

1 RAM Model

1.1 Memory

Infinite sequence of cells, contains w bits. Every cell has an address starting at 1

1.2 CPU

32 registers of width w bits.

1.2.1 Operations

Set value to register (constant or from other register). Take two integers from other registers and store the result of;

$a+b, a-b, a \cdot b, a/b$. Take two registers and compare them; $a < b, a = b, a > b$. Read and write from memory.

1.3 Definitions

An algorithm is a set of atomic operations. It's cost is the number of atomic operations. A word is a sequence of w bits

2 Worst-case

Worst-case cost of an algorithm is the longest possible running time of input size n

3 Dictionary search

let n be register 1, and v be register 2
register $left \rightarrow 1, right \rightarrow 1$
while $left \leq right$
 register $mid \rightarrow (left + right)/2$
 if the memory cell at address $mid = v$ then
 return yes
 else if memory cell at address $mid > v$ then
 $right = mid - 1$
 else
 $left = mid + 1$
return no

Worst-case time: $f_2(n) = 2 + 6 \log_2 n$