

Competitive STL Extensions

Meeting C++ 2018

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Good evening everyone! Thanks for having me. My name is Fedor. I'm a student from Moscow.

I'm also doing some competitive programming as a hobby. I have a team called My pity.

Outline

Competitive Programming

Kool tricks

- Standard library

- g++ builtins

- SGL STL extensions

- Policy-Based Data Structures

Competitive Programming

Competitive Programming

Engineering is Programming integrated over time?

Standard library

- ▶ `#include <bits/stdc++.h>`
- ▶ `std::__gcd` from `<algorithm>`

popcount: number of set bits

```
int main(int argc, const char* argv[]) {  
    static_assert(0 == __builtin_popcount(0)); // wow so constexpr  
    static_assert(4 == __builtin_popcount(0b1111));  
    static_assert(3 == __builtin_popcount(0b100101));  
    return __builtin_popcount(argc);  
}
```

godbolts to

main:

```
xor     eax, eax  
popcnt  eax, edi  
ret
```

ctz: Count Trailing Zeros

```
int main(int argc, const char* argv[]) {  
    static_assert(32 == __builtin_ctz(0));  
    static_assert(0 == __builtin_ctz(0b1111));  
    static_assert(2 == __builtin_ctz(0b10100));  
    return __builtin_ctz(argc);  
}
```

godbolts to

main:

```
    xor     eax, eax  
    tzcnt   eax, edi  
    ret
```

Also `__builtin_clz(int)` counts leading zeros

Kool tricks: SGI STL extensions

power rope

Kool tricks: pbds order statistics tree

pbds gp hash table

kthxbye