Design Defects and Restructuring

Lecture 1

Sat, Sep 11, 2021

Course Outline

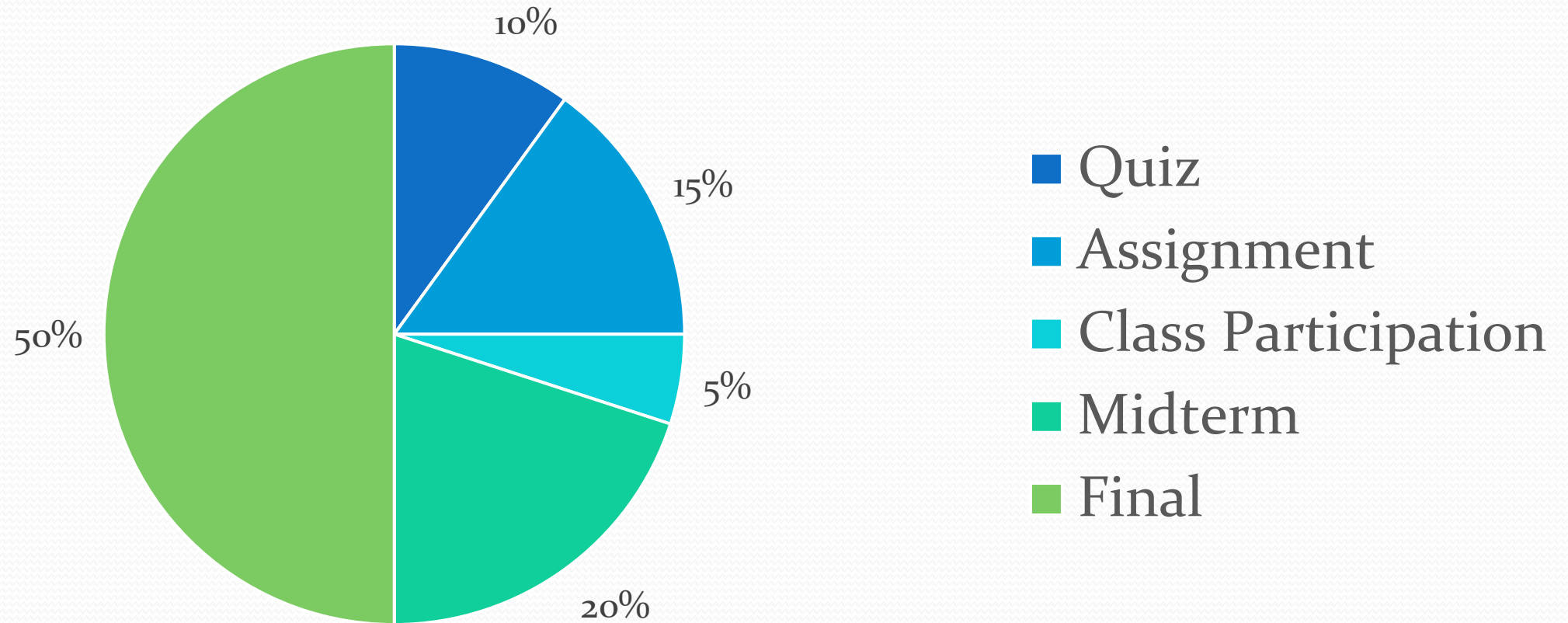|		
Design Concepts	OOP Reprise	Programming Practices
Data Modeling	Refactoring	Design Patterns

Course Organization

- 2 Lectures – Morning & Afternoon
  - Class Timings for Morning Lecture
    - 10:00 AM – 1:00 PM
    - 1st Session: 10:00 AM – 11:30 AM
    - Break: 11:30 AM – 11:45 AM
    - 2nd Session: 11:45 AM – 1:00 PM
  - Class Timings for Afternoon Lecture
    - 2:00 PM – 5:00 PM
    - 1st Session: 2:00 PM – 3:30 PM
    - Break: 3:30 PM – 3:45 PM
    - 2nd Session: 3:45 PM – 5:00 PM

Course Evaluation

Quiz — 10%
Assignment — 15%
Class Participation — 5%
Midterm — 20%
Final — 50%

Reference Books

- Object-Oriented Methods: A Foundation
  - UML Edition (2nd Edition)
    - By: James Martin, James J. Odell
- Agile Software Development
  - Principles, Patterns, and Practices
    - By: Robert C. Martin
- Design Patterns
  - Elements of Reusable Object-Oriented Software
    - By: Erich Gamma, John Vlissides, Richard Helm, Ralph Johnson (Gang of Four – GoF)

Reference Books

- Refactoring
  - Improving the Design of Existing Code (2nd Edition)
    - By: Martin Fowler
- Code Complete
  - A Practical Handbook of Software Construction (2nd Edition)
    - By: Steve McConnell
- The Clean Coder
  - A Code of Conduct for Professional Programmers
    - By: Robert C. Martin

Software Development

- Granularity – From algorithm to large software application
- Software Development Lifecycle
  - Analysis of Requirements
  - Solution Design
  - Programming
  - Unit Testing
  - Build Testing
  - Go-Live Delivery
  - Support and Maintenance
  - Software Repository
  - User Acceptance Testing
  - User Training
  - Technical and User Manual

Software Development

- Solution Design and Programming
  - Program Constructs (Computation)
    - Assignment (Sequence) – Expressions (Numeric, Logical, String, Temporal)
    - Loop (Iteration)
    - Condition (Selection)
  - Program Organization
    - Functions
    - Procedures
    - Classes
    - Files
    - Folders

Concept

An idea or notion that we apply to the things, or objects, in our awareness

Concepts are the recognition device

Concepts – Examples

- Tangible
  - Person
  - Pencil
  - Car
- Intangible
  - Time
  - Quality
  - Company

- Roles
  - Doctor
  - Patient
  - Owner
- Judgments
  - Productive Job
  - High Pay

- Relational
  - Marriage
  - Partnership
  - Ownership
- Events
  - Sale
  - Purchase
  - Market Crash

- Others
  - String
  - Number
  - Icon
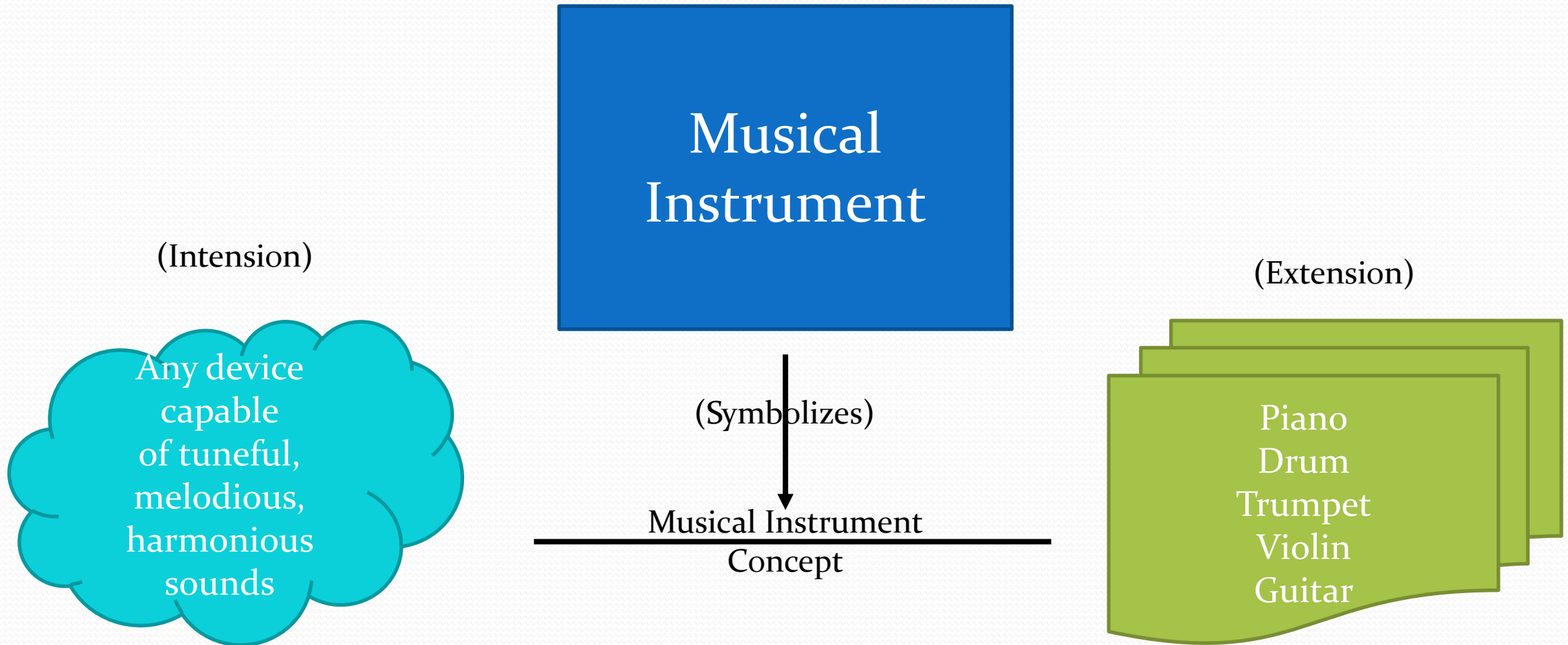 - Image
  - Signal

Concept Triad

The Term Concept

The Intension

- The complete definition of the concept
- The test that determines whether the concept applies to an object

The Extension

- The set of all objects to which the concept applies

Concept Triad – Example

Musical Instrument

(Intension)

Any device capable of tuneful, melodious, harmonious sounds

(Symbolizes)

Musical Instrument Concept

(Extension)

Piano
Drum
Trumpet
Violin
Guitar

Concept Triad – Incomplete

- Concepts without name
  - slow down the communication
  - Example
    - Intension: A commission to purchase, sell or supply goods or services
    - Extension: Order # AA-01834, Order # DX-99286
  - Name: Order

Concept Triad – Incomplete

- Concepts without instance
  - have no value
  - Example
    - Name: Company Saboteur
    - Intension: A person who engages in damaging property with the intention of injuring a corporation
  - Extension: None

Concept Triad – Incomplete

- Concepts without definition
  - are not concepts
  - they are just meaningless
  - Example
    - Name: P-CD-X99
    - Extension: "X17", "Z42"
  - Intension: None, no documentation, meaningless names or values

Concept Triad

- Synonyms
  - concepts with two names
  - Example
    - Name: Customer, Client
    - Intension: A person or organization that purchases goods or services
    - Extension: "IBM", "Sayed Yousuf"

Concept Triad

- Homonyms
  - concept with two meanings
  - Example
    - Name: Finalized Sale
    - Intension: A sale sealed with a handshake
    - Intension: A sale sealed with a signed sales contract
    - Extension: Sale Contract Documents

Type

- A shared notion or idea that applies to objects in our awareness
- A type is a concept
- It is a kind of object
- Synonym of concept
- A recommended term for concept in object-oriented analysis standard community

Object Oriented Concepts

- Abstraction
- Class
- Object
- Encapsulation
- Information Hiding (Scope)
- Inheritance

- Polymorphism
  - Ad hoc – Overload
  - Subtype – Override
  - Parametric – Templates or Generics
- Interface
- Messaging
- Delegate (Function Pointer)
- Relationship