CS 4504
Parallel and Distributed Computing

Project 2 Lab

Kun Suo

Computer Science, Kennesaw State University

https://kevinsuo.github.io/

Assignment

- Given two emoji strings s1 and s2. Write a Pthread program to find out the number of sub-emoji-strings, in string s1, that is exactly the same as s2.

S1= 

S2= 

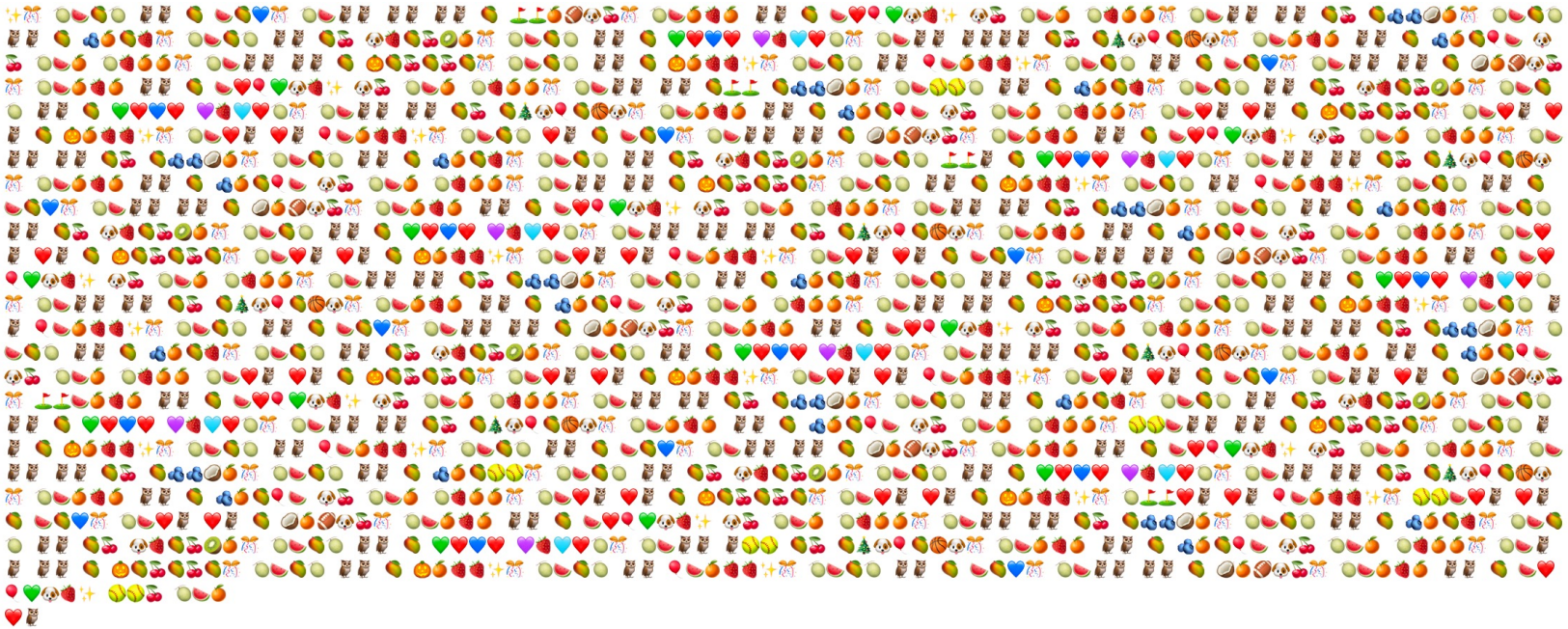
Assignment Examples

- number_subEmojiStrings("🥎🍈🍉🍊🎊🍈🍉🥭🍈", "🍈🍉") = 2
- number_subEmojiStrings("🥎🥎🥎", "🥎") = 3
- number_subEmojiStrings("💚❤️💙❤️", "💚💙") = 0

Subsequence not substring

Assignment

- Input file: https://raw.githubusercontent.com/kevinsuo/CS4504/main/emoji.txt



```c
int main(int argc, char *argv[])
{
    int count;

    readf(fp);
    count = num_substring();
    printf("The number of substrings is: %d\n", count);
    return 1;
}
```

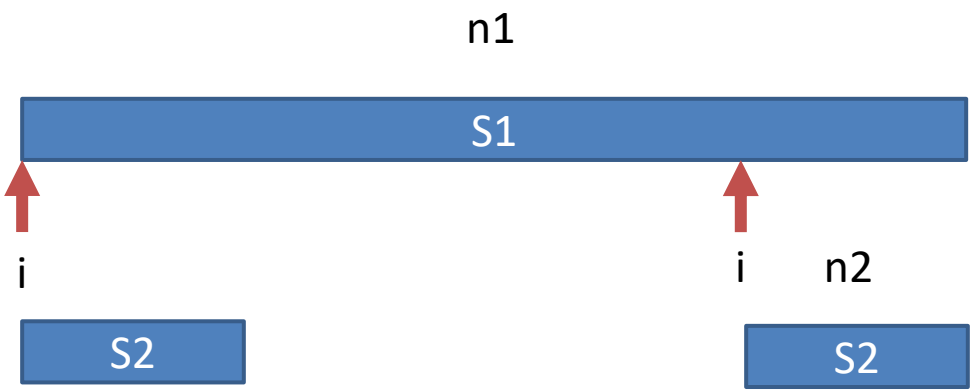
S1= 🍈🍉🦉🦉 ... ... 🥭🫐❤️🦉

S2= ❤️🦉

```c
int total = 0;
int n1,n2;
char *s1,*s2;
FILE *fp;

int readf(FILE *fp)
{
    if((fp=fopen("strings.txt", "r"))==NULL){
        printf("ERROR: can't open string.txt!\n");
        return 0;
    }
    s1=(char *)malloc(sizeof(char)*MAX);
    if(s1==NULL){
        printf("ERROR: Out of memory!\n");
        return -1;
    }
    s2=(char *)malloc(sizeof(char)*MAX);
    if(s2==NULL){
        printf("ERROR: Out of memory\n");
        return -1;
    }
    /*read s1 s2 from the file*/
    s1=fgets(s1, MAX, fp);
    s2=fgets(s2, MAX, fp);
    n1=strlen(s1);  /*length of s1*/
    n2=strlen(s2);   /*length of s2*/

    if(s1==NULL || s2==NULL || n1<n2)  /*when error exit*/
        return -1;
    return 0;
}
```

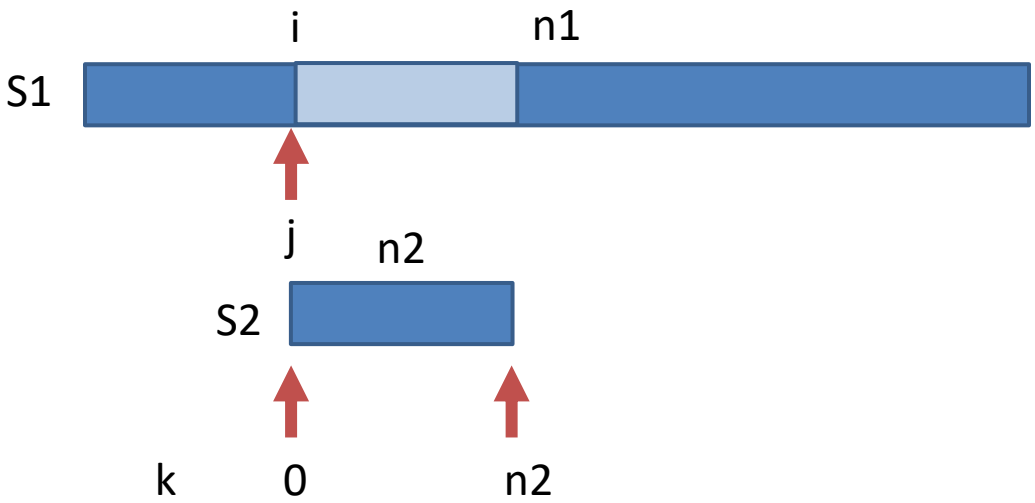
```c
int main(int argc, char *argv[])
{
        int count;

        readf(fp);
        count = num_subEmojiString();
        printf("The number of substrings is: %d\n", count);
        return 1;
}
```

```c
int num_subEmojiString(void)
{
        int i,j,k;
        int count;

        for (i = 0; i <= (n1-n2); i++){
                count=0;
                for(j = i,k = 0; k < n2; j++,k++){  /*search for the next string of size of n2*/
                        if (*(s1+j)!=*(s2+k)){
                                break;
                        }else{
                                count++;
                        }

                        if(count==n2){
                                total++;                /*find a substring in this step*/
                        }
                }
        }
        return total;
}
```



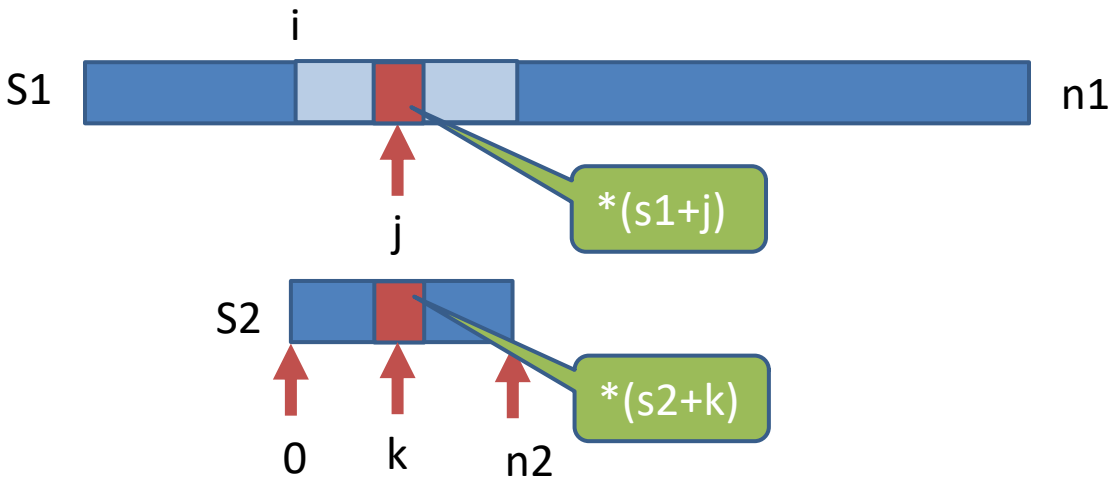
```c
int main(int argc, char *argv[])
{
        int count;

        readf(fp);
        count = num_subEmojiString();
        printf("The number of substrings is: %d\n", count);
        return 1;
}
```

```c
int num_subEmojiString(void)
{
        int i,j,k;
        int count;

        for (i = 0; i <= (n1-n2); i++){
                count=0;
                for(j = i,k = 0; k < n2; j++,k++){  /*search for the next string of size of n2*/
                        if (*(s1+j)!=*(s2+k)){
                                break;
                        }else{
                                count++;
                        }

                        if(count==n2){
                                total++;                /*find a substring in this step*/
                        }
                }
        }
        return total;
}
```



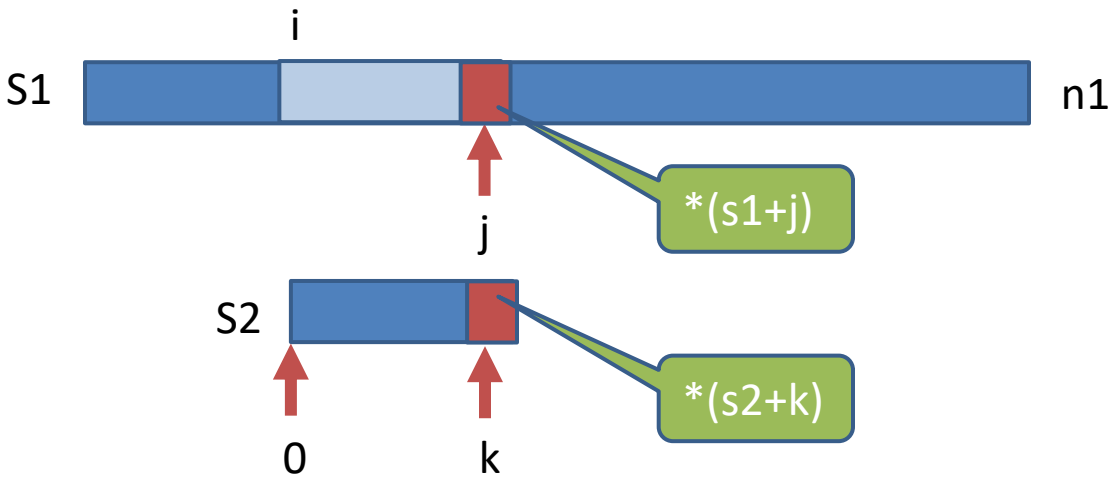
```c
int main(int argc, char *argv[])
{
        int count;

        readf(fp);
        count = num_subEmojiString();
        printf("The number of substrings is: %d\n", count);
        return 1;
}
```

```c
int num_subEmojiString(void)
{
        int i,j,k;
        int count;

        for (i = 0; i <= (n1-n2); i++){
                count=0;
                for(j = i,k = 0; k < n2; j++,k++){  /*search for the next string of size of n2*/
                        if (*(s1+j)!=*(s2+k)){
                                break;
                        }else{
                                count++;
                        }

                        if(count==n2){
                                total++;                /*find a substring in this step*/
                        }
                }
        }
        return total;
}
```



```c
int main(int argc, char *argv[])
{
        int count;

        readf(fp);
        count = num_subEmojiString();
        printf("The number of substrings is: %d\n", count);
        return 1;
}
```

```c
int num_subEmojiString(void)
{
        int i,j,k;
        int count;

        for (i = 0; i <= (n1-n2); i++){
                count=0;
                for(j = i,k = 0; k < n2; j++,k++){  /*search for the next string of size of n2*/
                        if (*(s1+j)!=*(s2+k)){
                                break;
                        }else{
                                count++;
                        }

                        if(count==n2){
                                total++;                /*find a substring in this step*/
                        }
                }
        }
        return total;
}
```



Assignment

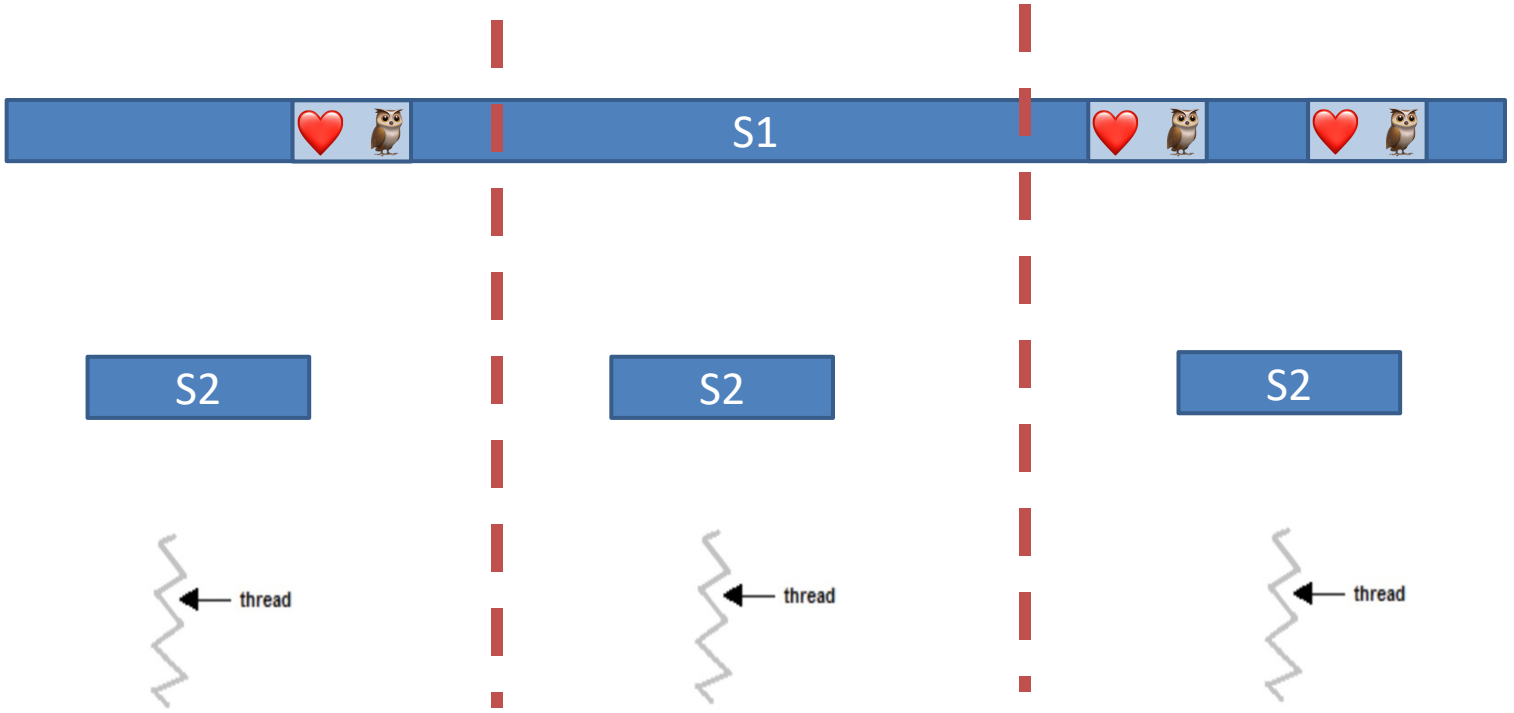
```
int main(int argc, char *argv[])
{
        int count;

        readf(fp);
        count = num_subEmojiString();
        printf("The number of substrings is: %d\n", count);
        return 1;
}
```

(Different text files output is also different. For the emoji.txt, the output is 55)

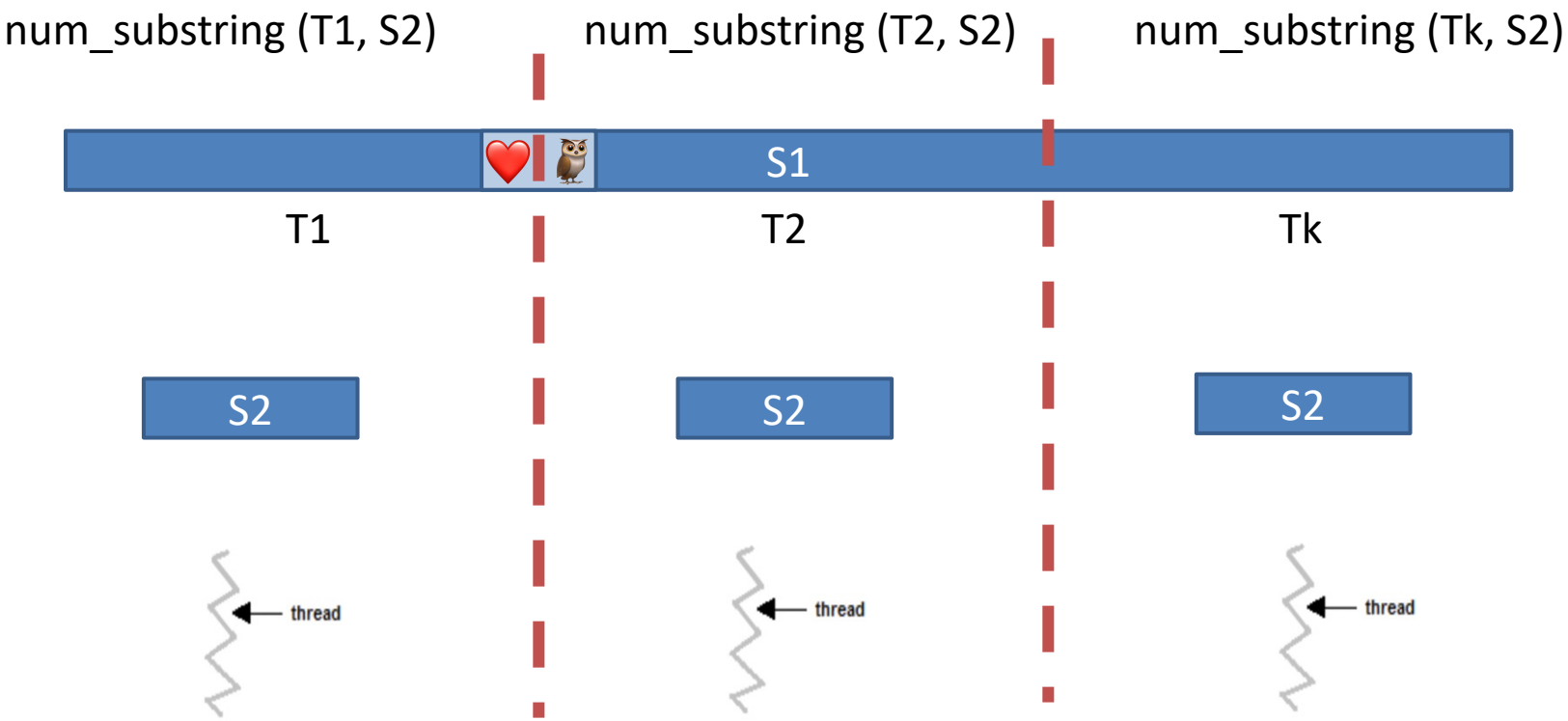
```
ksuo@LinuxKernel2 ~> ./project-pthread.o
The number of substrings is: 320
```

Idea

- Write a parallel program using Pthread based on this sequential solution.



Corner Case


num_substring (T1, S2)
num_substring (T2, S2)
num_substring (Tk, S2)
S1
T1
T2
Tk
S2
S2
S2
thread
thread
thread

Verify whether your parallel thread is correct

- Modify the emoji.txt by yourself

- Compare the sequential and parallel program results that whether the total numbers are the same

Submission

1. source code
2. output screenshot of your parallel code
3. a report describe your code logic