Object orientation (1)

Content
- What is object orientation?
- Example of object oriented analysis
- Place in ISD
- Evaluation of Object orientation
- Reading list

History of object orientation
- Developed in the 1970's
- Various places – computer architecture, operating systems, databases, cognitive science, artificial intelligence
- Programming language Simula and Smalltalk

Why popular now
- Popularity of graphical interfaces
- Acceptance of C++
- Cost cutting by business
- Increase in the power of technology
- Shift from mainframes to distributed computing

Object orientation describe:
- Structure (data)
- Behaviour
- Function (too a lesser degree?)

Object orientation help to present:
- The object
- State
- Behaviour described by actions

Of Objects
Other characteristics

- Abstraction
- Inheritance
- Encapsulation
- Polymorphism

Techniques used in Object orientation

- Object model – object diagrams
- Dynamic model – state transition diagrams
- Functional model – action data flow diagrams, use case

Object

- ‘is something to which action is directed, it has an identity, a state and exhibits behaviour’
- Can be anything concrete or conceptual
- Is an abstraction of the real world

Class

- ‘A group of object exhibiting the same characteristics such as structure and behaviour’
- Abstraction
- Inheritance

Message/signal

- Objects interact with one another through signal or message
- Signals are generated by an event
- Event occur when the object’s state changes
- Change the state of an object through an objects methods
- Has to conform to the interface of the object

Notation for a class/object

Object name

Attributes

Processes/Methods

Public part
Aggregation/ whole/part class

- Car
  - Body
  - Engine
    - Cam shaft
    - Cylinder
  - Wheel

Generalisation/Specialisation

- Account
  - Basic account
  - Checking account
  - Loan
    - Service Account

Steps

- Develop a summary paragraph
- Identify objects of interest
- Identify method/processes
- Define attributes of objects
- Perform class analysis
- Draw state transition diagram

Develop a summary paragraph

- Write declarative sentences
- Write each sentence on its own line
- Review paragraph carefully to ensure:
  - All desired functions are represented
  - All major information and processes are identified
  - All sentences are at the same level of abstraction and importance

Example of declarative sentences

Identify objects of interest

- Underline all nouns in summary paragraph
- List underlined nouns separately
- Evaluate each noun to ensure it is an object
- Determine whether object is solution or problem space
- Name each object in solution space
Example of objects

Identify processes

• Circle all verbs in the summary paragraph
• List verbs on a separate paper
• Evaluate each verb
• Determine whether the process is solution or problem space
• Name each unique process in the solution space
• Assign object to verbs if the objects is transformed or read by the process
• Evaluate object assignments

Example of processes

Define attributes of objects

• Attributes – named fields or properties that describe a class or object
• A set of attributes values describe an object or instance
• Primary key – unique set of values

Example of attributes

Define attributes of processes

• Assign attributes which were set aside during object or process definition
• Review the original problem description and any notes
• Review the summary paragraph to find implied attributes
Perform class analysis

- Look for shared attributes and processes across class/objects to define inheritance class
- Evaluate the class/objects for specialization
- Evaluate the class/objects for component part relationships
- Define common class objects
- Define meta-class

Example of class analysis

Thinking in Object orientation

- Hard Vs Soft ??
- Perspective
  - Objective vs Subjective
  - Nature of the organisation

Evaluation of Object oriented modelling

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Advantages/ Benefits of object orientation

- It unifies many aspects of the information systems development process.
- It facilitates re-use of software code – make application development quicker and more robust
- Ability to tackle more complex problems
- Improve user/analyst relations ???
- Improvement in the consistency of results
- Represent factors for change in the model

Disadvantages of object orientation

- Only now starting to be used
- Case tools are not readily available
- Not easily understood by novice users
- Difficult to master for some analysts + designers + programmers
- Inefficiency (need a lot of ‘power’)
- Others ??
Object orientation view of ISD

Objectives

Change process

Environment

Object system

Object system

Development group

Object orientation view of ISD

Reading for next week