# ACM-ICPC Team Reference Document

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# 1 Data Structures

## 1.1 Disjoin Set Union

```
struct DSU {
    vector<int> par;
    vector<int> sz;

    DSU(int n) {
        FOR(i, 0, n) {
            par.pb(i);
            sz.pb(1);
        }
    }

    int find(int a) {
        return par[a] = par[a] == a ? a : find(par[a]);
    }

    bool same(int a, int b) {
        return find(a) == find(b);
    }

    void unite(int a, int b) {
        a = find(a);
        b = find(b);
        if(sz[a] > sz[b]) swap(a, b);
        sz[b] += sz[a];
        par[a] = b;
    }
};
```

## 1.2 Fenwick Tree

# 2 General

## 2.1 Automatic Test

```
# Linux Bash
# gen, main and stupid have to be compiled beforehand
for((i=1;;++i)); do
    echo $i;
    ./gen $i > genIn;
    diff <(./main < genIn) <(./stupid < genIn) || break;
done

# Windows CMD
@echo off
FOR /L %%I IN (1,1,2147483647) DO (
    echo %%I
    gen.exe %%I > genIn
    main.exe < genIn > mainOut
    stupid.exe < genIn > stupidOut
    FC mainOut stupidOut || goto :eof
)
```

## 2.2 C++ Template

```
#include <bits/stdc++.h>
#include <ext/pb_ds/assoc_container.hpp> // gp_hash_table<int, int> == hash
    map
#include <ext/pb_ds/tree_policy.hpp>
using namespace std;
using namespace __gnu_pbds;
typedef long long ll;
typedef unsigned long long ull;
typedef long double ld;
typedef pair<int, int> pii;
typedef pair<ll, ll> pll;
typedef pair<double, double> pdd;
template <typename T> using min_heap = priority_queue<T, vector<T>, greater<
    T>>;
template <typename T> using max_heap = priority_queue<T, vector<T>, less<T
    >>;
template <typename T> using ordered_set = tree<T, null_type, less<T>,
    rb_tree_tag, tree_order_statistics_node_update>;
template <typename K, typename V> using hashmap = gp_hash_table<K, V>;

template<typename A, typename B> ostream& operator<<(ostream& out, pair<A, B
    > p) { out << "(" << p.first << ", " << p.second << ")"; return out;}
template<typename T> ostream& operator<<(ostream& out, vector<T> v) { out
    << "["; for(auto& x : v) out << x << ", "; out << "]";return out;}
template<typename T> ostream& operator<<(ostream& out, set<T> v) { out << "
    {"; for(auto& x : v) out << x << ", "; out << "}"; return out; }
template<typename K, typename V> ostream& operator<<(ostream& out, map<K,
    V> m) { out << "{"; for(auto& e : m) out << e.first << " -> " << e.second
    << ", "; out << "}"; return out; }
template<typename K, typename V> ostream& operator<<(ostream& out, hashmap
    <K, V> m) { out << "{"; for(auto& e : m) out << e.first << " -> " << e.
    second << ", "; out << "}"; return out; }

#define FAST_IO ios_base::sync_with_stdio(false); cin.tie(NULL)
```

```
#define TESTS(t) int NUMBER_OF_TESTS; cin >> NUMBER_OF_TESTS; for(
    int t = 1; t <= NUMBER_OF_TESTS; t++)
#define FOR(i, begin, end) for (int i = (begin) - ((begin) > (end)); i != (end) - ((
    begin) > (end)); i += 1 - 2 * ((begin) > (end)))
#define sgn(a) ((a) > eps ? 1 : ((a) < -eps ? -1 : 0))
#define precise(x) fixed << setprecision(x)
#define debug(x) cerr << "> " << #x << " = " << x << endl;
#define pb push_back
#define rnd(a, b) (uniform_int_distribution<int>((a), (b))(rng))
#ifndef LOCAL
    #define cerr if(0)cout
    #define endl "\n"
#endif
mt19937 rng(chrono::steady_clock::now().time_since_epoch().count());
clock_t ___clock___;
void startTime() {___clock___ = clock();}
void timeit(string msg) {cerr << "> " << msg << ": " << precise(6) << ld(clock()-
    ___clock___)/CLOCKS_PER_SEC << endl;}
const ld PI = asin(1) * 2;
const ld eps = 1e-14;
const int oo = 2e9;
const ll OO = 2e18;
const ll MOD = 1000000007;
const int MAXN = 1000000;

int main() {
    FAST_IO;
    startTime();

    timeit("Finished");
    return 0;
}
```

## 2.3 Compilation

```
# Simple compile
g++ -DLOCAL -O2 -o main.exe -std-c++17 -Wall -Wno-unused-result -Wshadow main
    .cpp
# Debug
g++ -DLOCAL -std=c++17 -Wshadow -Wall -o main.exe main.cpp -fsanitize=address
     -fsanitize=undefined -fuse-ld=gold -D_GLIBCXX_DEBUG -g
```