

# **OOP for Scientific Computing Notes - SoSe 24**

Igor Dimitrov

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# Preface

This is a Quarto book.

To learn more about Quarto books visit <https://quarto.org/docs/books>.

# 1 Introduction

This is a book created from markdown and executable code.

See Knuth (1984) for additional discussion of literate programming.

# **Part I**

## **Notes**

# 2 Fundamental Concepts of C++

## 2.1 Preface

- variables and types
- pointers and references
- control structures
- functions and templates
- classes and inheritance
- namespaces and structure

### 2.1.1 Variables, Temporaries, Literals

some stuff comes here...

### 2.1.2 Introducing New Types

- enum

```
enum Color = {RED, BLUE, GREEN}
```

- struct

### 2.1.3 Pointers

```
#include <iostream>

int main(int argc, char const *argv[])
{
    int i = 5;
    int *p1 = &i;
    int *p2 = new int;
```

```

        std::cout << "i: " << i << std::endl
        << "*p1: " << *p1 << std::endl
        << "p1: " << p1 << std::endl
        << "&p1: " << &p1 << std::endl
        << "p2: " << p2 << std::endl
        << "*p2: " << *p2 << std::endl;

    delete p2;
    return 0;
}

```

output:

```

i: 5
*p1: 5
p1: 0x7fff8d568184
&p1: 0x7fff8d568188
p2: 0x55c014358eb0
*p2: 0

```

- release memory with `delete`.
- deleting too early -> bugs, too late -> memory leaks

## 2.1.4 References

References are **aliases for an existing entity**. k

```

#include <iostream>

int main(int argc, const char** argv) {

    int a = 4;
    std::cout << "a: " << a << std::endl;
    int &b = a;
    b = 5;
    std::cout << "a: " << a << std::endl
        << "b: " << b << std::endl;

    return 0;
}

```

output:

a: 4  
a: 5  
b: 5



## 3 Summary

In summary, this book has no content whatsoever.

## References

Knuth, Donald E. 1984. “Literate Programming.” *Comput. J.* 27 (2): 97–111. <https://doi.org/10.1093/comjnl/27.2.97>.