OOP Assignment 4

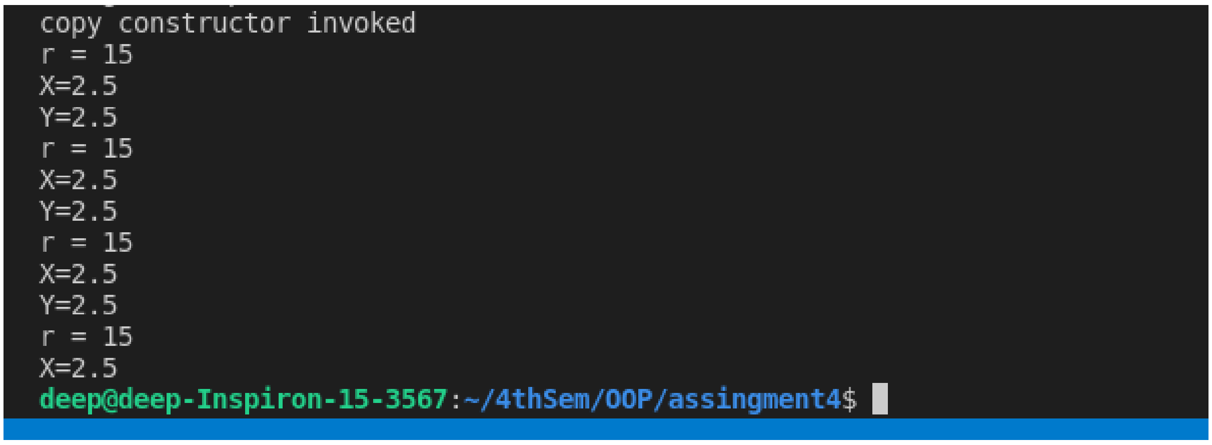
Submitted By : Deepjyoti Deka – 190103014 - 4th Semester (CSE)

1. Write a program in C++ to highlight the difference between overloaded assignment operator and copy constructor.

Ans:
Code:

```
#include <iostream>
using namespace std;
class circle
{
private:
  int r;
  float x, y;

public:
  circle()
  {
  }

  circle(int rr, float xx, float yy)
  {
      r = rr;
      x = xx;
      y = yy;
  }
  circle operator = (const circle &c)
  {
      cout << endl << "Assignment operator invoked";
      r = c.r;
      x = c.x;
      y = c.y;
      return circle(r, x, y);
  }
  circle(const circle &c)
  {
      cout << endl << "copy constructor invoked";
      r = c.r;
      x = c.x;
      y = c.y;
  }
  void showdata()
  {
      cout << endl << "r = " << r;
      cout << endl << "X=" << x;
      cout << endl << "Y=" << y;
  }
};


int main()
{
  circle c1(15, 2.5, 2.5);
  circle c2, c4;
  c4 = c2 = c1;
  circle c3 = c1;
  c1.showdata();
  c2.showdata();
  c3.showdata();
  c4.showdata();
  return 0;
}
```

Input/Output:



```
copy constructor invoked
r = 15
X=2.5
Y=2.5
r = 15
X=2.5
Y=2.5
r = 15
X=2.5
Y=2.5
r = 15
X=2.5
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$
```

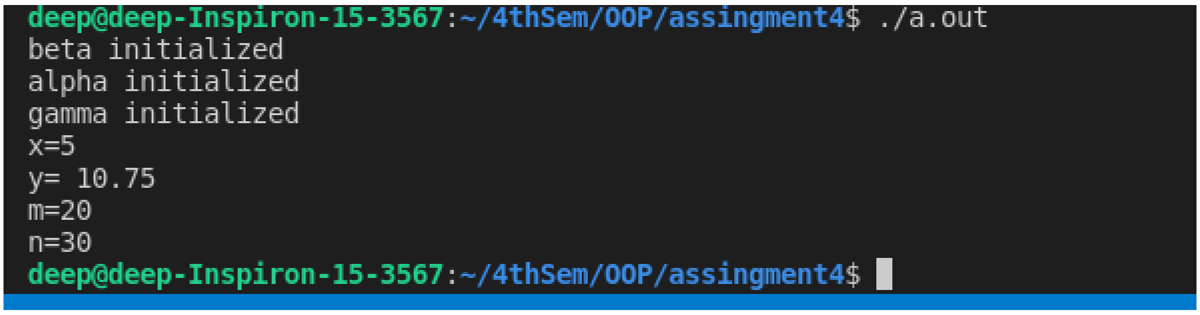
2.Write a Program illustrating how the constructors are implemented and the order in which they are called when the classes are inherited. Use three classes named alpha, beta, gamma such that alpha,beta are base class and gamma is derived class inheriting alpha & beta.

Ans:
Code:

```
#include <iostream>

using namespace std;

class alpha
{
  int x;

public:
  alpha(int i)
  {
      x = i;
      cout << "alpha initialized\n";
  }
  void show_x(void)
  {
      cout << "x=" << x << "\n";
  }
};
class beta
{
  float y;

public:
  beta(float j)
  {
      y = j;
      cout << "beta initialized\n";
  }
  void show_y(void)
  {
      cout << "y= " << y << "\n";
  }
};
class gamma : public beta, public alpha
{
  int m, n;

public:
  gamma(int a, float b, int c, int d) : alpha(a), beta(b)
  {
      m = c;
      n = d;
      cout << "gamma initialized\n";
  }
  void show_mn(void)
  {
      cout << "m=" << m << "\n";
      cout << "n=" << n << "\n";
  }
};
int main()
{
  gamma g(5, 10.75, 20, 30);
  g.show_x();
  g.show_y();
  g.show_mn();
```

```
}
```

Input/Output:



```
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ ./a.out
beta initialized
alpha initialized
gamma initialized
x=5
y= 10.75
m=20
n=30
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$
```

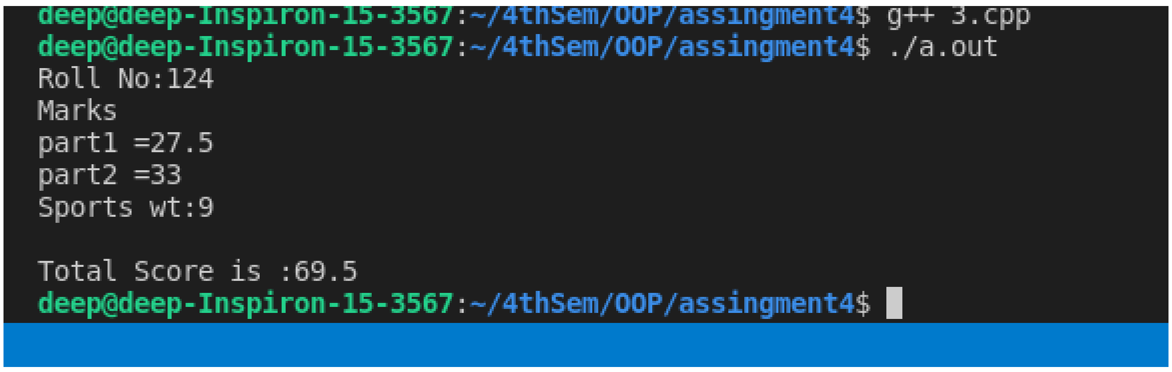
3.Write a Program to design a student class representing student roll no. and a test class (derived class of student) representing the scores of the student in various subjects and sports class representing the score in sports. The sports and test class should be inherited by a result class having the functionality to add the scores and display the final result for a student.

Ans:
Code:

```
#include <iostream>
using namespace std;

class student
{
protected:
  int roll;

public:
  void get_number(int a)
  {
      roll = a;
  }
  void put_number(void)
  {
      cout << "Roll No:" << roll << "\n";
  }
};
class test : public student
{
protected:
  float part1, part2;

public:
  void get_marks(float x, float y)
  {
      part1 = x;
      part2 = y;
  }
  void put_marks(void)
  {
      cout << "Marks "
           << "\n"
           << "part1 =" << part1 << "\n"
           << "part2 =" << part2 << "\n";
  }
};
class sports
{
protected:
  float score;

public:
  void get_score(float s)
  {
      score = s;
  }
  void put_score(void)
  {
      cout << "Sports wt:" << score << "\n\n";
  }
};
class result : public test, public sports
{
  float total;
```

```
public:
  void display(void);
};
void result ::display(void)
{
  total = part1 + part2 + score;
  put_number();
  put_marks();
  put_score();
  cout << "Total Score is :" << total << "\n";
}
int main()
{
  result student_1;
  student_1.get_number(124);
  student_1.get_marks(27.5, 33.0);
  student_1.get_score(9.0);
  student_1.display();
  return 0;
}
```

Input/Output:

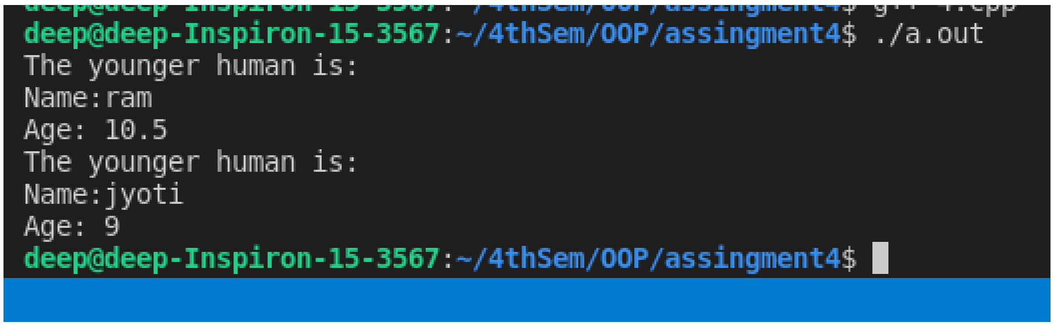


```
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ g++ 3.cpp
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ ./a.out
Roll No:124
Marks
part1 =27.5
part2 =33
Sports wt:9

Total Score is :69.5
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$
```

4.Write a program to maintain the records of person with details (Name and Age) and find the eldest among them. The program must use this pointer to return the result.
Ans:
Code:

```
#include <iostream>
#include <cstring>

using namespace std;
class human
{
  char name[20];
  float age;

public:
  human(const char *s, float a)
  {
      strcpy(name, s);
      age = a;
  }
  human greater(human &x)
  {
      if (x.age >= age)
          return x;
      else
          return *this;
  }
  void display(void)
  {
      cout << "Name:" << name << "\n"
           << "Age: " << age << "\n";
  }
};
int main()
{
  human p1("deep", 7.50),p2("jyoti", 9.0),p3("ram", 10.5);
  human p = p1.greater(p3);
  cout << "The younger human is:\n";
  p.display();
  p = p1.greater(p2);
  cout << "The younger human is:\n";
  p.display();
  return 0;
}
```

Input/Output:



```
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ g++ 4.cpp
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ ./a.out
The younger human is:
Name:ram
Age: 10.5
The younger human is:
Name:jyoti
Age: 9
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$
```

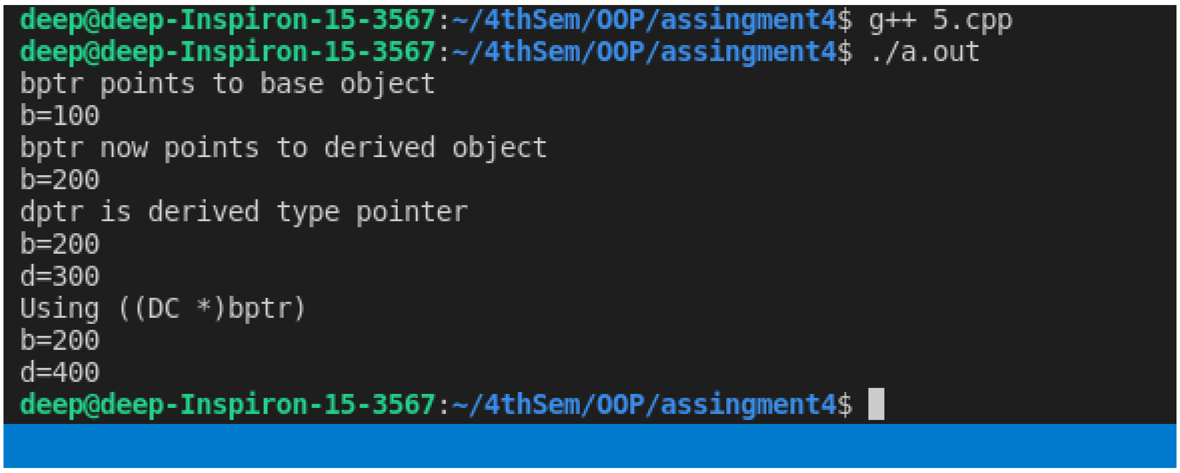
5.Write a Program to illustrate the use of pointers to objects whch are related by inheritance.

Ans:
Code:

```
#include <iostream>
using namespace std;

class BC
{
public:
  int b;
  void show()
  {
      cout << "b=" << b << "\n";
  }
};
class DC : public BC
{
public:
  int d;
```

```cpp
  void show()
  {
      cout << "b=" << b << "\n"
           << "d=" << d << "\n";
  }
};
int main()
{
  BC *bptr;
  BC base;
  bptr = &base;
  bptr->b = 100;
  cout << "bptr points to base object\n";
  bptr->show();
  DC derived;
  bptr = &derived;
  bptr->b = 200;
  cout << "bptr now points to derived object\n";
  bptr->show();
  DC *dptr;
  dptr = &derived;
  dptr->d = 300;
  cout << "dptr is derived type pointer\n";
  dptr->show();
  cout << "Using ((DC *)bptr)\n";
  ((DC *)bptr)->d = 400;
  ((DC *)bptr)->show();
  return 0;
}
```

Input/Output:



```
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ g++ 5.cpp
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ ./a.out
bptr points to base object
b=100
bptr now points to derived object
b=200
dptr is derived type pointer
b=200
d=300
Using ((DC *)bptr)
b=200
d=400
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$
```

6.Write a program illustrating the use of virtual functions in class.

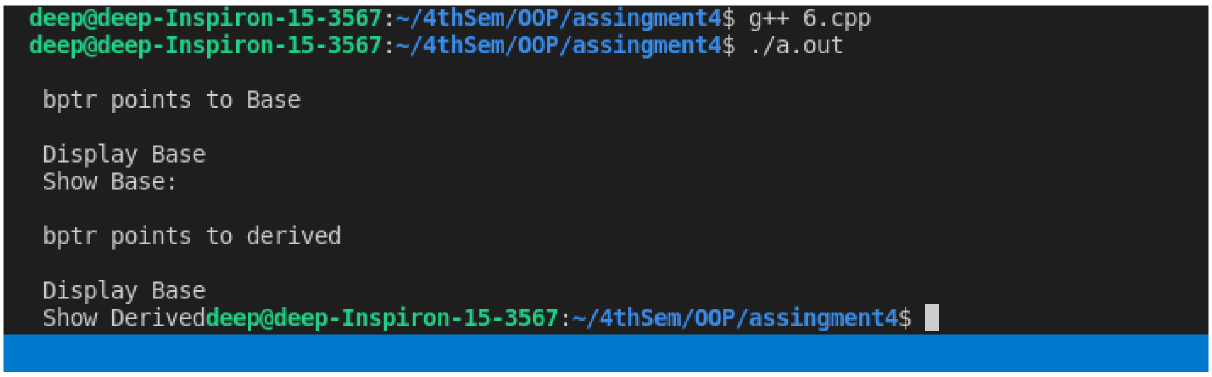
Ans:

Code:

```
#include <iostream>
using namespace std;
class Base
{
public:
  void display()
  {
      cout << "\n Display Base";
  }
  virtual void show()
  {
      cout << "\n Show Base:";
  }
};
class Derived : public Base
{
public:
  void display()
```

```cpp
  {
      cout << "\n Display Derived";
  }
  void show()
  {
      cout << "\n Show Derived";
  }
};
int main()
{
  Base B;
  Derived D;
  Base *bptr;
  cout << "\n bptr points to Base\n";
  bptr = &B;
  bptr->display();
  bptr->show();
  cout << "\n\n bptr points to derived\n";
  bptr = &D;
  bptr->display();
  bptr->show();
  return 0;
}
```

Input/Output:



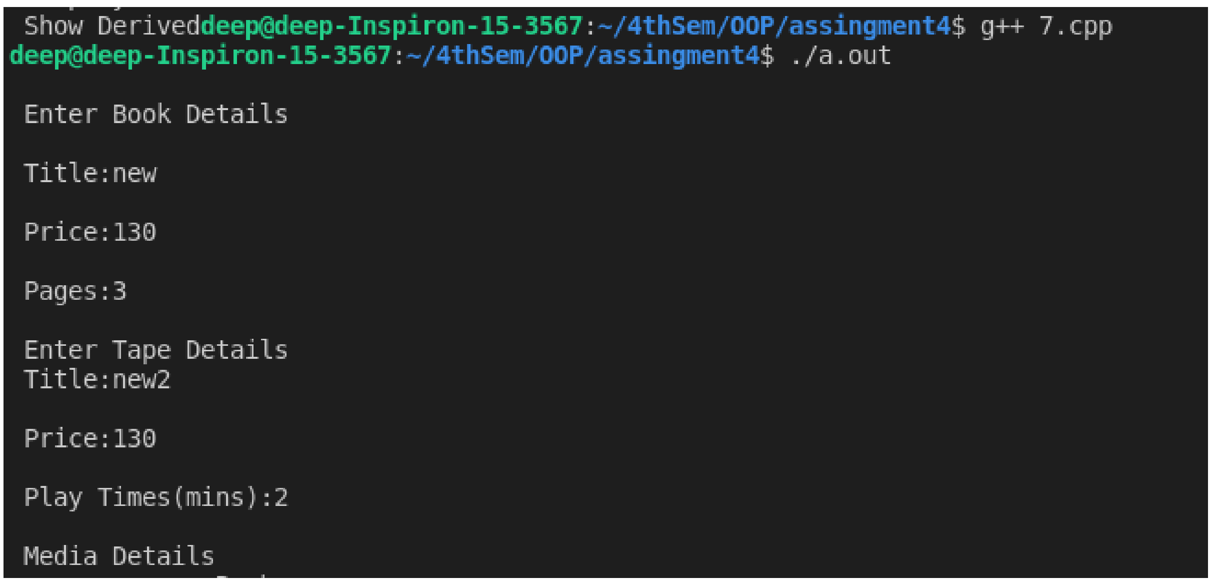
```
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ g++ 6.cpp
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ ./a.out

 bptr points to Base

 Display Base
 Show Base:

 bptr points to derived

 Display Base
 Show Deriveddeep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ 
```

7.Write a program to design a class representing the information regarding digital library (books, tape: book & tape should be separate classes having the base class as media). The class should have the functionality for adding new item, issuing, deposit etc. the program should use the runtime polymorphism.

Ans:
Code:
```
#include <iostream>
#include <cstring>

using namespace std;
class media
{
protected:
  char title[50];
  float price;

public:
  media(char *s, float a)
  {
      strcpy(title, s);
      price = a;
  }
  virtual void display() {}
};
class book : public media
{
  int pages;

public:
  book(char *s, float a, int p) : media(s, a)
  {
      pages = p;
  }
  void display();
};
class tape : public media
{
  float time;

```

```
public:
  tape(char *s, float a, float t) : media(s, a)
  {
      time = t;
  }
  void display();
};
void book ::display()
{
  cout << "\n Title:" << title;
  cout << "\n Pages:" << pages;
  cout << "\n Price:" << price;
}
void tape ::display()
{
  cout << "\n Title:" << title;
  cout << "\n Play Time:" << time << "mins";
  cout << "\n Price:" << price;
}
int main()
{
  char *title = new char[30];
  float price, time;
  int pages;
  cout << "\n Enter Book Details \n";
  cout << "\n Title:";
  cin >> title;
  cout << "\n Price:";
  cin >> price;
  cout << "\n Pages:";
  cin >> pages;
  book book1(title, price, pages);
  cout << "\n Enter Tape Details";
  cout << "\n Title:";
  cin >> title;
  cout << "\n Price:";
  cin >> price;
  cout << "\n Play Times(mins):";
  cin >> time;
  tape tape1(title, price, time);
  media *list[2];
  list[0] = &book1;
  list[1] = &tape1;
  cout << "\n Media Details";
  cout << "\n..............Book.....";
  list[0]->display();
  cout << "\n..............Tape.....";
  list[1]->display();
  return 0;
}
```

Input/Output:

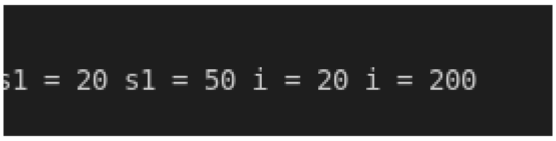


```
 Show Deriveddeep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ g++ 7.cpp
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ ./a.out

 Enter Book Details

 Title:new

 Price:130

 Pages:3

 Enter Tape Details
 Title:new2

 Price:130

 Play Times(mins):2

 Media Details
```

8.Write a program to show conversion from string to int and vice-versa.
Ans:
Code:

```
#include<iostream>
#include <stdlib.h>
#include <string.h>
using namespace std;
class string
{
private:
char str[20];
public:
  string ()
{
  str[0] = '\0';
}
string (char *s)
{
  strcpy (str, s);
}
string (int a)
{
  itoa (a, str, 10);
}
operator     int ()
{
  int i = 0, l, ss = 0, k = 1;
  l = strlen (str) - 1;
  while (l >= 0)
    {
  ss = ss + (str[l] - 48) * k;
  l--;
  k *= 10;
    }
  return (ss);
}
void displaydata ()
{
  cout << str;
}
}


;
void
main ()
{
string s1 = 20;
cout << endl << "s1=";
s1.displaydata ();
s1 = 50;
cout << endl << "s1=";
s1.displaydata ();
string s2 ("20");
int i = int (s2);
cout << endl << "i=" << i;
string s3 ("200");
i = s3;
cout << endl << "i=" << i;
}
```

Input/Output:



```
s1 = 20 s1 = 50 i = 20 i = 200
```

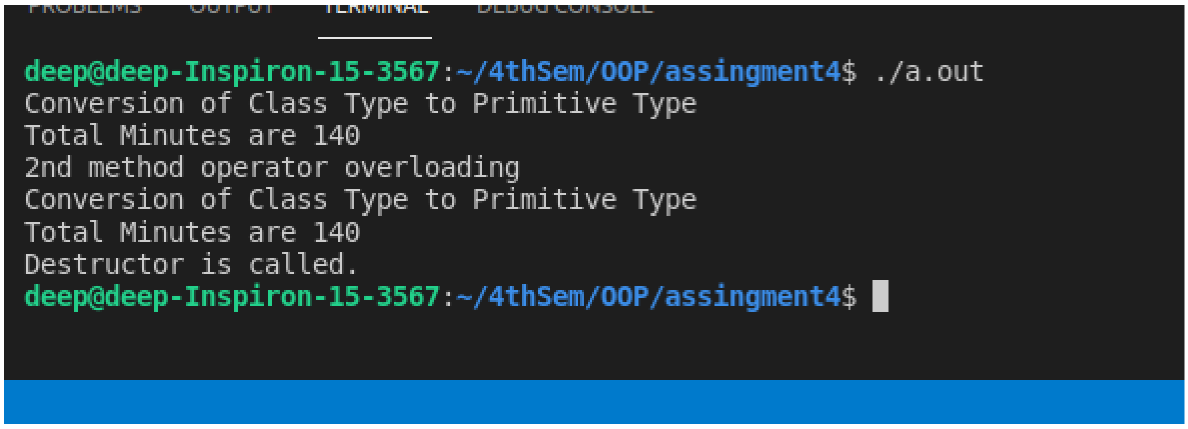
9.Write a program showing data conversion between objects of different classes.
Ans:
Code:

```
#include <bits/stdc++.h>
using namespace std;
class Time
{
```

```
int hrs, mins;

public:
Time(int, int);
operator int();
~Time()
{
  cout << "Destructor is called." << endl;
}
};
Time::Time(int a, int b)
{
hrs = a;
mins = b;
}
Time::operator int()
{
cout << "Conversion of Class"
     << " Type to Primitive Type" << endl;
return (hrs * 60 + mins);
}
void TypeConversion(int hour, int mins)
{
int duration;
Time t(hour, mins);
duration = t;
cout << "Total Minutes are " << duration << endl;
cout << "2nd method operator"
     << " overloading " << endl;
duration = t.operator int();
cout << "Total Minutes are " << duration << endl;
return;
}
int main()
{
int hour, mins;
hour = 2;
mins = 20;
TypeConversion(hour, mins);
return 0;
```

```
}
```

Input/Output:



PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE

```
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ ./a.out
Conversion of Class Type to Primitive Type
Total Minutes are 140
2nd method operator overloading
Conversion of Class Type to Primitive Type
Total Minutes are 140
Destructor is called.
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$
```

10.Write a program showing data conversion between objects of different classes and conversion routine should reside in destination class.

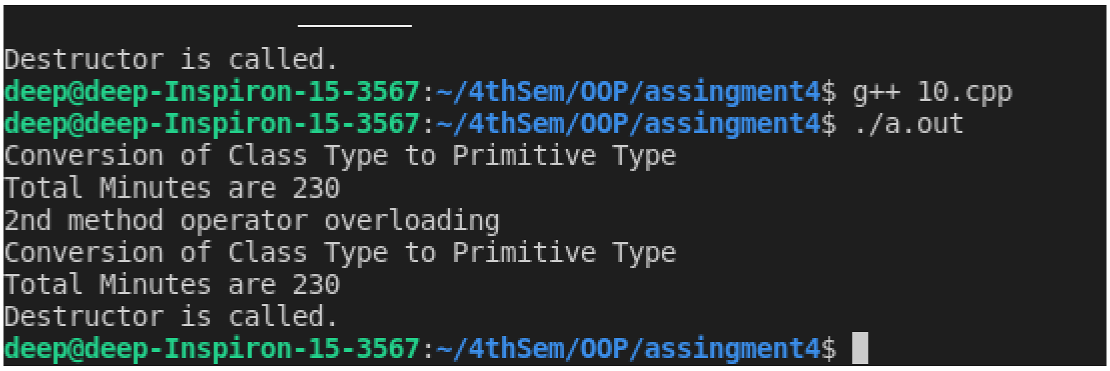
Ans:

Code:

```
#include <bits/stdc++.h>
using namespace std;
class Time
{
  int hrs, mins;

public:
  Time(int, int);
  operator int();
  ~Time()
  {
      cout << "Destructor is called." << endl;
  }
};
Time::Time(int a, int b)
{
  hrs = a;
  mins = b;
```

```cpp
}
Time::operator int()
{
  cout << "Conversion of Class"
       << " Type to Primitive Type" << endl;
  return (hrs * 60 + mins);
}
void TypeConversion(int hour, int mins)
{
  int duration;
  Time t(hour, mins);
  duration = t;
  cout << "Total Minutes are " << duration << endl;
  cout << "2nd method operator"
       << " overloading " << endl;
  duration = t.operator int();
  cout << "Total Minutes are " << duration << endl;
  return;
}
int main()
{
  int hour, mins;
  hour = 3;
  mins = 50;
  TypeConversion(hour, mins);
  return 0;
}
```

Input/Output:



```
Destructor is called.
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ g++ 10.cpp
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ ./a.out
Conversion of Class Type to Primitive Type
Total Minutes are 230
2nd method operator overloading
Conversion of Class Type to Primitive Type
Total Minutes are 230
Destructor is called.
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$
```

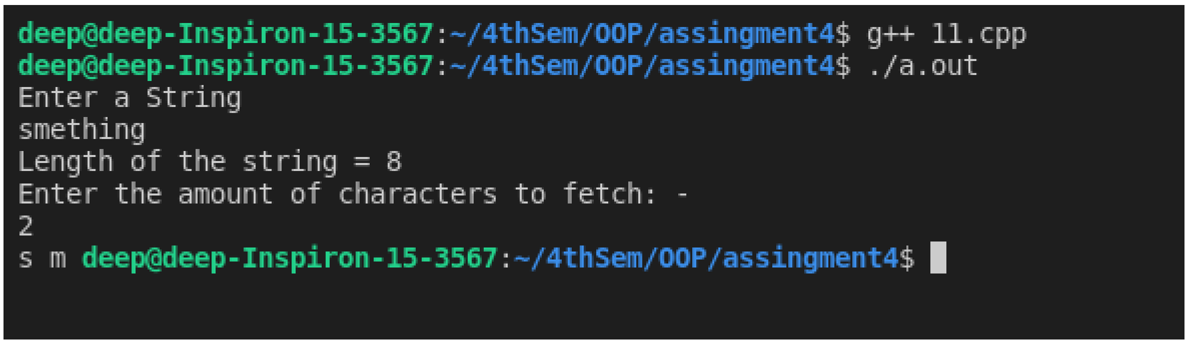
11.Write a program to perform read/write binary I/O operation on a file (i.e. write the object of a structure/class to file).

Ans:

Code:

```
#include <fstream>
#include <iostream>
#include <string.h>
using namespace std;


int main(int argc, char **argv)
{
  int num;
  char str[50];
  cout << "Enter a String \n";
  cin >> str;
  int len = strlen(str);
  cout << "Length of the string = " << len << endl;
  fstream myFile("test.txt", ios::in | ios::out | ios::trunc);
  myFile << str;
  cout << "Enter the amount of characters to fetch: - \n";
  cin >> num;
  myFile.seekg(0, ios::beg);
  char A[num];
  myFile.read(A, num);

  for (int i = 0; i < num; i++)
  {
      cout << A[i] << " ";
  }
  myFile.close();
  return 0;
}
```

Input/Output:



```
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ g++ 11.cpp
deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$ ./a.out
Enter a String
smething
Length of the string = 8
Enter the amount of characters to fetch: -
2
s m deep@deep-Inspiron-15-3567:~/4thSem/OOP/assingment4$
```