Applied Programming

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Introduction

http://alphapeeler.sourceforge.net/me/?page_id=565

FAST-M

This page is for the FAST – NU Students of
registered in the course of MS Applied Prog on.

Facebook group:
https://fb.com/groups/FASTMSAPFa19/
Email: fastmsapfa19@groups.facebook.com

Course portal, resources & lectures:
http://alphapeeler.com/edu/index.php

Guide on how to use the course portal:
Elearning And Collaboration Portal- How To Use.pdf

CALENDAR

September 2019

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
				27	28	29

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Class Policies

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Class Management & Policies

Engr. Abdul Rahman is expecting each student to follow Classroom / Lab Policies, & Procedures listed below:

A. Note from Engr. Abdul Rahman: I have established a few simple policies to lead a respectful and disciplined classroom. You are responsible to comply with the policies. If you fail to comply, there will be serious consequences.

B. Class / Lab Rules:

1. **Strict attendance policy**: Students are required to maintain 100% attendance throughout the session. 5 Minutes margin will be given after that student will be marked absent.
2. **No space for plagiarism**: Incase, if any of the assignment/project deliverables found plagiarized, the whole assignment/ project will be marked 'ZERO'.
3. **Late submission**: Within 1 day after deadline => 25% marks will be deducted. After 1 day => 50% marks will be deducted. After 2 days, 'ZERO' credit will be given.
4. **Submission of Assignment**: Students will submit their assignments within due date. If a student has an excused absence from class he or she is responsible for the assignments / homework that missed. It is up to the student to inquire about missed work and tests. Zero will be given if a student fails to make up work within an acceptable period. Following elements are mandatory for an assignment file:
    1. Assignment must be submitted in a proper file cover, and must be labeled properly.
    2. On cover page following items should be printed: Student name, Roll no, Date of submission.
    3. Attach print of the assignment question paper issued by the instructor after cover page.
    4. Attach hand written assignment after question paper.
5. **Consultation Time**: Students are advised to meet Engr. Abdul Rahman during the consultation time of the course only with prior appointment. Refer to the procedure for consulting hours from this url: http://alphapeeler.sourceforge.net/me/?page_id=158
6. **Project Submission**: The course required a proper project which will be submitted in Week 13. In this project, a proper report of at least 40 pages will be submitted after which a viva will be conducted in front of Engr. Abdul Rahman / HoD.
7. **Hand-held devices:** It is generally not acceptable to use cell phones, pagers, IPod/MP3 players, computers, etc. during lectures, except with the permission of Engr. Abdul Rahman and for reasons directly related to class activity.
8. **Lab assignments:** Assignments are checked only within lab timings. Lab files will not be entertained after lab timings.
9. **Courtesy and respect to all:** Students will exhibit courtesy and respect toward all other students at all times. Hateful comments concerning race, gender, sexuality, political views, appearance, or of any other type will not be tolerated; this applies to serious as well as "joking" comments.
10. **Leave the Food at Home:** Students may not eat in the classroom. This includes gum and candy. Drinks are also not permitted.
11. **Make-Up Tests:** There is no official policy defined for make-up tests, if you are absent or have not appeared in test then zero marks will be given to you.
12. **Final Year Students:** Students who are engaged in FYP, are responsible to demonstrate their work at least twice a week in FYP lab, otherwise I may send unsatisfactory report to the FYP coordinator.
13. **Leave policy:** Application of leave is not entertained by the class teacher, it should be notified to the HoD, and CC to Director Academics / Examination & Manager Student affairs. Even if the leave is approved, your class teacher will not mark you present on the basis of sick leave or any other type of leave. If you fail to maintain 75% attendance, you may not be eligible to sit in exams.

Class Policies

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14. **Class compensation:** Engr. Abdul Rahman will notify the CR of the class in case of any class missed die to holidays or extra class required for students. It is the responsibility of class CR to schedule extra class by after reviewing the time table of class and teacher's time table and book the classroom from administration block.
15. **Late arrival application:** No application will be considered for late arrival after the class has been dismissed. Students need to submit their late arrival application on the same date during the class. Teacher has the right to dismiss the late arrival apology application in case of regular late arrivals.
16. **Entering the Classroom Procedure:** Enter the classroom quietly and in advance of class starting time. Class start time means that you are in your seat and working on your exercise. Class CR is responsible to turn on the multimedia projector before the class starts.
17. **Classroom Exit Procedure:** Wait for me to dismiss you.

C. Exam policies:

1. Read all questions carefully first and then ask for clarifications.
2. Question paper related queries will not be entertained after 30 minutes after start of paper.
3. Do not write anything on question paper unless until specifically asked for.
4. Fill the required information and return the question paper along with the answer script.
5. Write your name, and enrollment number, otherwise you may not remain eligible for exam.
6. Get your paper signed from invigilator against your enrollment number; else your paper will not be checked.
7. Only attempt questions assigned to your column, otherwise you may disqualify from exam.
8. In case of MCQs, only circle one choice, otherwise you may disqualify from exam.
9. Any kind of miss-conduct/miss-behavior/cheating will disqualify the candidate.
10. Warning will be issues only once, along with -1 score, after that you will lose your eligibility for exam.

D. If YOU CHOOSE to Break a Rule: Punishments will always fit the crime. Of course there are behaviors that will warrant a Vice Principal's Referral immediately. Examples of this include gross insubordination or violent behavior.
Behaviors that are less severe, but in violation of the basic rules of the class will be dealt with in the manner described below. This format is in no way all inclusive and is subject to change:
1st Incident — Teacher/Student Conference
2nd Incident — Teacher/Student Conference, Parent Notification by phone or email, review behavior grade per grading policy.
3rd Incident — Referral to Administration / discipline committee.
Note: All students are required to print a copy of this page and submit to the class teacher with their signatures in order to make sure that all rules are communicated to the students.

- **Course Objective:**

Objective of this course is to make students familiar with the concepts of object oriented programming and data structures.

Applied Programming as a course

- What we will study:
  - Object Oriented Programming and data structures.
  - How to think in a OOP way.
  - How to map real world into a program

  - Aim :
    - Our aim is to refresh the concepts of Object Oriented programming.
    - Help in advance courses.

Grading policy

• Quiz's	10
• Assignments	10
• Class Participation	05
• Midterm's	25
• Final	50
	___
• Total	100

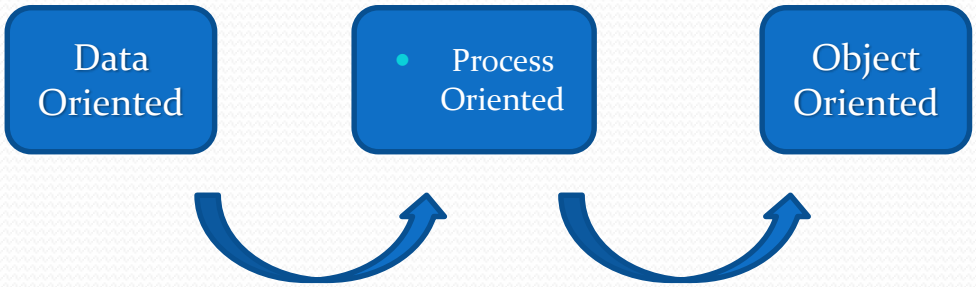
Views of a program

- Syntax — how program is formed
- Semantics — what program does
- Pragmatics — how language is used
- Pragmatics does not affect the *formal* specification of programming languages. Pragmatics includes:
  - Common programming idioms (the right ways and the wrong ways of doing things)
  - Programming environments, e.g., IDEs, REPLs, workspaces, playgrounds, playpens
  - The standard library or libraries
  - The ecosystem for 3rd party libraries (e.g. NPM for JavaScript, Pip for Python, Gems for Ruby, Rocks for Lua, Maven for Java, …)

Programming Paradigms

- 1- Sequential
- 2- Procedural
- 3- Object Oriented

Programming Paradigms



Think in term of data that we needed	Think in term of Process that we needed	Think in term of Object that is involved

What is object orientation

- - A technique for system modeling.
- - OO model consists of several interacting objects.

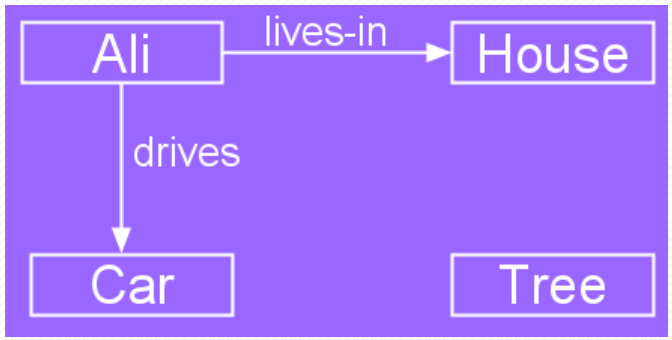
What is a Model?

- - abstraction of something.
- - Purpose is to understand the product before developing it.

Example – OO Model

Example – OO Model

- Objects
  - Person i.e Name: Ali
  - House
  - Car
  - Tree



- Interactions
  - Ali lives in the house
  - Ali drives the car

Object-Orientation - Advantages

- - People think in terms of objects
- - OO models map to reality

- Therefore, OO models are:
- - easy to develop
- - easy to understand

Five principles of OO paradigm

- 1- Abstraction: To have the relevant information.
- 2- Encapsulation: To hide information inside the object.
- 3- Polymorphism: To have many shapes / behaviors.
- 4- Inheritance: To create a new object with an existing one (To adopt features from others)
- 5- Reusability: Ability to use an object again and again if needed.

What is an Object?

- An object is:
- - It can be anything for which we want to save Information
- - Something tangible (Ali, Car)
- - Something that can be captured intellectually (Time, date)

- An object has:
  - State / attributes / properties / data
  - Well-defined behavior / methods / functions
  - Unique identity

Ali as an object

- Attributes:
  - Name
  - age
- Behavior (operations)
  - Walks
  - Eats
- Identity
  - His name

Car as an Object

- Attributes
  - Color
  - Model
- Behavior (operations)
  - Accelerate
  - Start Car
  - Change Gear
- Identity
  - Its registration number

Information Hiding

- Information hiding is one of the most important principles of OOP inspired from real life which says that all information should not be accessible to all persons. Private information should only be accessible to its owner.
- In OO :
  - *"Hiding the object details (state and behavior) from the users"*
- Encapsulation means *"we have enclosed all the characteristics of an object in the object itself"*

Interface

- Interface is a set of functions of an object that he wants to expose to other objects.
- Behaviors.
- **Interface of a Car:**
  - Steer Wheels
  - Accelerate
  - Change Gear
  - Apply Brakes
  - Turn Lights On/Off

Implementation

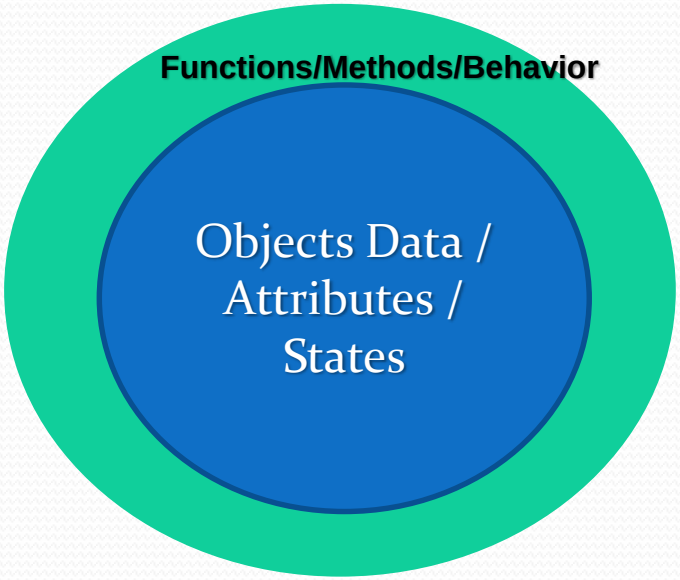
- It is actual implementation of the behavior of the object in any Object Oriented language.

- It has two parts,
  - Internal data structures to hold an object state that will be hidden from us it will store values for an object data members.
  - Functionality in the form of member functions to provide required behavior.

Separation of interface and implementations

- We only show interface of an object to outside world.
- Hide actual implementation from outside world.
- The benefit of using this approach is that our object interface to outside word becomes independent from inside implementation of that interface.

Visualizing an Object



Object

- Technical Definition:
- - “An Object is an Instance of a class”
- - “An Object is the implementation of a class”

- In general we say :
- “ Any tangible thing for which we want to save Information”

- Now onwards we treat object technically.

Discussion

- - Object belongs to a group.
- - Which similar.
- - Have some common attributes.
- - Have some common behaviors.
- - We can categorized objects on some basic features …. ?

Class

- - Collection of Similar object.
- - The objects that share some common features.
- - It is the a design of an object.
- - It is a detail of an object.
- - It tell us what an object contains in it.
- Technical Definition:
- “ A class is blueprint of an object”

Summarize

- A class :
  - It's a blue print .
  - It's a design or template.

An Object:

- Its an instance of a class.
- Implementation of a class.

NOTE: Classes are invisible, object are visible

Generalized Class

- - The class that only exhibits the common features of its objects.

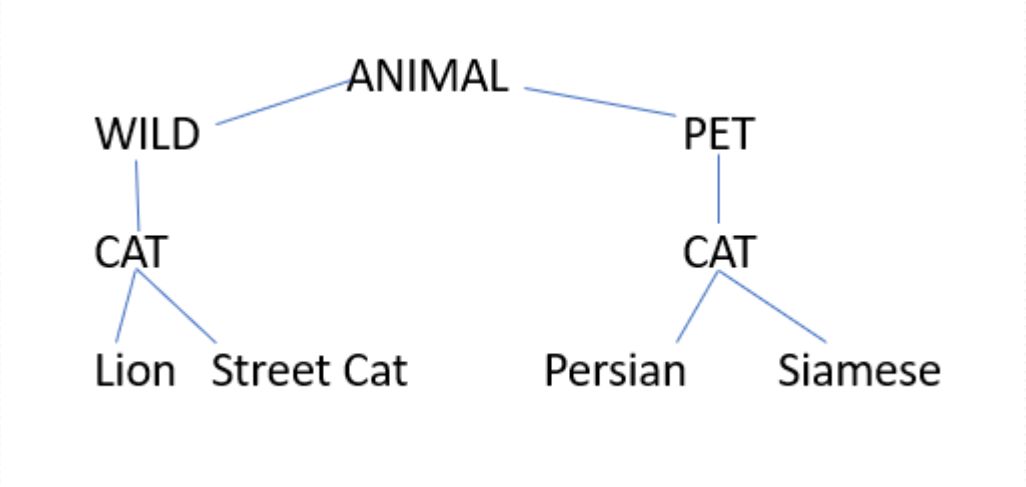
- Examples:

- - ANIMAL
- - BIRDS
- - HUMAN
- - No object of generalized class is found.

Specialized Class

- - The class that exhibits different or unique features (behaviors)

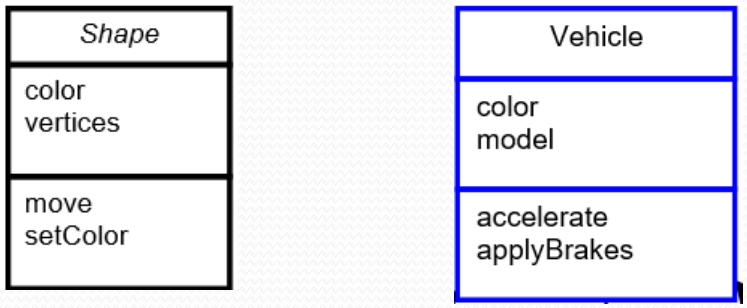
- ANIMAL (Generalized)
  - Specialized:
    - Mammals
    - Cats
    - Dog



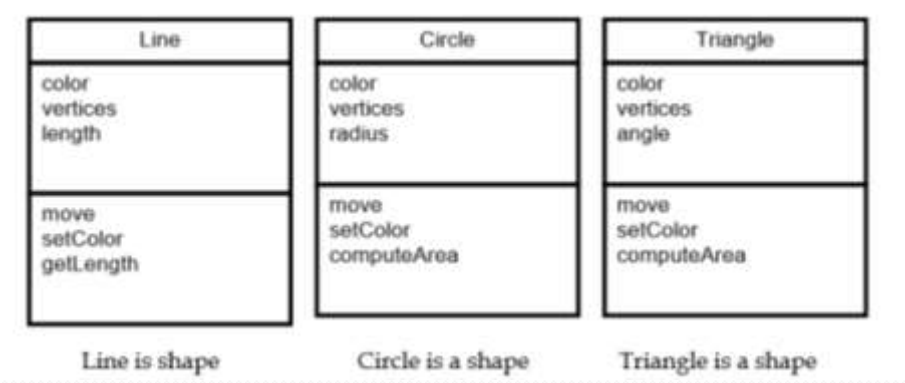
Type of classes

- 1- Abstract Class: The classes we make against abstract concepts are called abstract classes. Abstract Classes can not exist standalone.
- 2- Concrete Class: The entities that actually we see in our real world are called concrete objects and classes made against these objects are called concrete classes.
- 3- Sub-type: Sub-typing means that derived class is behaviorally compatible with the base class. Also known as Extension.
- 4- Specialized class: Specialization means that derived class is behaviourally incompatible with the base class

Abstract Class



Concrete Class

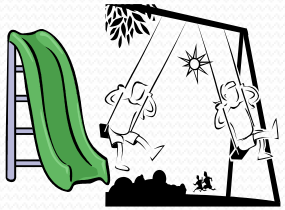


Class Activity

0/1- Library

2- Classroom

3- Parents



4- Playground

5- Pen

6- Book

7- Bag

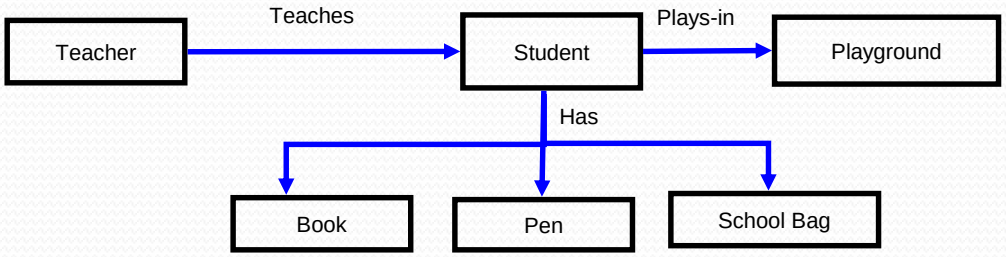
8- Student

9 Teacher

Questions

- 1- Identify at least 3 behaviors and related data for an object.
- 2- Draw an object interaction model based on the objects .

Solution


Teacher
Teaches
Student
Plays-in
Playground
Has
Book
Pen
School Bag

Principle of abstraction

- *"**Capture only those details about an object that are relevant to current perspective**"*
- Suppose we want to implement abstraction for the following statement
- *"Ali is a PhD student and teaches BS students"*

- *Here object Ali has two **perspectives** one is his **student perspective** and second is his **teacher perspective.***

- We can sum up Ali's attributes as follows,
  - Name
  - Age
  - Student Roll No
  - Year of Study
  - CGPA
  - Employee ID
  - Designation
  - Salary

Abstraction – Advantages

- Abstraction has following major advantages,
- It helps us understanding and solving a problem using object oriented approach as it hides extra irrelevant details of objects.
- Focusing on single perspective of an object provides us freedom to change implementation for other aspects of for an object later.