Cpp development

Lecture 1

About the lecturer

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- Age 21
- Born in Burgas
- High school of mechanics and electronics
- Technical University of Sofia
- Working for Broadsoft
- Creator of Project Valkyrie

Introduction to corse

What we gonna do ?

Requirements

- Laptop/Mac
- Cpp IDE (Recommended Visual studio / Xcode)
- Imagination

About the couse

- 9 lectures
- Exam preparation
- Exam

What you are going to learn

- Extended OOP
- Extended C++ development
- Complex software problem solving
- Multithread software development
- Coding standards
- Code designing

Evaluation

- Exam – 80 %
  - 50 % Cpp tasks
  - 30 % Theory

- Homeworks – 20%

Exam theory

- 100% Test
- No open answers
- Single and multiple choice

Exam tasks

- 5 tasks with different complexity

Homework Evaluation

- 50% is based on the solution of the homework
  - Homework must be submitted before the deadline
  - Homework are evaluated by people who has sent their own homework

- 50% is based on evaluating other people's homework
  - There will be a deadline for the evaluation
  - After evaluation of the homework a feedback

Куешчънс???

VAPROSI ??

Download and install an Cpp IDE

Task 1

Cpp basics

Concept of Cpp

- What is C++ programming language ?
- Object Oriented Programming Language
- One main function – int main();

Structure of a Cpp program

- Headers – <iostream>
- Main function
- Return

Our first (maybe) C++ program

Data types

Data types

- What is the meaning of “data type” ?
- Look at the data type as a block of memory, not as a word

Int

- Integer
- Base variable type
- Processor architecture
- Limits

Unsigned/Signed

- Meaning of signed and unsigned
- Always check if a value must be signed or not

How to work with bigger numbers ?

Long / long long

- Long size = 4 bytes
- Long Long size = 2x sizeof(long)

- Unsigned long

What about decimal numbers ?

Float

- Size = 4 bytes
- Bitmap
  - 1st bit – sign
  - 2nd to 8th bit – exponent
  - 9th to 32nd bit – mantissa
  - Accuracy – 6 decimal places
  - 3.141592

Double

- Size = 8 bytes
- Double precision
- Bitmap
  - 1st bin – sign
  - 2nd – 12th bit – exponent
  - 13 to 63 – mantissa
  - Accuracy – 15 decimal places

Long double

- Size = 10 bytes
- Accuracy – 19 decimal places

Are there other data types ?

Other data types

- Byte = 1 byte (not available at all systems)
- Char = unsigned byte
- Short (short int) = 2 bytes

Arithmetic operators

- +
- -
- *
- /
- %

Arithmetic operators

- x++
- ++x
- x--
- --x
- x+=5
- x-=5

Arithmetic operators

- x*=8
- x/=4

Task

- X = 5
- Y = 8
- Z = x+=y*=6
- X, Y, Z = ?

Answer

- Z = X+=Y*=6
- Y = Y * 6 = 48
- X = X + Y = 5 + 48 = 53
- Z = X = 53

Task

- Create a program which simplify the solution of the equation
  x = 1 * 3 – 1 / 1 + 7 % 3 + 4 + 4 – 8/1 + 1*2 =1 + 8 – 2 = 7

Answer

- x = (1 * 3 - 1) / (1 + 7 % 3) + 4 + 4 - 8/((1 + 1)*2) =1 + 8 - 2 = 7

Arrays

- Collection of data
- int anIntegerArray[10]

Functions

Functions

- What is a function ?
- Syntax
- Return

Conditional operators

What is a condition

- If (age >= 18) dringBeer();
  else drinkWater();

Complicated conditions

- If / else if / else structure

Operators

- ! - not
- && - and
- || - or
- > - larger
- >= - larger of equal
- < - smaller
- <= - smaller or equal
- == - equal
- != not equal

? Operator

- Not recommended to be used but must be known

- b = a == 6 ? 1 : 0
- If (a == 6) b = 1
- else b = 0

Task

- Write a program which check if a value is larger or smaller than 10. If it larger the program returns ”larger” if smaller return ”smaller” if equal returns ”beer”.
- The value is hardcoded in the program.

Loops

Loops

- What is a loop
- Why do we use it
- Types:
  - For
  - While
  - Do / while

For loop

- Declaration
- Condition
- At the end
- Syntax

While

- Condition
- Syntax

Do / while

- Condition
- Syntax

Task

- Write a simple loop that checks if a given string contains the character ‘o’. If yes print “YES”, else print “NO”.

More variables and operators

Casting

- double a = (int) 3.141592

- Used when we need exact data type to be passed

Bitwise operators

- Used for making masks

- X = 0x01 << 4 = 10000 (binary) = 16
- X = 0x10 >> 4 = 10000 >> 4 = 00001 (binary) = 1

Input / output functions

Output

- cout << 1234 ; // gives 1234 in the console
- cout << "asdf" ; // gives the string asdf in the console
- cout << asdf; // gives the value of the variable asdf in the console

- cout << "The value is: " << asdf + 1234 << endl;

Input

- Int a;
- cin >> a
- cout << a

String input

- #include <string>
- string myString;
- cin >> myString

String input

- Try to input “Hello My Name Is Neo”

String input

- #include <string>
- string myString;
- getline(cin, myString);
- cout << myString

Daily task

- Make a program that reads line from the keyboard and checks how many upper and lower case letters and other characters are available in the string.