软件工程

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4.8

Object-Oriented Paradigm

Advantages of Objects

- Same as advantages of abstract data types
  - Information hiding
  - Data abstraction
  - Procedural abstraction
- Inheritance provides further data abstraction
  - Easier and less error-prone product development
  - Easier maintenance
- Objects are more reusable than modules with functional cohesion.

Object-Oriented Paradigm

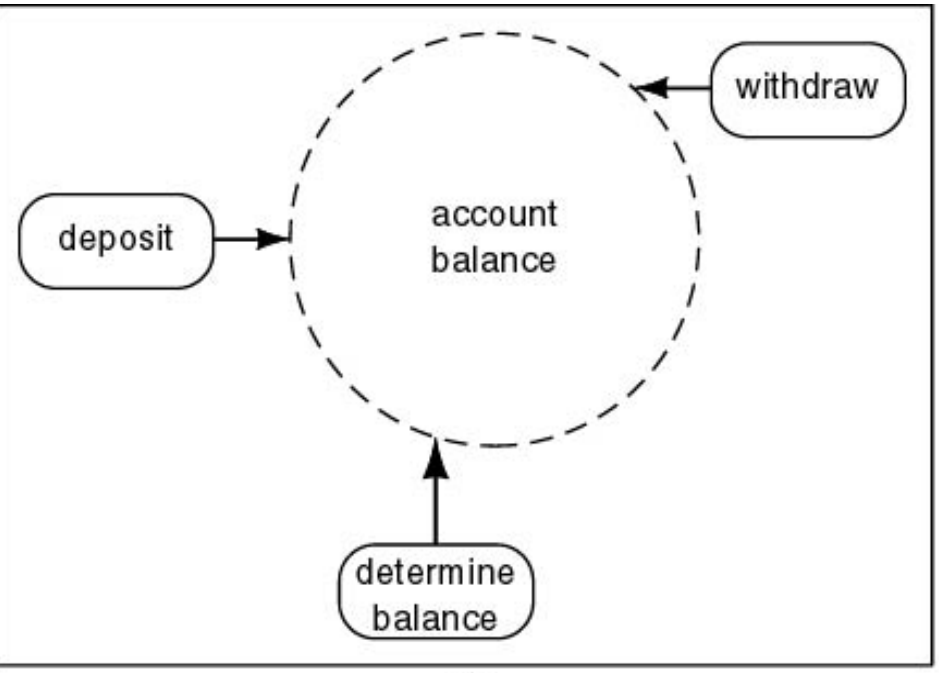
- **The structured paradigm had great successes initially**
  - **It started to fail with larger products (> 50,000 LOC)**
- **Maintenance problems**
- **Reason: structured methods are**
  - **Action oriented *or* Data oriented**
  - **But not both**

Object-Oriented Paradigm

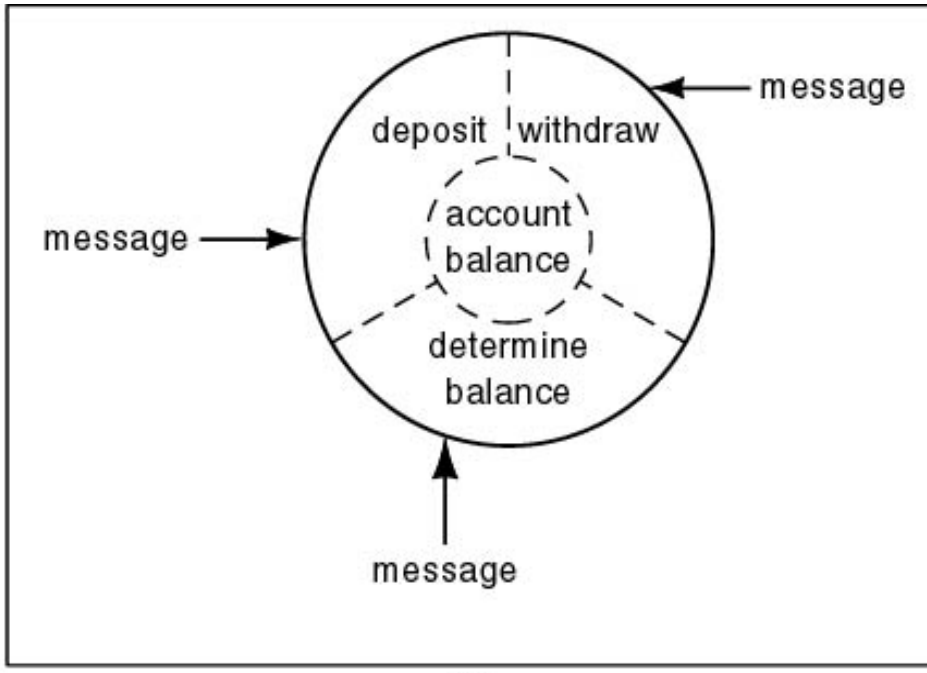
- **Both *data* and *actions* are of equal importance**
- **Object**
  - **Software component that incorporates both data and the actions that are performed on that data.**
- **Example : Bank account**
  - **Data: account balance**
  - **Actions: deposit, withdraw, determine balance**

Structured vs. Object-Oriented Paradigm

- **Encapsulation & Information hiding**
- **Responsibility-driven design**
- **Impact on maintenance, development**



(a)



(b)

Responsibility-Driven Design

- Also called “Design by Contract”
- Send flowers to your Mama in Chengdu
  - Call a flower shop
  - Place your order
  - Pay your order
  - OK !
- Object-oriented paradigm
  - “Send a message to a method [action] of an object”

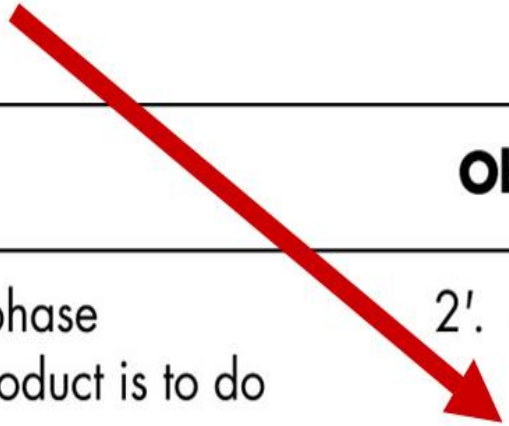
Transition From Analysis to Design

- **Structured paradigm:**
  - **Jolt between analysis (what) and design (how)**
- **Object-oriented paradigm:**

Structured Paradigm	Object-OrientedParadigm
1. Requirements phase	1. Requirements phase
2. Specification (analysis) phase	2′. Object-oriented analysis phase
3. Design phase	3′. Object-oriented design phase
4. Implementation phase	4′. Object-oriented programming phase
5. Integration phase	5. Integration phase
6. Maintenance phase	6. Maintenance phase
7. Retirement	7. Retirement

In More Detail

Objects enter here



Structured Paradigm	Object-Oriented Paradigm
2. Specification (analysis) phase • Determine what the product is to do	2′. Object-oriented analysis phase • Determine what the product is to do • Extract the objects
3. Design phase • Architectural design (extract the modules) • Detailed design	3′. Object-oriented design phase • Detailed design
4. Implementation phase • Implement in appropriate programming language	4′. Object-oriented programming phase • Implement in appropriate object-oriented programminglanguage