

```
.data
string: .space 100
copy:   .space 100
array:  .space 212
prompt: .ascii "Input String: "
semi:   .ascii ": "
sp:     .ascii "spaces: "
newLine: .ascii "\n"
pal:    .ascii "String is a palindrome"
npal:   .ascii "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
    la $t2,array
    #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:
    li $t1,208
    b increment

low:
    bge $t3,122,loop
    sub $t1,$t3,97
    addi $t1,$t1,26
    mul $t1,$t1,4
    b increment

upp:
    bge $t3,90,loop
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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 loop
print:
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,semi    #print :
li $v0,4
syscall
lw $a0,0($t1)#print frequency
li $v0,1
syscall
la $a0,newLine #print new line
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      #print char value
move $a0,$t2
syscall
la $a0,semi    #print :
li $v0,4
syscall
lw $a0,0($t1)#print frequency
li $v0,1
syscall
la $a0,newLine #print new line
li $v0,4
syscall
addi $t0,$t0,1
addi $t1,$t1,4

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        b pLowL
pSpace:  la $a0,sp      #print spaces:
        li $v0,4
        syscall
        lw $a0,0($t1)#print frequency
        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)

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    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 function
    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

```

Sample Output:

```
Console
Input String: RACecar
A: 1
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: 1
S: 0
T: 0
U: 0
V: 0
W: 0
X: 0
Y: 0
Z: 0
a: 1
b: 0
c: 1
d: 0
e: 1
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: 1
s: 0
t: 0
u: 0
v: 0
w: 0
x: 0
y: 0
z: 0
spaces: 0
String is a palindrome
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```
Console
Input String: RAce 345435#@$ CaR
A: 1
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: 2
S: 0
T: 0
U: 0
V: 0
W: 0
X: 0
Y: 0
Z: 0
a: 1
b: 0
c: 1
d: 0
e: 1
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: 0
x: 0
y: 0
z: 0
spaces: 2
String is a palindrome
|
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