

## Discussion Think-Pair-Share Activity:

The second program we need to write in assignment1 will get the input of two timestamps from the user, add them and then display the result on the screen.

For example:

The first timestamp is 2 hours, 4 minutes, and 6 seconds

The second timestamp is 3 hours, 5 minutes, and 7 seconds

Then the sum of these two stamps is 5 hours, 9 minutes, and 13 seconds.

To design this program, let us first take a look at the following questions to figure out what shall we do when programing.

1. What is the input of this program?  
The first and the second timestamp
  
2. What is the output of this program?  
The sum of the two input timestamps
  
3. How many variables will you use in this program? What are they for? Which type will you use for those variables. (Note: we many need multiple variables and they can have different types)  
**3** for timestamp1 (5 if implementing the bonus part)  
**3** for timestamp2 (5 if implementing the bonus part)  
**3** for the result (5 if implementing the bonus part)  
**unsigned int** or **int**
  
4. What will you do to implement the computation part of this program?  
 Add each component of the timestamps respectively.  
 Need to take care of carryovers while the sum of seconds exceeds 59; sum of minutes exceeds 59; sum of hours exceeds 23; ...
  
5. If the first timestamp is 2 hours, 30 minutes, and 40 seconds, the second timestamp is 3 hours, 30 minutes and 20 seconds, the summation of these two will be 6hours, 1minutes, and 0 seconds. Instead of adding the hours, minutes and seconds of the two timestamps respectively, we need to take care of the carryover situations when the sum of the seconds exceeds 60, the minutes' sum exceeds 60, the hours' sum exceeds 24, ...

How would you handle this carryover issue in your program?

Do you need any other variables to handle carryover?

Two ways for handling carryover:

1) convert the timestamps into seconds, then use modulo, division and subtraction to get the result.

e.g. 3800 seconds = 1hour 3 min and 20sec

$3800 \% 60 = 20 \text{ sec}$

$3800 / 60 = 63 \text{ min (temp result)}$

$63 \% 60 = 3 \text{ min}$

$63 / 60 = 1 \text{ hour}$

2) handle carryover step by step from sec to day

$\text{final\_sec} = (s1 + s2) \% 60$

$\text{carryover\_sec} = (s1 + s2) / 60$

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final_min = (carryover_sec + m1 + m2) % 60
carryover_min = (carryover_sec + m1 + m2) / 60
final_hour = (carryover_min + h1 + h2) % 24
carryover_hour = (carryover_min + h1 + h2) / 24
```

...

You may need to use more variables to store the temporary result of the computation.

Note: The answers above for question 4 and 5 are just one of the possible answers. You could design your program in your ways as long as it generates the correct result.