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CS 264

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Lab 3 Resubmission

**Code:**

.data

userinput: .space 256

inputsani: .space 256

array: .space 212

prompt: .asciiz "Please input a string: "

prompt2: .asciiz "\nFrequency of "

colon: .asciiz ": "

spaces: .asciiz "spaces: "

newline: .asciiz "\n"

notpal: .asciiz "\nInput is not a palindrome!"

pal: .asciiz "\nInput is a palindrome!"

.text

.globl main

#begin user input

main: li $v0, 4 #syscall 4 - print string

la $a0, prompt

syscall

li $v0, 8 #syscall 8 - read string

la $a0, userinput

li $a1, 128

syscall

#end user input

jal freqread

#begin frequency print

jal freqprint

#end frequency print

jal palendrome

#begin palendrome print

beqz $v1, palfalse #if $v1 = false, palendrome

b paltrue #else, is palendrome

#end palendrome print

freqread: la $t2, array

#ascii values:

#A: 65

#Z: 90

#a: 97

#z: 122

#' ': 32

freqloop: lb $t3, 0($a0) #load byte at address

addi $a0, $a0, 1

beqz $t3, freqcont

beq $t3, 32, spc

bge $t3, 97, low

bge $t3, 65, upp

b freqloop

spc: li $t1, 208

b increment

low: bge $t3, 122, freqloop

sub $t1, $t3, 97

addi $t1, $t1, 26

mul $t1, $t1, 4

b increment

upp: bge $t3, 90, freqloop

sub $t1, $t3, 65

mul $t1, $t1, 4

increment: add $t1, $t1, $t2

lw $t0, 0($t1)

addi $t0, $t0, 1

sw $t0, 0($t1)

b freqloop

freqprint: li $t0, 0

la $t1, array

ploop: bge $t0, 26, plow

add $t2, $t0, 65

li $v0, 11 #print char value

move $a0, $t2

syscall

la $a0, colon

li $v0, 4

syscall

lw $a0, 0($t1) #print frequency

li $v0, 1

syscall

la $a0, newline

li $v0, 4

syscall

addi $t0, $t0, 1

addi $t1, $t1, 4

b ploop

plow: li $t0, 0

plowl: bge $t0, 26, pspace

add $t2, $t0, 97

li $v0, 11

move $a0, $t2

syscall

la $a0, colon

li $v0, 4

syscall

lw $a0, 0($t1)

li $v0, 1

syscall

la $a0, newline

li $v0, 4

syscall

addi $t0, $t0, 1

addi $t1, $t1, 4

b plowl

pspace: la $a0, spaces

li $v0, 4

syscall

lw $a0, 0($t1)

li $v0, 1

syscall

la $a0, newline

li $v0, 4

syscall

freqcont: jr $ra

palendrome: #palendromes ignore punctuation and letter case, so we must sanitize string

li $v1, 0 #set return to false initially

li $t1, 0 #string length

li $t3, 0 #character

la $t0, userinput #load string

move $a0, $t0 #i

la $a1, inputsani

sanitize: lb $t3, ($t0)

beqz $t3, isPal

addi $t0, $t0, 1 #i+1

#character cases

bgt $t3, 'z', ignore #if > z

blt $t3, 'A', ignore #if < A

ble $t3, 'Z', toLowerCase #if <= Z

blt $t3, 'a', ignore #if < a

saveCharacter: sb $t3, ($a1) #save char in sanitized string

addi $t1, $t1, 1 #increment length

addi $a1, $a1, 1 #increment

ignore: b sanitize

toLowerCase: addi $t3, $t3, 32 #add 32 makes it lowercase

b saveCharacter

isPal: li $v0, 0

la $t0, inputsani #start

la $t2, inputsani #end

add $t2, $t2, $t1

addi $t2, $t2, -1

addi $t1, $t1, 1

div $t1, $t1, 2 #middle index

loop: lb $t3, ($t0) #front character

lb $t4, ($t2) #back character

addi $t2, $t2, -1

addi $t0, $t0, 1 #increment front character

addi $t1, $t1, -1 #decrement back character

bne $t3, $t4, return

bgtz $t1, loop

li $v1, 1 #if here, loop is done, is palendrome

b return

palfalse: li $v0, 4 #syscall 4 - print string

la $a0, notpal

syscall

b end

paltrue: li $v0, 4 #syscall 4 - print string

la $a0, pal

syscall

b end

return: jr $ra

end: li $v0, 10 #syscall 10 - end program

syscall

**Output:**

Please input a string: Taco Cat

A: 0

B: 0

C: 1

D: 0

E: 0

F: 0

G: 0

H: 0

I: 0

J: 0

K: 0

L: 0

M: 0

N: 0

O: 0

P: 0

Q: 0

R: 0

S: 0

T: 1

U: 0

V: 0

W: 0

X: 0

Y: 0

Z: 0

a: 2

b: 0

c: 1

d: 0

e: 0

f: 0

g: 0

h: 0

i: 0

j: 0

k: 0

l: 0

m: 0

n: 0

o: 1

p: 0

q: 0

r: 0

s: 0

t: 1

u: 0

v: 0

w: 0

x: 0

y: 0

z: 0

spaces: 1

Input is a palindrome!

-- program is finished running --

Please input a string: Won't lovers revolt now?

A: 0

B: 0

C: 0

D: 0

E: 0

F: 0

G: 0

H: 0

I: 0

J: 0

K: 0

L: 0

M: 0

N: 0

O: 0

P: 0

Q: 0

R: 0

S: 0

T: 0

U: 0

V: 0

W: 1

X: 0

Y: 0

Z: 0

a: 0

b: 0

c: 0

d: 0

e: 2

f: 0

g: 0

h: 0

i: 0

j: 0

k: 0

l: 2

m: 0

n: 2

o: 4

p: 0

q: 0

r: 2

s: 1

t: 2

u: 0

v: 2

w: 1

x: 0

y: 0

z: 0

spaces: 3

Input is a palindrome!

-- program is finished running --

Please input a string: Seventy seven benevolent elephants end up IRRELEPHANT!!!!!

A: 1

B: 0

C: 0

D: 0

E: 2

F: 0

G: 0

H: 1

I: 1

J: 0

K: 0

L: 1

M: 0

N: 1

O: 0

P: 1

Q: 0

R: 2

S: 1

T: 1

U: 0

V: 0

W: 0

X: 0

Y: 0

Z: 0

a: 1

b: 1

c: 0

d: 1

e: 10

f: 0

g: 0

h: 1

i: 0

j: 0

k: 0

l: 2

m: 0

n: 6

o: 1

p: 2

q: 0

r: 0

s: 2

t: 3

u: 1

v: 3

w: 0

x: 0

y: 1

z: 0

spaces: 8

Input is not a palindrome!

-- program is finished running --