IEEE
Kenyatta University
Student Branch

WORKSHOP 1

BEGINNING C++

PROGRAMMING SERIES

ABOUT ME

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WHAT WE WILL COVER TODAY

1. What is C++
2. A bit of history of C++
3. Keywords to know (Compiler, Assembler, etc)
4. The environment (IDE & setup)
5. Syntax
6. Data types & variable types
7. Example codes

WHAT IS C++?

- Just like Python, C, JS, Go, PHP, etc, C++ is a programming language
- C++ is a middle-level programming language
- Runs on a variety of platforms like Windows, MaC, Linux, (*nix), etc.
- C++ is a general-purpose language
- Is a compiled language not interpreted

where is it used?

Used in many fields, areas, applications, etc

1. Operating systems : Most use comination of C/C++ be it Windows, Linux, Mac, Android, etc
   Linux Kernel : ***https://github.com/torvalds/linux***

2. Browsers - Rendering engines for browsers utilize C++ ie

   Chrome V8 engine - ***https://github.com/v8/v8***

3. Libraries - ML, Computer Vision, etc ie Tensorflow, opencv

   https://github.com/tensorflow/tensorflow, ***https://github.com/opencv/opencv***

4. Databases like **MySQL, PostgreSQL**

where is it used?

5. Embedded systems - Arduino, STM32, Pico, etc
6. Compilers - Many languages have their compilers witten in C/C++ ie CPython for python,
7. Banking systems
8. Medical devices

why use C++?

1. Speed
2. Close to hardware
3. Concurrency support
4. Statically typed

BUT, learning C++ may be harder than learning other higher level languages

HISTORY OF C++

Developed in 1979 by Bjarne Stroustrup at bell laboratories of AT&T (American Telephone & Telegraph), located in U.S.A.

Called a superset of C, it means any valid C program is also a valid C++ program

1983, name changed from 'C with classes' to C++

2011 new standard version was released called C++11

simula

TERMINOLOGIES

Compiler - converts instructions into machine-code or low-level form so that they may be executed by the machine

Assembler - Program that converts assembly language to machine code

Interpreter - Program that directly executes instructions in higher level languages / scripting lang without requiring prior compilation

Compiled language vs interpreted language

Compiled: C, **C++**, Go, Rust, ...
Interpreted: Python, JS, PHP, Perl, ...

So, what do you need to write and run cpp files?

1. A text editor ie Notepad++, VSCode, notepad, etc
2. A compiler ie gcc, msvc, mingw, clang, etc
3. An IDE - like Visual Studio, DevC++, Eclipse C++, Qt Creator, etc

Setting up our environment

Online GDB at ***https://www.onlinegdb.com/online_c++_compiler***

Run Debug Stop Share Save { } Beautify Language C++

main.cpp

```
/******************************************************************************

                              Online C++ Compiler.
                   Code, Compile, Run and Debug C++ program online.
Write your code in this editor and press "Run" button to compile and execute it.

*******************************************************************************/

#include <iostream>

using namespace std;

int main()
{
    cout<<"Hello World";

    return 0;
}

```

input

Command line arguments:

Standard Input: Interactive Console Text

Huuh! Fear NOT

Boilerplate code!

main.cpp

flashtext > main.cpp > ...

```cpp
/*
This is a basic HEllo World example
by ME
*/

#include <iostream>

using namespace std;

// The main function
int main()
{
    cout << "Hello World!" << endl;

    return 0;
}
```

The output

```
lalanke@devqt:~/Downloads/Com
Hello World!
lalanke@devqt:~/Downloads/Com
```

let's break it down

File ends with a **.cpp** or **.cc**, in our case ***main.cpp***

1 & **4** are comments

2 is the preprocessor command to include iostream library to our program

3 Tells the compiler to use the std namespace

5 The entry point to your application, all C/C++ files start execution at the main function.

main.cpp

flashtext > main.cpp > ...

```
1  /*
2  This is a basic HEllo World example
3  by ME
4  */
5
6  #include <iostream>
7
8  using namespace std;
9
10 // The main function
11 int main()
12 {
13     cout << "Hello World!" << endl;
14
15     return 0;
16 }
```

1 2 3 4 5 6

let's break it down

5 *return 0;* Terminates the main function and causes it to exit with a 0 code

cout << "Hello World" << endl;

cout - command part of the iostream library that causes the "Hello World" to be displayed on the console

endl - command part of the iostream library- end line, similar to '\n'

Primitive data types

Type	Keyword
Boolean	bool
Character	char
Integer	int
Floating point	float
Double floating point	double
Valueless	void
Wide character	wchar_t

Variable definition

data_type variable_name;

```
int x;
char v;
float distance;
```

Variable instantiation

variable_name = value;

```
x =5;
v = 'A';
distance = 34.5;
```

Or simply

```
int age = 5;
```

Rules for variables

You cant use keyword as a variable

Can comprise of AZaz_09

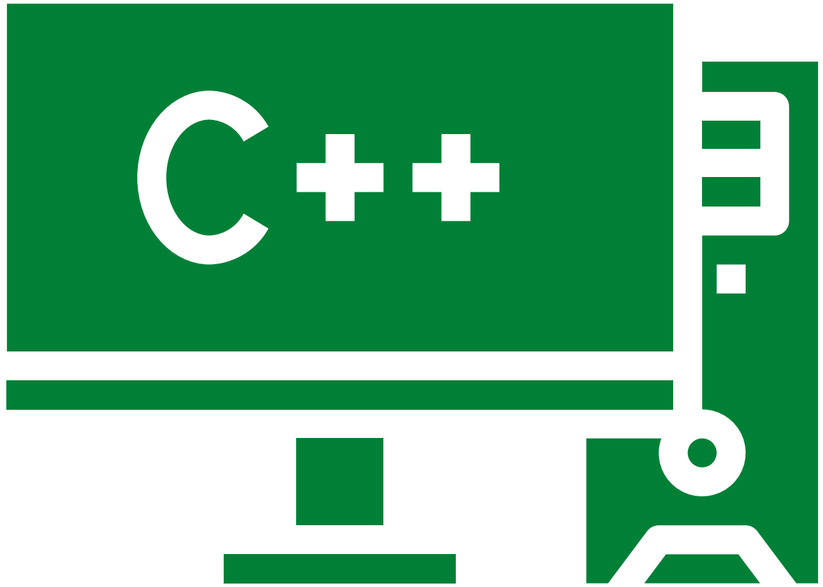
They are case sensitive

Can only start with a letter or an _,
not a number

alignas (since C++11)	decltype (since C++11)	reflexpr (reflection TS)
alignof (since C++11)	default (1)	register (2)
and	delete (1)	reinterpret_cast
and_eq	do	requires (since C++20)
asm	double	return
atomic_cancel (TM TS)	dynamic_cast	short
atomic_commit (TM TS)	else	signed
atomic_noexcept (TM TS)	enum	sizeof (1)
auto (1)	explicit	static
bitand	export (1) (3)	static_assert (since C++11)
bitor	extern (1)	static_cast
bool	false	struct (1)
break	float	switch
case	for	synchronized (TM TS)
catch	friend	template
char	goto	this
char8_t (since C++20)	if	thread_local (since C++11)
char16_t (since C++11)	inline (1)	throw
char32_t (since C++11)	int	true
class (1)	long	try
compl	mutable (1)	typedef
concept (since C++20)	namespace	typeid
const	new	typename
consteval (since C++20)	noexcept (since C++11)	union
constexpr (since C++11)	not	unsigned
constinit (since C++20)	not_eq	using (1)
const_cast	nullptr (since C++11)	virtual
continue	operator	void
co_await (since C++20)	or	volatile
co_return (since C++20)	or_eq	wchar_t
co_yield (since C++20)	private	while
	protected	xor
	public	xor_eq

Lets Code! It's fun.

Let's use the online gdb to write some code



https://www.onlinegdb.com/online_c++_compiler

What we have looked at today

What is C++
Its origins
Its Syntax
Common terms
Data types & Variable types
Basic Arithmetics

You will find today's code and an exercise in the folder Workshop1/main.cpp here https://github.com/lalan-ke/IEEE_KU-beginning-cpp

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THANK YOU