

## Results

```
.../algo/lab0 master ● ./a.out
key      Time in File 1  Time in File 2  Time and File 3
500      0.000064       0.000275       0.172598
700      0.000116       0.000056       0.176282
387745451 0.100893          0.101793       0.000023
804289383 0.099174          0.099798       0.165431
```

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## Code

### generate.c

```
#include <stdio.h>

#include <stdlib.h>

#define N 1e6

#define ll unsigned long long

// Generate n random numbers between x and y and save in file_name
int generate(ll n, ll x, ll y, char file_name[256], int randomize) {

    // Open File

    FILE* fp;

    fp = fopen(file_name, "w");
```

```

if(randomize == 0) {
    for(ll i = x; i <= y; i++)
        for(ll j = 0; j < N/1000; j++)
            fprintf(fp, "%llu\n", j);
}
else{
    for(ll i = 0; i < n; i++) {
        fprintf(fp, "%llu\n", x + (rand() % (y-x)));
    }
}

printf("Generated file %s\n", file_name);
return 0;
}

int main() {

    generate(N, 1, 1000, "first.txt", 0);
    generate(N, 1, 1000, "second.txt", 1);
    generate(N, 1e6, 1e9, "third.txt", 1);
}

```

## **linear\_search.c**

```

#include <stdio.h>
#include <stdlib.h>
#include <time.h>

```

```

#define N 1e6L

#define ll unsigned long long

int linear_search(char file_name[256], ll key) {
    FILE* fp;
    fp = fopen(file_name, "r");
    ll num;
    while(!feof(fp)) {
        fscanf(fp, "%llu\n", &num);
        if (num == key) {
            return 1;
        }
    }
    return -1;
}

void find_and_time(ll key) {

    double t1, t2, t3;

    clock_t t;
    t = clock();
    linear_search("first.txt", key);
    t = clock() - t;
    t1 = ((double)t)/CLOCKS_PER_SEC;
    t = clock();
    linear_search("second.txt", key);
    t = clock() - t;

```

```
t2 = ((double)t)/CLOCKS_PER_SEC;
t = clock();
linear_search("third.txt", key);
t = clock() - t;
t3 = ((double)t)/CLOCKS_PER_SEC;
printf("%llu\t%f\t%f\t%f\n", key, t1, t2, t3);
}

int main(){
    printf("key\tTime in File 1\tTime in File 2\tTime and File 3\n");
    find_and_time(500);
    find_and_time(700);
    find_and_time(387745451);
    find_and_time(rand()%1000000000);
}
```