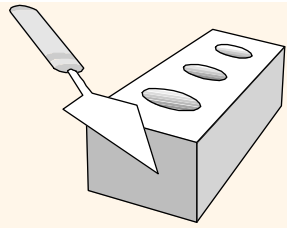
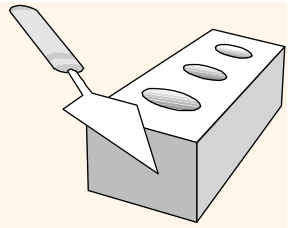


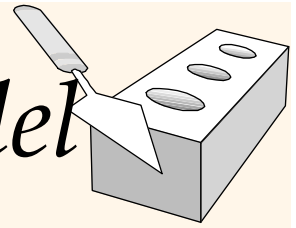
ORDBMS - Introduction

Theme



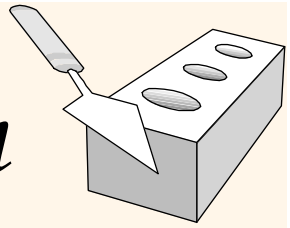
- The need for extensions in Relational Data Model
- Classification of database systems
- Introduce extensions to the basic relational model
- Applications that would benefit from extended relational databases

Why Extend Relational Data Model

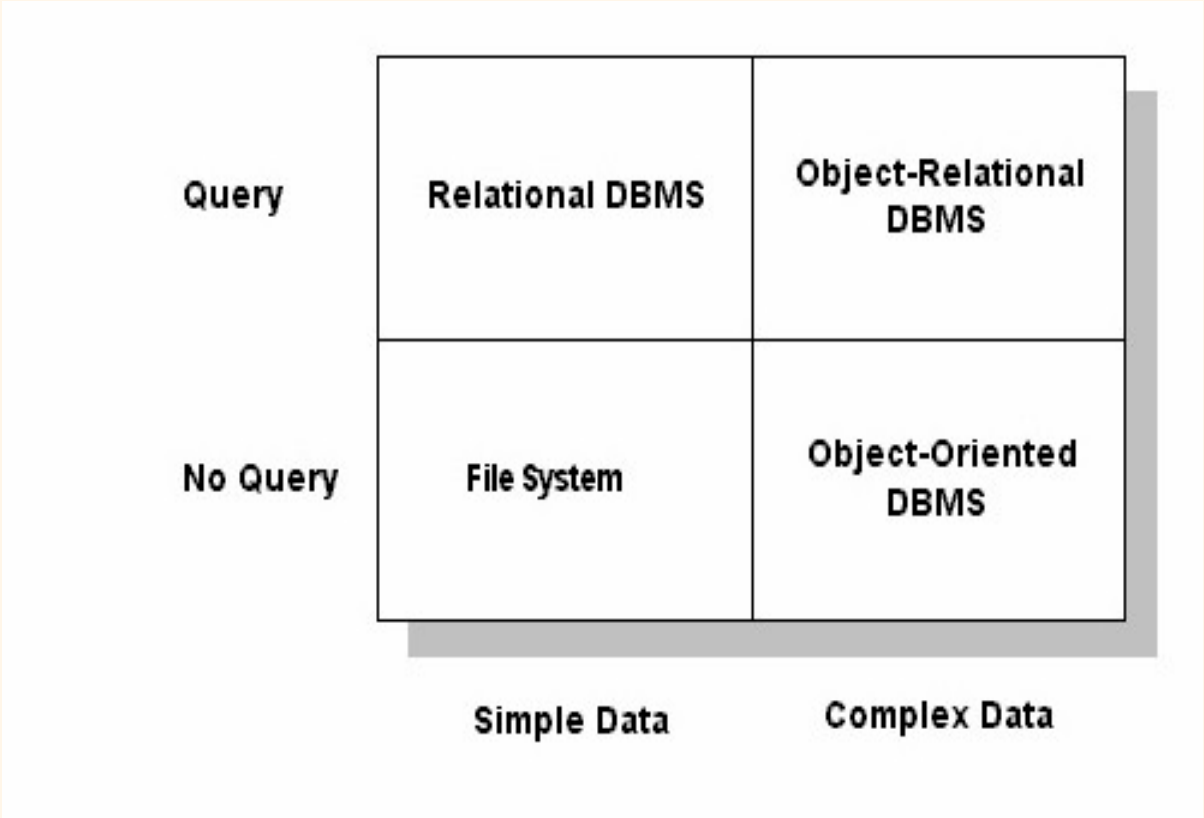


- To eradicate the following weaknesses
  - Poor representation of 'real world' conceptual model
    - Usually the relational schema does not correspond to real world entities
  - Difficult to change schema without affecting the applications; e.g., Y2K
  - Semantic overloading
    - The same relation is used to represent entities as well as relationships
  - Poor support for integrity and business rules
  - Fixed number of attributes & all attribute values must be atomic
  - Limited operations
  - Difficult to handle recursive queries
  - Impedance mismatch (when SQL is embedded in PLs)
    - Type System mismatch, Evaluation Strategy mismatch
  - Poor navigational access
  - Short-lived transactions (strict locking and recovery mechanisms)

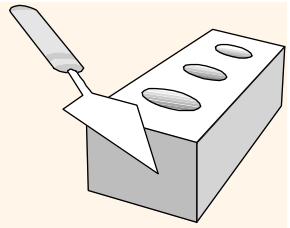
Michael Stonebraker's Classification



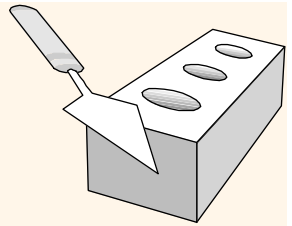
- Michael Stonebraker presents this four-quadrant matrix in the book entitled *"Object-Relational DBMSs: The Next Great Wave"*
  - This is a classification of both database applications and systems.



Lower-Left Quadrant

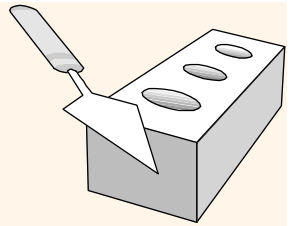


- Those application that process simple data and require no query capability e.g. text processors (word, emacs)
  - Information has little internal structure.
  - Document updates are relatively infrequent.
  - Documents are of modest size.
  - Queries are simple string or pattern searches.



Upper-Left Quadrant

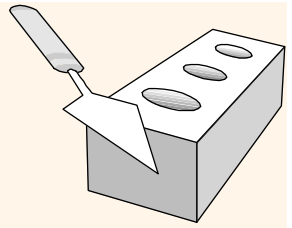
- Those application that process simple data and require complex query capability e.g. a typical business application require RDBMS.
  - Information has straightforward and fixed structure.
  - Information collection may be large.
  - Information storage must be reliable.
  - Queries are relatively complex.
  - Updates are frequent and Security is vital.



Lower-Right Quadrant

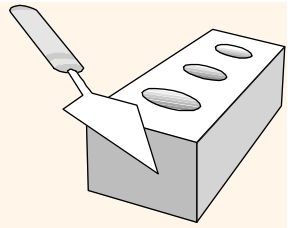
- Those application that process complex data and require no query capability e.g. a CAD application requires OODBMS.
  - Information has complex structure.
  - Analysis are complex.
  - Information is moderate in quantity.
  - Updates are periodic.

Upper-Right Quadrant



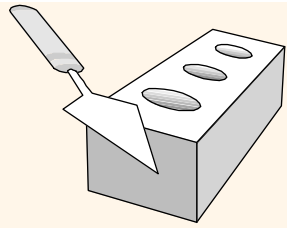
- Those application that process complex data and require complex query capability e.g. an Image Data Archive requires ORDBMS.
  - Information has complex structure.
  - Information may include special data types.
    - Images, Spatial information
  - Information is large in quantity.
  - Queries are important.
  - Updates are periodic.

Object-Relational Databases



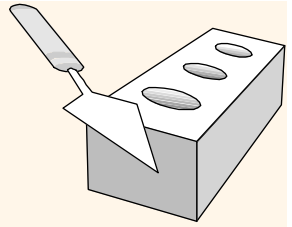
- Object-Relational databases (ORDBSs) seek to:
  - Retain the relational model as a subset.
  - Retain the strengths of the relational model and all the technologies that come with it.
  - Supports complex data types (BLOBS, ADTs, Spatial, and Multimedia, …).
  - Supports object-oriented design.
  - Reduces impedance mismatch (type system).

Advantages of ORDBMSs



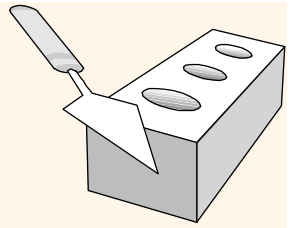
- Resolves many of known weaknesses of RDBMS.
- Preserves significant body of knowledge and experience gone into developing relational applications.

Disadvantages of ORDBMSs



- Complexity.
- Increased costs.
- Supporters of relational approach believe simplicity and purity of relational model are lost.
- Some believe RDBMS is being extended for what will be a minority of applications.
- OO purists not attracted by extensions either.
- SQL now extremely complex.

Classification Problems



- Most of OODBMSs claim to be in Upper-Right quadrant not just ORDBMSs.

	Simple Data	Complex Data
Query	Relational DBMS	Object-Relational DBMS and Object-Oriented DBMS
No Query	File System	---