## Lab4实验报告

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算法部分：

由实验4要求，考虑设计三个字符串，通过读取地址指针所在位置进行输出,设计R4作为counter，每有一行在游戏过程中被取完就+1，并做一次判断，如果R4等于3，则游戏结束，根据R0判断当前最一次操作由谁来完成，0为player2,1为player1，谁完成对方赢。根据lc3代码改写riscv代码，由此思路编写算法如下：

编写部分：

根据书中学过的汇编语言，依据算法写出如下代码:

.equ Newline 0x0000000A

.equ SAVE 0x0000000B

.equ SaveR0 0x0000000C

.equ SaveR00 0x00000000

.equ SAVE0 0x00000000

.equ ASCIIA 0x00000041

.equ LastA 0x0000000E

.equ LastB 0x0000000F

.equ LastC 0x00000010

li x8,0

li x4,0

li x5,0

addi x5,x5,3

sw x5,LastA(x8)

addi x5,x5,2

sw x5,LastB(x8)

addi x5,x5,3

sw x5,LastC(x8)

CHECKA la x2,Prompt1

lw x3,6(x2)

bnez x3,START

addi x4,x4,1

addi x3,x4,-3

beqz x3,JUDGE

CHECKB la x2,Prompt2

lw x3,6(x2)

bnez x3,START

addi x4,x4,1

addi x3,x4,-3

beqz x3,JUDGE

CHECKC la x2,Prompt3

lw x3,6(x2)

bnez x3,START

addi x4,x4,1

addi x3,x4,-3

beqz x3,JUDGE

START la x0,Prompt1

call Init

la x0,Prompt2

call Init

la x0,Prompt3

call Init

la x0,SaveR00

not x0,x0

addi x0,x0,1

addi x0,x0,1

sw x0,SaveR00(x8)

again la x0,SaveR00

bgtz x0,player1

beqz x0,player2

player1 la x0,Prompt4

j L

Player2 la x0,Prompt5

j L

L sw x0,SaveR0

lw x0,0(x0)

beqz x0,Loop

call printf

la x0,SaveR0

addi x0,x0,1

bnez x0,L

Loop call scanf

call printf

li x1,0

add x1,x1,x0

call scanf

sw x0,SAVE

call printf

la x0,Newline

call printf

la x0,SAVE

la x2,ASCIIA

sub x2,x1,x2

bltz x2,fail

beqz x2,A

addi x3,x2,-1

beqz x3,B

addi x3,x2,-2

beqz x3,C

bgtz x3,fail

A la x2,Prompt1

lw x5,6(x2)

beqz fail

addi x1,x0,-48

blez x1,fail

addi x3,x1,0

la x5,LastA

sub x3,x5,x3

bltz x3,fail

la x2,Prompt1

sub x5,x5,x1

sw x5,LastA(x0)

addi x5,x5,6

add x2,x2,x5

la x0,SAVE

sw x0,0(x2)

j CHECKA

B la x2,Prompt2

lw x5,6(x2)

beqz fail

addi x1,x0,-48

blez x1,fail

addi x3,x1,0

la x5,LastB

sub x3,x5,x3

bltz x3,fail

la x2,Prompt2

sub x5,x5,x1

sw x5,LastB(x0)

addi x5,x5,6

add x2,x2,x5

la x0,SAVE

sw x0,0(x2)

j CHECKB

C la x2,Prompt3

lw x5,6(x2)

beqz fail

addi x1,x0,-48

blez x1,fail

addi x3,x1,0

la x5,LastC

sub x3,x5,x3

bltz x3,fail

la x2,Prompt3

sub x5,x5,x1

sw x5,LastC(x0)

addi x5,x5,6

add x2,x2,x5

la x0,SAVE

sw x0,0(x2)

j CHECKC

JUDGE la x0,SaveR00

bgtz x0,Player\_2\_Wins

beqz x0,Player\_1\_Wins

Player\_2\_Wins la x0,Prompt8

call Init

Player\_1\_Wins la x0,Prompt7

call Init

Init sw x0,SaveR0(x8)

lw x0,0(x0)

beqz OK

auipc ra,0x0

la x0,SaveR0

addi x0,x0,1

bnez x0,Init

OK la x0,Newline

auipc ra,0x0

ret

fail la x0,Prompt6

call Init

j again

Prompt1 .STRINGZ "ROW A:ooo"

Prompt2 .STRINGZ "ROW B:ooooo"

Prompt3 .STRINGZ "ROW C:oooooooo"

Prompt4 .STRINGZ "Player1, choose a row and number of rocks:"

Prompt5 .STRINGZ "Player2, choose a row and number of rocks:"

Prompt6 .STRINGZ "Invalid move. Try again."

Prompt7 .STRINGZ "Player1 Wins."

Prompt8 .STRINGZ "Player2 Wins."

测试部分：

经输入，测试无误，代码正确！