Answers to Assignment No. 1 - GDB :

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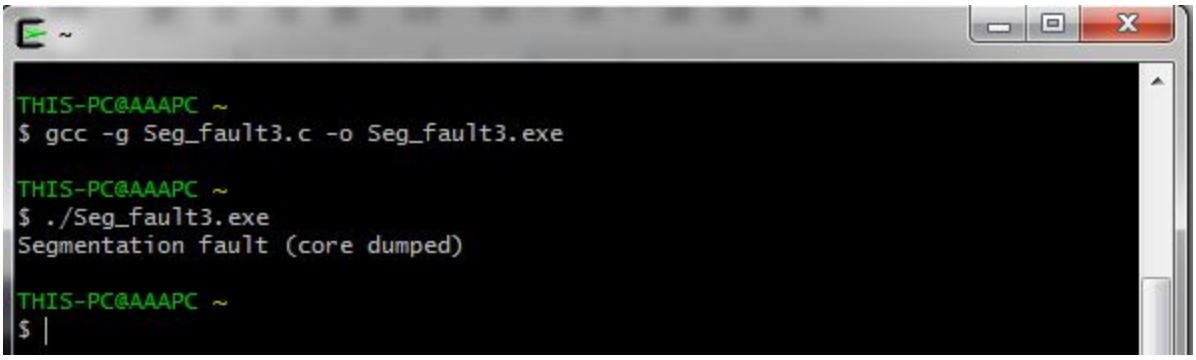
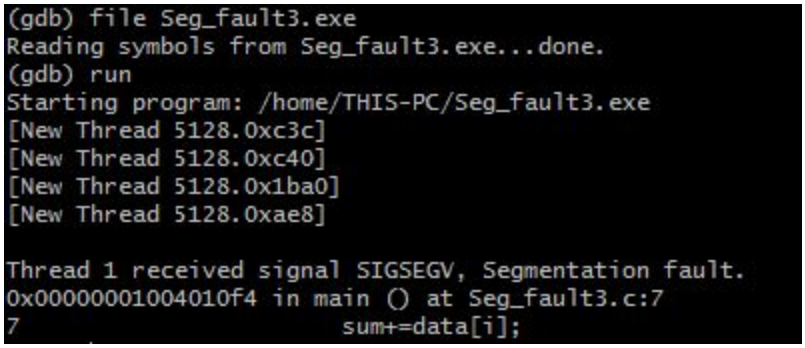
Program File: **Seg_fault3.c**

```
#include <stdio.h>
int main(void)
{
      const int data[10] = {1,2,3,4,5,6,7};
      int i,sum;
      for(i=0;i>=0;i++){
            sum+=data[i];
      }
      printf("sum=%i \n",sum);
      return 0;
}
```

Program Compilation and Runtime Error:



Error Shown by GDB:



Observation:

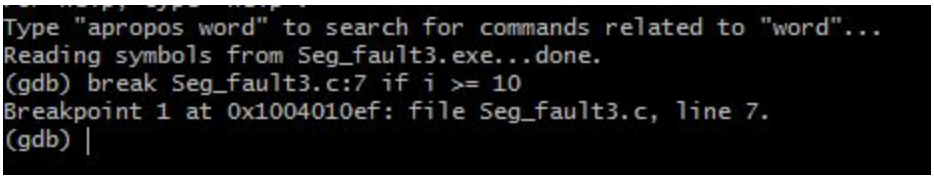
1) It is known that when we try to access the memory which is **out of bounds of array**, an error may occur at runtime.

Conclusion: The variable ‘i’ may be going out of ‘data’ array limits in the ‘for’ loop

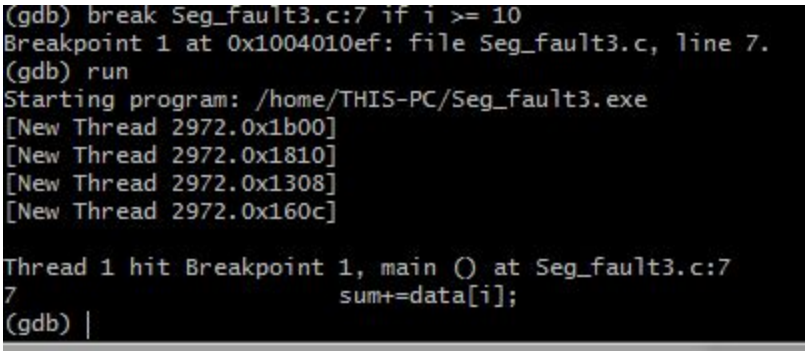
Action: We use “Conditional Breakpoint” as follows:

```
break Seg_fault3.c:7 if i >= 10
```

We use the condition that if ‘i’ goes beyond the Array Size of ‘data’ which is 10, then the execution is to be halted at line no. 7



Subsequent Execution under GDB:



As expected, the execution halted at line no. 7, indicating that ‘i’ is going beyond the bounds of array ‘data’.

Solution to Bug:

1) It is seen in the source file that ‘i’ is not properly limited by condition in the ‘for’ loop.

```
for(i=0;i>=0;i++)
```

This is an “Infinite Loop” since ‘i’ is always going to be greater than zero and hence is always incremented

2) The condition is corrected as follows:

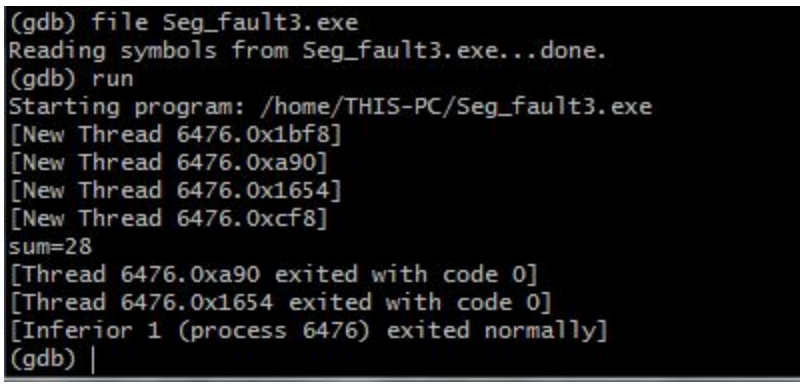
```
for(i=0;i<7;i++)
```

Though 10 = ARRAYSIZE of ‘data’, we put i<7 because ‘data’ has values only from 0 to 6 (i.e 7 values) .So now the variable ‘i’ is always under the ARRAYSIZE.

Corrected Program:

```
#include <stdio.h>
int main(void)
{
      const int data[10] = {1,2,3,4,5,6,7};
      int i,sum;
      for(i=0;i<=7;i++){ //Correction Performed
            sum+=data[i];
      }
      printf("sum=%i \n",sum);
      return 0;
}
```

Output Under GDB:



Since now GDB shows that our program has executed normally, it is finally debugged