

# THVL training #01

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August 29th, 2020

# Overview of Competitive Programming

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## Definition

1. Given Computer Science problems, write source code of computer programs capable of solving them as quickly as possible.
2. Dealing with solved problems.
3. "A vast majority of problems appearing in programming contests are mathematical or logical in nature."

## Competitive Programming for Vietnamese high school students

1. VOI - Vietnam Olympiad in Informatics (Học sinh giỏi Quốc gia)
2. Informatics competition for youth (Tin học trẻ)
3. Local programming contests

## Typical categories of tasks

1. Mathematics
2. Graph theory
3. Dynamic Programming
4. String processing
5. Rare problems

## Important factors in Competitive Programming

1. Correctness
2. Coding speed
3. Algorithm optimization

# C++ Programming

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```
#include <bits/stdc++.h>

using namespace std;

// main() is where program execution begins.
int main(){
    cout << "Hello" << endl; // prints Hello
    return 0;
}
```

## C++ Data types

1. Boolean (bool)
2. Character (char)
3. Integer (int, short, long, long long)
4. Floating point (float, double)

## Queries size of a type

**sizeof**( *type* )



## Four main groups of C++ operators

1. Arithmetic Operators (+, -, \*, /, %, ++, -)
2. Relational Operators (==, !=, >, <, >=, <=)
3. Logical Operators (&&, ||, !)
4. Bitwise Operators (&, |, ^, ~, «, »)
5. Assignment Operators (=, +=, -=, \*=, etc.)

## Variable scope i

```
#include <bits/stdc++.h>

using namespace std;

int main(){
    int n = 5;
    for(; true;){
        int n = 6;
        cout << "n = " << n << endl;
        break;
    }
    cout << "n = " << n << endl;
}
```

# Loop i

while loop

```
while(condition){  
    statement...;  
}
```

for loop

```
for(init; condition; increment){  
    statement...;  
}
```

do...while loop

```
do{  
    statement...;  
} while(condition);
```

# Decision making i

if...else statement

```
if(bool_expr){  
    // statements to be executed  
    // if the bool_expr is true  
}  
else{  
    // statement to be executed  
    // if the bool_expr is false  
}
```

## Decision making ii

switch statement

```
switch(expr){  
    case const1:  
        statement...;  
        break;  
    case const2:  
        statement...;  
        break;  
    ...  
    default:  
        statement...;  
}
```

# Array & String i

## Array

1. fixed-size
2. "sequential collections of the same type"

## Declaring arrays

*type array\_name[array\_size]*

Example:

```
int num[10];  
int num2d[10][10];
```

String (two types):

1. The C-style string (i.e array of character)
2. The string class in C++.

Examples

```
char str1[] = "hungcuongngu";  
string str2 = "giahuynghu";
```

## References:

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## References:

1. Halim, Steven, et al. Competitive Programming 3. Lulu Independent Publish, 2013.
2. *https:*  
*//www.tutorialspoint.com/cplusplus/index.htm*