C++ vs. C and Java

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| C++= $C+Java+More$ | C | C++ | Java |
|-------------------------------|-----|------|--------------|
| Low-level machine programming | Yes | Yes | No |
| High-level OO programming | No | Yes | Yes |
| Generic template programming | No | Yes | Limit -ed |
| Complexity | Low | High | Med. |

Why use C++?

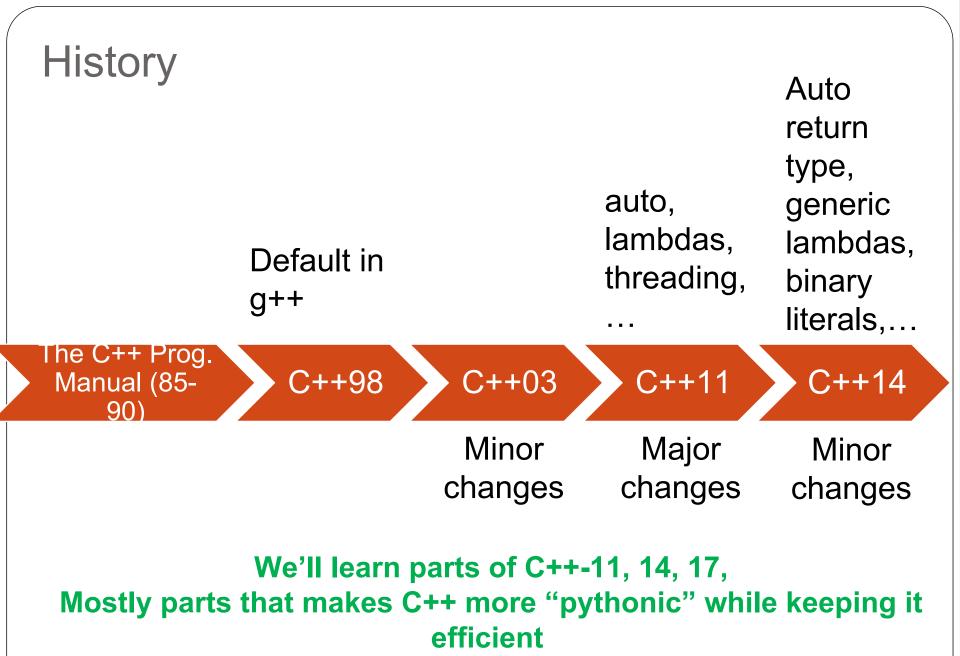
- Combine high-level abstractions with low-level time and memory control.
- Understand the machine.
- Practice learning a complex language.

Some software written in C++:

- Facebook: https://github.com/facebook/folly
- Bitcoin: https://github.com/bitcoin/bitcoin
- LibreOffice: https://github.com/LibreOffice/core
- Unreal: https://github.com/EpicGames/UnrealEngine
- TensorFlow: https://github.com/tensorflow/tensorflow(+python)

C++ vs. Java – memory

- In C++, the memory consumption of a data structure is tight – you get only what you ask for.
- In Java, your data structures might consume much more memory.
- See example in folder 2.
 - Why is this?



Future





The missing types

```
strings in C++
#include <iostream>
                          :More about string functions
#include <string>
                          http://www.cppreference.com/cppstring
int main()
   std::string str;
   int a;
   double b;
   std::cin >> str >> a >> b;
   if(std::cin.fail())
      std::cerr << "input problem\n";</pre>
      return 1;
   std::cout << "I got: "<< str << ' '
   << a << ' ' << b << std::endl;
```

Boolean variables

```
#include <iostream>
int main()
                           Good
                           style
   int a = 5;
   bool isZero = (a = 0);
   // same conditions
   if(lisZero && isZero==false &&
   isZero!=true && !!! isZero && a )
      std::cout << "a is not zero\n";</pre>
```

C++-11 namespace (folder 3)

- Groups different variables and functions together;
- Reduces danger of name-collision when including different libraries;
- Can span multiple files.
- Standard library namespace: std;
- Another example: folly https://github.com/facebook/folly/blob/master/folly/stop_watch.h
- Standard library namespace: std;

C++-11 enum class (folder 4)

```
enum class Season : char {
  WINTER, // = 0 by default
  SPRING, // = WINTER + 1
  SUMMER, // = WINTER + 2
  AUTUMN // = WINTER + 3
};
Season curr_season;
curr season= Season::AUTUMN;
curr_season= SUMMER; // won't compile! (good)
curr season= 19; // won't compile! (good)
int prev season= (int)Season::SUMMER; // won't
compile! (good)
```

Error Handling in C++ (folders 5-6)

| | Exception | Assert |
|--------------|----------------------------------|------------------------------------|
| Used during: | Normal run | Development |
| Used for: | Handling exceptional conditions. | Spotting internal errors and bugs. |
| Disabling: | No | With compiler flag |