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Operating Systems
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Problem Set 5

Source Code:

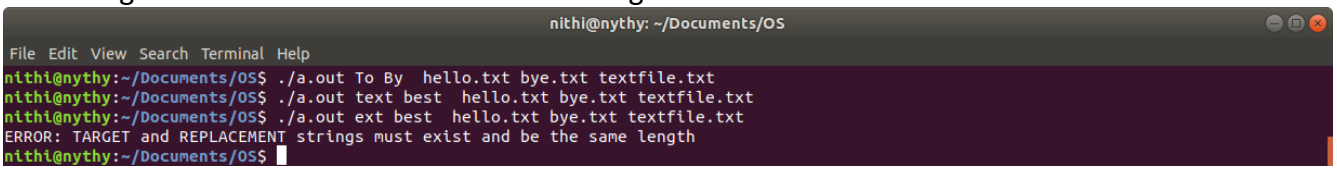
```
#include <sys/mman.h>
#include <sys/stat.h>
#include <fcntl.h>
#include <stdio.h>
#include <errno.h>
#include <stdlib.h>
#include <string.h>
#include <unistd.h>

char* actualsmear(char *addrMmap, const char *target, const char *replacement) {
	char *tmp;
	int distBtwnTargetToTarget, targetCount;
	int targetLength = strlen(target);
	char* addrStart = addrMmap;

	if ((!(targetLength == strlen(replacement))) || targetLength == 0 || target == NULL ) {
		printf("ERROR: TARGET and REPLACEMENT strings must exist and be the same length\n");
		exit(EXIT_FAILURE);
	}

	char* ins = addrMmap;
	for (targetCount = 0; tmp = strstr(ins, target); ++targetCount) {
		ins = tmp + targetLength;
	}

	while (targetCount--) {
		ins = strstr(addrMmap, target);
		distBtwnTargetToTarget = ins - addrMmap;
		for (int j = 0; j< targetLength; j++) {
			addrMmap[distBtwnTargetToTarget+j] = replacement[j];
		}
		addrMmap += distBtwnTargetToTarget + targetLength;
	}
	return addrStart;
}

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

```
    char *addr;
    int fd;
    struct stat sb;

    if (argc < 4) {
        printf("ERROR: Improper arguments specified, appropriate structure is: smear TARGET
REPLACEMENT file1 {file 2....}\n");
        exit(EXIT_FAILURE);
    }

    char* TARGET = argv[1];
    char* REPLACEMENT = argv[2];

    for(int i = 0; i < (argc-3); i++) {

        if((fd = open(argv[i+3], O_RDWR)) <0) {
            fprintf(stderr, "ERROR: Could not open file '%s' to replace TARGET with REPLACEMENT
due to '%s' \n", argv[i+3], strerror(errno));
            exit(EXIT_FAILURE);
        }

        if (fstat(fd, &sb) < 0) {
            fprintf(stderr, "ERROR: Could not stat file '%s' due to:%s \n", argv[i+3], strerror(errno));
            exit(EXIT_FAILURE);
        }

        size_t length = sb.st_size;

        if ((addr = mmap(NULL, length, PROT_READ|PROT_WRITE, MAP_SHARED, fd, 0)) ==
MAP_FAILED) {
            fprintf(stderr, "ERROR: Could not map file '%s': %s\n", argv[i+3], strerror(errno));
            exit(EXIT_FAILURE);
        }

        addr = actualsmear(addr, TARGET, REPLACEMENT );

        if(munmap(addr, length) < 0) {
            fprintf(stderr, "ERROR: Could not munmap file %s\n", strerror(errno));
            exit(EXIT_FAILURE);
        }

        if(close(fd) < 0) {
            fprintf(stderr, "ERROR: Could not close file '%s' due to %s\n",  argv[i+3], strerror(errno));
            exit(EXIT_FAILURE);
        }
```

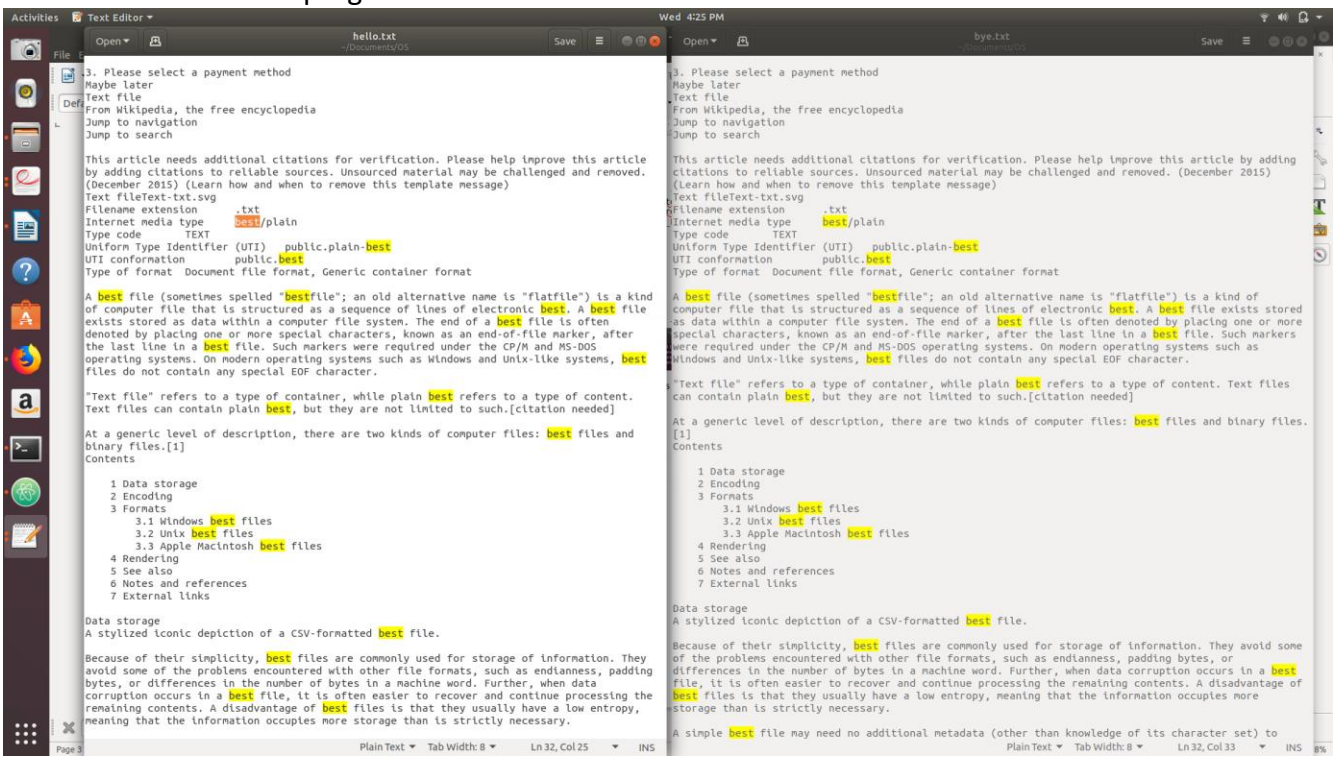
```
    }
    exit(EXIT_SUCCESS);
}
```

Examples of Program Running:

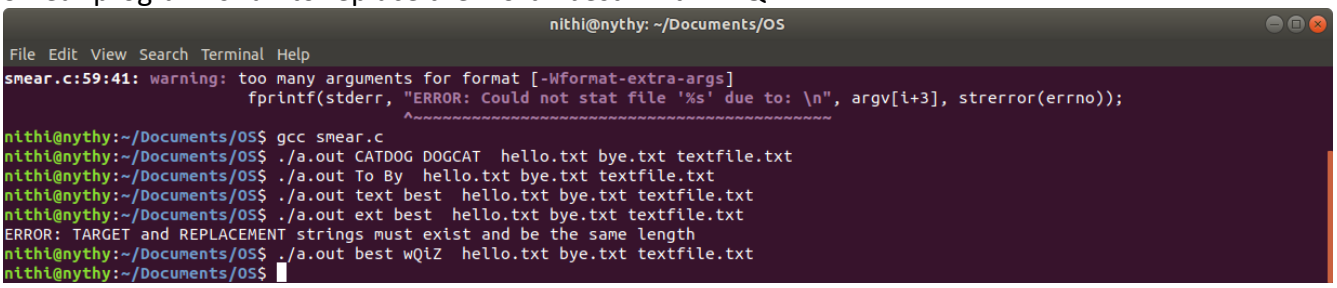
Use of arguments that do not have the same length is not allowed:



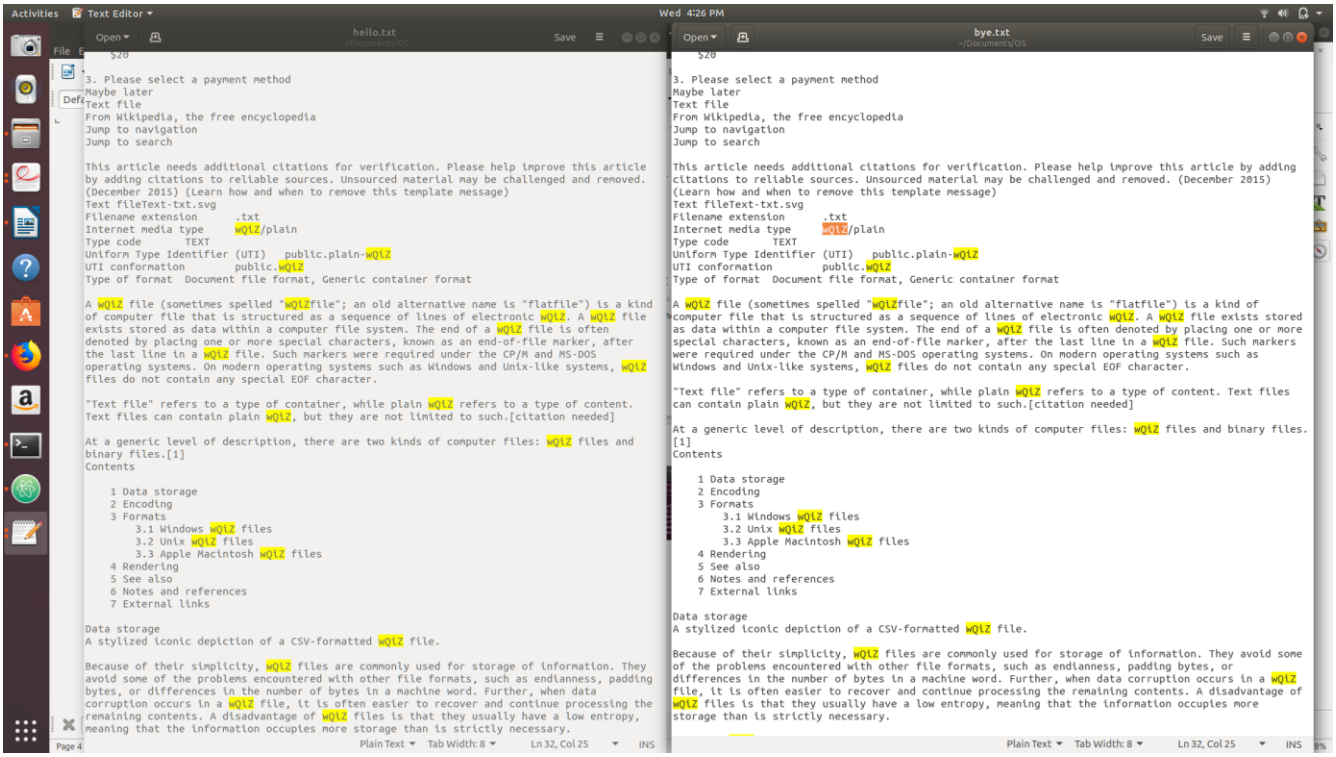
Text files before smear program is run:



Smear program is run to replace the word “best” with “wQiZ”:



Here are the text files after the command is run:



Note: Text used in files hello.txt and bye.txt is the text from the wikipedia page “text file”