set-up locally or through a network. The **security manager** verifies whether a user has the right privileges to execute the database actions required.

DDL Compiler: The **Data Definition Language (DDL) compiler** compiles the data definitions specified in DDL. Most relational databases use SQL as their DDL.

Database Utilities: Various utilities, example: A loading utility (load data from a variety of sources), reorganization utility (reorganizes the data), user management utilities (support the creation of user groups or accounts), etc.

DML Compiler: The **Data Manipulation Language (DML) compiler** compiles the data manipulation statements specified in DML.

Query Parser: The **query parser** parses the query into an *internal representation format* that can then be further evaluated by the system. It checks the query for syntactical and semantical correctness.

Query rewriter: The **query rewriter** optimizes the query, independently of the

current database state. It simplifies it using a set of predefined rules and heuristics that are DBMS-specific.

Query Optimizer: The **query optimizer** optimizes the query based upon the current database state. It can make use of predefined indexes that are part of the internal data model and provide quick access to the data.

Query Executor: The **query executor** takes care of the actual execution by calling on the storage manager to retrieve the data requested

Transaction Manager : The **transaction manager** supervises the execution of database transactions. Remember, a database transaction is a sequence of read/write operations considered to be an atomic unit.

Buffer Manager: The **buffer manager** is responsible for managing the buffer memory of the DBMS. The DBMS checks first the memory when data need to be retrieved. Retrieving data from the buffer is significantly faster than retrieving them from external disk-based storage.

Lock Manager: The **lock manager** is an essential component for providing concurrency control, which ensures data integrity at all times.

Recovery Manager: The **recovery manager** supervises the correct execution of database transactions. It keeps track of all database operations in a **logfile** and will be called upon to undo actions of aborted transactions or during crash recovery.