jboner / latency.txt

Last active 39 minutes ago • Report abuse

☆ Star

<> **Code**   ⚬—Revisions 18   ☆Stars 5,000+   ⅄Forks 1,896

Latency Numbers Every Programmer Should Know

<> **latency.txt**

```
 1   Latency Comparison Numbers (~2012)
 2   ----------------------------------
 3   L1 cache reference                           0.5 ns
 4   Branch mispredict                            5   ns
 5   L2 cache reference                           7   ns                      14x L1 cache
 6   Mutex lock/unlock                           25   ns
 7   Main memory reference                      100   ns                      20x L2 cache,
 8   Compress 1K bytes with Zippy             3,000   ns       3 us
 9   Send 1K bytes over 1 Gbps network       10,000   ns      10 us
10   Read 4K randomly from SSD*             150,000   ns     150 us           ~1GB/sec SSD
11   Read 1 MB sequentially from memory     250,000   ns     250 us
12   Round trip within same datacenter      500,000   ns     500 us
13   Read 1 MB sequentially from SSD*     1,000,000   ns   1,000 us    1 ms  ~1GB/sec SSD,
14   Disk seek                          10,000,000   ns  10,000 us   10 ms  20x datacenter
15   Read 1 MB sequentially from disk    20,000,000   ns  20,000 us   20 ms  80x memory, 20
16   Send packet CA->Netherlands->CA    150,000,000   ns 150,000 us  150 ms
17
18   Notes
19   -----
20   1 ns = 10^-9 seconds
21   1 us = 10^-6 seconds = 1,000 ns
22   1 ms = 10^-3 seconds = 1,000 us = 1,000,000 ns
23
24   Credit
25   ------
26   By Jeff Dean:          http://research.google.com/people/jeff/
27   Originally by Peter Norvig: http://norvig.com/21-days.html#answers
28
29   Contributions
30   -------------
31   'Humanized' comparison:  https://gist.github.com/hellerbarde/2843375
32   Visual comparison chart: http://i.imgur.com/k0t1e.png
```