# Virtual Functions Example + Creation Rules in C++ | C++ Tutorials for Beginners #57

In this tutorial, we will discuss virtual functions example and its creation rules in C++

**Virtual Functions Example in C++**

As we have seen in the previous tutorial that how virtual functions are used to implement run-time polymorphism. In this tutorial, we will see an example of virtual functions.

```
class CWH{
    protected:
        string title;
        float rating;
    public:
        CWH(string s, float r){
            title =  s;
            rating = r;
        }
        virtual void display(){}
};
```

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***Code Snippet 1: Code with Harry Class***

As shown in a code snippet 1,

1. We created a class "CHW" which contains protected data members "title" which has a "string" data type and "rating" which has a "float" data type.

2. The class “CWH” has a parameterized constructor which takes two parameters “s” and “r” and assign their values to the data members “title” and “rating”
3. The class “CHW” has a virtual function void “display” which does nothing

```
class CWHVideo: public CWH
{
    float videoLength;
    public:
        CWHVideo(string s, float r, float vl): CWH(s, r){
            videoLength = vl;
        }
        void display(){
            cout<<"This is an amazing video with title "<<title<<endl;
            cout<<"Ratings: "<<rating<<" out of 5 stars"<<endl;
            cout<<"Length of this video is: "<<videoLength<<" minutes"<<endl;
        }
};
```

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***Code Snippet 2: Code with Harry Video Class***

As shown in a code snippet 2,

1. We created a class “CHWVideo” which is inheriting the “CWH” class and contains private data members “videoLength” which has a “float” data type.
2. The class “CWHVideo” has a parameterized constructor which takes three parameters “s”, “r” and “vl”. The constructor of the base class is called in the derived class and the values of the variables “s” and “r” are passed to it. The value of the parameter “vl” will be assigned  to the data members “videoLength”

3. The class “CHWVideo” has a function void “display” which will print the values of the data members “title”, “rating” and “videoLength”

```
class CWHText: public CWH
{
    int words;
    public:
        CWHText(string s, float r, int wc): CWH(s, r){
            words = wc;
        }
     void display(){
      cout<<"This is an amazing text tutorial with title
"<<title<<endl;
      cout<<"Ratings of this text tutorial: "<<rating<<" out of 5
stars"<<endl;
      cout<<"No of words in this text tutorial is: "<<words<<"
words"<<endl;
         }
};
```

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***Code Snippet 3: Code with Harry Text Class***

As shown in a code snippet 3,

1. We created a class “CHWText” which is inheriting the “CWH” class and contains private data members “words” which has an “int” data type.
2. The class “CWHText” has a parameterized constructor which takes three parameters “s”, “r” and “wc”. The constructor of the base class is called in the derived class and the values of the variables “s” and “r” are passed to it. The value of the parameter “wc” will be assigned  to the data members “words”
3. The class “CHWText” has a function void “display” which will print the values of the data members “title”, “rating” and “words”

```cpp
int main(){
    string title;
    float rating, vlen;
    int words;

    // for Code With Harry Video
    title = "Django tutorial";
    vlen = 4.56;
    rating = 4.89;
    CWHVideo djVideo(title, rating, vlen);

    // for Code With Harry Text
    title = "Django tutorial Text";
    words = 433;
    rating = 4.19;
    CWHText djText(title, rating, words);

    CWH* tuts[2];
    tuts[0] = &djVideo;
    tuts[1] = &djText;

    tuts[0]->display();
    tuts[1]->display();

    return 0;
}
```

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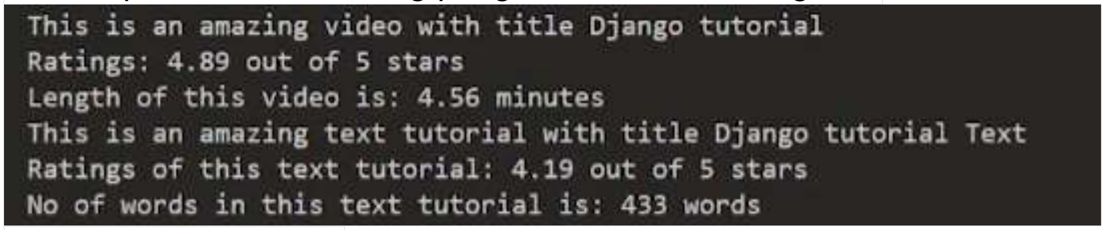
***Code Snippet 4: Main Program***

As shown in a code snippet 4,

1. We created a string variable “title”, float variables “rating”, “vlen” and integer variable “words”
2. For the code with harry video class, we have assigned “Django tutorial” to the string “title”, “4.56” to the float “vlen” and “4.89” to the float “rating”.
3. An object “djVideo” is created of the data type “CWHVideo” and the variables “title”, “rating” and “vlen” are passed to it.
4. For the code with harry text class, we have assigned “Django tutorial text” to the string “title”, “433” to the integer “words” and “4.19” to the float “rating”.
5. An object “djText” is created of the data type “CWHText” and the variables “title”, “rating” and “words” are passed to it.
6. Two pointers array “tuts” is created of the “CWH” type
7. The address of the “djVideo” is assigned to “tuts[0]” and the address of the “djText” is assigned to “tuts[1]”
8. The function “display” is called using pointers “tuts[0]” and “tuts[1]”

The main thing to note here is that if we don’t use the “virtual” keyword with the “display” function of the base class then the “display” function of the base class will run.
But we have used the “virtual” keyword with the “display” function of the base class to make is a **virtual function** so when the display function is called by using the base class pointer the display function of the derived class will run because the base class pointer is pointing to the derived class object.
The output of the following program is shown in figure 1



```
This is an amazing video with title Django tutorial
Ratings: 4.89 out of 5 stars
Length of this video is: 4.56 minutes
This is an amazing text tutorial with title Django tutorial Text
Ratings of this text tutorial: 4.19 out of 5 stars
No of words in this text tutorial is: 433 words
```

***Figure 1: Program Output***

## Rules for virtual functions

1. They cannot be static

2. They are accessed by object pointers
3. Virtual functions can be a friend of another class
4. A virtual function in the base class might not be used.
5. If a virtual function is defined in a base class, there is no necessity of redefining it in the derived class