DSA REPORT

Name: Anirban Das Roll: 001910501077 Class: BCSE -II Sem: First Session: 2020-21

Assignment Set: 1

Problem 7:

Problem Statement:

Take a four-digit prime number P. Generate a series of large integers L and for each member L(i), compute the remainder R(i), after dividing L(i) by P. Tabulate L(i) and R(i). Repeat for seven other four digit prime numbers keeping L(i) fixed.

Solution Approach:

Firstly a binary array is taken, which stores the prime status of a range of integers, i.e it stores 1 if the number is prime and 0 otherwise.
In the main, 20 large integers are generated using the rand() funtion on a very large integer (a.k.a 1e8), and stored in an integer array.
Using the binary array created earlier, the first eight, 4-digit prime numbers are found and stored in an array.
Finally, two nested loops are made with the outer one running 8 times and the inner 20 times. In eacch iteration of the outer loop, the 20 large integers are divided by a single prime number and the corresponding reminders are printed.

Structured Pseudocode:

```
FUNCTION SIEVE():
    N = LARGE INTEGER (1e8)
```

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```
    FOR i=2 TO n DO:
        IF( PRIME[i]!=0 ):
            FOR j=2*i TO n DO:
                PRIME[j]=1
                j = j + 1
        i = i+1
MAIN():
FOR i=0 TO 20 DO:
    LARGE[i] = 1E8 + RAND() % 1E8
    i = i + 1
COUNT = 0
ARRAY[8] = {0}
FOR i=1001 DO:
    IF (COUNT<8)
        IF (PRIME[i] == 1)
            ARRAY[COUNT] = i
            COUNT = COUNT +1
    i = i+1
FOR i=0 TO 8 DO:
    FOR j=0 TO 20 DO:
        PRINT(ARRAY[i] % LARGE[j])
        j = j+1
    i = i + 1
```

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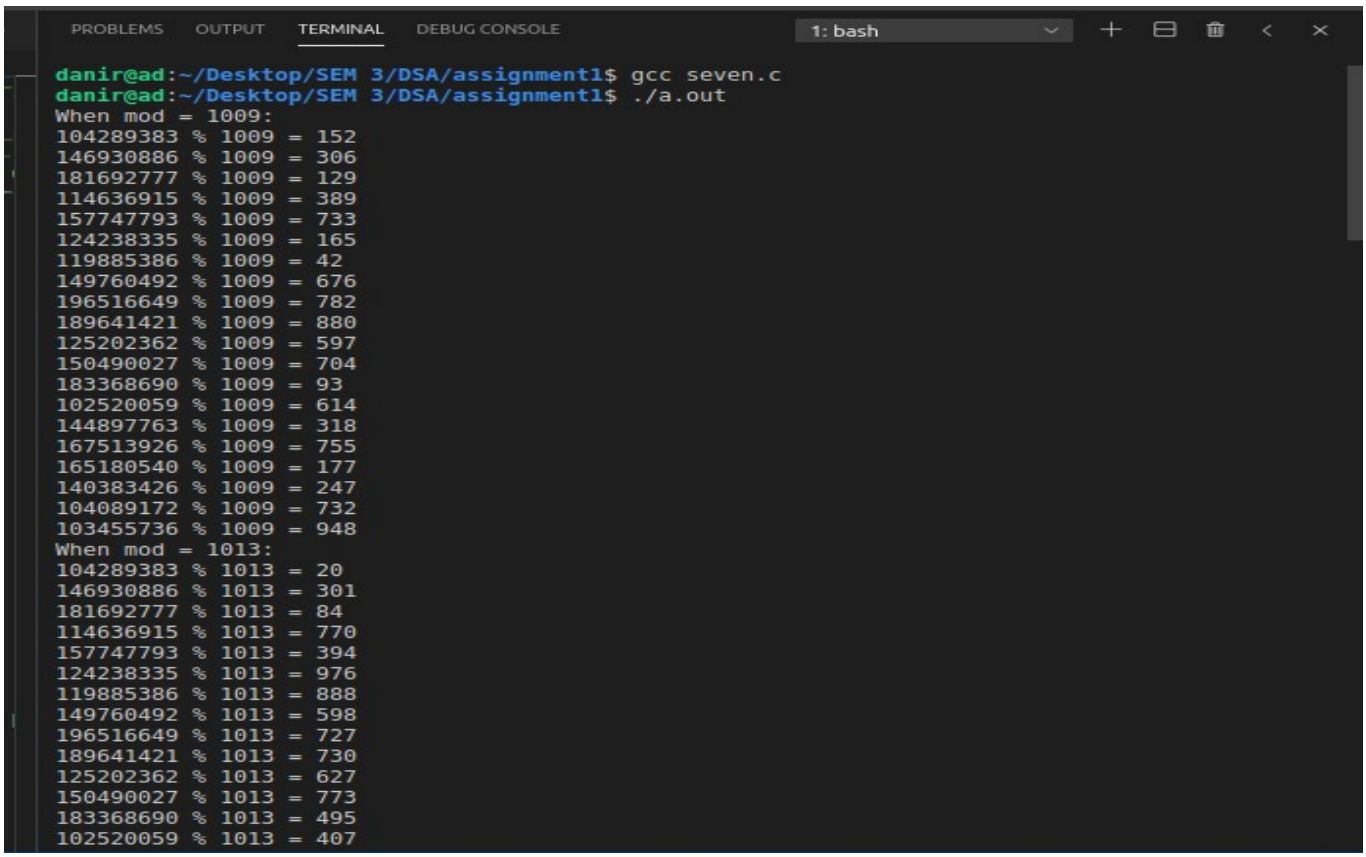
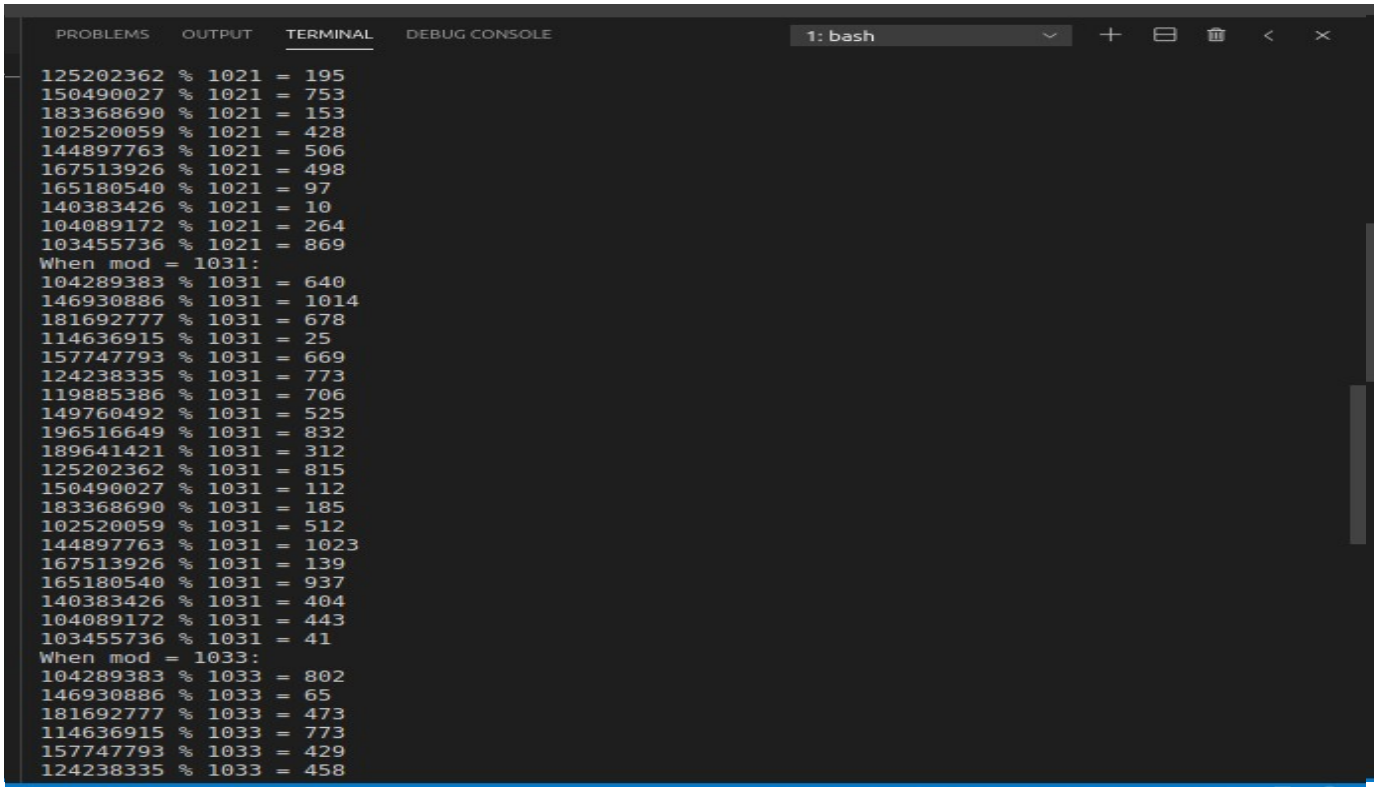
Results:





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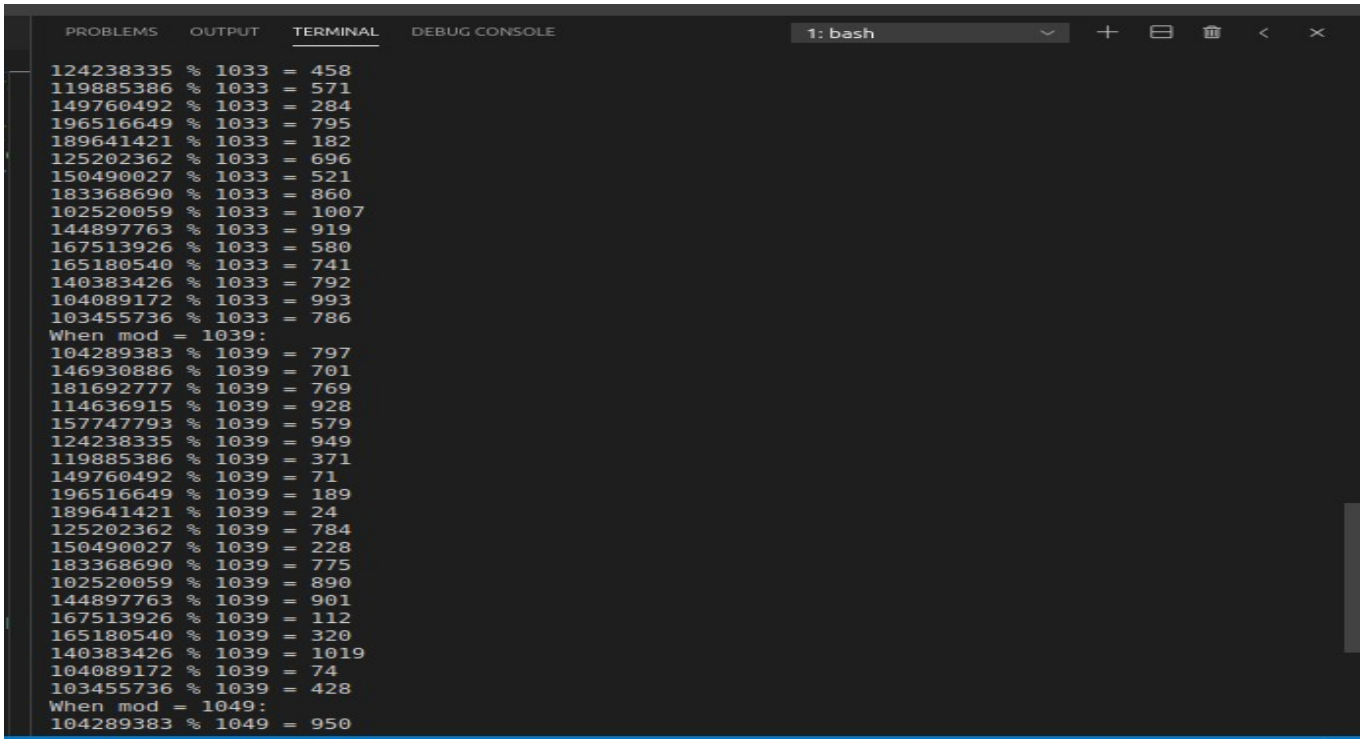

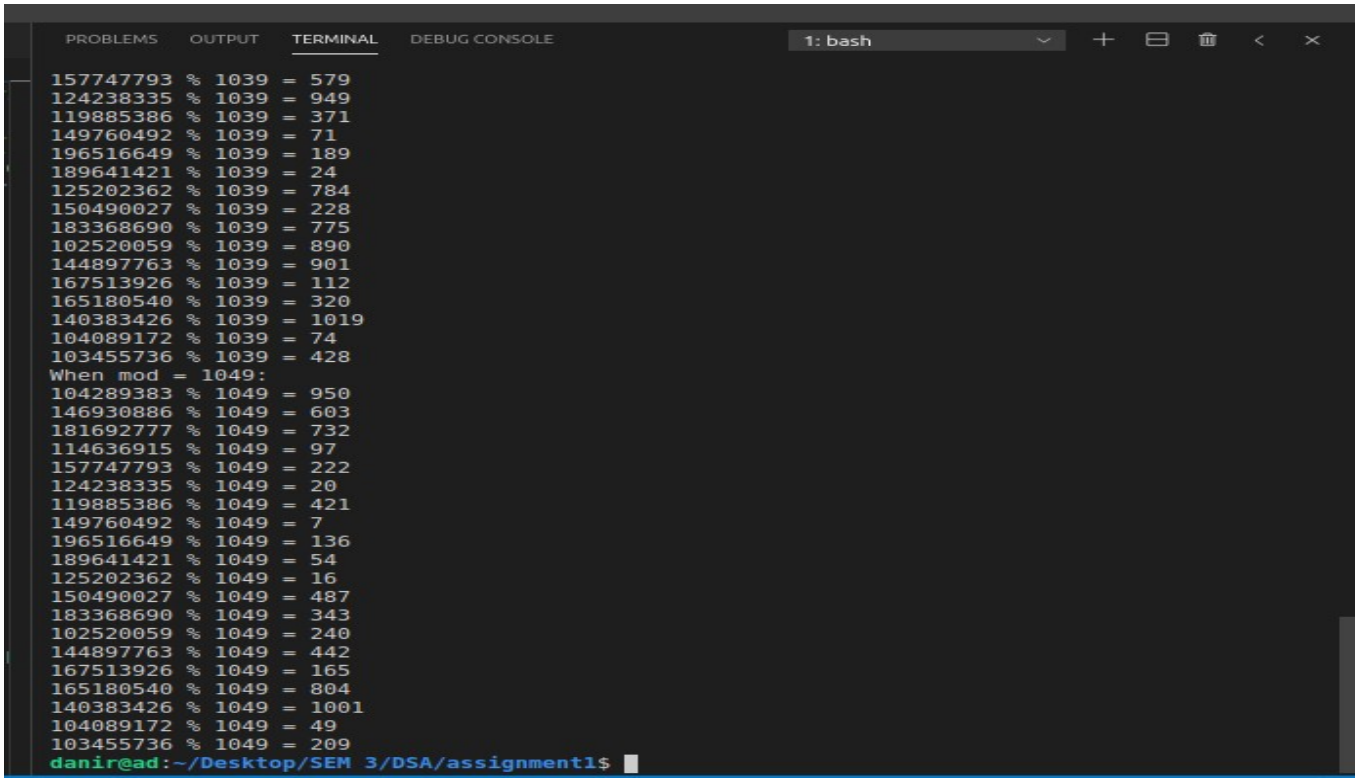

Discussions:

O(nlog(logn)) time complexity. The space complexity is O(n).

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Source Code:

FILE NAME:

Code – “seven.c”

(can be found in the following link: https://drive.google.com/drive/folders/1-nNb6aRleNLE1mcE58i85096fDmDUCvd?usp=sharing)