

Computer Programming

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Session: Putting it all together for polymorphism and virtual functions

Recap



- Polymorphism in C++ programming
- Virtual destructor
- Abstract class

Overview of This Lecture



- An example program on polymorphism

Acknowledgement



- Much of this lecture is motivated by the treatment in
An Introduction to Programming Through C++
by **Abhiram G. Ranade**
McGraw Hill Education 2014

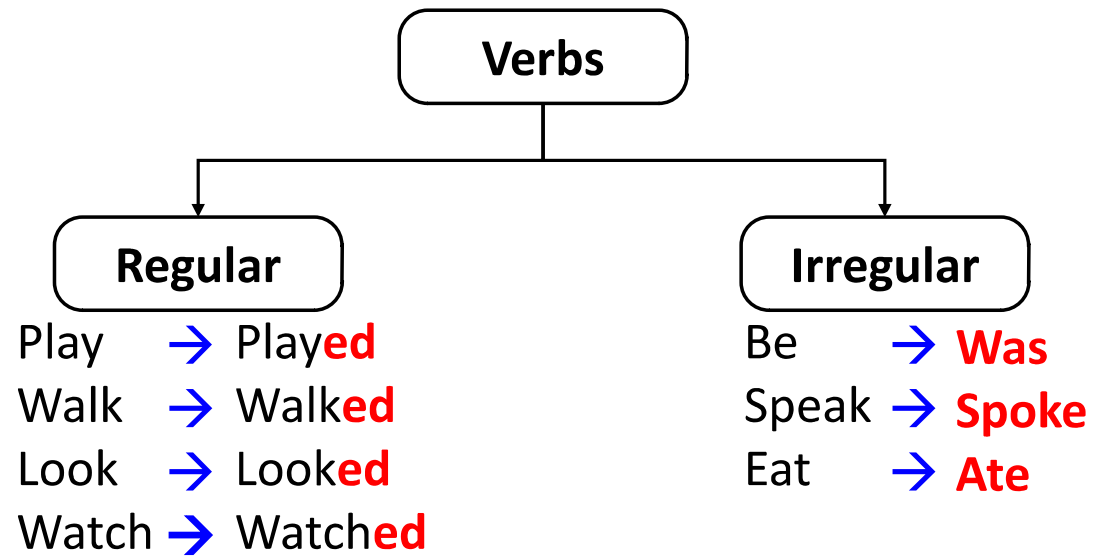
Problem Statement



We want to write a program to:

- Take input (a verb) from the user
 - Print its past tense

Verbs



Possible Solution

Suffix '^{ed}'
whenever required

Store every verb
and its past tense

Solution

- Represents all verbs
- Base class of class 'regular' and 'irregular'
- Definition of verb contains information common to all verbs
- Data member root contains the verb itself (supplied by the user as input)

```
class verb{  
    protected:  
        string root;  
    public:  
        string getRoot() {  
            return root;  
        }  
        virtual string past_tense() = 0;  
};
```

Solution

- Stores regular verbs in 'root' (inherited from class 'verb')
- Member function 'past_tense()' returns the past tense of the verb by suffixing 'ed' to the verb (stored in root).

```
class regular : public verb{  
public:  
    regular(string rt) {  
        root = rt;  
    }  
    string past_tense() {  
        return root + "ed";  
    }  
};
```


Solution

- Stores irregular verbs in 'root' (inherited from class 'verb')
- Stores the past tense of such verbs in private member 'pt',
 - passed as a constructor argument.
- Member function 'past_tense()' returns the past tense of the verb, which is stored in 'pt'.

```
class irregular : public verb{
    string pt;
public:
    irregular(string rt, string p) {
        root = rt;
        pt = p;
    }
    string past_tense() {
        return pt;
    }
};
```

Solution



```
int main() {  
  
    verb *v1;  
    regular r[2] = { regular("play"), regular("watch") };  
    irregular ir[3] = { irregular("is","was"), irregular("go","went"), irregular("speak","spoke") };  
  
    string query;  
    do {  
        ...  
        ...  
    } while (true) ;  
  
    return 0;  
}
```

Solution



```
do{
    cout << "Enter the verb to find: " ;
    cin >> query;
    bool found = false;
    //Loop for the list of regular verbs
    for (int i =0; i < 2; i++){
        v1 = &r[i];
        //(to compare input of user with our list)
        if (v1->getRoot() == query){
            cout << "Past tense of ";
            cout << v1->getRoot() << " is ";
            cout << v1->past_tense() << endl;
            found = true; //Verb found in this list
            break;
        } // End of if
    } // End of for
    if (found == true) //Verb found in the list
        continue; //Ask user for another verb
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//Loop for the list of irregular verbs
for (int i =0; i < 3; i++) {
    v1 = &ir[i];
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        found = true; //Verb found in this list
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    } //End of if
} //End of for
if (found == false) //Verb not found in both lists
    cout << "Verb not found" << endl;
} while(true); //End of do..while
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Sample Output

Enter the verb to find: play
Past tense of **play** is **played**
Enter the verb to find: go
Past tense of **go** is **went**
Enter the verb to find: speak
Past tense of **speak** is **spoke**
Enter the verb to find: **have**
Verb not found
Enter the verb to find: watch
Past tense of **watch** is **watched**
Enter the verb to find: ^C

Summary



- Written a complete program that prints the past tense of regular and irregular verbs
 - Shown polymorphism using virtual functions
 - Used pure virtual functions, abstract class