Closest Pair in C++

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Table 1: Runtimes on different set sizes using naive implementation

Set Size	Time Taken (ms)
100	1.73
1000	131.151
10000	12509.9
100000	???

Table 2: Runtimes on different set sizes using grid implementation

Set Size	Time Taken (ms)
100	0.053
1000	0.50
10000	5.37
100000	46.78
1000000	496.904

As we can see, the time difference is significant even for 100 elements, but there's a clear linear relationship in the grid implementation; given n, the set size, we can calculate the runtime t with a rough formula: $t = n/2000$, which is a linear relationship.

In the naive implementation, increasing the set size by a factor of 10 pretty consistently increase the time taken by a factor of a little over 100. We tried to run the program on 100,000 elements and our estimate says it should have been around 20 minutes.