C++, variables, cin, cout, Arithmetic

Author: Krishna Mahavadi
Variables in C++

• Used to store:
  1. information from the user
  2. data internally for programs
• There are several types of variables
• Variables have to be declared i.e, created before using
• General syntax:
  \[ \text{variable\_type \ variable\_name;} \]

  – variable\_type: The type of the variable, different type stores different type of information.
  – variable\_name: The name of the variable, how it will be referred to in the rest of the program.
Rules for variable names

1. Must begin with a letter
2. Can be followed by any letter or number
3. Except for _ (underscore), no spaces or special characters are allowed
4. C++ key words must not be used as variable names

• Suggestions:
  - words should be meaningful
  - Words should be readable
Important Note

• C++ is case sensitive
• Examples:
  - int name; // declares an integer variable name
  - int Name; // declares another integer variable Name
  - String slogan; // error: String is not a c++ type
  - Double num; // error: Double is not a c++ type
Types of variables

- string
- int (integer)
- double (decimal)
- char
- bool (boolean)
• Declaration
  - string name;
  - string date;
  - string month;

• Examples of valid strings
  - name = “George”;
  - date = “8/31/2015”;
  - month = “December”;

• Examples of invalid strings
  - name = ‘George’;
  - date = 8/31/2015;
  - month = November;
int (Integers)

- Declaration
  
  ```
  int num;
  int name;
  int year;
  ```

- Examples of integers
  
  ```
  num = 15;
  age = 47;
  year = 2015;
  ```

- Examples of invalid integers
  
  ```
  num = 22.5;
  age = “forty seven”;
  year = ‘2015’;
  ```
double (decimals, high precision)

• Variable declaration
  – double pi;
  – double e;

• Examples of double (decimals)
  – pi = 3.1415926535;
  – e = 2.71828;

• Examples of INVALID double
  – pi = "3.141";
  – pi = ' 3.141';
char (Characters)

• Variable declaration
  - char c;
  - char newline;
  - char code;

• Examples of char (characters)
  - c = ‘c’;
  - newline = ‘\n’;
  - code = 72; // This is ASCII code in which all characters are stored

• Example of invalid char (characters)
  - c = “c”;  
  - code = 356;
  - newline = “\n”;
bool (boolean: true or false)

Variable declaration
- bool answer;
- bool reply;

Examples of bool
- answer = true;
- answer = false;
- reply = 0;
- reply = 1;

Examples of invalid bool
- answer = “false”;
- reply = ‘0’; //will be true
cin operator

• cin is used to store the data obtained from the user in a variable
• cin works in conjunction with cout
• Examples:
  string name;
  cout << “Enter your first name :”;
  cin >> name

  int num;
  cout << “Enter an integer greater than 10 “;
  cin >> num ;
# Arithmetic Operators

<table>
<thead>
<tr>
<th>Operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Addition</td>
</tr>
<tr>
<td>–</td>
<td>Subtraction</td>
</tr>
<tr>
<td>*</td>
<td>Multiplication</td>
</tr>
<tr>
<td>/</td>
<td>Division</td>
</tr>
<tr>
<td>%</td>
<td>Modulus (Remainder)</td>
</tr>
<tr>
<td>()</td>
<td>Parenthesis</td>
</tr>
</tbody>
</table>

Note: C++ does not directly support exponent operation.
# Operator Precedence

<table>
<thead>
<tr>
<th>Operation</th>
<th>Name</th>
<th>Precedence</th>
</tr>
</thead>
<tbody>
<tr>
<td>()</td>
<td>Parenthesis</td>
<td>Contents of the parenthesis have the highest precedence; should be evaluated first</td>
</tr>
<tr>
<td>^</td>
<td>Exponent</td>
<td>Operation does not exist in C++</td>
</tr>
<tr>
<td>* / %</td>
<td>Multiplication Division Modulus</td>
<td>Equal precedence Evaluated from left to right</td>
</tr>
<tr>
<td>+ -</td>
<td>Addition Subtraction</td>
<td>Equal precedence Evaluated from left to right</td>
</tr>
</tbody>
</table>
Practice Exercise

Convert Fahrenheit temperature to Celsius degrees using the formula:

\[ c = (f - 32) \times \frac{5}{9}; \]
#include <iostream>
using namespace std;

int main() {
    double ftemp, ctemp;
    cout << "Enter the Fahrenheit temperature: ";
    cin >> ftemp;

    ctemp = (ftemp - 32)*5/9;

    cout << "The Celsius temperature is " << ctemp << "\n";

    return 0;
}