

What is a Program

Wednesday, April 15, 2020 8:14 PM

Participants View

A program is a collection of instructions

(to whom?) the computer system

(why?) To perform a task

Is this an Object Oriented Definition?



Popular Perception

Wednesday, April 15, 2020 8:06 PM

Abstraction

What?

hiding data.

hiding details.

hiding implementation.

showing only necessary information.

driver don't need to know the internal technical aspects of a car-abstraction ?

only useful information to be shown to end user.

Why?

End user may not require to know all minute details

How?

specifying in scope like private, public protected



Encapsulation

What?

- * grouping data and functions into a single object

- * enclosing related information together

- * wrapping data and function in a class

- * prevent changes data outside

Why?

- * to protect information from other object

- * data hiding

How?

- * using class

- * class with get and set property

- * access specifier (private/protected)

Inheritance

What?

- * reuse from parent

- * derive properties from another class <-- what is another class?

- * derived class inheriting the properties and behaviours from

parent class

- * hierarchy

- * access properties of parent class by child class

Why?

- * Avoid redundant code (code reuse)

How?

- * language semantic

class X : Y{}

functions

who

Polymorphism

What?

- * behaving in different ways depending on the input received

Why?

- * Hide type/properties/methods

- * features can be similar so we can specify them in base class?

- * helps in abstraction----> you hide inner details

How?

- * function and operator overloading

- * method and overriding

- * access modifier

What is an Object?

Wednesday, April 15, 2020 8:16 PM

What is a Table (Participants Definition)

properties

- * Four legged
- * Elevated Wooden Surface
- * For day to day use

what about one legged/three legged/hanging tables?

what about glass table or plastic table?

What use? (Be specific)

Important !

States pollutes the definition of table.

* A Table is where you keep your things

- x table is not its
- x surface
- x legs
- x materials

- * why do we need surface, legs, etc?
- * to keep things

Generalize Object Concept

* An Object is what object does.

- * An object is a collection of Behaviors only
- * object is not a collection of states (Fields)

- * why do we need state?
- * to implement behavior

What type of Programmer Are you?

Wednesday, April 15, 2020 8:21 PM

You are driving a bike on a busy day when your friend stops you asks a SFAQ (Silly Frequently Asked Question) -- Hey what are you doing? What would be your response?

A. I am burning the fuel

- engineering of driving, energy conversion, bike parts

Assembly language thought process.
Thinking in terms of memory, stack, heap
and program as set of data and methods

B. I am Driving

- following direction, following traffic rules etc etc

Procedural Thinking. In terms of
instruction to achieve the task. Often in
the details the real task loses the focus

C. I am going to office

D. I am going to work

- Work from Home!

Object Oriente Thinking

Focus on the business and defocus the
implementation details. There are
more than one procedural approach
to do whatever you want to do

Furhter Refinement of
thinking. A more abstract
generalized approach

Code Economics

Wednesday, April 15, 2020 8:27 PM

Everyline of code you write is either an expense or investment.

Code ---> Expense, Investment?

Expense Code --> `main()/even-handler`

Investment Code --> Reusable! Long Lasting Use!
`printf()/Console.WriteLine`

Animal Class

Wednesday, April 15, 2020 8:28 PM

```
class Animal
{
    public void Move()
    {
        switch(animalType)
        {
            case AnimalType.Tiger:
                //move on land

            case AnimalType.Snake:
                //crawl
        }
    }

    public void Breed()
    {
        switch(animalType)
        {
            case AnimalType.Tiger:
                //child birth

            case AnimalType.Snake:
                //egg lay
        }
    }
}
```

Is A vs Has A

Thursday, April 16, 2020 9:53 AM

Gaurang is an Employee

- He is a born Employee
- Will remain an Employee as long as he lives
 - Forget
 - Retirement
 - Own Business

Gaurang Has an Employee

- Gaurang may have employed someone such as
 - Driver
 - HouseHelp

Not Same

```
Employee gaurang=new Employee();
```

```
Console.WriteLine(gaurang.GetType()); //Employee
```

```
gaurang.SetType(); //unchangeable
```

To change "is a" to "has a" you need to change your design

Gaurang **Has an** Employment

- If you have an employment you can decide
 - Not to have an employment
 - Change the employment
 - **Have multiple employment**

Inhuman

Person is unqualified biological species with

- some behavior
- some skills
- some relationship

```
class Person{
    Behavior behavior
    List<Relation> relations;
    List<Skills> skills;
    ...
}
```

//C# code

```
var gaurang= new Human() Person();
```

```
gaurang.Behavior=new HumanBehavior();
```

```
gaurang.Employment= new LTSEmployment();
```

```
//unemployed
gaurang.Employment=null;
```

```
//change employment
gaurang.Employment=new SelfEmployment()
```

```
//C# code for multiple employements
var gaurang=new ???();
```

```
gaurang.Employments.Add( new SoftwareDeveloper());
gaurang.Employments.Add(new YoutubeBlogger());
```

```
var vivek=new ???()
```

```
vivek.Role=new TrainerRole();
vivek.Work(); //works as trainer
```

```
vivek.Role=new Driver();
vivek.Work(); //works as Driver
```

Grammar of OO Design

Thursday, April 16, 2020 10:30 AM

Traditional/Academic/Outdated Approach

Convert Noun to -----> class or object

Covert Verb to -----> class method

How to convert Adjective, Adverb, Preposition, Conjunction?

Modern Understanding of Object Oriented Design

Convert Everything to Object

- You are an object
- Your states (age, height) is an object
- Your behaviors are object
- Your nature is object
- Your skills are object
- You relation to other object is also object

What is the difference

Thursday, April 16, 2020

11:22 AM

Humans can't fly vs Ostrich can't fly?

- Ostrich being a Bird has a fly method
 - But implementation wise it doesn't work
 - It has a **non-working fly() behavior**
- Humans don't have **fly behavior**

Important!

What is True?

- A. Square Don't have any orientation
- B. Square have orientation equal to None

Rectangle-Square Problems

Thursday, April 16, 2020 11:39 AM

1. Rectangle require 2 int to define, Square needs only 1
2. Rectangle has set method for Width/Height, Square's width, height can't be different
3. Rectangle has Orientation, Squares don't have Orientation

While Inheritance is easy, there is way to uninherit or partially inherit!

What is a software component

Thursday, April 16, 2020 12:58 PM

It has 3 qualities

1. It has a weldefined responsibility
 2. It is reusable
 3. It is **Replaceable!**
-
- Encapsulation
- Polymorphism

```
class LinkedList
{
    void Add(Object item){ //adds item at the end of list
    }
    Object Remove(int pos){
    }
    int Size(){
    }
    Object this [](int index){} //get/set
}
```

```
class Stack{
    LinkedList items;
    public void Push(Object value){ items.Add(value); }
}
```

what if I need an LinkedList to add item in sorted order (not at the end)
//we can go and modify the add logic

modify

This
change

is not
acceptable
here

Meaningful word

Friday, April 17, 2020 12:07 PM

```
class Triangle{  
    int Solve(){}  
    int Calculate(){}  
}
```

Together Triangle,Solve and Calculate doesn't make any sense

Meaningful means we can understand the responsibility of a method