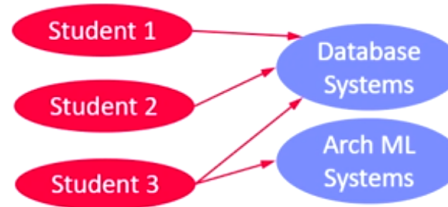


Problem

- application use object-oriented approach
- data stored in normalized flat tables
- application is responsible for bridging
- example

```
▪ SELECT * FROM Students
▪ SELECT C.Name, C.ECTS FROM
  Courses C, Attendance A
  WHERE C.CID = A.CID
    AND A.SID = 7;
▪ ... A.SID = 8; ◦
```

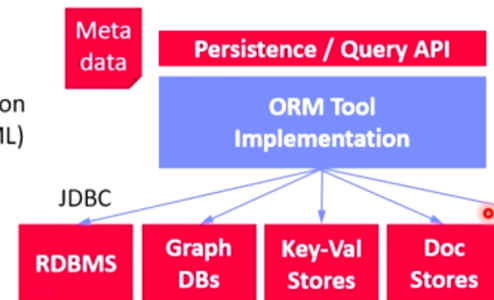


Object-Relational Mapping

- ORM tools allow automatic
 - handling of object persistence lifecycle
 - querying of underlying data stores
- reduced development effort

Common High-Level Architecture

- **#1** Persistence definition (meta data → e.g., XML)
- **#2** Persistence API
- **#3** Query language / query API



- improved testing and independence of DBMS

Pros and Cons

- advantages
 - simple CRUD operations
 - simple queries
 - application centric development
- disadvantages
 - unnecessary indirections and complexity
 - * mapping
 - * meta data
 - performance harder to ensure
 - no application centric development
 - * schema ownership
 - * already existing data
 - dependent on framework APIs

[[Call Level Interfaces]]