Design Defects and Restructuring

LECTURE 01

SAT, AUG 24, 2019

Course Outline

Introduction

Programming Practices

Design Issues

Data Modeling

Design Patterns

Refactoring

Course Organization

2 Lectures – Morning & Afternoon

- Class Timings for Morning Lecture
  - 9:30 AM – 12:30 PM
  - 1st Session: 9:30 AM – 11:00 AM
  - Break: 11:00 AM – 11:15 AM
  - 2nd Session: 11:15 AM – 12:30 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 Evaluations

Quiz – 10%

Assignment – 15%

Class Participation – 5%

Midterm – 20%

Final – 50%

Software Development

Why do we develop Software?

What is the purpose of Software Development?

Technical aspects of Software Development
- 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

Concepts (Examples)

Relational
- Marriage
- Partnership
- Ownership

Events
- Sale
- Purchase
- Market Crash

Others
- String
- Number
- Icon
- Image
- Signal

Concept Triad

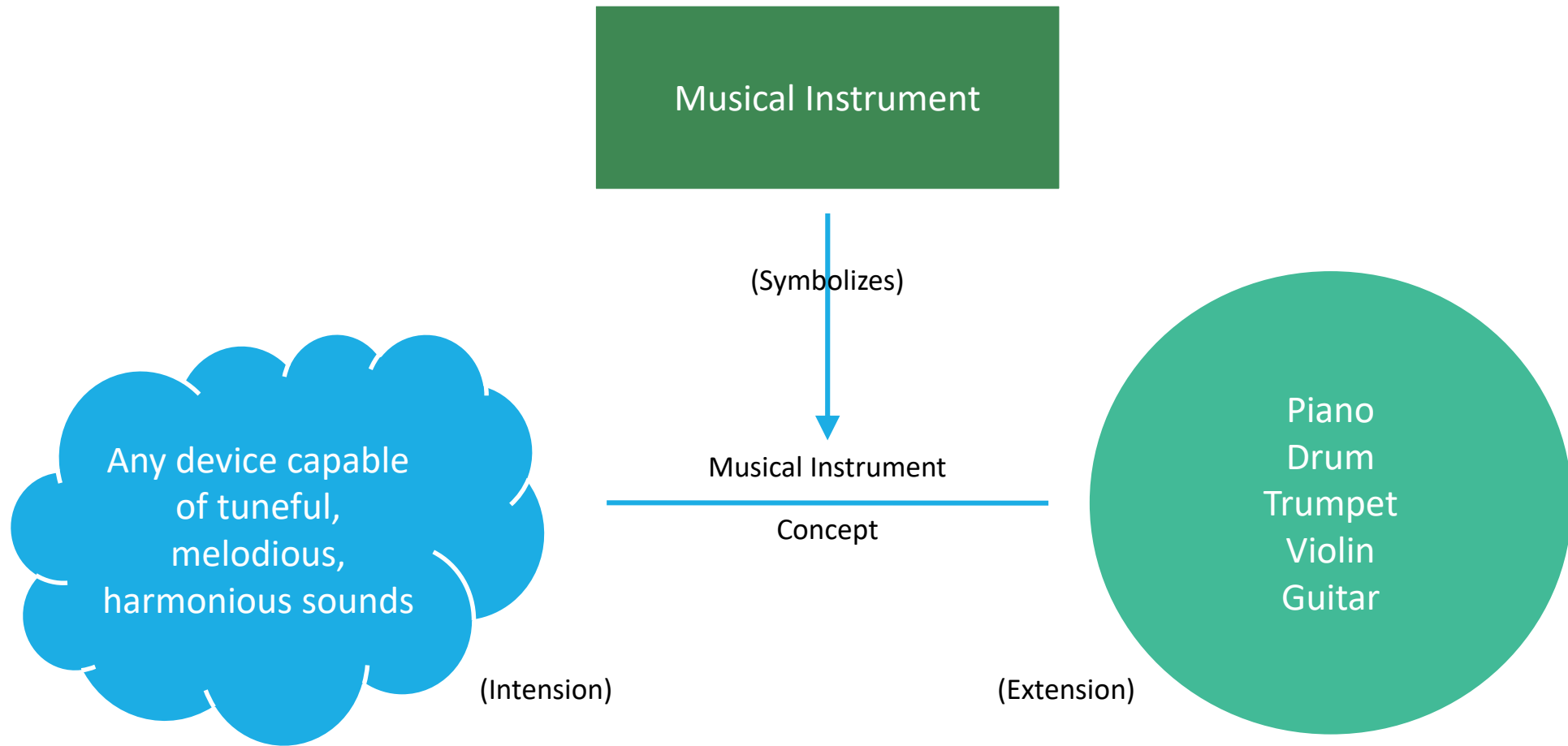The Term Concept

The Intension

The complete definition of the concept

The test that determines whether or not the concept applies to an object

The Extension

The set of all objects to which the concept applies

Concept Triad – Example

Musical Instrument

(Symbolizes)

Musical Instrument

Concept

Any device capable of tuneful, melodious, harmonious sounds

(Intension)

Piano
Drum
Trumpet
Violin
Guitar

(Extension)

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, 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

Program Structure

Don'ts for Structured Programming
- Goto
- Break (unless under switch statement)
- Continue
- Return (other than last line in a function)

Side effects to avoid
- Global Variables
- Global Objects (unless they are read only)
- Static Variables and Objects (unless they are initialized once)

Don'ts for better programming practices
- Getters and Setters (unless they have purposeful names)
- Mutation