

# Non-default constructors

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Source markdown available at [github.com/BenLangmead/c-cpp-notes](https://github.com/BenLangmead/c-cpp-notes)

## Non-default constructors

Constructors can take parameters, giving the caller more control over how to initialize the object

```
// Uses non-default constructor to initialize s1 to a copy
// of the argument
string s1("hello");

// Same here
string s2 = "world";
```

# Non-default constructors

```
#include <iostream>
using std::cout; using std::endl;

class DefaultSeven {
public:
    DefaultSeven() : i(7) {
        cout << "In default constructor" << endl;
    }

    DefaultSeven(int initial) : i(initial) {
        cout << "In non-default constructor" << endl;
    }

    int get_i() { return i; }
private:
    int i;
};

int main() {
    DefaultSeven s = DefaultSeven(10); // definitely calls non-default ctor
    DefaultSeven s2 = 20; // does this call non-default ctor?
    DefaultSeven *sptr = new DefaultSeven(30); // non-default ctor
    cout << "s.get_i() = " << s.get_i() << endl;
    cout << "s2.get_i() = " << s2.get_i() << endl;
    cout << "sptr->get_i() = " << sptr->get_i() << endl;
    delete sptr;
    return 0;
}
```

## Non-default constructors

```
$ g++ -c new_eg3.cpp -std=c++11 -pedantic -Wall -Wextra
$ g++ -o new_eg3 new_eg3.o
$ ./new_eg3
In non-default constructor
In non-default constructor
In non-default constructor
s.get_i() = 10
s2.get_i() = 20
sptr->get_i() = 30
```

Even `DefaultSeven s2 = 20;` declaration calls non-default constructor

## Non-default constructors

If the only constructors provided are non-default, *no implicit default constructor is added* by the compiler

Attempt to use default constructor will yield compiler error

# Non-default constructors

```
#include <iostream>
using std::cout; using std::endl;

class NoDefault {
public:
    NoDefault(int initial) : i(initial) { }

    int get_i() { return i; }
private:
    int i;
};

int main() {
    NoDefault s;
    cout << "s.get_i() = " << s.get_i() << endl;
    return 0;
}
```

# Non-default constructors

```
$ g++ -c no_default.cpp -std=c++11 -pedantic -Wall -Wextra
```

```
no_default.cpp: In function 'int main()':
```

```
no_default.cpp:14:15: error: no matching function for call to  
'NoDefault::NoDefault()'
```

```
    NoDefault s;
```

```
        ^
```

```
no_default.cpp:6:5: note: candidate: NoDefault::NoDefault(int)
```

```
    NoDefault(int initial) : i(initial) { }
```

```
    ~~~~~
```

```
no_default.cpp:6:5: note:   candidate expects 1 argument, 0 provided
```

```
no_default.cpp:4:7: note: candidate: constexpr NoDefault::NoDefault(const  
NoDefault&)
```

```
    class NoDefault {
```

```
        ~~~~~
```

```
no_default.cpp:4:7: note:   candidate expects 1 argument, 0 provided
```

```
no_default.cpp:4:7: note: candidate: constexpr NoDefault::NoDefault(NoDefault&&)
```

```
no_default.cpp:4:7: note:   candidate expects 1 argument, 0 provided
```

## Non-default constructors

```
int main() {  
    NoDefault *s = new NoDefault[10];  
    cout << "s[9].get_i() = " << s[9].get_i() << endl;  
    delete[] s;  
    return 0;  
}
```

This won't work either; new tries to call default constructor on each allocated NoDefault



# Non-default constructors

```
$ g++ -c no_default2.cpp -std=c++11 -pedantic -Wall -Wextra
no_default2.cpp: In function 'int main()':
no_default2.cpp:14:36: error: no matching function for call to
'NoDefault::NoDefault()'
    NoDefault *s = new NoDefault[10];
                          ^
no_default2.cpp:6:5: note: candidate: NoDefault::NoDefault(int)
    NoDefault(int initial) : i(initial) { }
    ^~~~~~
no_default2.cpp:6:5: note:   candidate expects 1 argument, 0 provided
no_default2.cpp:4:7: note: candidate: constexpr NoDefault::NoDefault(const
NoDefault&)
    class NoDefault {
        ^~~~~~
no_default2.cpp:4:7: note:   candidate expects 1 argument, 0 provided
no_default2.cpp:4:7: note: candidate: constexpr
NoDefault::NoDefault(NoDefault&&)
no_default2.cpp:4:7: note:   candidate expects 1 argument, 0 provided
```