

# Computer Architecture

## Assignment-2

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### Report

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The algorithm used to sort the array: Bubble sort.

#### Input format :

1. Enter N.
2. Starting memory address X of the input numbers
3. Starting memory address Y of the output sorted numbers.

#### C++ version of the MIPS program :

```
void bubblesort(int arr[], int n)
{
    for(int i = 0; i < n - 1; i++)
        for(int j = 0; j < n - i - 1; j++)
            if(arr[j] > arr[j + 1])
                swap(arr[j], arr[j + 1])
}
```

#### Explanation of the MIPS program:

\$t1 contains N  
\$t2 contains X  
\$t3 contains Y

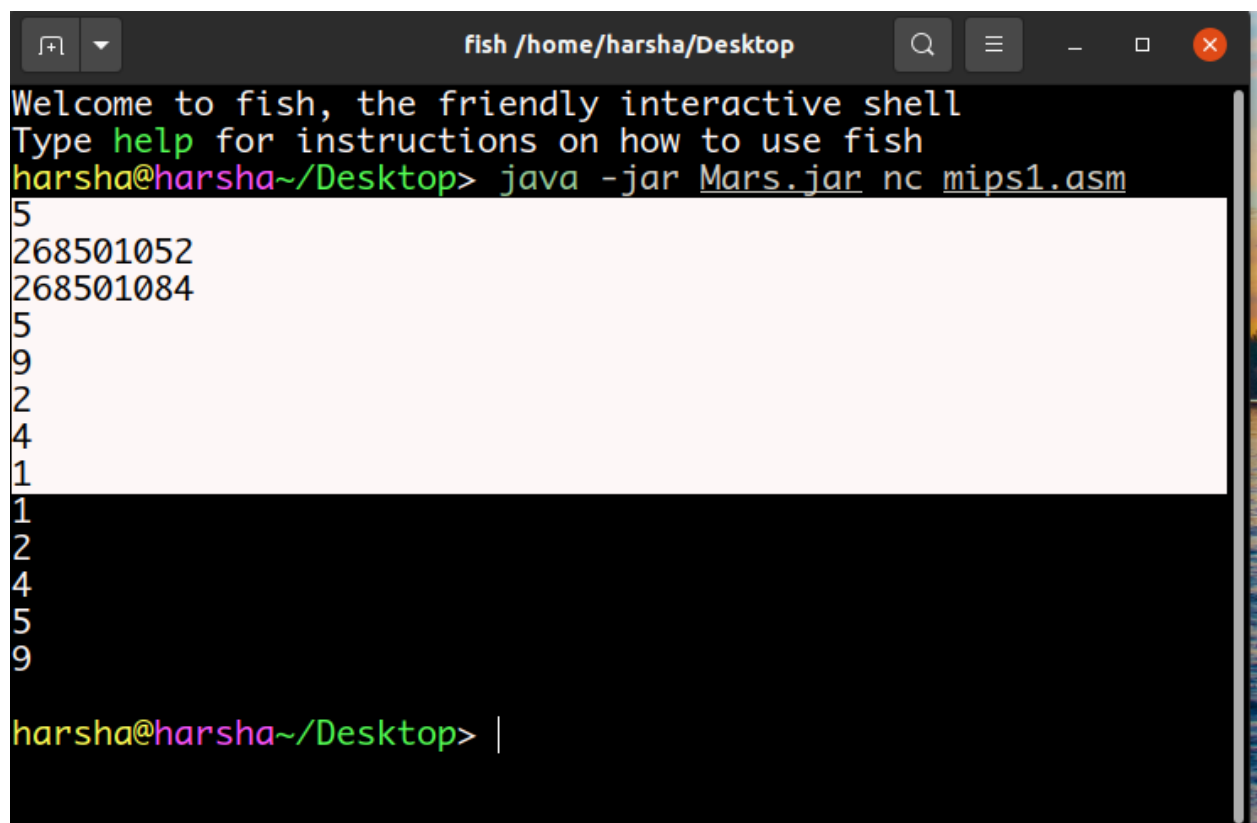
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- 
- First, we copy the numbers from the locations  $X, X + 4 \dots$  to  $Y, Y+4$  by loading the number into a register and storing the number in destination memory locations.
  - Next, we sort our array using bubble sort.
  - We swap the consecutive numbers if they are not in increasing order.

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Screenshots of various test cases:

Test case - 1



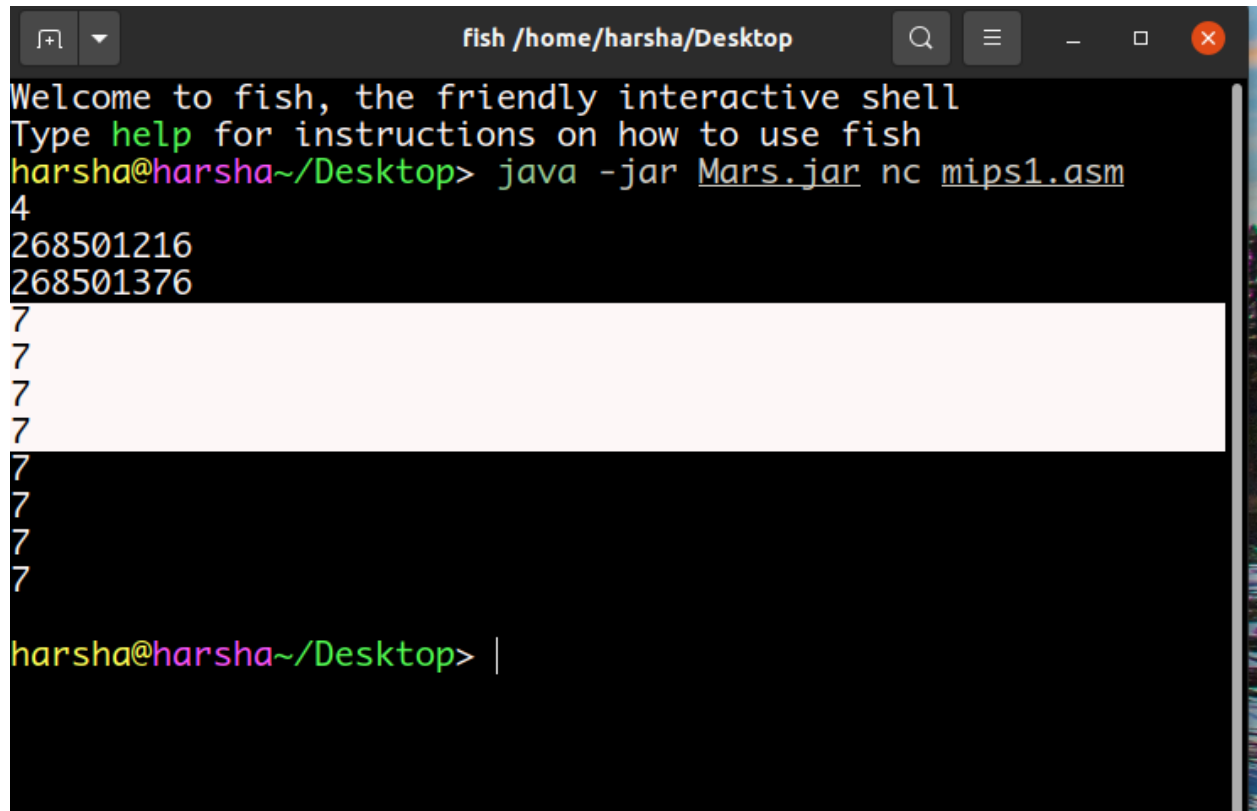
```
fish /home/harsha/Desktop
Welcome to fish, the friendly interactive shell
Type help for instructions on how to use fish
harsha@harsha~/Desktop> java -jar Mars.jar nc mips1.asm
5
268501052
268501084
5
9
2
4
1
1
2
4
5
9
harsha@harsha~/Desktop> |
```

## Test case - 2

```
fish /home/harsha/Desktop
Welcome to fish, the friendly interactive shell
Type help for instructions on how to use fish
harsha@harsha~/Desktop> java -jar Mars.jar nc mips1.asm
10
268501056
268501472
4
2
5
23
253
2
89
223
12
7
2
2
4
5
7
12
23
89
223
253
harsha@harsha~/Desktop> |
```

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### Test case - 3



```
fish /home/harsha/Desktop
Welcome to fish, the friendly interactive shell
Type help for instructions on how to use fish
harsha@harsha~/Desktop> java -jar Mars.jar nc mips1.asm
4
268501216
268501376
7
7
7
7
7
7
7
7
harsha@harsha~/Desktop> |
```

The screenshot shows a terminal window titled "fish /home/harsha/Desktop". The prompt is "harsha@harsha~/Desktop>". The user has executed the command "java -jar Mars.jar nc mips1.asm". The output of the program is displayed on the following lines: "4", "268501216", "268501376", and then a series of "7"s. A light pink rectangular box highlights the first four lines of output. The prompt "harsha@harsha~/Desktop> |" is shown at the bottom, indicating the user is waiting for more input.