4. Database Management Systems (1/4)

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- The Architecture of DBMS
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- Database Access Management
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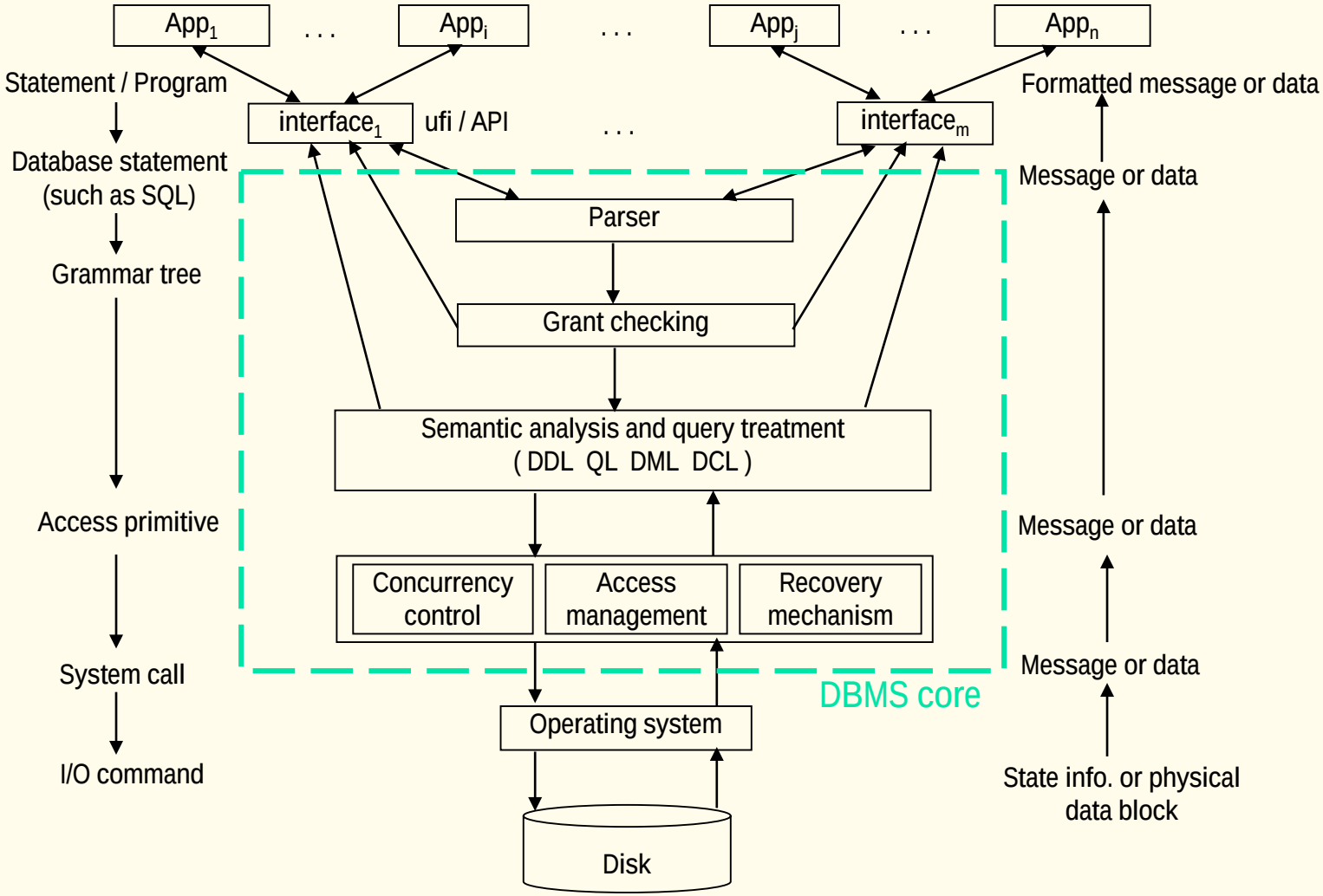
4.1 The Components of DBMS Core

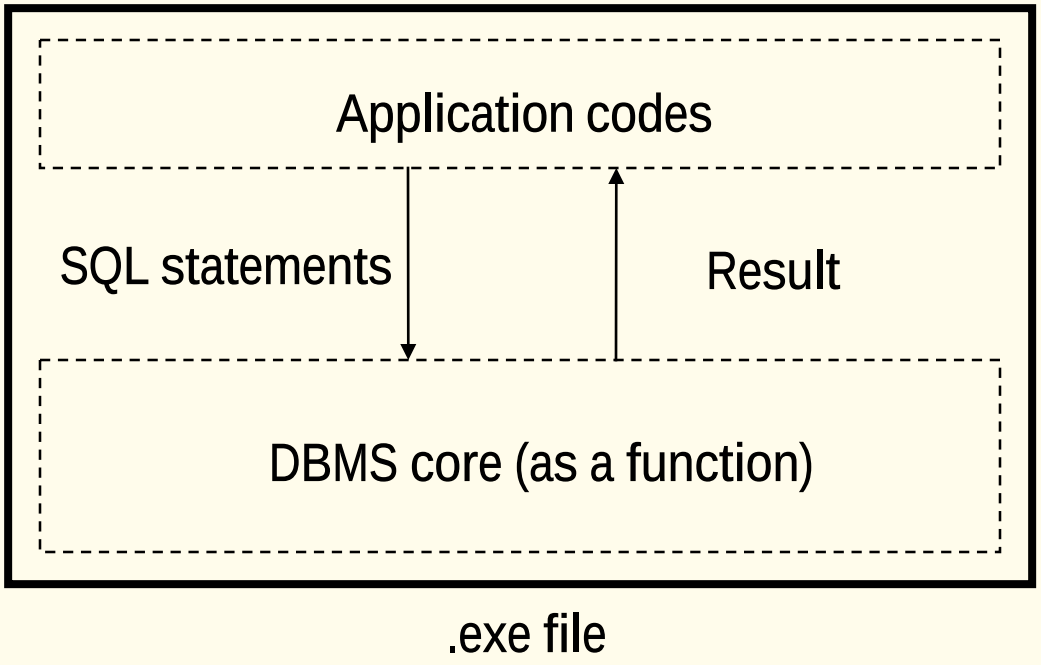


4.2 The Process Structure of DBMS

- Single process structure
- Multi processes structure
- Multi threads structure
- Communication protocols between processes / threads

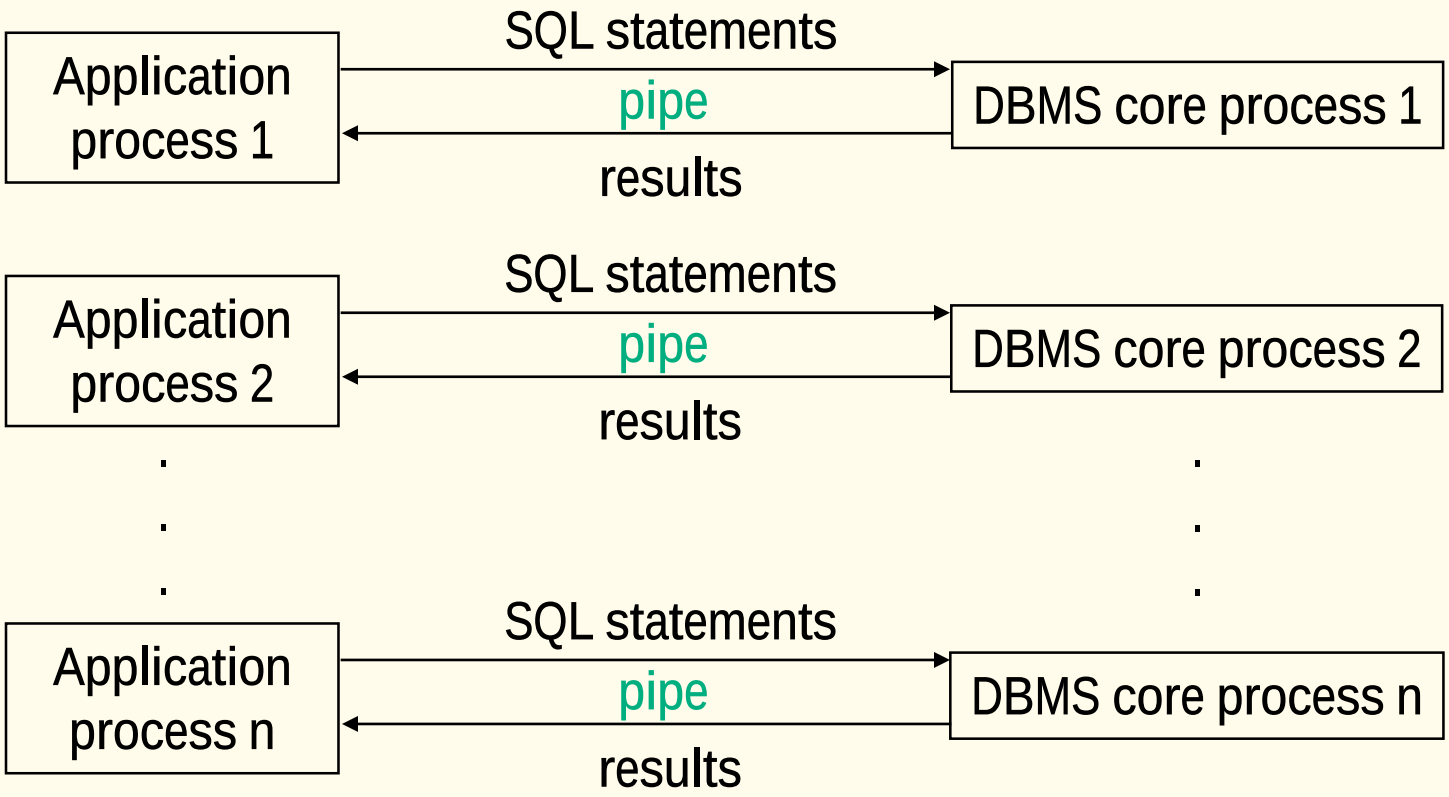
Single process structure

- The application program is compiled with DBMS core as a single .exe file, running as a single process.



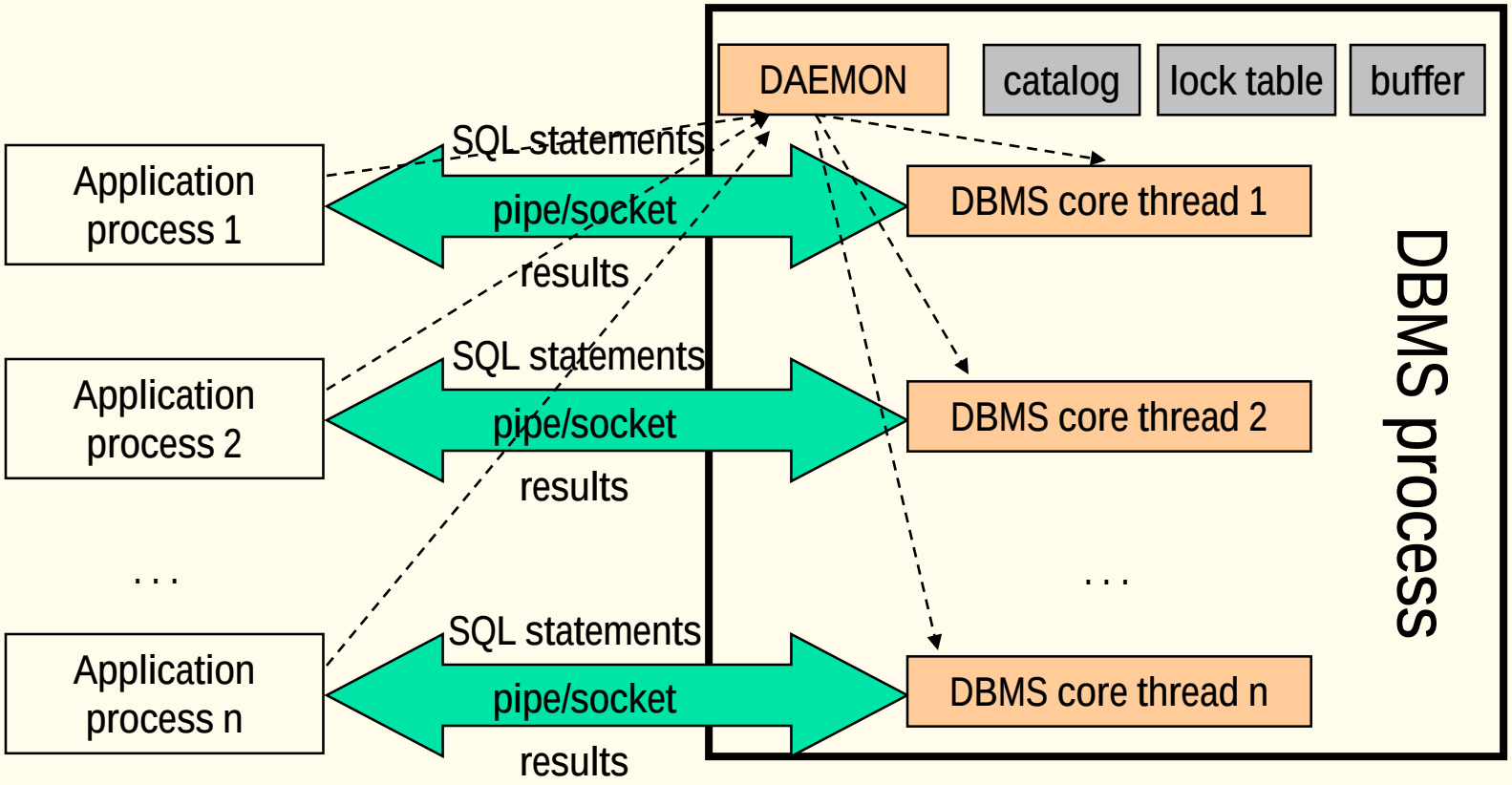
Multi processes structure

- One application process corresponding to one DBMS core process



Multi threads structure

- Only one DBMS process, every application process corresponding to a DBMS core thread.



4.3 Database Access Management

The access to database is transferred to the operations on files (of OS) eventually. The file structure and access route offered on it will affect the speed of data access directly. It is impossible that one kind of file structure will be effective for all kinds of data access.

- Access types
- File organization
- Index technique
- Access primitives

Access Types

- Query all or most records of a file (>15%)
- Query some special record
- Query some records (<15%)
- Scope query
- Update

File Organization

- Heap file: records stored according to their inserted order, and retrieved sequentially. This is the most basic and general form of file organization.
- Direct file: the record address is mapped through hash function according to some attribute's value.
- Indexed file: index + heap file/cluster
- Dynamic hashing
- Grid structure file: suitable for multi attributes queries
- Raw disk (notice the difference between the logical block and physical block of file. You can control physical blocks in OS by using raw disk)

Index Technique

- B+ Tree (√ √)
- Clustering index (√)
- Inverted file
- Dynamic hashing
- Grid structure file and partitioned hash function
- Bitmap index (used in data warehouse)
- Others