
Subject: About Nuller and Null

Posted by [Tom1](#) on Sat, 10 Oct 2020 08:58:09 GMT

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Hi,

I failed to find much documentation about Nuller and Null. Then I just looked around the source and tried to put together a generic macro to support Nuller/Null in a class.

Could someone with deeper understanding confirm if my following NULLSUPPORT -macro covers all the relevant aspects of supporting Null for a class?

```
#define NULLSUPPORT(x)\
    CLASSNAME(const Nuller&){ SetNull(); }\
    void SetNull(){ x=NULL; }\
    bool IsNullInstance() const { return IsNull(x); }
```

```
class A{\
public:\
    typedef A CLASSNAME;
```

```
    NULLSUPPORT(a);
```

```
    int a;\
    int b;
```

```
    A(){\
        a=0;\
        b=0;\
    }\
};
```

Best regards,

Tom

Subject: Re: About Nuller and Null

Posted by [mirek](#) on Sat, 10 Oct 2020 17:32:05 GMT

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Seems fine to me.

Subject: Re: About Nuller and Null

Posted by [Tom1](#) on Sat, 10 Oct 2020 18:25:40 GMT

Hi Mirek,

Thanks for looking into this. I really have trouble and feel insecure about returning Null references. The access to Array and Vector containers comes as references. So, when I create a function returning those references, I need to be able to return Null if the container does not have a suitable object to return for a request.

However, returning a Null reference is not trivial. And possibly also forbidden in C++. Then, I looked at using pointers instead and found that C++ references have the following limitation:

"There shall be no references to references, no arrays of references, and no pointers to references. " (ISO C++)

Finally (after quite a few hours) I came up with the following solution: Using: " return (A&)Null; " to return a Null reference. How dangerous is this? (I also added the check: " this==&(classname&)Null " to IsNullInstance() in order to cover this case.

In contrast to the previous code the following compiles with CLANG too and seems to work as expected:

```
#include <Core/Core.h>

using namespace Upp;

#define NULLSUPPORT(classname, variable)\
classname(const Nuller&) { variable=NULL; }\
void SetNull() { variable=NULL; }\
bool IsNullInstance() const { return this==&(classname&)Null || IsNull(variable); }

class A{
public:
    int a;
    int b;

    NULLSUPPORT(A,a)

    void Clear(){ a=b=0; }

    A(){
        a=1;
        b=2;
    }

    void Serialize(Stream &s){
        s % a % b;
    }
}
```

```
String ToString() const { return IsNullInstance() ? String("Null") : String("A[") << a << ", " << b <<
"]"; }
};
```

// Testing:

```
Array<A> av;
```

```
A& GetA1(int x){
    if((x<0)||x>=av.GetCount()) return (A&)Null;
    return av[x];
}
```

```
CONSOLE_APP_MAIN{
    av.Add().a=1;
    av.Add().a=2;
    av.Add().a=3;
    av.Add().a=4;

    for(int i=-1;i<6;i++){ A &a=GetA1(i); Cout() << a << "\n"; }
    return;
}
```

But is this safe? If not, is there a decent way to do it?

Best regards,

Tom

Subject: Re: About Nuller and Null
Posted by [Tom1](#) on Sat, 10 Oct 2020 22:02:45 GMT
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Hi,

How about this? I did not benchmark the performance, but at least this is not relying on testing for a Null reference. As you can see, the 'Optional' is named in the foot steps of std::optional which is available in C++17 for the same purpose. (However, std::optional does not seem to support passing reference variables.)

```
#include <Core/Core.h>
```

```
using namespace Upp;
```

```
template <typename T>
struct Optional : public Tuple2<bool, T>{
```

```

typedef Tuple2<bool, T> Base;
Optional(T data) : Base(true, data) { }
Optional() : Base(false, (T)Null) { }
inline bool IsOK(){ return (bool)Base::a; }
inline T Get(){ return (T)Base::b; }
};

class A{
public:
    int a;
    int b;

    A(){
        a=1;
        b=2;
    }

    String ToString() const { return String("A[") << a << ", " << b << "]" ; }
};

// Testing:

Array<A> av;

Optional<A&> GetA2(int x){
    if((x<0)||x>=av.GetCount()) return Optional<A&>();
    return Optional<A&>(av[x]);
}

CONSOLE_APP_MAIN{
    av.Add().a=1;
    av.Add().a=2;
    av.Add().a=3;
    av.Add().a=4;

    for(int i=-1;i<6;i++){
        Optional<A&> result=GetA2(i);
        Cout() << (result.IsOK() ? AsString(result.Get()) : "Null") << "\n";
    }
}

```

Best regards,

Tom

Subject: Re: About Nuller and Null
Posted by [mirek](#) on Sat, 10 Oct 2020 23:39:01 GMT
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Tom1 wrote on Sat, 10 October 2020 20:25Hi Mirek,

Thanks for looking into this. I really have trouble and feel insecure about returning Null references. The access to Array and Vector containers comes as references. So, when I create a function returning those references, I need to be able to return Null if the container does not have a suitable object to return for a request.

However, returning a Null reference is not trivial. And possibly also forbidden in C++. Then, I looked at using pointers instead and found that C++ references have the following limitation:

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In contrast to the previous code the following compiles with CLANG too and seems to work as expected:

```
#include <Core/Core.h>
```

```
using namespace Upp;
```

```
#define NULLSUPPORT(classname, variable)\
classname(const Nuller&) { variable=NULL; }\
void SetNull() { variable=NULL; }\
bool IsNullInstance() const { return this==&(classname&)Null || IsNull(variable); }
```

```
class A{\
public:\
int a;\
int b;
```

```
NULLSUPPORT(A,a)
```

```
void Clear(){ a=b=0; }
```

```
A(){\
a=1;\
b=2;\
}
```

```
void Serialize(Stream &s){\
s % a % b;
```

```

}

String ToString() const { return IsNullInstance() ? String("Null") : String("A[" << a << ", " << b <<
"]"); }
};

```

// Testing:

```

Array<A> av;

A& GetA1(int x){
    if((x<0)||x>=av.GetCount()) return (A&)Null;
    return av[x];
}

CONSOLE_APP_MAIN{
    av.Add().a=1;
    av.Add().a=2;
    av.Add().a=3;
    av.Add().a=4;

    for(int i=-1;i<6;i++){ A &a=GetA1(i); Cout() << a << "\n"; }
    return;
}

```

But is this safe? If not, is there a decent way to do it?

Best regards,

Tom

I am totally confused what are you trying to achieve here...

Both Null and Nuller are never supposed to be used outside of "assigning Null syntax sugar" context.

I think you might be overthinking something here.

Mirek

Mirek

Subject: Re: About Nuller and Null
 Posted by [Tom1](#) on Sun, 11 Oct 2020 08:34:47 GMT

Hi,

I sure have been overthinking, and then some! :)

I just wanted to basically return a null pointer (instead of a pointer to the result) when a function cannot solve a valid result. Then by checking for a null pointer, I could determine if the function succeeded or not.

When working on container classes based on e.g. Vector or Array classes, I would obtain the result as a reference to the item. Or the solution might fail, in which case I would return a null reference. But null references are not allowed or their behavior is undefined. So using null references is likely just asking for trouble.

Then I (naively) figured out Upp::Null and Nuller are just right for the purpose. However, it seems this is not the case. I cannot easily/safely return a Null object in place of a reference. The problems I have encountered while trying to work around the issue include:

- 'warning: returning a reference to a local or temporary object' when returning a T(Null) for an object
- returning null references are generally undefined and should not exist in C++
- There shall be no pointers to references in C++, which prevents changing my function to return pointers and null pointers alternatively

After quite some hours of tinkering, I came up with the Tuple2<bool,T> based solution to get a feeling of returning a pointer/null.

```
template <typename T>
struct Optional : public Tuple2<bool, T>{
    typedef Tuple2<bool, T> Base;
    Optional(T data) : Base(true,data) { }
    Optional() : Base(false,(T)Null) { }
    inline operator bool() const { return (bool)Base::a; }
    inline operator T(){ return (T)Base::b; }
    inline bool IsOK() const { return (bool)Base::a; }
    inline T Get(){ return (T)Base::b; }
    inline bool IsNullInstance() const{ return !IsOK(); }
};
```

// Usage:

```
//
// Optional<T> func(){
// if(success) return Optional<T>(value);
// else return Optional<T>();
// }
//
// In the calling function:
//
```

```
// Optional<T> result = func();  
// if(!result) Cout() << "Failed, returned null\n";  
// else Cout() << "Success, returned " << result << "\n";
```

Please note that this can return real references, if T is a reference.

If you see any flaws in this approach, or have a cleaner way to do it, please let me know.

Best regards,

Tom

Subject: Re: About Nuller and Null
Posted by [mirek](#) on Sun, 11 Oct 2020 09:22:29 GMT
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Tom1 wrote on Sun, 11 October 2020 10:34

Please note that this can return real references, if T is a reference.

Well, Null is about "value null", or "empty value". Definitely was not meant to be used with NULL references or pointers...

If you insist on returning a reference to something and you want to use Null value as error, you can always do something like

```
const Foo& GetData(...)  
{  
    static Foo null_data = Null;  
    ...  
    if(error) return null_data;  
    ...  
}
```

I mean, instead of inventing something to contain NULL reference, just return a reference to Null value...

Subject: Re: About Nuller and Null
Posted by [Tom1](#) on Sun, 11 Oct 2020 10:34:22 GMT
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Hi Mirek,

Thanks for fixing my thoughts. Now that you pointed it out, using a static initialized to Null as the return value is definitely the clear and easy way out. I wonder why I did not think of that...

Thanks and best regards,

Tom
