#include <stdio.h>

#include <iostream>

#include <vector>

#include <time.h>

int main() {

union ticks {

unsigned long long t64;

struct s32 { long th, tl; } t32;

} start, end;

int k, i, N, K=5,st=1;

printf("UP\n");

for (int ii = 1; ii < 17; ii++) {

int\* x = new int[256 \* st];

for (int i = 0; i < 256 \* st - 1; i++)

x[i] = i + 1;

x[256 \* st - 1] = 0;

N = st \* 256;

for (k = 0, i = 0; i < N\*K; i++) k = x[k];

asm("rdtsc\n":"=a"(start.t32.th), "=d"(start.t32.tl));

for (k = 0, i = 0; i < N \* K; i++) k = x[k];

asm("rdtsc\n":"=a"(end.t32.th), "=d"(end.t32.tl));

if (ii < 11)

printf("N = %d KB -- time = %llu tucts\n", st, (end.t64 - start.t64) / (N \* K));

else

printf("N = %d MB -- time = %llu tucts\n", st / 1024, (end.t64 - start.t64) / (N \* K));

st \*= 2;

delete[] x;

}

st = 1;

printf("DOWN\n");

for (int ii = 1; ii < 17; ii++) {

int\* x = new int[256 \* st];

for (int i = 1; i < 256 \* st; i++)

x[i] = i - 1;

x[0] = 256 \* st - 1;

N = st \* 256;

for (k = 0, i = 0; i < N \* K; i++) k = x[k];

asm("rdtsc\n":"=a"(start.t32.th), "=d"(start.t32.tl));

for (k = 0, i = 0; i < N \* K; i++) k = x[k];

asm("rdtsc\n":"=a"(end.t32.th), "=d"(end.t32.tl));

if (ii < 11)

printf("N = %d KB -- time = %llu tucts\n", st, (end.t64 - start.t64) / (N \* K));

else

printf("N = %d MB -- time = %llu tucts\n", st / 1024, (end.t64 - start.t64) / (N \* K));

st \*= 2;

delete[] x;

}

st = 1;

srand(time(NULL));

printf("RANDOM\n");

for (int ii = 1; ii < 17; ii++) {

N = st \* 256;

srand(time(NULL));

int\* x = new int[N];

for (int i = 0; i < N; i++)

x[i] = i;

for (int i = N - 1; i > 0; i--)

{

int j = rand() % i;

int tmp = x[j];

x[j] = x[i];

x[i] = tmp;

}

for (k = 0, i = 0; i < N \* K; i++) k = x[k];

N: asm("rdtsc\n":"=a"(start.t32.th), "=d"(start.t32.tl));

for (k = 0, i = 0; i < N \* K; i++) k = x[k];

asm("rdtsc\n":"=a"(end.t32.th), "=d"(end.t32.tl));

if ((end.t64 - start.t64) / (N \* K) > 200)

goto N;

else

if(ii<11)

printf("N = %d KB -- time = %llu tucts\n", st, (end.t64 - start.t64) / (N \* K));

else

printf("N = %d MB -- time = %llu tucts\n", st/1024, (end.t64 - start.t64) / (N \* K));

st \*= 2;

delete[] x;

}

return 0;

}