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IT 2022: Object Oriented Programming

Composition

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Module Content

- Introduction to Object-Oriented Programming in C++
- Classes & Objects
- Constructors & Destructors
- Class Abstraction
- Encapsulation
- Composition
- Inheritance
- Polymorphism

Objects

What is an object?

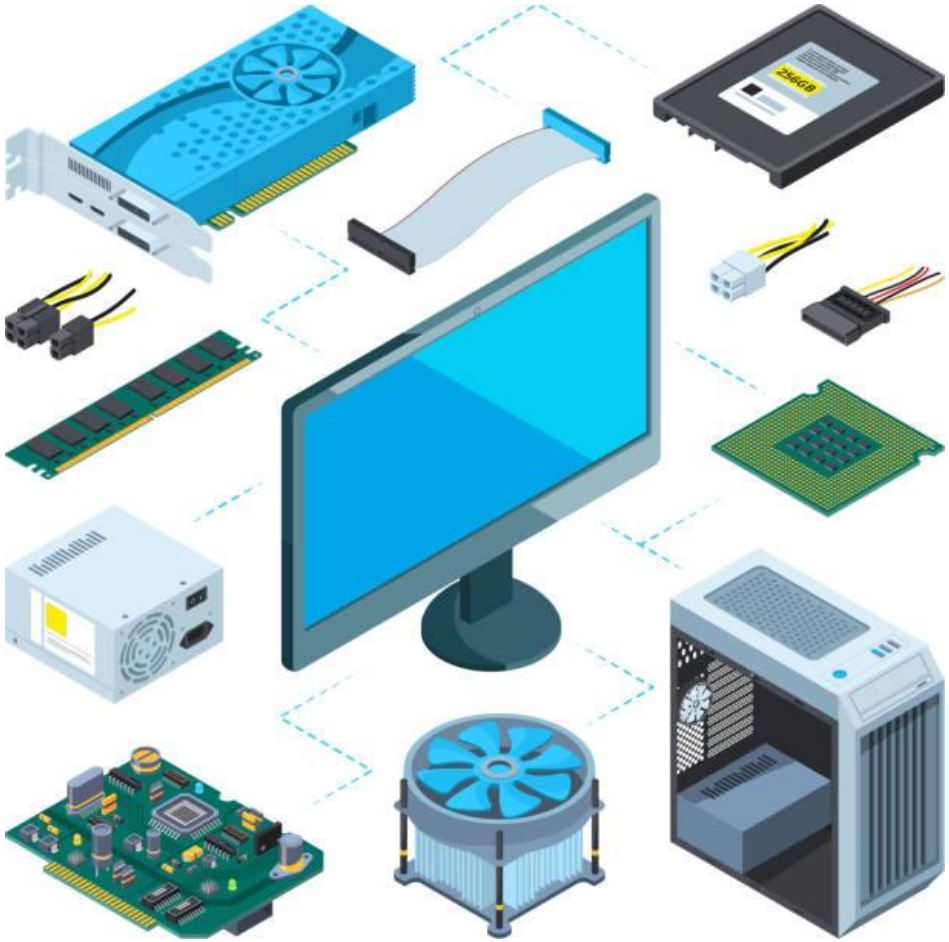
- An **object** is a basic unit of OOP (Object-Oriented Programming)
- It represents real-life entities
- Complex objects are built from smaller or a collection of objects

Real Life Example 1

Real Life Example 1

A car is built using a metal frame, an engine some tires, a transmission system, a steering wheel, and a large number of other parts

Real Life Example 2



Real Life Example 2

A computer is built from a CPU, a motherboard, memory unit, input and output units, etc.

Composition

- **Process of building complex objects from simple objects is called as composition**

- Also known as object composition

Composition

- In C++ composition, an object is a part of another object
- The complex object is called the whole or a parent object
- The simple object is known as a sub-object or child object
- When a C++ composition is destroyed, then all of its sub-objects are destroyed as well

Composition

- In OOP, object composition is used for objects that have a **“has-a”** relationship with each other
- For example, a mobile has-a battery, has-a sensor, has-a screen, etc
- In this case, all the objects or components are the child objects which together make up the complex object (mobile)

Types of Object Composition

1. Composition

- Relationships are part-whole relationships where a part can only be a part of one object at a time
- This means that the part is created when the object is created and destroyed when the object is destroyed

Types of Object Composition

1. Composition

- To qualify as a composition, the object and a part must have the following relationship;

1. The part is part of the object
2. The part can only belong to one object
3. The part has its existence managed by the object
4. The part does not know about the existence of the object

Types of Object Composition

2. Aggregation

- Also, a part-whole relationship
- In aggregation, the parts can belong to more than one object at a time, and the whole object is not responsible for the existence of the parts

Types of Object Composition

2. Aggregation

- To qualify as aggregation, a whole object and its part must have the following relationships:

1. The part is part of the object
2. The part can belong to more than one object at a time
3. The part does not have its existence managed by the object
4. The part does not know about the existence of the object

Advantages of Composition

- Each individual class can be simple and straightforward
- One class can focus on performing one specific task and obtain one behavior
- The class is easier to write, debug, understand, and usable by other programmers
- Lowers the overall complexity of the complex object

Thank You!