UNIVERSITY OF ENGINEERING AND TECHNOLOGY

(NAROWAL CAMPUS)

Object-Oriented Programming Lab Manual

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Topics: This Pointer, Composition,

Friend function & Friend Class

Lab Manual

(Object-Oriented Programming Lab)

- **Task 1:**

Write a C++ program that demonstrates the cascading call of member function using this pointer and also uses this pointer to assign values to data members of the class.

Program:

```cpp
#include <iostream>
#include <string>
using namespace std;
class Driver{
private:
    string name, car;
    int age, id;
public:
    Driver(string="Ali", string ="Corolla", int=29, int=123);
    Driver& set();
    Driver& print();
};
int main(){
    Driver D1("Abdullah", "Audi S8", 19, 525);
    D1.print().set().print();
    return 0;
}
Driver::Driver(string n, string c, int a, int iD){
    this->name = n;
    this->car = c;
    this->age = a;
    this->id = iD;
}
Driver& Driver :: set(){
    cout<<" --: Enter Driver Information :--"<<endl;
    cout<<"Enter Name: ";
    getline(cin>>ws,this->name);
    cout<<"Enter Age: ";
    cin>>this->age;
    cout<<"Enter Car: ";
    getline(cin>>ws,this->car);
    cout<<"Enter Id: ";
    cin>>this->id;
    return *this;
}
```

```cpp
Driver& Driver :: print(){
    cout<<" --: Driver Informaion :-- "<<endl;
    cout<<"Name:    "<<this->name<<endl;
    cout<<"Age:     "<<this->age<<endl;
    cout<<"Car:     "<<this->car<<endl;
    cout<<"ID:      "<<this->id<<endl;
    return *this;
}
```

Output:

```
 --: Driver Informaion :--
Name:    Abdullah
Age:     19
Car:     Audi S8
ID:      525
 --: Enter Driver Information :--
Enter Name: Ali
Enter Age: 24
Enter Car: Audi R8
Enter Id: 500
 --: Driver Informaion :--
Name:    Ali
Age:     24
Car:     Audi R8
ID:      500

D:\UET Narowal\2nd Semester\Object Oriented Programming\Lab\OOP Lab\x64\Debug\OOP Lab.exe (process 17900) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .
```

- ## Task 2:

Write a class that contains the object of other classes as its data members and demonstrate composition in a C++ program.

Program:

```cpp
#include <iostream>
#include <string>
 using namespace std;
class Mercedes{
private:
    string brand,model,make,fuelType,color;
    int yearOfManufacture, engineCapacity;
public:
    Mercedes(string="Mercedes Benz",string="S Class",string="German", string="Electrical",string="Black", int=2023, int=1700);
    void display();
    void set();
};
class BMW{
private:
    string brand,model,make,fuelType,color;
    int yearOfManufacture, engineCapacity;
public:
    BMW(string="BMW",string="i8",string="Italy", string="Electrical",string="White-Blue", int=2022, int=1200);
    void display();
    void set();
};
class showRoom{
private:
    Mercedes S8;
    BMW m5;
public:
    showRoom(string mec = "Mercedes", string bmw = "BMW"): S8(mec), m5(bmw) {}
    showRoom& displayAll(){
        S8.display();
        m5.display();
        return *this;
    }
    showRoom& setAll(){
        S8.set();
        m5.display();
        return *this;
    }
};
```

```cpp
int main(){
    showRoom Lahore;
    Lahore.displayAll().setAll().displayAll();
    return 0;
}
Mercedes::Mercedes(string b, string md, string mk, string ft, string c, int ym, int ec){
    this->brand = b;
    this->model = md;
    this->make = mk;
    this->fuelType = ft;
    this->color = c;
    this->yearOfManufacture = ym;
    this->engineCapacity = ec;
}
BMW::BMW(string b, string md, string mk, string ft, string c, int ym, int ec){
    this->brand = b;
    this->model = md;
    this->make = mk;
    this->fuelType = ft;
    this->color = c;
    this->yearOfManufacture = ym;
    this->engineCapacity = ec;
}
void Mercedes::set(){
    cout<<"     --: Enter Car Details :--   "<<endl;
    cout<<"Enter Car Brand: ";
    getline(cin>>ws,this->brand);
    cout<<"Enter Car Model: ";
    getline(cin>>ws,this->model);
    cout<<"Enter Car Make: ";
    getline(cin>>ws,this->make);
    cout<<"Enter Car Fuel Type: ";
    getline(cin>>ws,this->fuelType);
    cout<<"Enter Car Color: ";
    getline(cin>>ws,this->color);
    cout<<"Enter Car Year of Manufacture: ";
    cin>>yearOfManufacture;
    cout<<"Enter Car Engine Capacity: ";
    cin>>engineCapacity;
}
void BMW::set(){
    cout<<"     --: Enter Car Details :--   "<<endl;
    cout<<"Enter Car Brand: ";
    getline(cin>>ws,this->brand);
    cout<<"Enter Car Model: ";
    getline(cin>>ws,this->model);
    cout<<"Enter Car Make: ";
    getline(cin>>ws,this->make);
    cout<<"Enter Car Fuel Type: ";
    getline(cin>>ws,this->fuelType);
    cout<<"Enter Car Color: ";
    getline(cin>>ws,this->color);
    cout<<"Enter Car Year of Manufacture: ";
    cin>>yearOfManufacture;
    cout<<"Enter Car Engine Capacity: ";
    cin>>engineCapacity;
}
```

```cpp
void Mercedes:: display(){
    cout<<"             --: Car Details :--             "<<endl;
    cout<<"Car Brand:               "<<this->brand<<endl;
    cout<<"Car Model:               "<<this->model<<endl;
    cout<<"Car Make:                "<<this->make<<endl;
    cout<<"Car Fuel Type:           "<<this->fuelType<<endl;
    cout<<"Car Color:               "<<this->color<<endl;
    cout<<"Car Year of Manufacture: "<<this->yearOfManufacture<<endl;
    cout<<"Car Engine Capacity:     "<<this->engineCapacity<<endl<<endl;
}
void BMW:: display(){
    cout<<"             --: Car Details :--             "<<endl;
    cout<<"Car Brand:               "<<this->brand<<endl;
    cout<<"Car Model:               "<<this->model<<endl;
    cout<<"Car Make:                "<<this->make<<endl;
    cout<<"Car Fuel Type:           "<<this->fuelType<<endl;
    cout<<"Car Color:               "<<this->color<<endl;
    cout<<"Car Year of Manufacture: "<<this->yearOfManufacture<<endl;
    cout<<"Car Engine Capacity:     "<<this->engineCapacity<<endl<<endl;
}
```

Output:

```
            --: Car Details :--
Car Brand:              Mercedes
Car Model:              S Class
Car Make:               German
Car Fuel Type:          Electrical
Car Color:              Black
Car Year of Manufacture: 2023
Car Engine Capacity:    1700

            --: Car Details :--
Car Brand:              BMW
Car Model:              i8
Car Make:               Italy
Car Fuel Type:          Electrical
Car Color:              White-Blue
Car Year of Manufacture: 2022
Car Engine Capacity:    1200

     --: Enter Car Details :--
Enter Car Brand: Toyota
Enter Car Model: Corolla
Enter Car Make: 2019
Enter Car Fuel Type: Petrol
Enter Car Color: Red
Enter Car Year of Manufacture: 2019
Enter Car Engine Capacity: 1200
            --: Car Details :--
Car Brand:              BMW
Car Model:              i8
Car Make:               Italy
Car Fuel Type:          Electrical
Car Color:              White-Blue
Car Year of Manufacture: 2022
Car Engine Capacity:    1200

            --: Car Details :--
Car Brand:              Toyota
Car Model:              Corolla
Car Make:               2019
Car Fuel Type:          Petrol
Car Color:              Red
Car Year of Manufacture: 2019
Car Engine Capacity:    1200
```

```
            --: Car Details :--
Car Brand:              BMW
Car Model:              i8
Car Make:               Italy
Car Fuel Type:          Electrical
Car Color:              White-Blue
Car Year of Manufacture: 2022
Car Engine Capacity:    1200


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Press any key to close this window . . .
```

- **Task 3:**

Write a C++ program and use Friend Function to access class data members.

Program:

```cpp
#include <iostream>
using namespace std;
class Person{
friend void display(const Person&);
private:
    string name, fname, city;
    int age,salary;
public:
    Person(string="Abdullah", string="Zahid", string="Lahore", int=18, int=00);
};
int main(){
    Person p;
    display(p);
    return 0;
}
Person::Person(string n, string fn, string ct, int ag, int sl){
    this->name = n;
    this->fname = fn;
    this->city = ct;
    this->age = ag;
    this->salary = sl;
}
void display(const Person& per){
    cout<<"Person Name: "<<per.name<<endl;
    cout<<"Person Father Name: "<<per.fname<<endl;
    cout<<"Person City: "<<per.city<<endl;
    cout<<"Person Age: "<<per.age<<endl;
    cout<<"Person Salary: "<<per.salary<<endl;
}
```

Output:

```
Person Name: Abdullah
Person Father Name: Zahid
Person City: Lahore
Person Age: 18
Person Salary: 0

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Press any key to close this window . . .
```

- **Task 4:**

Create a friend class that accesses the data members of other classes in the C++ program.

Program:

```cpp
#include <iostream>
#include <string>
using namespace std;
class Employee{
private:
    string name, fname, city;
    int age, salary;
public:
    Employee(string="Abdullah",string="Zahid",string="Lahore",int=11,int=10000);
    void set();
    friend class Display;
};
class Display{
public:
    void display(Employee& ep){
        cout<<"Name:        "<<ep.name<<endl;
        cout<<"Father Name: "<<ep.fname<<endl;
        cout<<"City:        "<<ep.city<<endl;
        cout<<"Age:         "<<ep.age<<endl;
        cout<<"Salary:      "<<ep.salary<<endl;
    }
};
int main(){
    Employee Abdullah;
    Display print;
    print.display(Abdullah);
    return 0;
}
Employee:: Employee(string n, string fn, string ct, int ag, int sl){
    this->name = n;
    this->fname = fn;
    this->city = ct;
    this->age = ag;
    this->salary = sl;
}
void Employee :: set(){
    cout<<"Enter Name: ";
    getline(cin>>ws,this->name);
    cout<<"Enter Father Name: ";
    getline(cin>>ws,this->fname);
    cout<<"Enter City: ";
    getline(cin>>ws,this->city);
    cout<<"Enter Age: ";
    cin>>this->age;
    cout<<"Enter Salary: ";
    cin>>this->salary;
}
```

Output:

```
Person Name: Abdullah
Person Father Name: Zahid
Person City: Lahore
Person Age: 18
Person Salary: 0

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```
