.data

string: .space 100

copy: .space 100

prompt: .asciiz "Input String: "

upper: .asciiz "Frequency of upper case: "

lower: .asciiz "Frequency of lower case: "

sp: .asciiz "Frequency of spaces: "

newLine:.asciiz "\n"

pal: .asciiz "String is a palindrome"

npal: .asciiz "String is not a palindrome"

.text

main:

li $v0, 4 #print prompt

la $a0,prompt

syscall

li $v0, 8 #user input

la $a0, string

li $a1, 100

syscall

la $a0,string

count:

#address of string should be in a0

#t0 - upper case count

#t1 - lower case count

#t2 - space count

li $t0,0

li $t1,0

li $t2,0

#65 #A

#90 #Z

#97 #a

#122 #z

#32 #" "

loop:

lb $t3,0($a0)

addi $a0,$a0,1

beqz $t3,print #end string

beq $t3,32,spc

bge $t3,97,low

bge $t3,65,upp

b loop

spc:

addi $t2,$t2,1

b loop

low:

bge $t3,122,loop

addi $t1,$t1,1

b loop

upp:

bge $t3,90,loop

addi $t0,$t0,1

b loop

print:

la $a0,upper #print upper prompt

li $v0,4

syscall

move $a0,$t0 #print count upper case

li $v0,1

syscall

la $a0,newline #print new line

li $v0,4

syscall

la $a0,lower #print lower prompt

li $v0,4

syscall

move $a0,$t1 #print count lower case

li $v0,1

syscall

la $a0,newLine #print new line

li $v0,4

syscall

la $a0,sp #print space prompt

li $v0,4

syscall

move $a0,$t2 #print count space

li $v0,1

syscall

la $a0,newline #print new line

li $v0,4

syscall

#part 2

la $a0,string

jal palindrome

move $t0,$v0

beq $t0,1,pals

npals: #not a palindrome

la $a0,npal #print not palindrome

li $v0,4

syscall

b stop

pals: #is palindrome

la $a0,pal #printpalindrome

li $v0,4

syscall

stop:

la $a0,newLine #print new line

li $v0,4

syscall

la $a0,newLine #print new line

li $v0,4

syscall

li $v0, 10 #stop

syscall

palindrome:

#returns in v0, 0 if false,1 if true

li $t1,0 #char count

li $t3,0 #char

move $t0,$a0 #spot

la $a1,copy

#make a copy with only lowercase letters

copyl:

lb $t3,0($t0)

beqz $t3,isPal #if end string

addi $t0,$t0,1

#skip

bgt $t3,122,ignore #if > z

blt $t3,65,ignore #if < A

ble $t3,90,uppCase #if <= Z

blt $t3,97,ignore #if < a

#char is lower case

saveChar:

sb $t3,0($a1) #save char in copy

addi $t1,$t1,1 #increase char count

addi $a1,$a1,1

ignore:

b copyl

uppCase:

addi $t3,$t3,32 #make char lowercase

b saveChar

isPal:

li $v0,0

la $t0,copy #start

la $t2,copy #end

add $t2,$t2,$t1

addi $t2,$t2,-1

addi $t1,$t1,1 #offset decrementing before bgtz $t1,loop2

div $t1,$t1,2 #count should be half because we are looking

#at the front and back

loop2:

#all chars in copy will be letters and lowercase

lb $t3,0($t0) #front char

lb $t4,0($t2) #back char

addi $t2,$t2,-1

addi $t0,$t0,1

addi $t1,$t1,-1 #decrease count

bne $t3,$t4,back #they aren't equal stop fucntion

bgtz $t1,loop2 #they are equal continue if still more chars

li $v0,1 #loop is done so palindrome

jr $ra #return

back: li $v0,0

jr $ra #return

