Lab-05
Overloading & Access Control

Objectives:

Understanding concepts method and constructor overloading. Learn how to provide different access controls on class members

Theory:

- **Method Overloading**
  If a class has multiple methods by same name but different parameters, it is known as Method Overloading.

Three ways to overload a method
In order to overload a method, the parameter list of the methods must differ in either of these:

1. Number of parameters.
For example: This is a valid case of overloading
add(int, int)
add(int, int, int)

2. Data type of parameters.
For example:
add(int, int)
add(int, float)

3. Sequence of Data type of parameters.
For example:
add(int, float)
add(float, int)

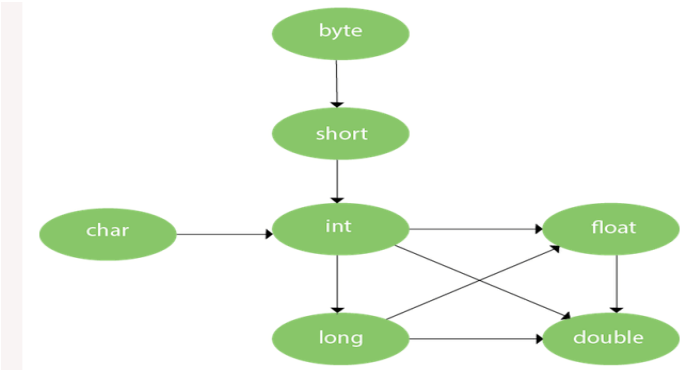
Invalid case of method overloading:
Parameters list doesn't mean the return type of the method, for example if two methods have same name, same parameters and have different return type, then this is not a valid method overloading example. This will throw a compilation error.

int add(int, int)
float add(int, int)

Type Promotion table:
The data type on the left side can be promoted to any of the data type present at the right side.

byte → short → int → long → double
short → int → long → float → double
int → long → float → double
float → double
long → float → double
char → int → long → float → double

This can be represented as a diagram like this:



- **Constructor Overloading**
  If a class has multiple constructors having different parameters, it is known as Constructor Overloading.
- **Access Control**
  The access modifiers in java specify accessibility (scope) of a data member, method, constructor or class.

There are 4 types of java access modifiers:

1) private
2) default
3) protected
4) public

Lab Task:

```
// Demonstrate method overloading.
classOverloadDemo {
void test() {
System.out.println("No parameters");
}
// Overload test for one integer parameter.
void test(int a) {
System.out.println("a: " + a);
}
// Overload test for two integer parameters.
void test(int a, int b) {
System.out.println("a and b: " + a + " " + b);}
// overload test for a double parameter
double test(double a) {
System.out.println("double a: " + a);
return a*a;          }
OverloadDemo(){
System.out.println("No-args constructor ");}
OverloadDemo(int demo){
```

```
System.out.println("Parameterized Constructor  :" + demo) ;} }
// _____ Calling Class _____
class Overload {
public static void main(String args[]) {
OverloadDemo ob = new OverloadDemo();
OverloadDemo ob1 = new OverloadDemo(33);
double result;
// call all versions of test()
ob.test();
ob.test(10);
ob.test(10, 20);
result = ob.test(123.25);
System.out.println("Result of ob.test(123.25): " + result);
 }
}
```

Lab Assignment:

Design a class named Account that contains:

- A private int data field named id for the account (default 0).
- A private double data field named balance for the account (default 0).
- A private double data field named annualInterestRate that stores the current interest rate (default 0). Assume all accounts have the same interest rate.
- A private Date data field named dateCreated that stores the date when the account was created.
- A no-arg constructor that creates a default account.
- A constructor that creates an account with the specified id and initial balance.
- The accessor and mutator methods for id, balance, and annualInterestRate.
- The accessor method for dateCreated.
- A method named getMonthlyInterestRate() that returns the monthly interest rate.
- A method named getMonthlyInterest() that returns the monthly interest.
- A method named withdraws that withdraws a specified amount from the account.
- A method named deposit that deposits a specified amount to the account.

(Hint: Monthly interest is balance * monthlyInterestRate.
monthlyInterestRate is annualInterestRate / 12.
Note that annualInterestRate is a percentage. You need to divide it by 100.

Design a test program that creates an Account object with an account ID of 1122, a balance of $20,000, and an annual interest rate of 4.5%. Use the withdraw method to withdraw $2,500, use the deposit method to deposit $3,000, and print the balance, the monthly interest, and the date when this account was created.

Conclusion: