problem 1A

```
[yg336@wind ~/inf503/homework2 ]$ jobstats -r
JobID            JobName     ReqMem     MaxRSS     ReqCPUS    UserCPU      Timelimit   Elapsed     State       JobEff
=================================================================================================================
37473526         problem1A   19.5G      3.24G      1          00:25.001    00:10:00    00:01:45    COMPLETED   17.04
=================================================================================================================
```

Fig. 1

```
yg336@wind:~/inf503/homework2
The number of arguments passed: 4
The first argument is: main
The second argument is: problem1A
The third argument is: /common/contrib/classroom/inf503/hw_dataset.fa
The fourth argument is: /common/contrib/classroom/inf503/test_genome.fasta
time used for reading all the reads is: 9 s
memory released!
~
```

Fig. 2

problem 1B

```
FASTAreadset_LL::~FASTAreadset_LL()
{
    Node *temp1, *temp2;
    temp1 = head;
    temp2 = head;
    while(temp1 != NULL)
    {
        delete[] temp1->sequence;
        temp1 = temp1->next;
        delete[] temp2;
        temp2 = temp1;
    }
    cout << "memory released!" << endl;
}
```

From problem 1A we can see that the memories can be released by this destructor.

O(n). When releasing the memories, the program just deallocate the memories one by one.

problem 1C

```
FASTAreadset_LL::FASTAreadset_LL(const FASTAreadset_LL &obj)
{
    this->init();
    Node *temp1, *temp2;
    temp1 = obj.head;
    if(temp1 == NULL)
```

```
        {
            return;
        }

        this->head = new Node;
        temp2 = this->head;
        temp2->sequence = new char[51];
        strcpy(temp2->sequence, temp1->sequence);

        temp1 = temp1->next;

        while(temp1 != NULL)
        {
            temp2->next = new Node;
            temp2 = temp2->next;
            temp2->sequence = new char[51];
            strcpy(temp2->sequence, temp1->sequence);
            temp1 = temp1->next;
        }
    }
```

```
The number of arguments passed: 4
The first argument is: ./main
The second argument is: problem1C
The third argument is: /common/contrib/classroom/inf503/hw_dataset.fa
The fourth argument is: /common/contrib/classroom/inf503/test_genome.fasta

first 10 segments from the file:
GTAACTGAACTGTTTGGTCAGCTCAGCGACTACAGACGACTTGTAGTAAT
AGGGGCAGGCGTACGGCCTTTTCTTCGCGCTCGTCGCGAACGACCGCGCG
AATGGCTTTTTTTCCAAAGATAAACCGAATTTTTTAATATATTTACTGAC
GTGACCCAGAAACCCAACCGATCATGATGCGTCTGCAATCGGATCTGGTT
TTCCGAAAGCTGTACTAAGCCTTTCAGCAGTTGCTTTTGCTTGAGTGGGT
ACGAGAACTGATAGCCGGCCGTCACCGCGACGCGCTGCTCCGCCTGCGCG
TGTCGAAGGATGTCGGTAAATCGATATTCTGTGTCGAAACGTCGATATAA
AAACATGTTGATACAACTGAGTACATTAAACTAGACTATAGCTATTCATA
ACAAAGAAGGTTGGTTTTTCTGGTTTTGGCCTTCCTGCCTGAATCCAAGT
ACCATTAATTGATTTTGTTCAGATGCACATCCATTTGTGGGAATGGAATT

first 10 segments from the copied object:
GTAACTGAACTGTTTGGTCAGCTCAGCGACTACAGACGACTTGTAGTAAT
AGGGGCAGGCGTACGGCCTTTTCTTCGCGCTCGTCGCGAACGACCGCGCG
AATGGCTTTTTTTCCAAAGATAAACCGAATTTTTTAATATATTTACTGAC
GTGACCCAGAAACCCAACCGATCATGATGCGTCTGCAATCGGATCTGGTT
TTCCGAAAGCTGTACTAAGCCTTTCAGCAGTTGCTTTTGCTTGAGTGGGT
ACGAGAACTGATAGCCGGCCGTCACCGCGACGCGCTGCTCCGCCTGCGCG
TGTCGAAGGATGTCGGTAAATCGATATTCTGTGTCGAAACGTCGATATAA
AAACATGTTGATACAACTGAGTACATTAAACTAGACTATAGCTATTCATA
ACAAAGAAGGTTGGTTTTTCTGGTTTTGGCCTTCCTGCCTGAATCCAAGT
ACCATTAATTGATTTTGTTCAGATGCACATCCATTTGTGGGAATGGAATT

memory released!
memory released!
```

Fig. 3

O(n). When copying all the elements from an object to another, the program copy them one by one.

problem 1D

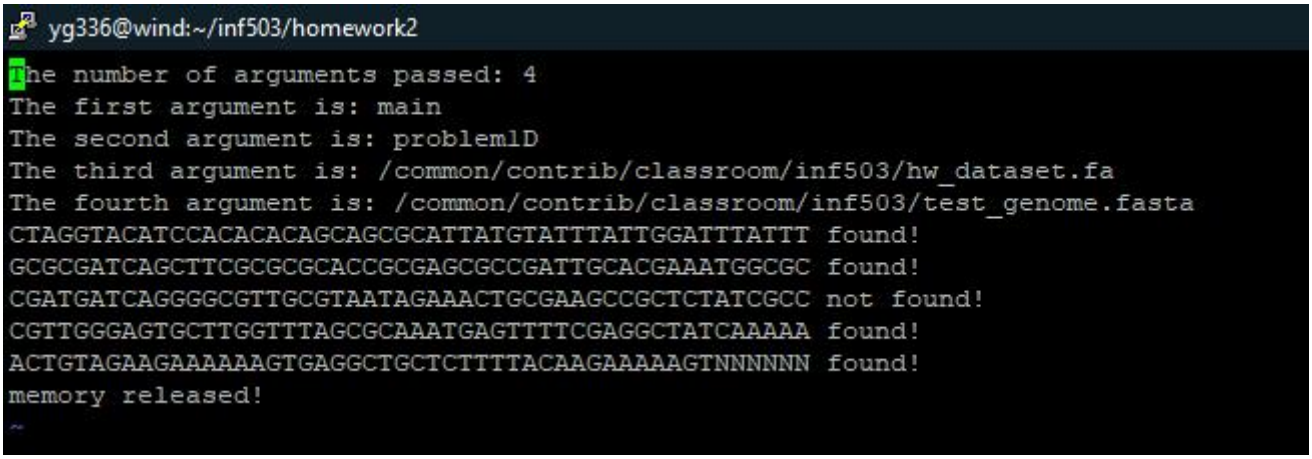

Fig. 4

problem 2A

The number of 50-character fragments is 5227244.

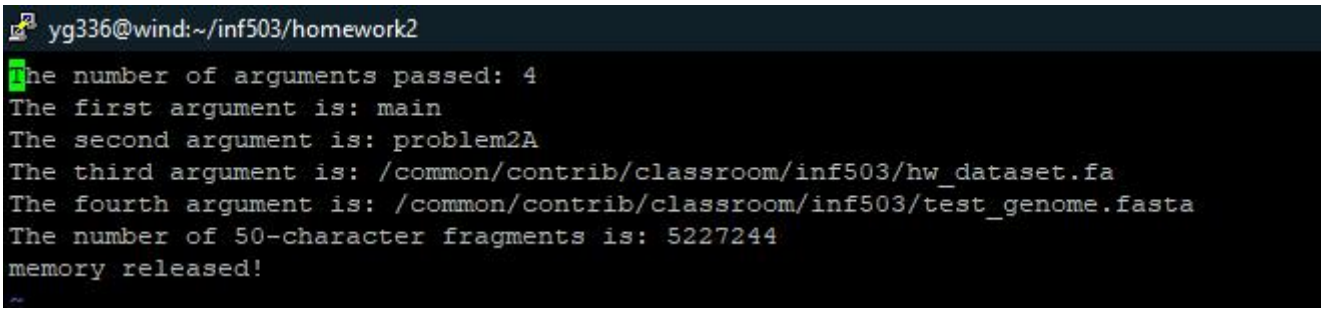

Fig. 5

problem 2B

1000 searches

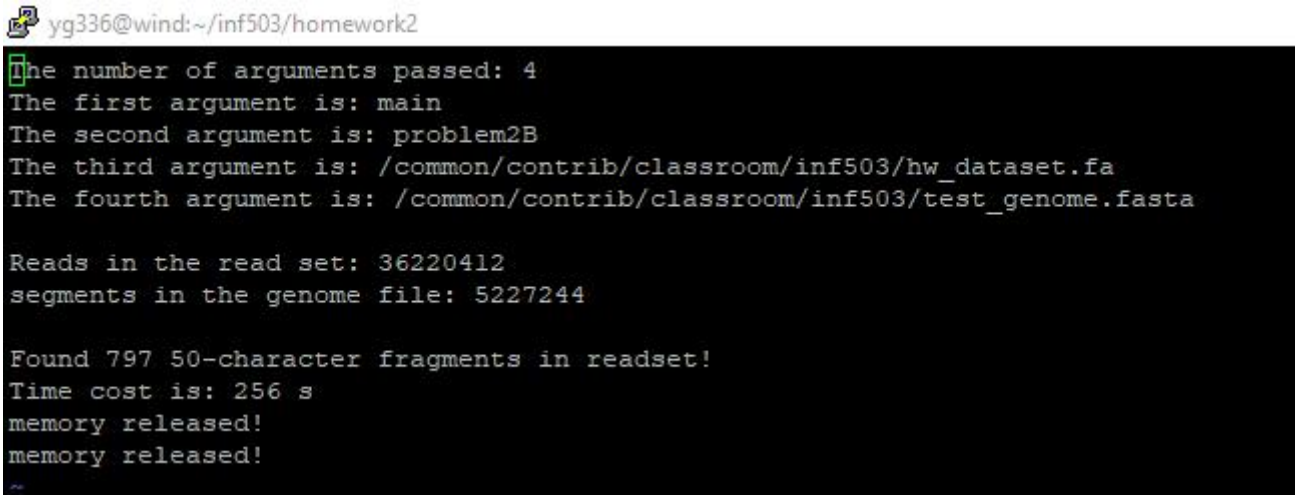

Fig. 6

10000 searches

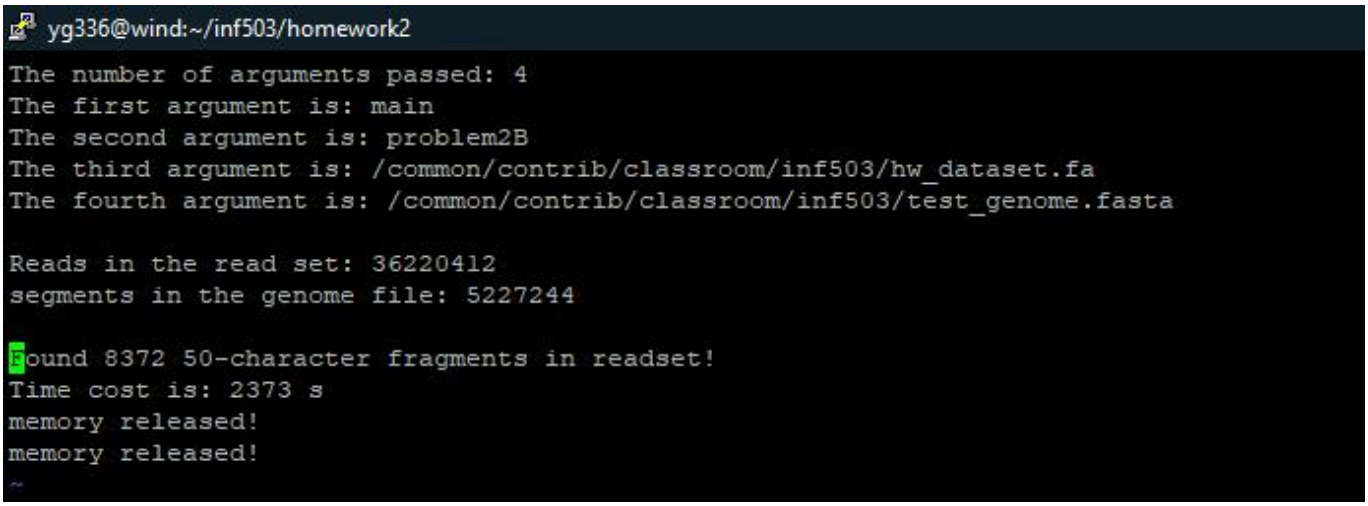

Fig. 7

100000 searches

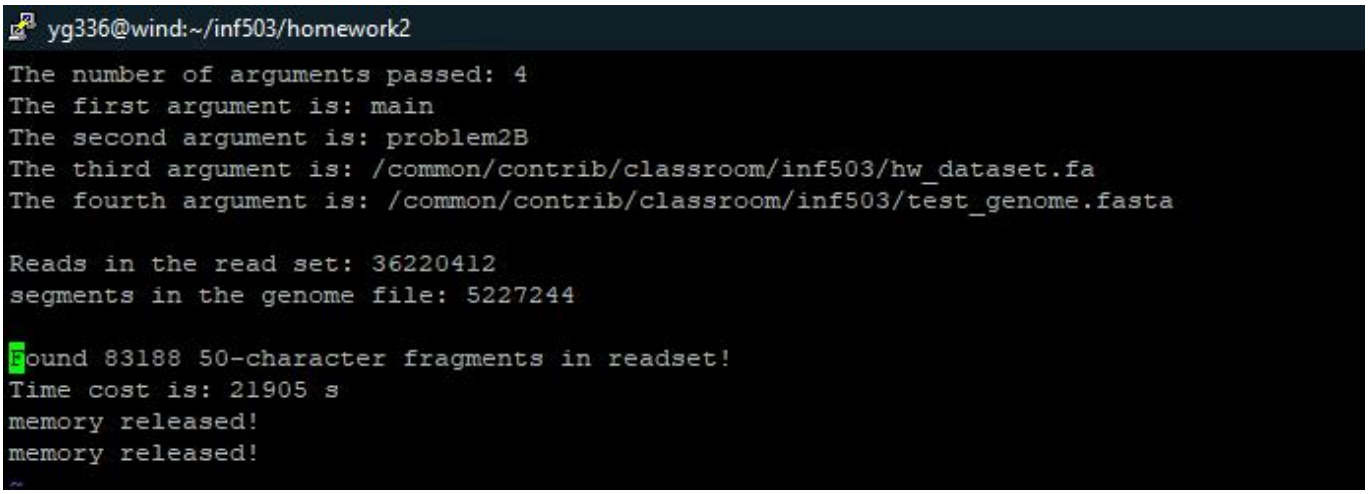

Fig. 8

From the results of 1000, 10000 and 100000 searches we can estimate that the total time consumption for 5227244 segments is about:

```
(5227244/100000)*21905 = 1145027 (s) = 401 (h)
```