NCTU OS HW2 report 2018

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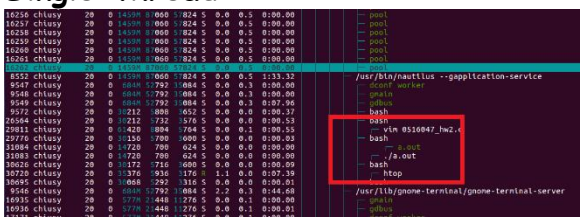
Question	Answer
Q1. **Briefly describe about your design for the problem "Sum Checker" and total num of threads you used in your code.**	For sum_checker_single.c: I write a function using three outermost "for" loop to count the sum of row, column, nine sub-gribs. In the main function, I create a thread and execute the above function in the thread,  For sum_checker.c: I separate the three outermost "for" loop to three function. In the main function, I create two threads first to execute the function that count the sum of rows and columns., and then ues another "for" loop to create nine threads to count the sum of sub-gribs respectively. The main function will wait for the threads until they end.

```
int i,j,x,y,sum_nine=0,sum_row=0,sum_col=0,sum=-1;
for(i=1;i<10;i++){
    for(j=1;j<10;j++){
        sum_row = sum_row + puzzle[i][j];
    }
    if(sum == -1)sum = sum_row;
    else if(sum != sum_row){
        data->result = 0;
        pthread_exit(NULL);
    }
    sum_row = 0;
}

for(j=1;j<10;j++){
    for(i=1;i<10;i++){
        sum_col = sum_col + puzzle[i][j];
    }
    if(sum != sum_col){
        data->result = 0;
        pthread_exit(NULL);
    }
    sum_col = 0;
}
for(i=0;i<3;i++){
    for(j=0;j<3;j++){
        int x=i*3+1,y=j*3+1;
        for(int p=x;p<x+3;p++){
            for(int q=y;q<y+3;q++){
                sum_nine = sum_nine + puzzle[p][q];
            }
        }
        if(sum_nine != sum){
            data->result = 0;
            pthread_exit(NULL);
        }
        sum_nine = 0;
    }
```

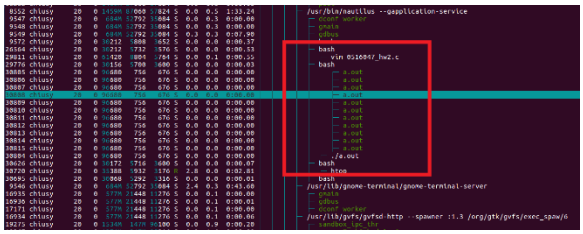
```c
pthread_t t1,t2,t[9];
pthread_create(&t1,NULL,checkrow,(void*) &data);
pthread_create(&t2,NULL,checkcol,(void*) &data);
for(int i=0;i<3;i++){
    for(int j=0;j<3;j++){
        data.x = i*3+1;
        data.y = j*3+1;
        pthread_create(&t[k],NULL,checknine,(void*) &data);
        k++;
    }
}

k=0;
pthread_join(t1,NULL);
pthread_join(t2,NULL);
for(int i=0;i<3;i++){
    for(int j=0;j<3;j++){
        pthread_join(t[k],NULL);
        k++;
    }
}
```

Q2.
Show your thread info screenshots while "Sum Checker" code running.

Single-thread:

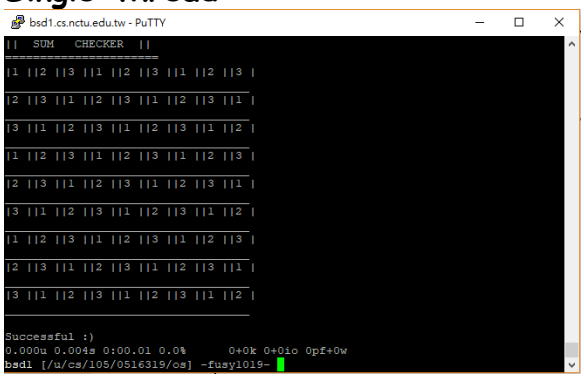


Multi-thread:

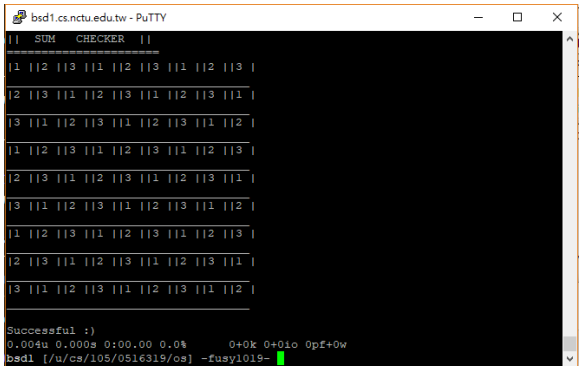


Q3.
Compare the time between Single-thread and Multi-thread.

Single-thread:



Multi-thead:

	
Q4. **What you learned from doing OS hw2 or some improvements you want to say to TAs.**	**Learn how to use thread to speed up the program, and understand that global variables can be used at all threads, but local variables only belongs to itself.**

p.s You can reference to homework info pdf and show your answer as the format for Q2 and Q3.