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FACULTY OF ENGINEERING & TECHNOLOGY

CSPS103: Object Oriented Programming

Lecture-23

Preeti Singh

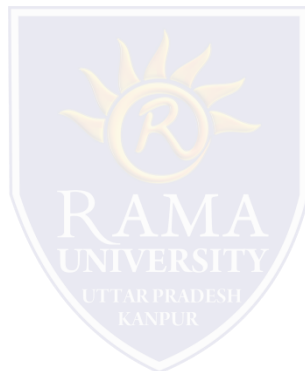
Department of Computer Science & Engineering
Rama University, Kanpur

preeti.ru@ramauniversity.ac.in

OBJECTIVES

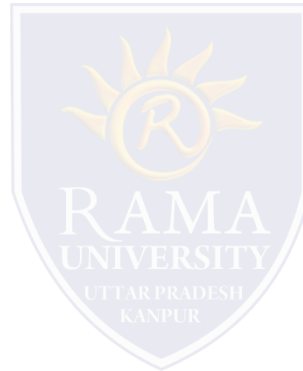
In this lecture, you will learn to:

- ❖ Polymorphism
- ❖ Types of polymorphism
- ❖ Compile time polymorphism
- ❖ Run time polymorphism
- ❖ Runtime Polymorphism Example



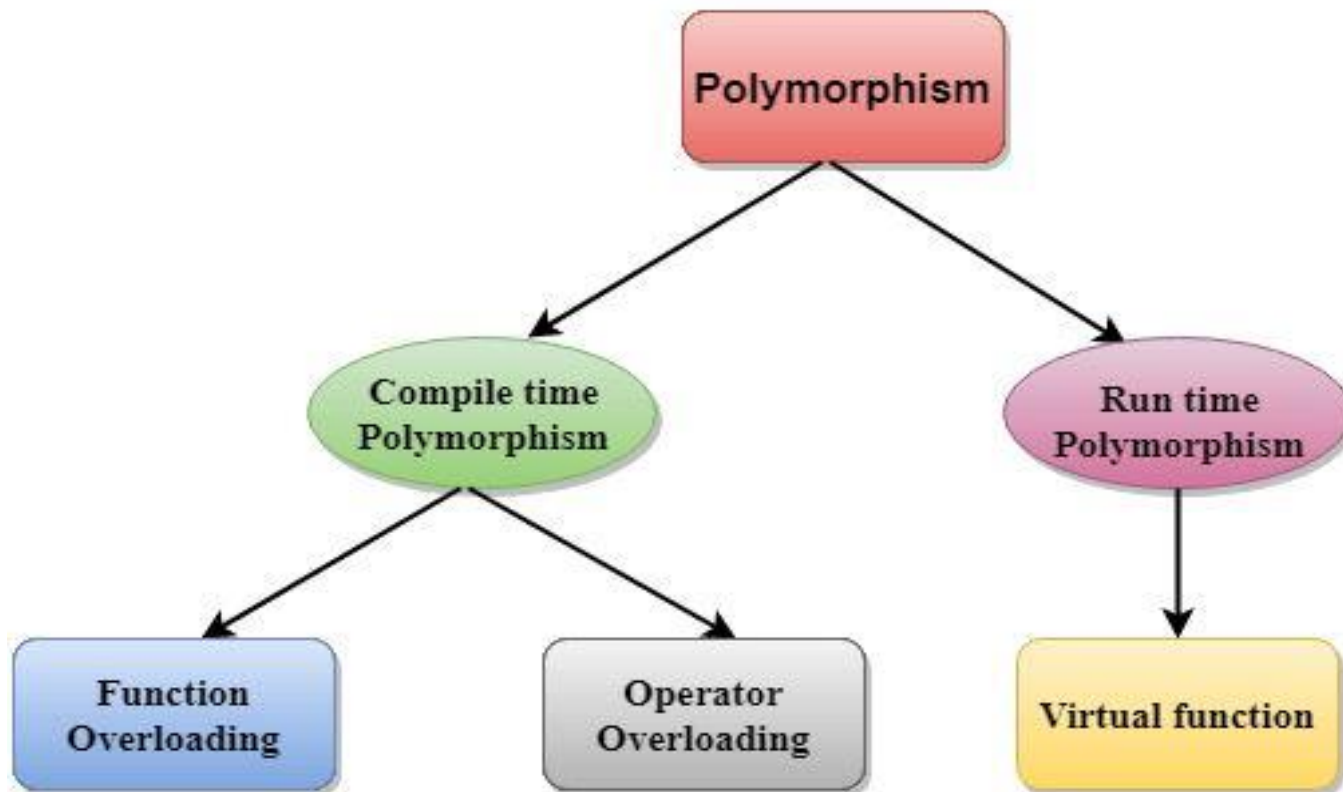
POLYMORPHISM

- ❑ The term "Polymorphism" is the combination of "poly" + "morphs" which means many forms.
- ❑ It is a greek word.
- ❑ In object-oriented programming, we use 3 main concepts: inheritance, encapsulation, and polymorphism.



TYPES OF POLYMORPHISM

There are two types of polymorphism in C++:



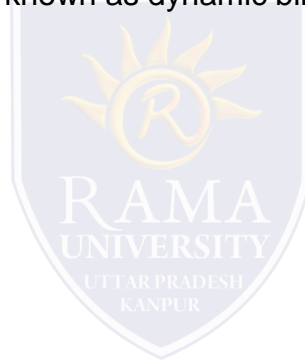
COMPILE TIME POLYMORPHISM

- ❑ The overloaded functions are invoked by matching the type and number of arguments.
- ❑ This information is available at the compile time and, therefore, compiler selects the appropriate function at the compile time.
- ❑ It is achieved by function overloading and operator overloading which is also known as static binding or early binding.



RUN TIME POLYMORPHISM

- ❑ Run time polymorphism is achieved when the object's method is invoked at the run time instead of compile time.
- ❑ It is achieved by method overriding which is also known as dynamic binding or late binding.



DIFFERENCE

Differences b/w compile time and run time polymorphism.

Compile time polymorphism	Run time polymorphism
The function to be invoked is known at the compile time.	The function to be invoked is known at the run time.
It is also known as overloading, early binding and static binding.	It is also known as overriding, Dynamic binding and late binding.
Overloading is a compile time polymorphism where more than one method is having the same name but with the different number of parameters or the type of the parameters.	Overriding is a run time polymorphism where more than one method is having the same name, number of parameters and the type of the parameters.
It is achieved by function overloading and operator overloading.	It is achieved by virtual functions and pointers.
It provides fast execution as it is known at the compile time.	It provides slow execution as it is known at the run time.
It is less flexible as mainly all the things execute at the compile time.	It is more flexible as all the things execute at the run time.

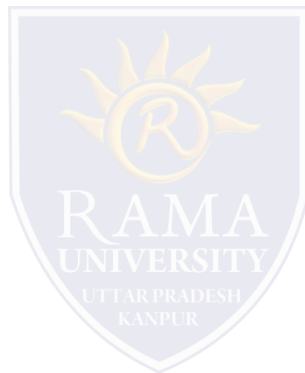
RUNTIME POLYMORPHISM EXAMPLE

```
#include <iostream>

class Animal {
    public:
    void eat(){
        cout<<"Eating...";
    }
};

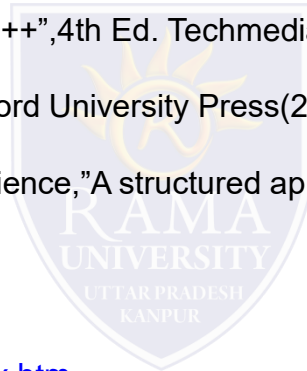
class Dog: public Animal
{
    public:
    void eat()
        { cout<<"Eating bread...";
        }
};

int main(void) {
    Dog d = Dog();
    d.eat();
    return 0;
}
```



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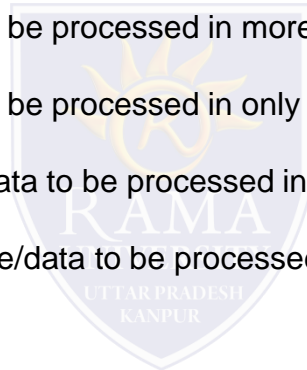


MULTIPLE CHOICE QUESTION

Multiple Choice Question:

Q1. Which among the following best describes polymorphism?

- a) It is the ability for a message/data to be processed in more than one form
- b) It is the ability for a message/data to be processed in only 1 form
- c) It is the ability for many messages/data to be processed in one way
- d) It is the ability for undefined message/data to be processed in at least one way



MULTIPLE CHOICE QUESTION

Multiple Choice Question:

Q2. What do you call the languages that support classes but not polymorphism?

- a) Class based language
- b) Procedure Oriented language
- c) Object-based language
- d) If classes are supported, polymorphism will always be supported



MULTIPLE CHOICE QUESTION

Multiple Choice Question:

Q3. Which among the following is the language which supports classes but not polymorphism?

- a) SmallTalk
- b) Java
- c) C++
- d) Ada



MULTIPLE CHOICE QUESTION

Multiple Choice Question:

Q4. If same message is passed to objects of several different classes and all of those can respond in a different way, what is this feature called?

- a) Inheritance
- b) Overloading
- c) Polymorphism
- d) Overriding

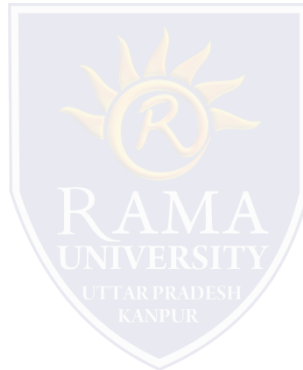


MULTIPLE CHOICE QUESTION

Multiple Choice Question:

Q5. Which type of function among the following shows polymorphism?

- a) Inline function
- b) Virtual function
- c) Undefined functions
- d) Class member functions



Summary

In this lecture, you learned that:

- Polymorphism (from the Greek, meaning “many forms”) is a feature that allows one interface to be used for a general class of actions.

