

Program 3.

Write a program to demonstrate usage of pthread library.

```
#include<pthread.h>
#include<stdio.h>
#include<stdlib.h>
#include<fcntl.h>
#include<unistd.h>

// This program takes n files as input from arguments
// Print number of lines in each file and then total of lines

// Count line breaks
// n_breaks + 1 lines will be there, unless we encounter EOF in
beginning

struct input {
    char *filename;
    int *slot; // write the answer in an integer array
}; // for use by linecount function

int count_breaks(char *buf, ssize_t sz) {
    ssize_t i = 0;
    int count = 0;
    for(i=0;i<sz;i++) {
        if (buf[i] == '\n') count++;
    }
    return count;
}

void *linecount(void *inp) {
    struct input *in = (struct input *)inp;
    char buf[256];
    ssize_t rd;
    int fd = open(in->filename, O_RDONLY);
    if (fd < 0) {
        printf("Cannot open %s\n", in->filename);
        *(in->slot) = -1;
        return NULL;
    }
    int count = 0;
    while((rd = read(fd,buf,256)) > 0) {
        count += count_breaks(buf,rd);
    }
    *(in->slot) = count;
    return NULL;
}

struct input *create_input(char *filename, int *slot) {
    struct input *inp = malloc(sizeof(struct input));
    inp->filename = filename;
    inp->slot = slot;
}
```

```

        return inp;
    }

int main(int argc, char **argv) {
    pthread_t *threads = malloc((argc-1)*sizeof(pthread_t));
    int *results = malloc((argc-1)*sizeof(int));
    pthread_attr_t attr;
    pthread_attr_init(&attr);
    int i, total = 0;

    if (argc < 2) {
        fprintf(stderr, "Needs at least 1 argument\n");
        return 1;
    }

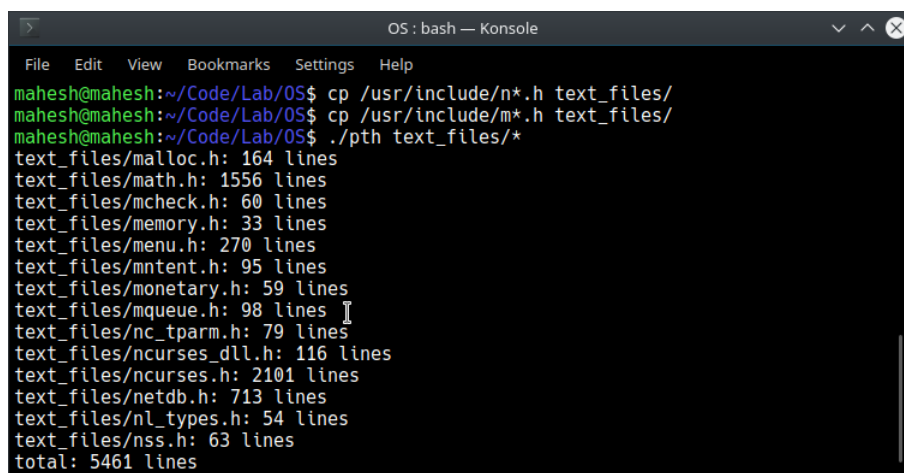
    for(i = 1; i < argc; i++) {
        struct input *in = create_input(argv[i], &results[i-1]);
        // an intentional memory leak, will clear on exiting
        pthread_create(&threads[i-1], &attr, linecount, in);
    }

    for(i=1; i < argc; i++) {
        int jstatus = pthread_join(threads[i-1], NULL);
        if (jstatus != 0) {
            fprintf(stderr, "cannot join thread for file %s",
argv[i]);
            continue;
        }
        if(results[i-1] >= 0) {
            printf("%s: %d lines\n", argv[i], results[i-1]);
            total += results[i-1];
        }
    }

    printf("total: %d lines\n", total);
    free(threads);
    free(results);
    return 0;
}

```

Output:

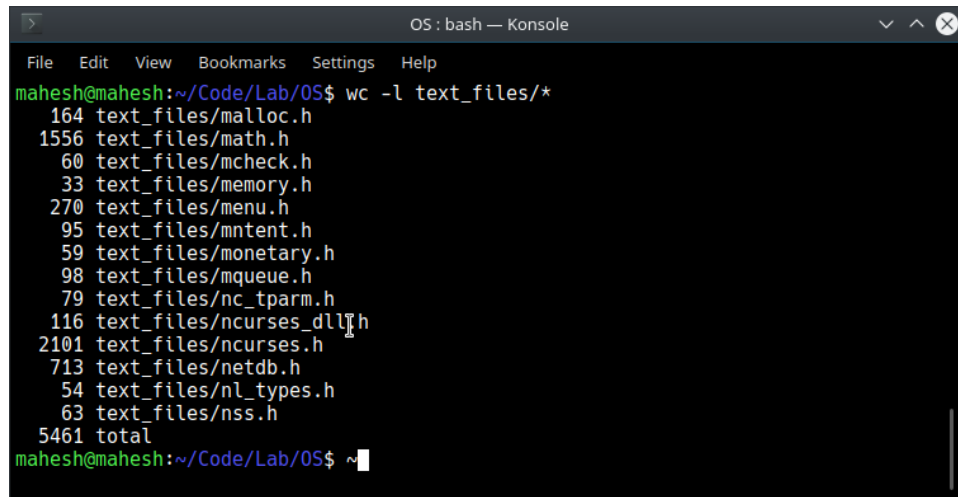


```

OS: bash — Konsole
File Edit View Bookmarks Settings Help
mahesh@mahesh:~/Code/Lab/OS$ cp /usr/include/n*.h text_files/
mahesh@mahesh:~/Code/Lab/OS$ cp /usr/include/m*.h text_files/
mahesh@mahesh:~/Code/Lab/OS$ ./pth text_files/*
text_files/malloc.h: 164 lines
text_files/math.h: 1556 lines
text_files/mcheck.h: 60 lines
text_files/memory.h: 33 lines
text_files/menu.h: 270 lines
text_files/mntent.h: 95 lines
text_files/monetary.h: 59 lines
text_files/mqueue.h: 98 lines
text_files/nc_tparm.h: 79 lines
text_files/ncurses_dll.h: 116 lines
text_files/ncurses.h: 2101 lines
text_files/netdb.h: 713 lines
text_files/nl_types.h: 54 lines
text_files/nss.h: 63 lines
total: 5461 lines

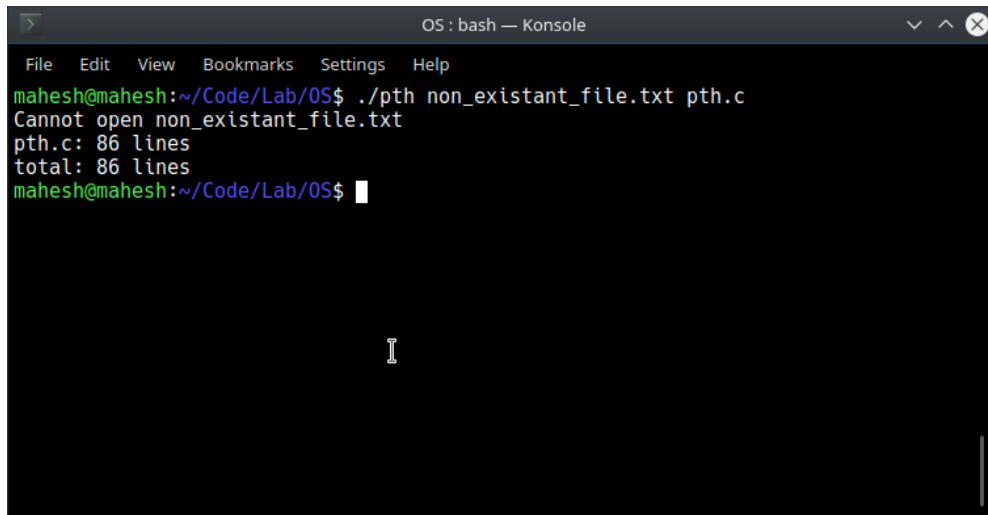
```

For comparison below is the output of `unix wc -l`



```
OS : bash — Konsole
File Edit View Bookmarks Settings Help
mahesh@mahesh:~/Code/Lab/OS$ wc -l text_files/*
 164 text_files/malloc.h
1556 text_files/math.h
   60 text_files/mcheck.h
   33 text_files/memory.h
  270 text_files/menu.h
   95 text_files/mntent.h
   59 text_files/monetary.h
   98 text_files/mqueue.h
   79 text_files/nc_tparm.h
  116 text_files/ncurses_dll.h
2101 text_files/ncurses.h
   713 text_files/netdb.h
   54 text_files/nl_types.h
   63 text_files/nss.h
5461 total
mahesh@mahesh:~/Code/Lab/OS$ ~
```

Case when a file does not exist



```
OS : bash — Konsole
File Edit View Bookmarks Settings Help
mahesh@mahesh:~/Code/Lab/OS$ ./pth non_existant_file.txt pth.c
Cannot open non_existant_file.txt
pth.c: 86 lines
total: 86 lines
mahesh@mahesh:~/Code/Lab/OS$
```

The image shows a terminal window titled "OS : bash — Konsole". The prompt is "mahesh@mahesh:~/Code/Lab/OS\$". The user has entered the command "pth non_existant_file.txt pth.c". The output shows an error message "Cannot open non_existant_file.txt", followed by "pth.c: 86 lines" and "total: 86 lines". The prompt is now "mahesh@mahesh:~/Code/Lab/OS\$".