

OOPS CONCEPTS by Yash Jain Sir



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WHY OOPS ?

Course Link: <https://www.knowledgegate.in/learn/Mera-Placement-Hoga>

MERA PLACEMENT HOGA

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LINK IN DESCRIPTION



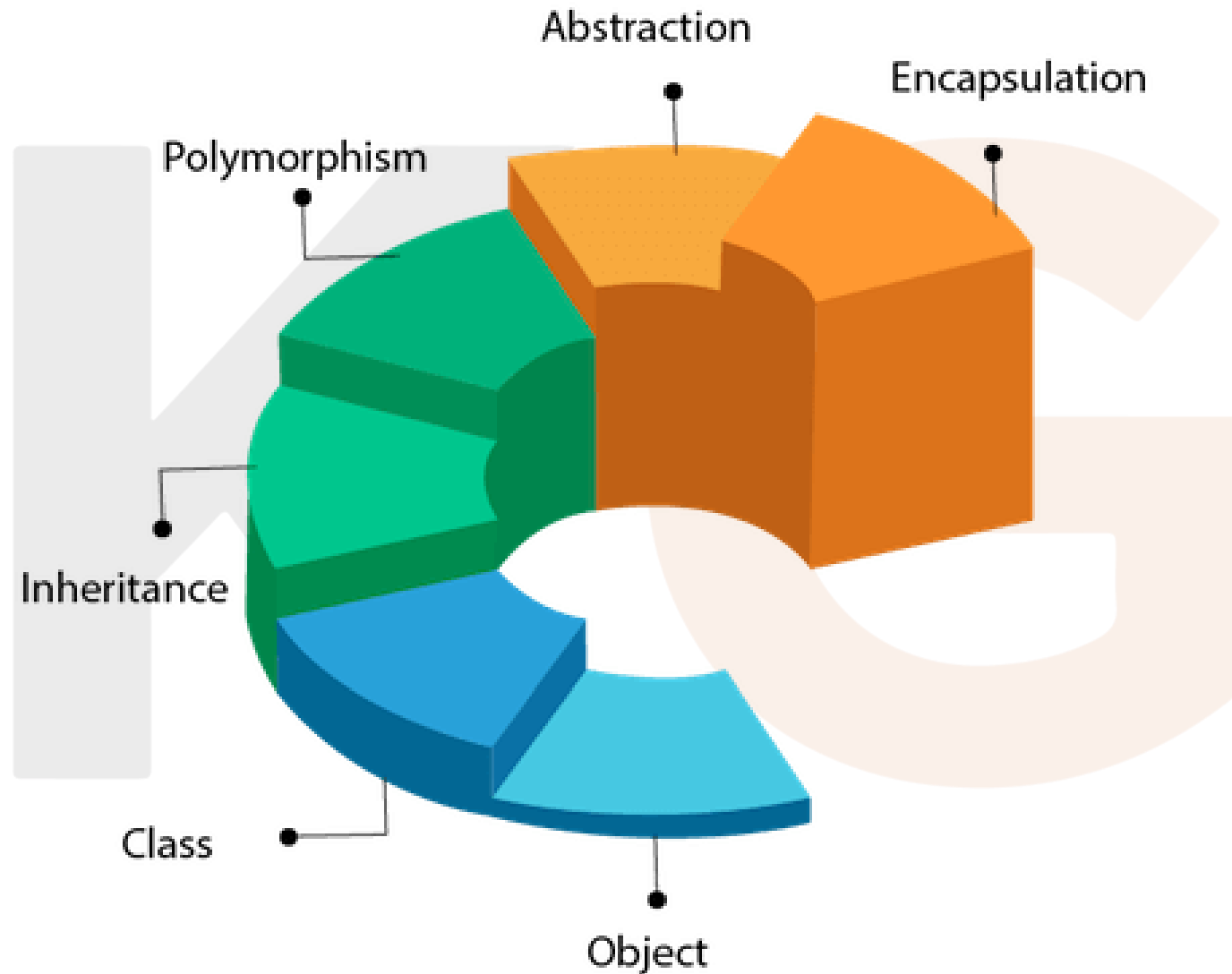
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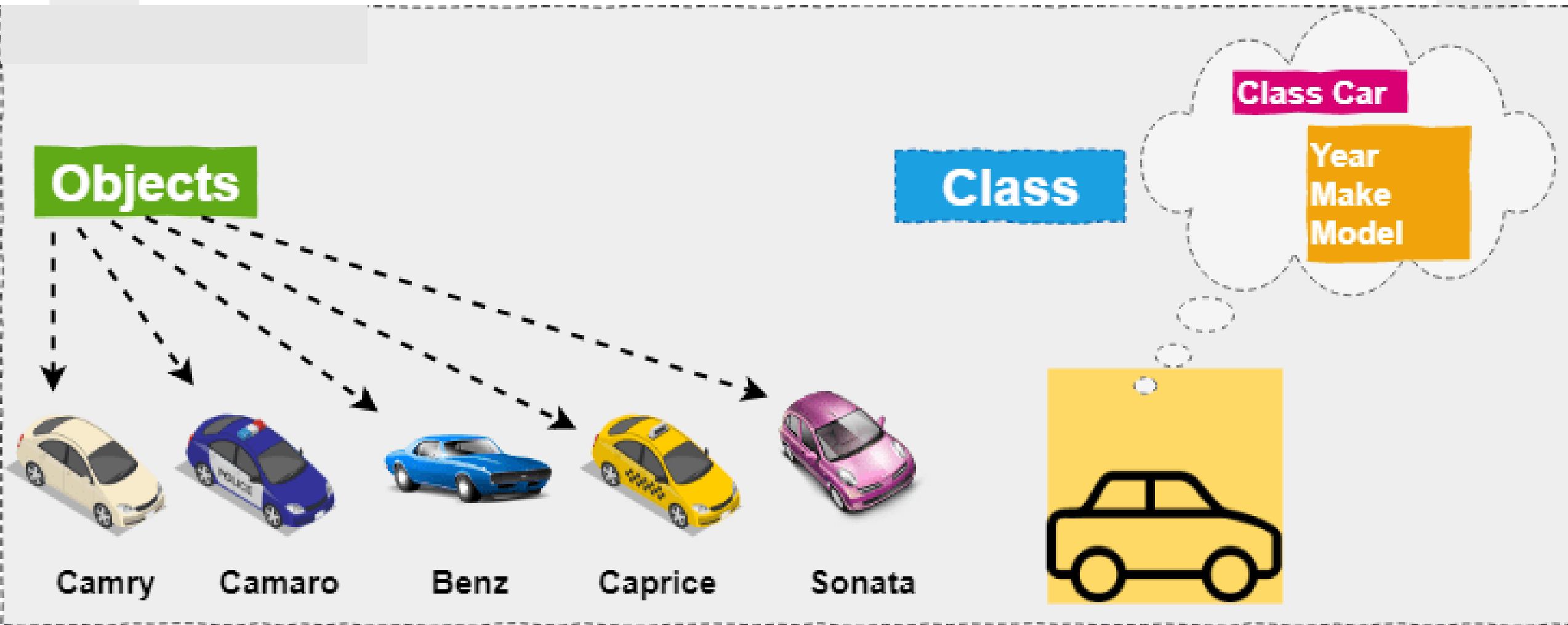
WHY MODULAR PROGRAMMING ?



OOPs (Object-Oriented Programming System)



CLASS & OBJECT



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CLASS & OBJECT

- Objects have state and behaviour
Eg: Dogs have state (name, colour, breed, hungry) and behaviour (barking, fetching, wagging tail).
- An object stores its state in fields (or in variables) and exposes its behaviour through methods.

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CLASS & OBJECT

- A class is the blueprint of an object. When you write a class, you are describing how the JVM should make an object of that type.

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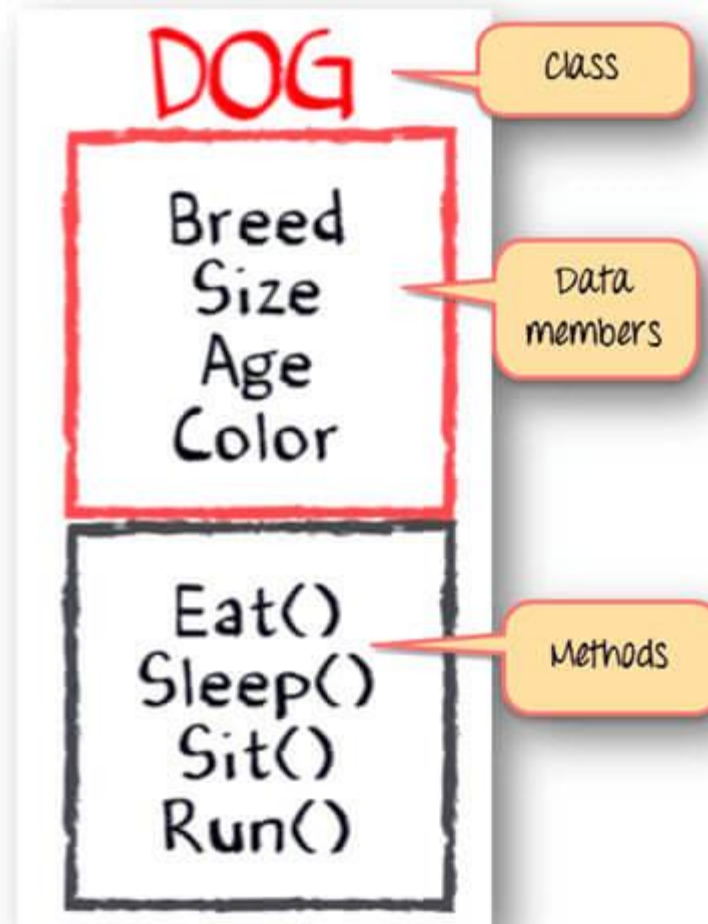
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CLASS & OBJECT



CLASS & OBJECT

```
class Student{  
    string name;  
    int age;  
    bool gender;  
};
```

KG

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

class Student{
    string name;
    int age;
    bool gender;
};

int main()
{
    Student yash;
    yash.name = "Yash";
    return 0;
}
```

Compilation failed due to following error(s).

```
main.cpp:13:10: error: 'std::string Student::name' is private within this context
```

```
13 |     yash.name = "Yash";  
    |           ^~~~
```

```
main.cpp:5:12: note: declared private here
```

```
5 |     string name;  
  |           ^~~~
```

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

```
class Student{
    public:
    string name;
    int age;
    bool gender;
};

int main()
{
    Student yash;
    yash.name = "Yash";
    return 0;
}
```

Code Link: <https://onlinegdb.com/3bxjXPjGi>

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```
class Student{  
    string name;  
    int age;  
    bool gender;  
};  
  
int main()  
{  
    Student yash;  
    yash.name = "Yash";  
    yash.age = 20;  
    yash.gender = 1;  
  
    Student kanika;  
    kanika.name = "Kanika";  
    kanika.age = 19;  
    kanika.gender = 0;  
  
    return 0;  
}
```

How to create an object ?



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ENCAPSULATION

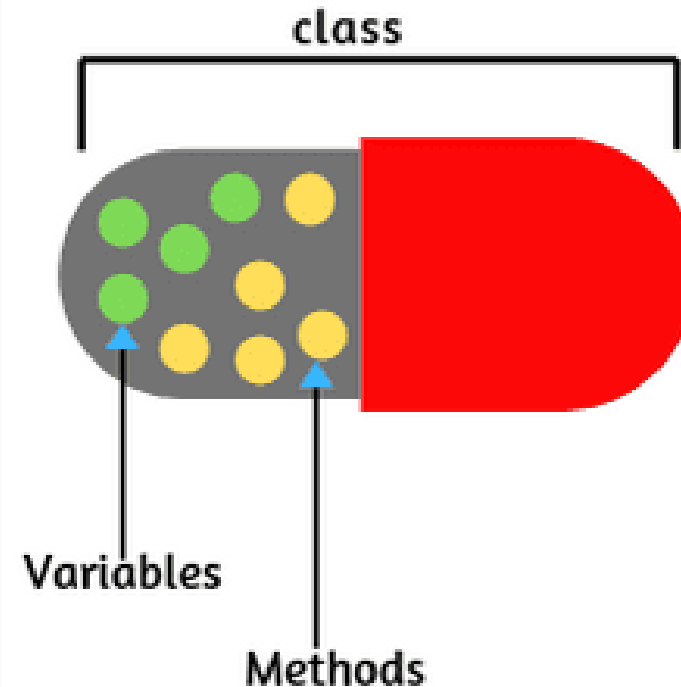
Encapsulation is defined as the wrapping up of data under a single unit. It is the mechanism that binds together code and the data it manipulates. Another way to think about encapsulation is, it is a protective shield that prevents the data from being accessed by the code outside this shield.

Technically in encapsulation, the variables or data of a class is hidden from any other class and can be accessed only through any member function of its own class in which it is declared.

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ENCAPSULATION

```
class  
{  
  
    data members  
    +  
    methods (behavior)  
  
}
```



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PERSONAL MENTORSHIP

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

```
class KG{  
    public: int p;  
    public: int q;  
  
    public: void setP(int input)  
    {  
        p= input;  
        q= p/2;  
    }  
};  
  
int main()  
{  
    KG obj;  
    obj.p=1;  
    obj.q=5;  
    return 0;  
}
```

Code Link: <https://onlinegdb.com/JVvfLINB1p>

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ENCAPSULATION

Instance variables are declared private to prevent misuse.

Providing methods that can be used to read/write the state rather than accessing the state directly.

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

Code Link: <https://onlinegdb.com/3iLwksjQZ>

```
class KG{
    private: int p;
    private: int q;

    public: void setP(int input)
    {
        p= input;
        q= p/2;
    }
};

int main()
{
    KG obj;
    obj.p=1;
    obj.q=5;
    return 0;
}
```

Compilation failed due to following error(s).

```
main.cpp:18:9: error: 'int KG::p' is private within this context
```

```
18 |     obj.p=1;  
    |         ^
```

```
main.cpp:5:18: note: declared private here
```

```
5 |     private: int p;  
   |                 ^
```

```
main.cpp:19:9: error: 'int KG::q' is private within this context
```

```
19 |     obj.q=5;  
    |         ^
```

```
main.cpp:6:18: note: declared private here
```

```
6 |     private: int q;  
   |                 ^
```

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

class KG{
    private: int p;
    private: int q;

    public: void setP(int input)
    {
        p= input;
        q= p/2;
    }
};

int main()
{
    KG obj;
    obj.setP(6);
    return 0;
}
```

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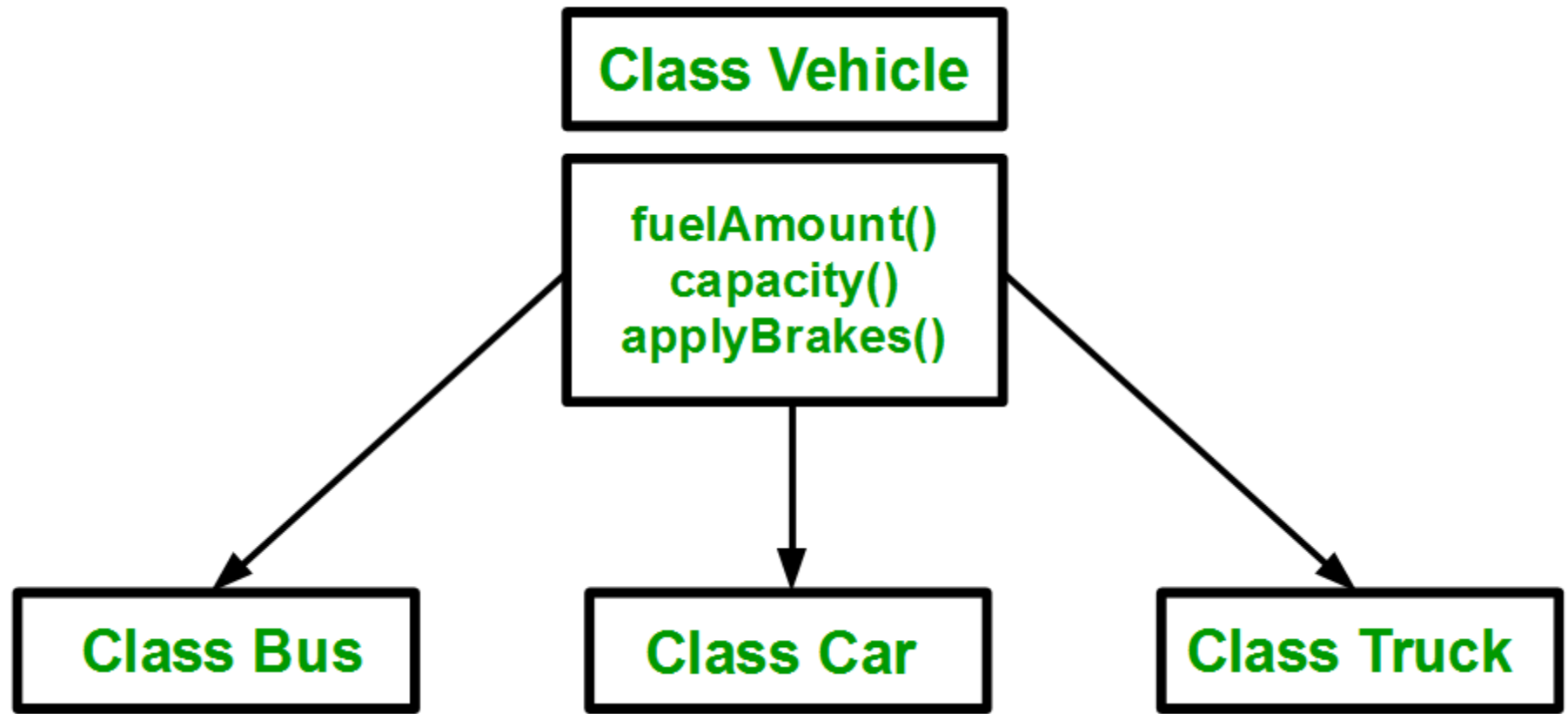


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INHERITANCE



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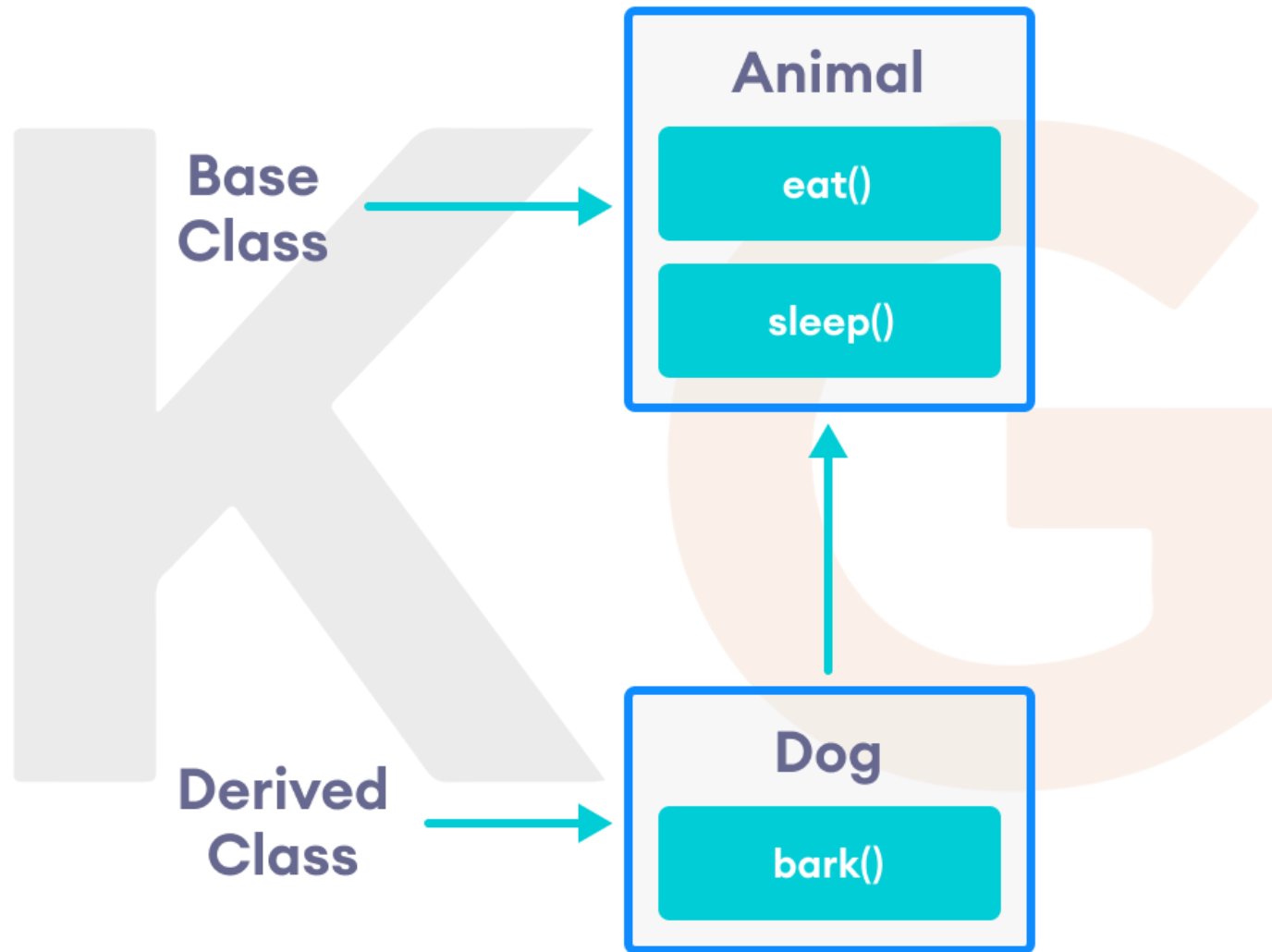
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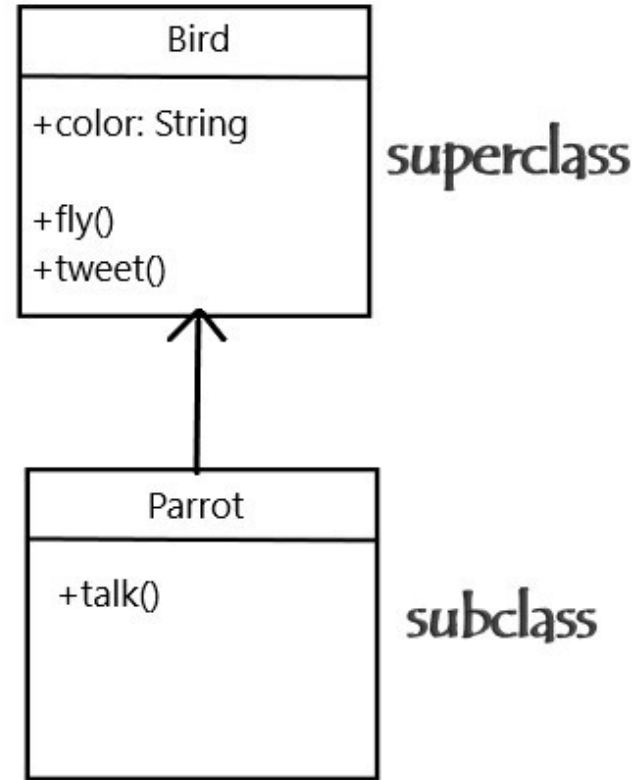


INHERITANCE



INHERITANCE

Inheritance




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

// Base class
class Parent
{
public:
    int p;
};

// Sub class inheriting from Base Class(Parent)
class Child : public Parent //class Child extends Parent
{
public:
    int c;
};

int main()
{ }
```

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```
int main()
{
    Child obj1;

    // An object of class child has all data members
    // and member functions of class parent
    obj1.c = 7;
    obj1.p = 91;
    cout << "Child id is: " << obj1.c << '\n';
    cout << "Parent id is: " << obj1.p << '\n';

    return 0;
}
```

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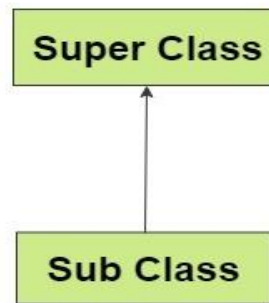


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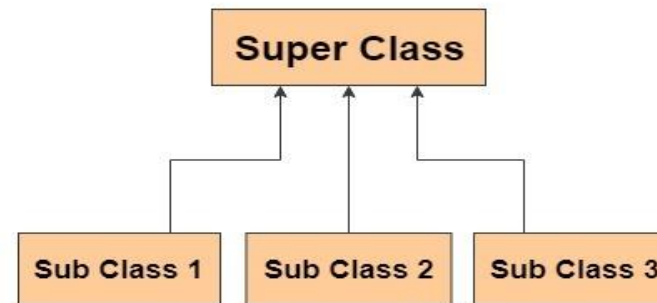


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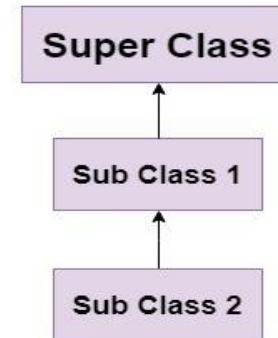
Single Inheritance



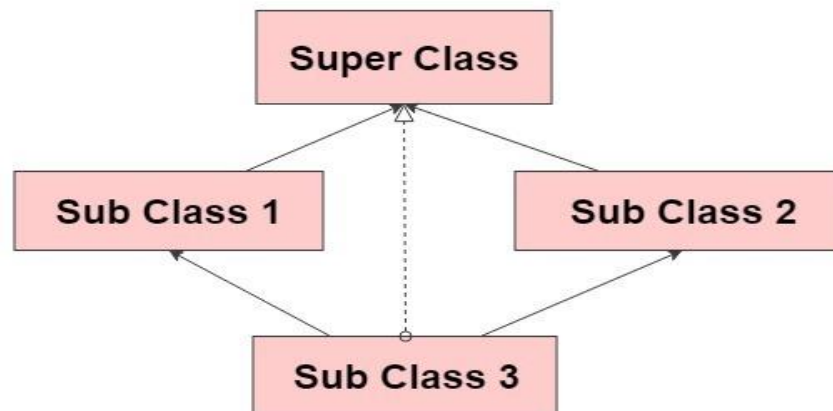
Hierarchical Inheritance



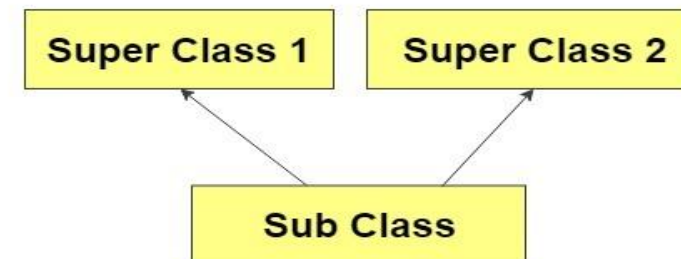
MultiLevel Inheritance



Hybrid Inheritance



Multiple Inheritance



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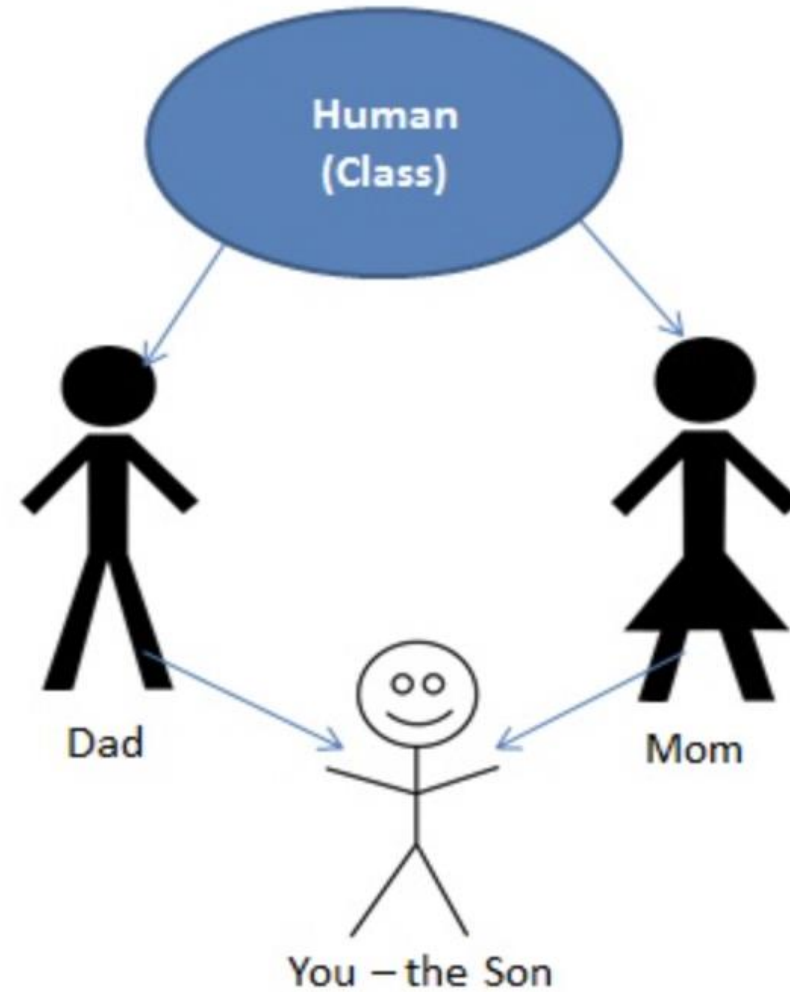


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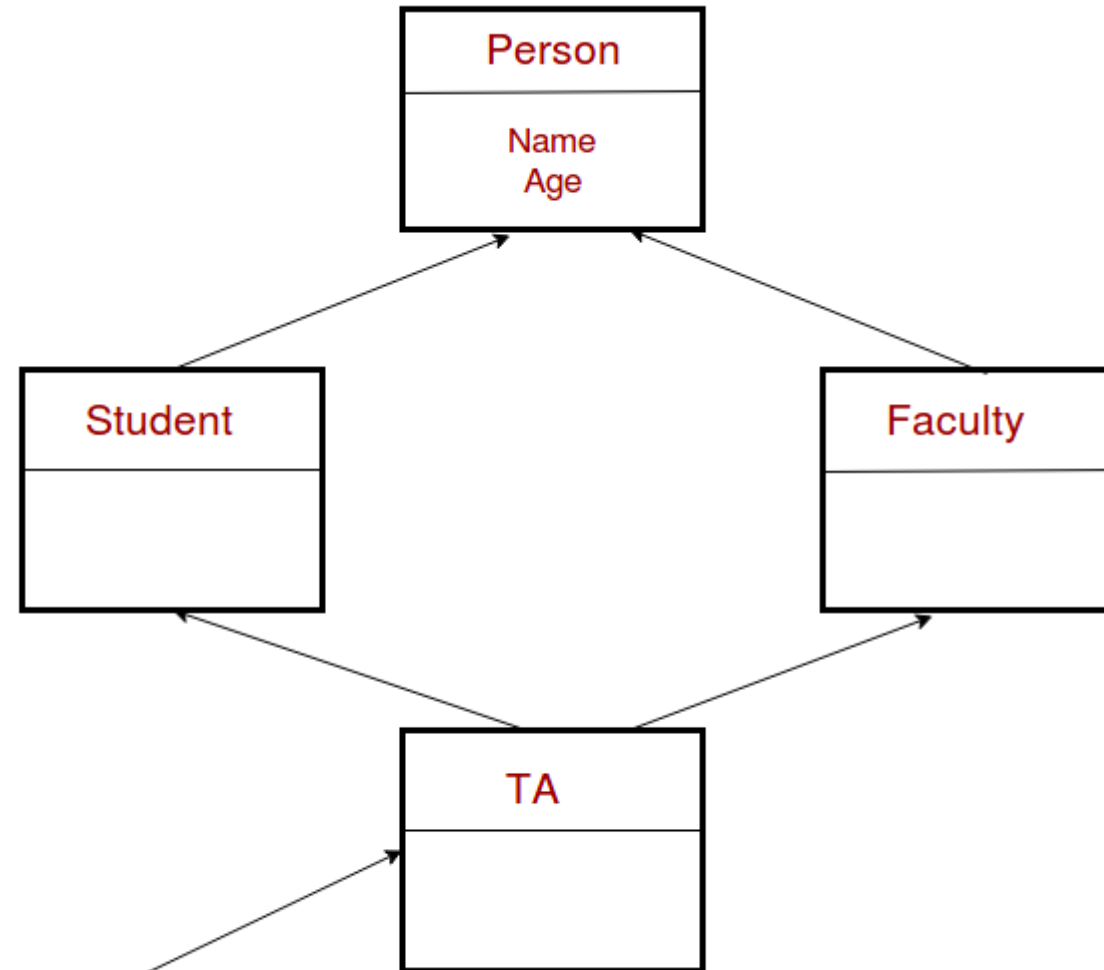


INHERITANCE

Inheritance



DIAMOND PROBLEM



Name and Age needed only once

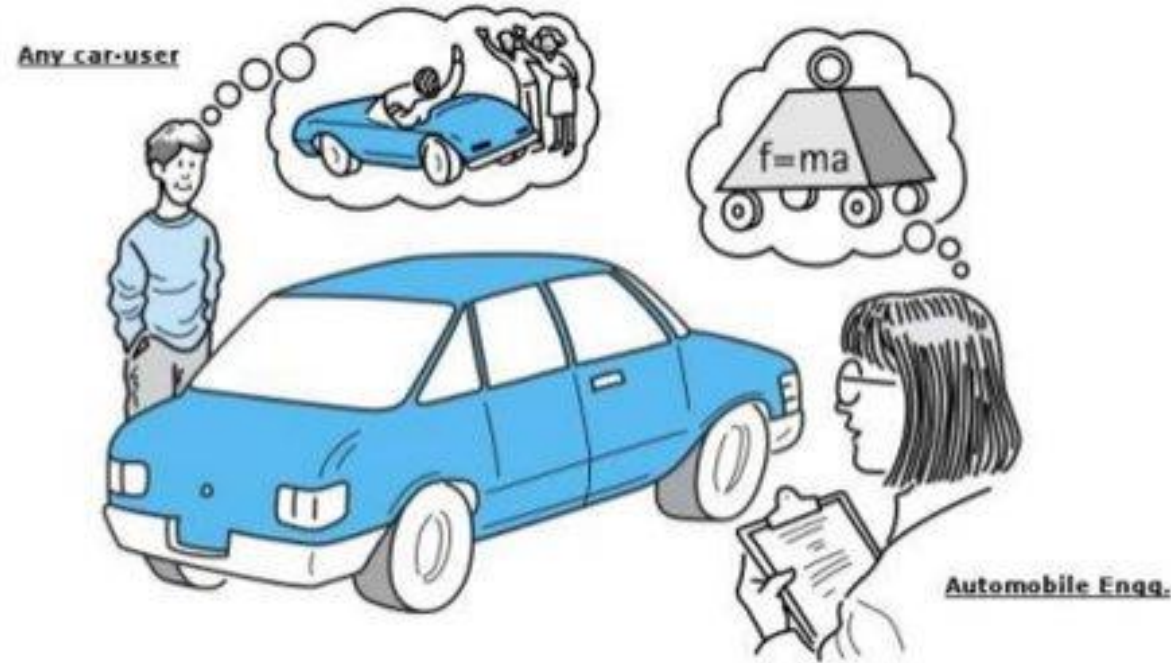
ABSTRACTION

Abstraction means displaying only essential information and hiding the details. Data abstraction refers to providing only essential information about the data to the outside world, hiding the background details or implementation.

Consider a real life example of a man driving a car. The man only knows that pressing the accelerators will increase the speed of car or applying brakes will stop the car but he does not know about how on pressing accelerator the speed is actually increasing, he does not know about the inner mechanism of the car or the implementation of accelerator, brakes etc in the car. This is what abstraction is.

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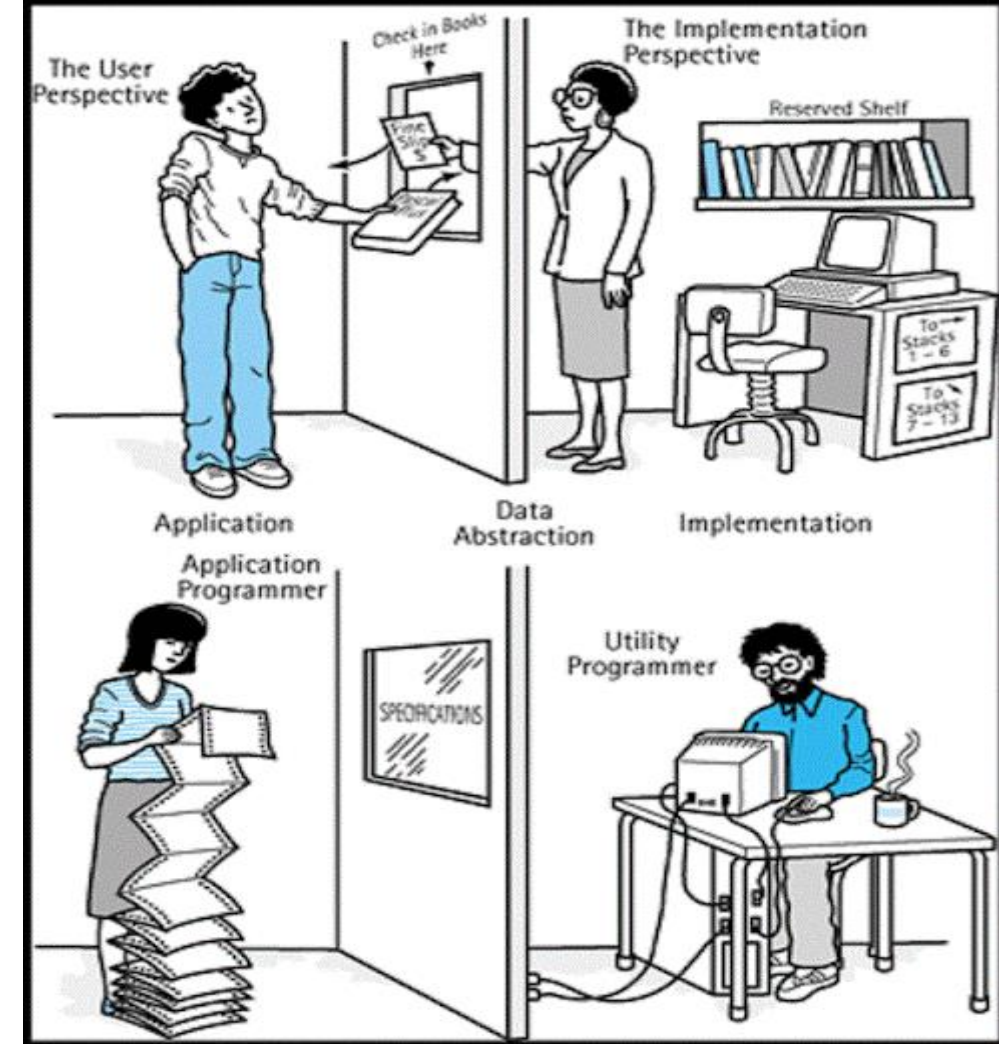


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ABSTRACTION



ABSTRACTION



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

class KG{
    private: int p;
    private: int q;

    public: void setP(int input)
    {
        p= input;
        q= p/2;
    }
};

int main()
{
    KG obj;
    obj.setP(6);
    return 0;
}
```

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POLYMORPHISM

The word polymorphism means having many forms. In simple words, we can define polymorphism as the ability of a message to be displayed in more than one form.

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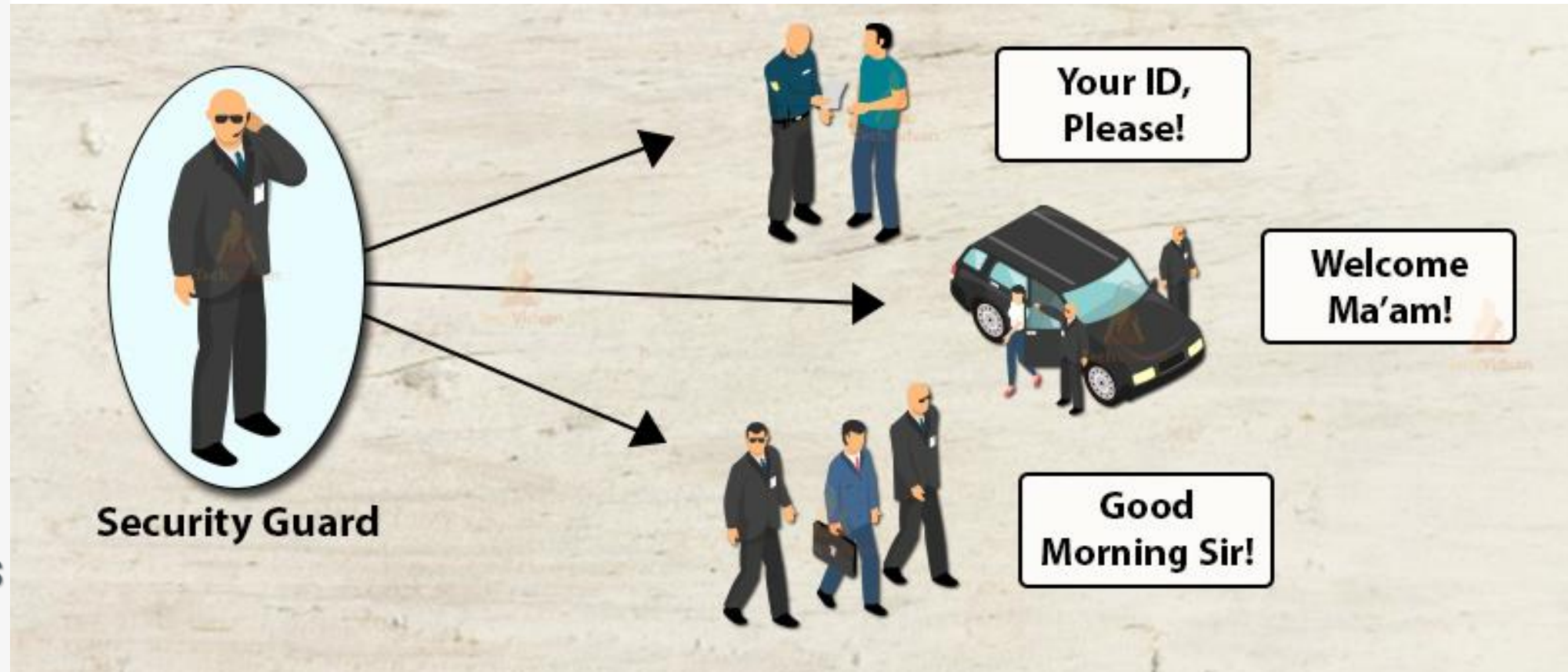


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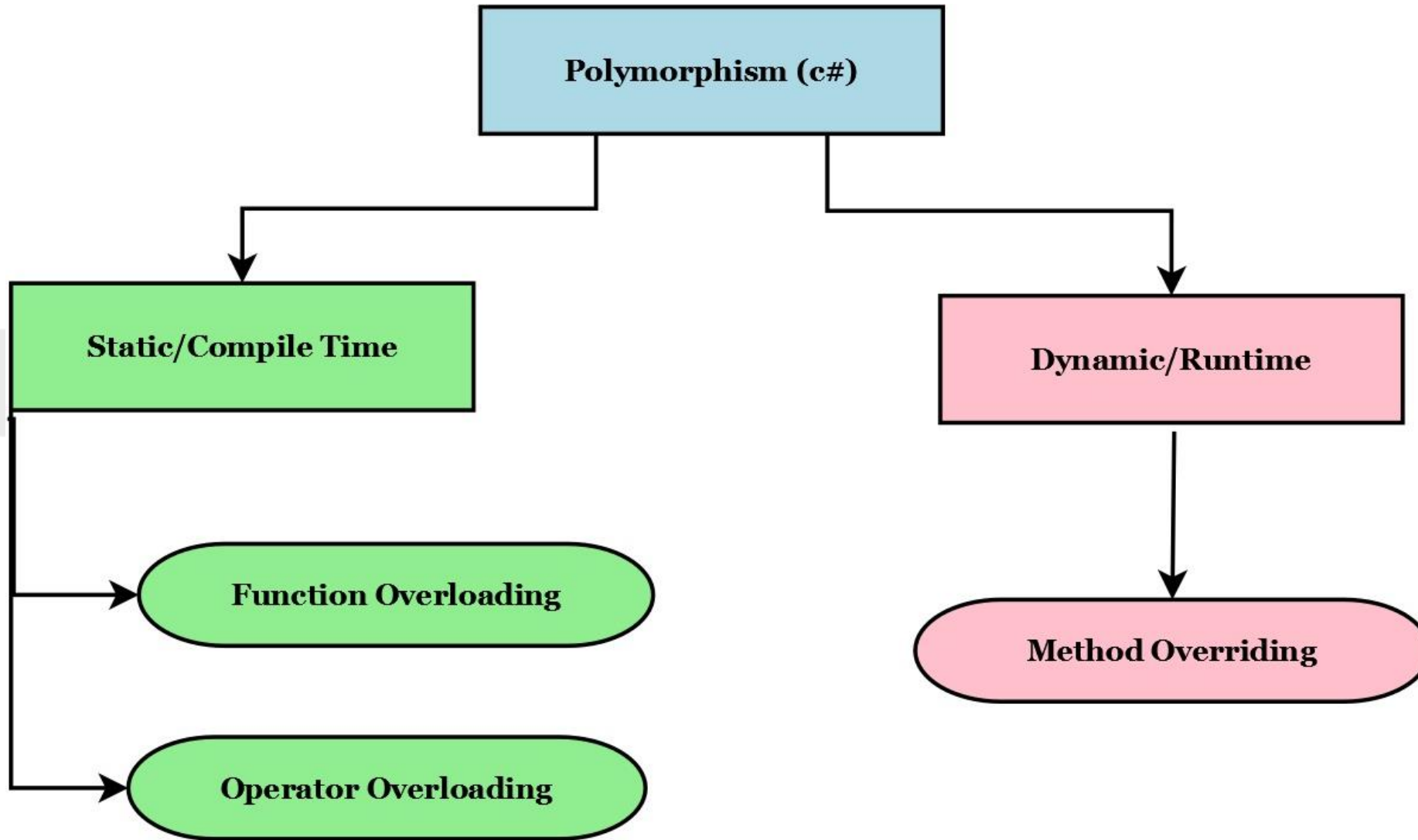
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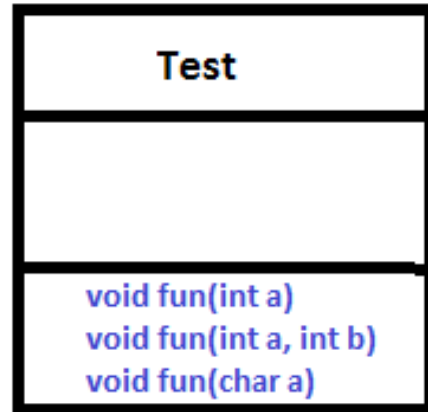
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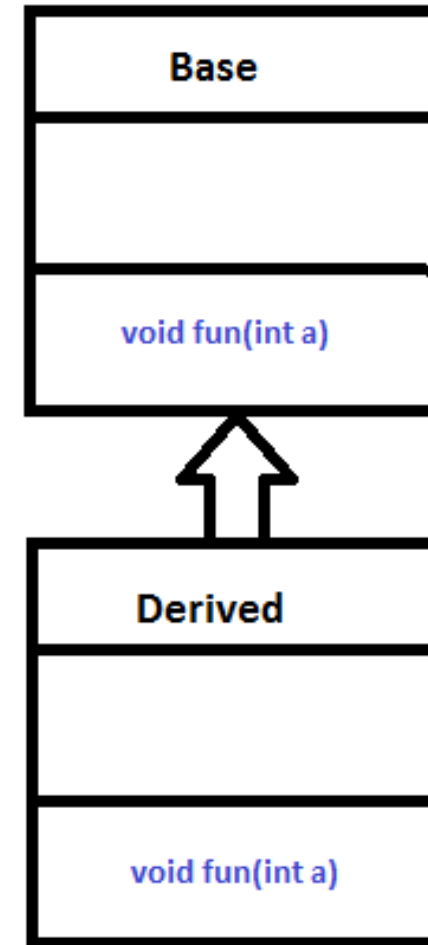
POLYMORPHISM



POLYMORPHISM



Overloading



Overriding

METHOD OVERLOADING

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

class KG
{
    public:

    void func(int x)
    {cout << "value of x is " << x << endl;}

    void func(double x)
    {cout << "value of x is " << x << endl;}

    void func(int x, int y)
    {cout << "value of x and y is " << x << ", " << y << endl;}
};

int main()
{
    KG obj1;
    obj1.func(7);
    obj1.func(9.132);
    obj1.func(85,64);
    return 0;
}
```

Code Link: https://onlinegdb.com/Uqd1Wde_wa

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METHOD OVERRIDING

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

class base
{
public:
    virtual void print ()
    { cout<< "print base class" <<endl; }

    void show ()
    { cout<< "show base class" <<endl; }
};
```

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METHOD OVERRIDING

```
class derived:public base
{
public:
    void print ()
    { cout<< "print derived class" <<endl; }
};

int main()
{
    base *bptr;
    derived d;
    bptr = &d;
    bptr->print();
    bptr->show();
    return 0;
}
```

Code Link: <https://onlinegdb.com/EN3AorR8x>

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