Object-Orientation and Extensibility

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Limitations of Classic Data Models

- Data objects with simple structure
  - record-oriented, fixed format
  - only simple data types
- Weak semantic expressiveness
  - no abstraction concepts
  - limited expressive power of query languages
- Only basic support for semantic integrity
- "Semantic gap" between (object-oriented) host/programming language and DBS
  - "Impedance Mismatch"
- Support for short transactions (ACID)
- No support for
  - temporal aspects, versioning
  - spatial relationships
  - unstructured data
  - …

Object-oriented Data Bases (OODBS)

- OODBS criteria
  - must be a DBS
  - must be an object-oriented system
- DB aspects
  - persistence
  - support for very large data sets
  - synchronisation (concurrency)
  - logging and recovery
  - descriptive query language
- OOS aspects
  - object identity
  - complex object support
  - types/classes
  - encapsulation
  - class hierarchies/inheritance
  - computational completeness
  - overriding, overloading, late binding
  - extensibility
- Optional aspects
  - multiple inheritance, type-checking, type derivation
  - distribution, long transactions

M. P. Atkinson, et. al: „The Object-Oriented Database System Manifesto", in: Won Kim, Jean-Marie Nicolas, and Shojiro Nishio (eds.), Proc. First Intl. Conf. on Deductive and Object-Oriented Databases, Elsevier Science Publishers, Amsterdam, 1989.

Why have OODBS not been successful?

- Lack of agreement
  - programming interfaces, query language, …
  - ODMG standard not widely accepted
- Functional limitations
  - lack of view support
  - schema evolution is often painful
    - requires schema compilation process …
  - (too) tight coupling of OODBS and application programming language
- Lack of tool support
  - application development, end-user tools
- Not enough maturity
  - robustness, availability, scalability, query performance, …
- No easy "evolution" from classic data bases supported

Object-Relational Support

- Major goals
  - support management of complex business objects
  - provide extensibility for defining new, complex data types and behavior
  - based on an evolution of relational data model, SQL standard
- Key features
  - Large Objects (LOBs)
    - Binary, Character
  - User-Defined Data Types
    - Distinct types, Structured types
  - Type Constructors
    - Row types, Reference types
  - Collection Types
    - Arrays, Multisets
  - User-Defined Methods, Functions, and Procedures
  - Typed tables and views
    - Table hiearchies, View hierarchies (object views)