

# In The Beginning There Was Light

Introduction



Matematikos  
ir informatikos  
fakultetas

Arūnas Janeliūnas  
**Object Databases**

## Legacy systems



**Database**



**Programming  
Language**

## Object databases



**Programming  
Language  
+  
Data Saving  
and Querying**

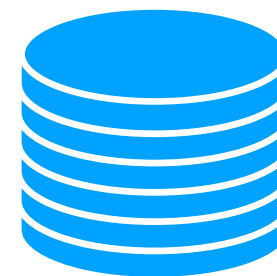
**Programming  
Language  
+  
Data Saving  
and Querying**

***~~INSERT~~***

***~~UPDATE~~***

***~~DELETE~~***

***SELECT***



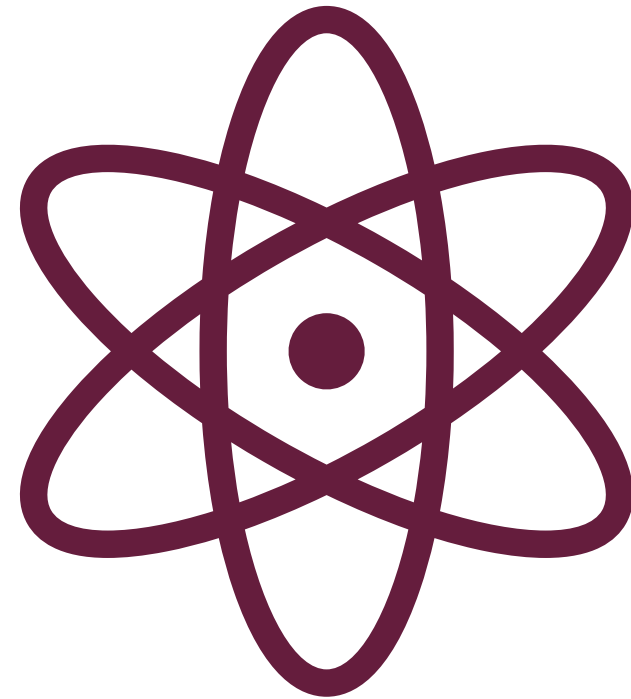
# The Object-Oriented Database System Manifesto

- *Malcolm Atkinson, University of Glasgow*
- *Francois Bancilhon, Altar*
- *David DeWitt, University of Wisconsin*
- *Klaus Dittrich, University of Zurich*
- *David Maier, Oregon Graduate Center*
- *Stanley, Zdonik Brown University*



# Complex objects

*Thou shalt support  
complex objects*



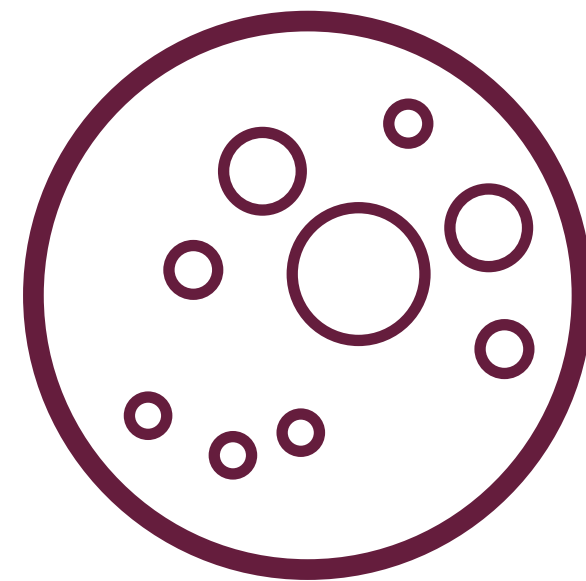
# Object identity

*Thou shalt support  
object identity*



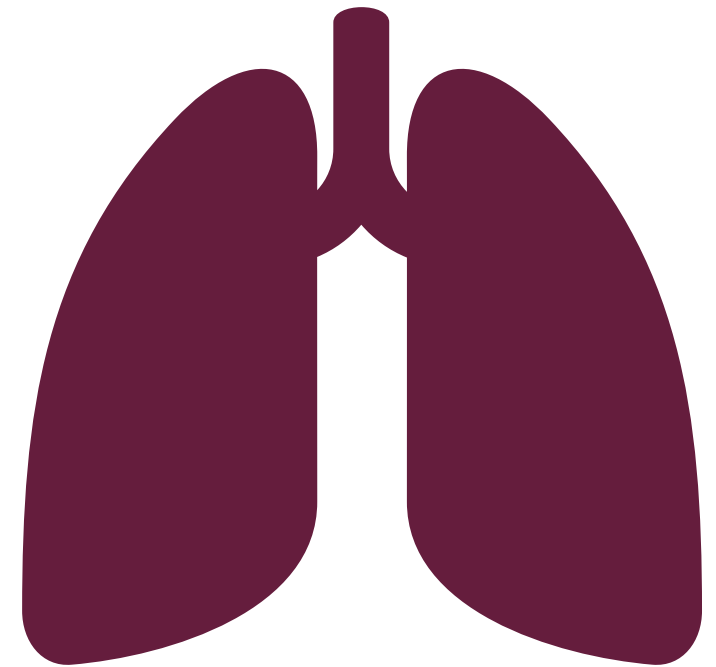
# Encapsulation

*Thou shalt encapsulate  
thine objects*



# Types and Classes

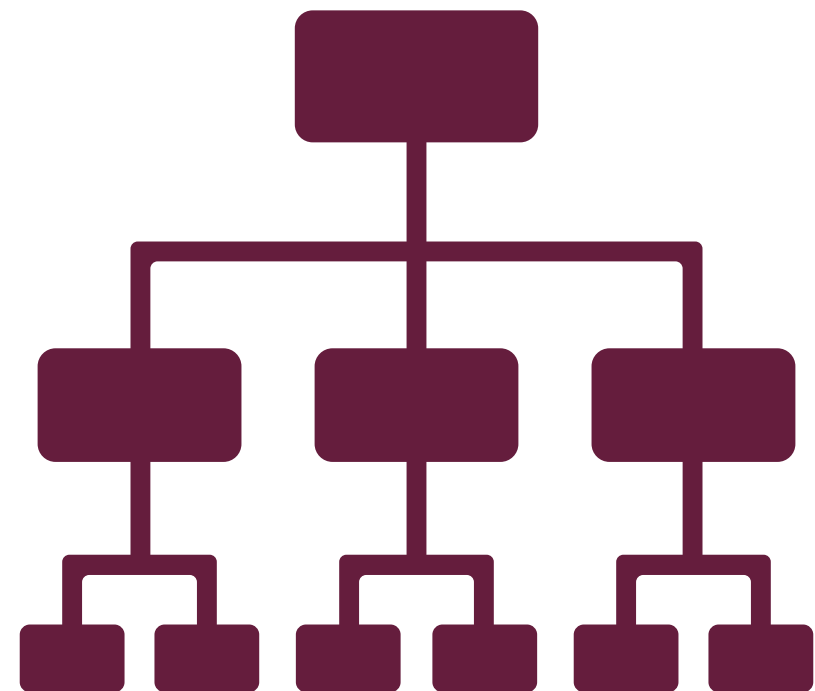
*Thou shalt support types  
or classes*





# Class or Type Hierarchies

*Thine classes or types  
shalt inherit from their  
ancestors*



# Overriding, overloading and late binding

*Thou shalt not bind  
prematurely*



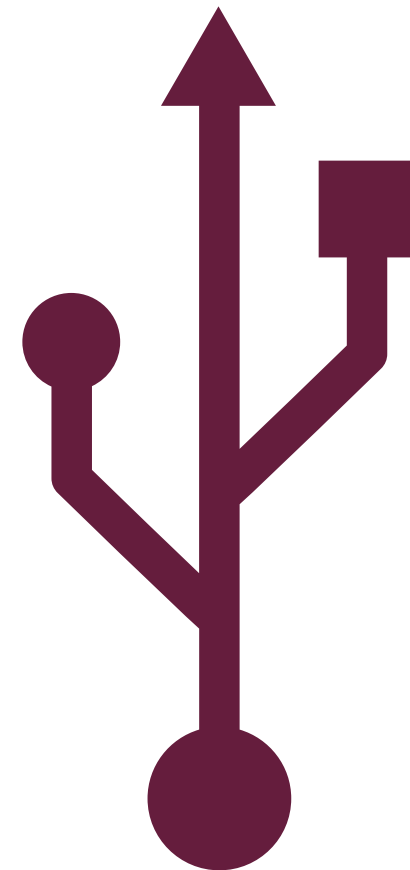
# Computational completeness

*Thou shalt be  
computationally  
complete*



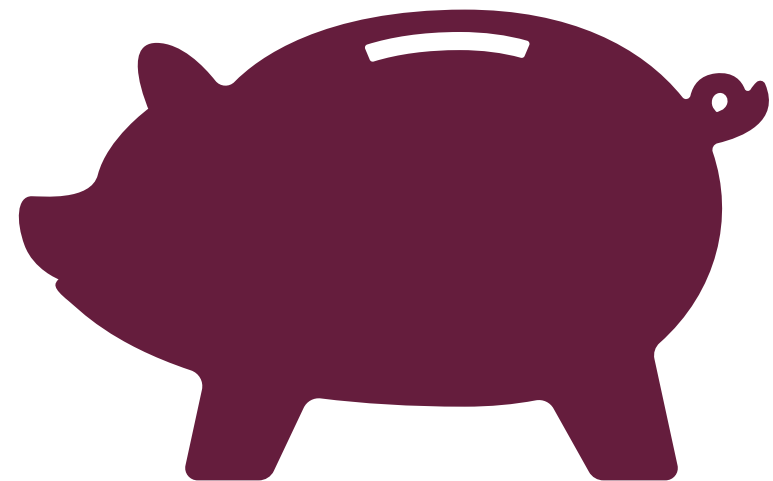
# Extensibility

*Thou shalt be extensible*



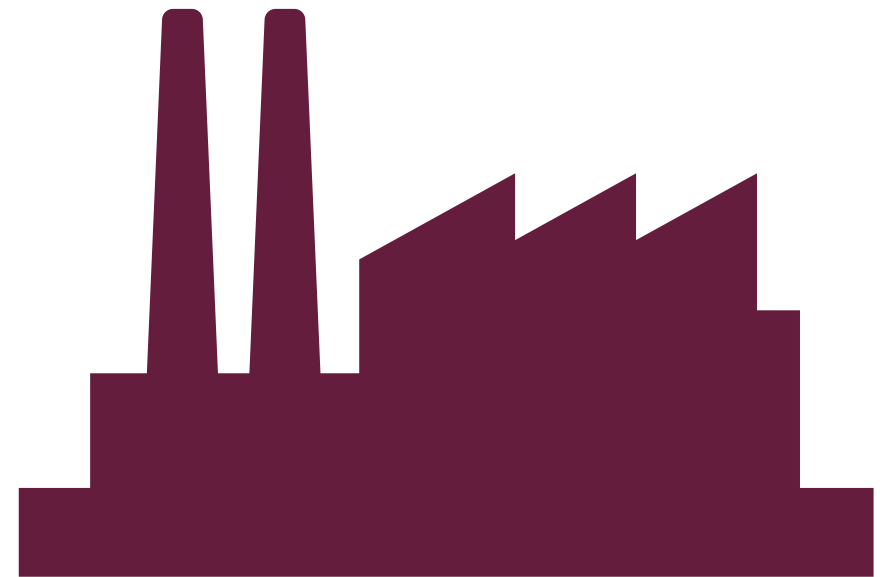
# Persistence

*Thou shalt remember thy  
data*



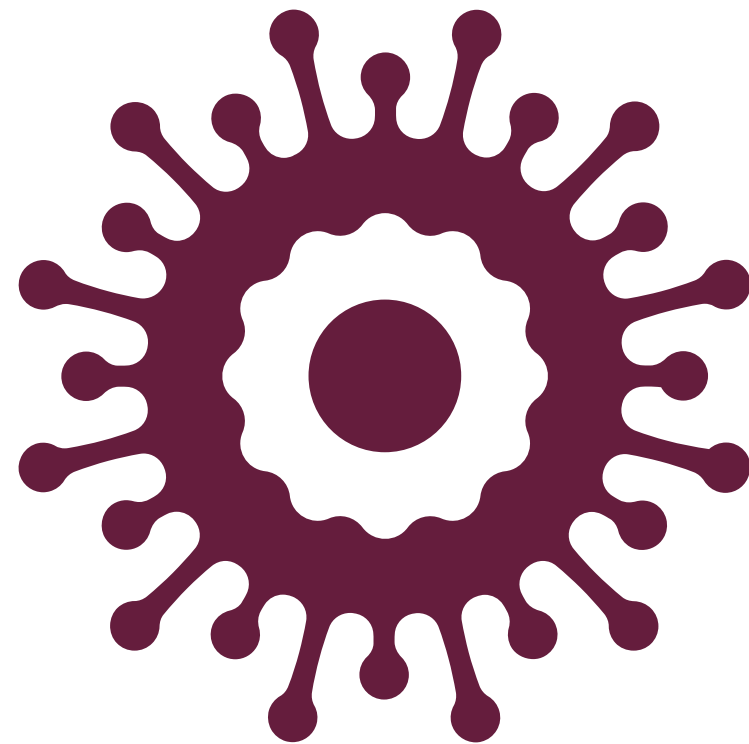
# Secondary storage management

*Thou shalt manage very  
large databases*



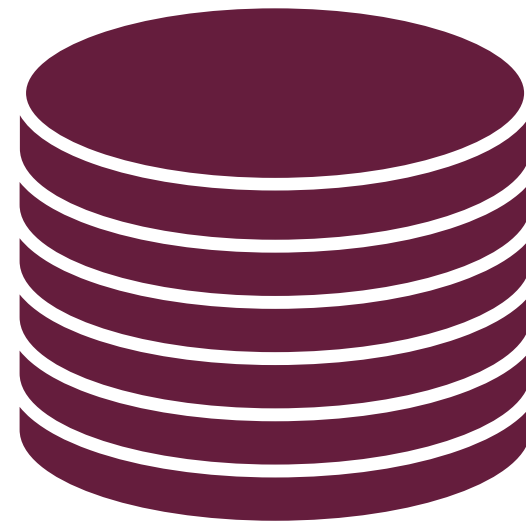
# Concurrency

*Thou shalt accept  
concurrent users*



# Recovery

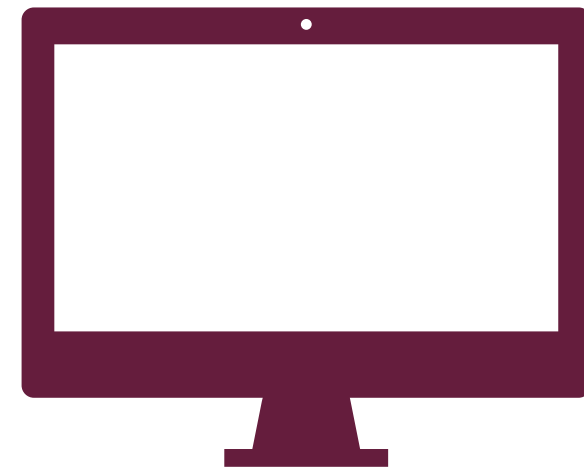
*Thou shalt recover from  
hardware and software  
failures*





# Ad Hoc Query Facility

*Thou shalt have a simple way of querying data*



# Optional features: the goodies

*Multiple inheritance*

*Type checking and type  
inferencing*

*Distribution*

*Design transactions*

*Versions*



# ODMG Standard

- 1.0 (1993), 2.0 (1997), 3.0 (2004)
- From database API to object storage API
- Main components:
  - Object model (based on OMG model)
  - Object definition language (based on IDL)
  - Object Query Language
- Interfaces to programming languages
  - C++
  - Java
  - SmallTalk
- Appendixes
  - OMG data model vs. ODMG data model
  - Interface to OMG ORB

# ODMG Standard

