

# Searching

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## Introduction

## Linear Search

### Unsorted Search

key = -1 to sort through whole array and take the time of that

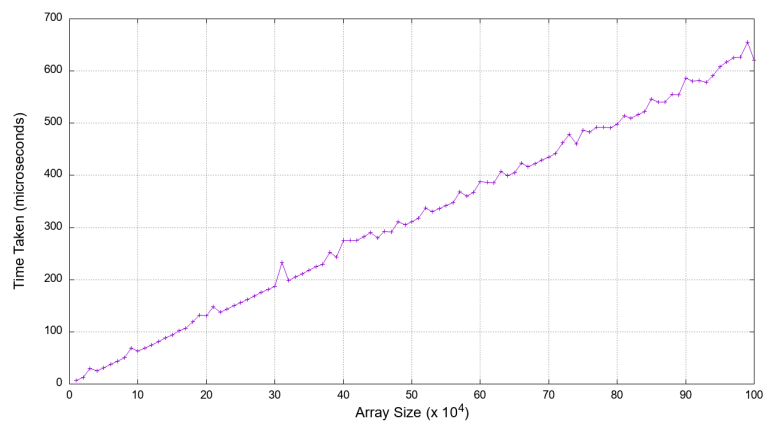


Figure 1: Unsorted linear search, array size plotted against time

### Sorted Search

In the hit case, the element that is in position array size/2 is selected as the key and the time taken to find it is reported. In the miss case, I'm adding 10 to the largest element in the array to ensure the key is beyond the array's range.

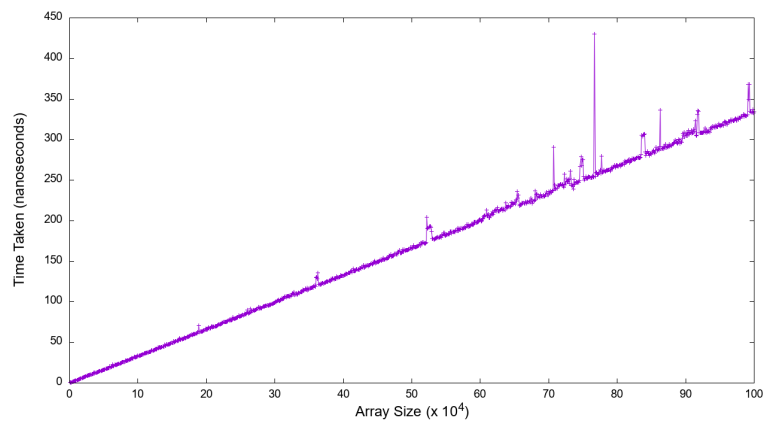


Figure 2: Sorted linear search, hits, array size plotted against time

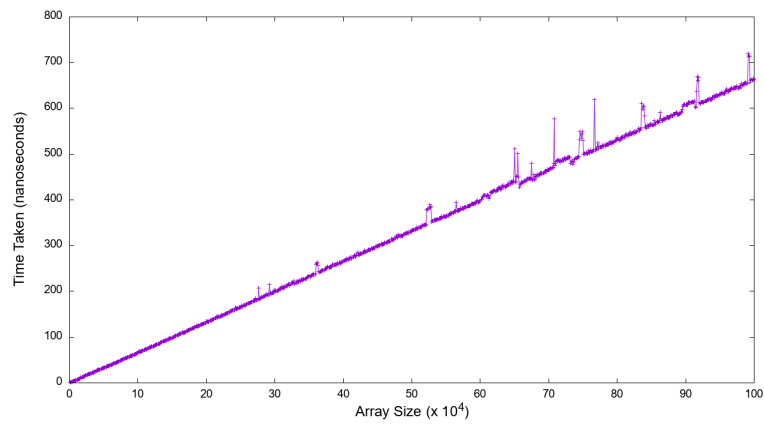


Figure 3: Sorted linear search, misses, array size plotted against time

## Binary Search

### Layout

#### 0.1 sections

\* (for example \section\* ).

#### inserting code

minted: List.sort().

```
for (int i = 0; i < 100; i++){
    sum += i;
}
```

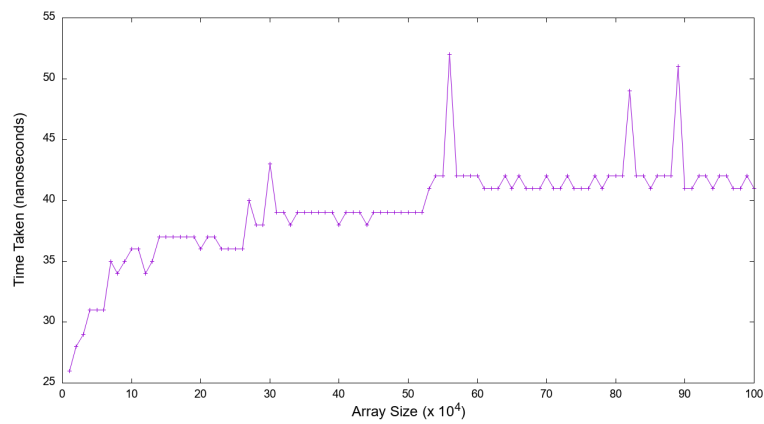


Figure 4: Sorted search, hits, array size plotted against time

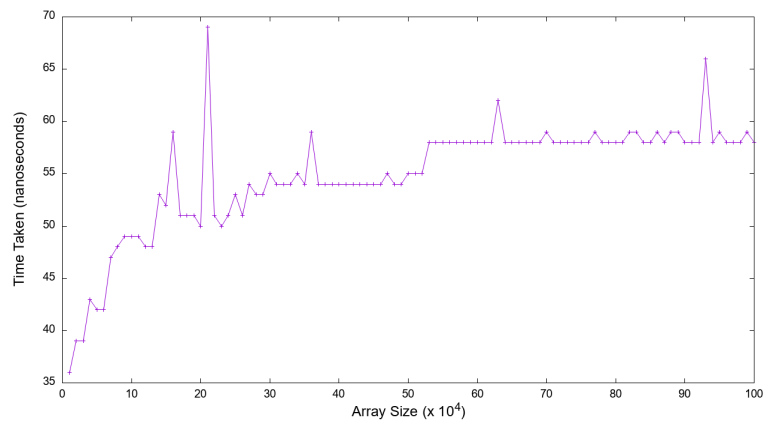


Figure 5: Sorted search, misses, array size plotted against time

**numbers**

1.2345678s

1.235s or 1.2s?

**tables**

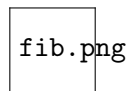
**no f\*ing screen shots**

**graphs**

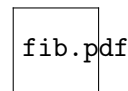
The graph in Fig.7 is generated using Tikz and as you can see, I know have the time in " $\mu s$ " instead of in "us".

prgm	runtime	ratio
dummy	115	1.0
union	535	4.6
tailr	420	3.6

Table 1: Union and friends, list of 50000 elements, runtime in microseconds



(a) using raster graphics



(b) using vector graphics.

Figure 6: Difference in image formats.

## L<sup>A</sup>T<sub>E</sub>Xthings

Some L<sup>A</sup>T<sub>E</sub>X errors that I frequently see that could easily be avoided if you only know where they come from.

### less than

If you in your LaTeX code write "5 < 7" it will look like 5 ; 7 and "9 > 7" will look like 9 ; 7. Using the characters < and > directly does not work ... so, how did I do it? I used the commands `\textless` and `\textgreater` to generate the symbols < and >.

You could also use `\tt 5 < 7` but then it will use the teletype font and look like this: 5 < 7.

Still another way is to write it using so called **math mode**. This is a

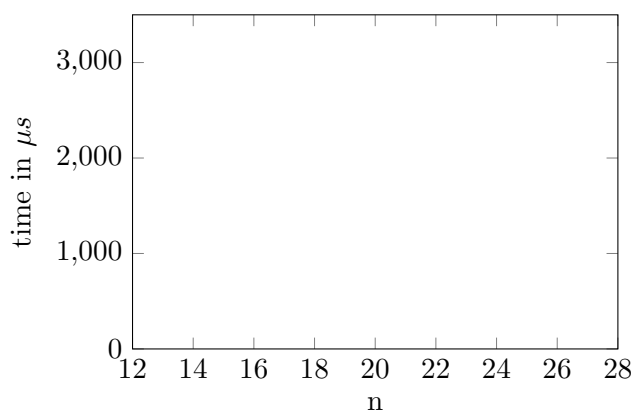


Figure 7: The same graph using TikZ

mode used for writing mathematical formulas in a nice way. You enclose your expression in `$` signs like this `$5 < 7$` and then it will look like this  $5 < 7$ .

If you have a larger mathematical expression you enclose it in double `$` and the result is that it is written centered with some space around it like this:

$$5 < (3 * 8/3)$$

## 0.2 math mode

There are several ways that you can write  $n \log(n)$  in `LATEX`.

- `$n \log(n)$` : which is interpreted as  $xyz(n)$  i.e.  $n \times l \times o \times g \times (n)$  and since we then omit the multiplications it will be displayed as  $nlog(n)$
- `$n \times \log(n)$` : which is better since we then explicitly have one multiplication and it is displayed as  $n \times \log(n)$ .
- `$n \log(n)$` : which is how it should be done, it's now displayed as  $n \log(n)$ .

## why strange font

If you want to write *foo* in teletype font you write like this `{\tt foo}`. If you forget the closing `}` then it will look like this: `foo`. Now everything here after until the end of your report will look like this.

## make