

# Báo cáo thực hành - Tuần 5

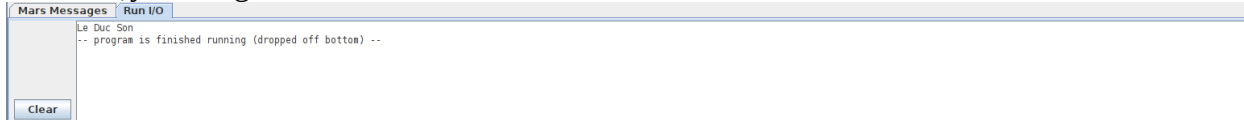
## Lê Đức Sơn - 20194658

### Bài 1:

- Source code:

```
1 .data
2 test: .asciiz "Le Duc Son"
3 .text
4 li $v0, 4
5 la $a0, test
6 syscall
```

- Chạy chương trình:



Address	Value (+0)	Value (+4)	Value (+8)	Value (+c)	Value (+10)	Value (+14)	Value (+18)	Value (+1c)
0x10010000	0	e L	S	c u				
0x10010020	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
0x10010040	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
0x10010060	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
0x10010080	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
0x100100a0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
0x100100c0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
0x100100e0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0

### Bài 2:

- Source code:

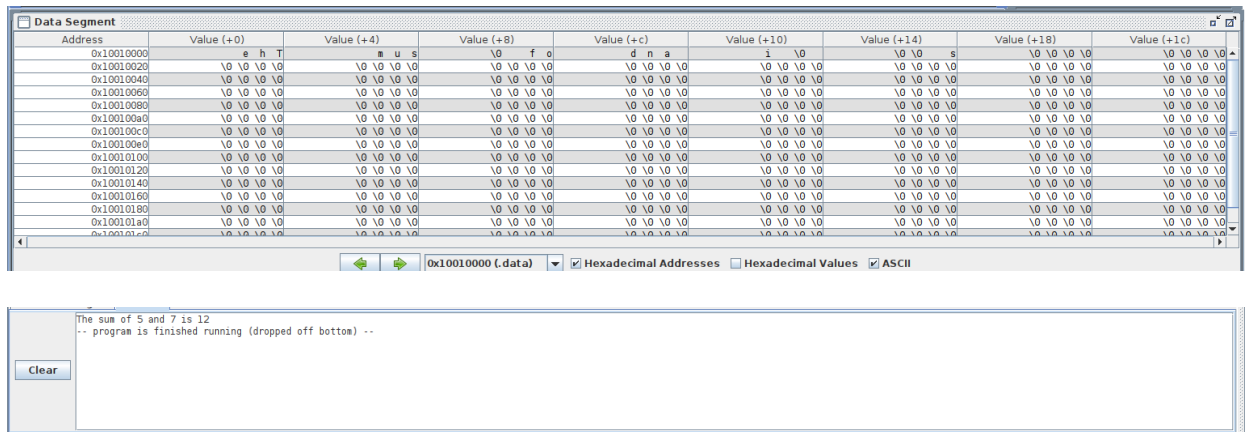
```
1 .data
2 theSum: .asciiz "The sum of "
3 And: .asciiz " and "
4 is: .asciiz " is "
5 .text
6 addi $s0, $zero, 5 #gan $s0 = 5
7 addi $s1, $zero, 7 #gan $s1 = 7
8 add $t0, $s0, $s1 # $t0 = $s0 + $s1
9
10 li $v0, 4 # $v0 = 4 -> in ra chuoai theSum
11 la $a0, theSum
12 syscall # goi ham
13
14 li $v0, 1 # $v0 = 1 -> in ra so $s0
15 la $a0, 0($s0)
16 syscall #goi ham
17
18 li $v0, 4 # $v0 = 4 -> in ra chuoai And
19 la $a0, And
20 syscall #goi ham
21
22 li $v0, 1 # $v0 = 1 -> in ra so $s1
23 la $a0, 0($s1)
24 syscall #goi ham
25
26 li $v0, 4 # $v0 = 4 -> in ra chuoai is
27 la $a0, is
28 syscall #goi ham
29
30 li $v0, 1 # $v0 = 1 -> in ra so $t0 ($t0 = $s0 + $s1)
31 la $a0, 0($t0)
32 syscall #goi ham
33
```

- Chạy chương trình:

Text Segment				Labels	
Bkpt	Address	Code	Basic	Label	Address
	0x00400000	0x20100005	addi \$16,\$0,5		
	0x00400004	0x20110007	addi \$17,\$0,7		
	0x00400008	0x02114020	add \$8,\$16,\$17		
	0x0040000c	0x24020004	addiu \$2,\$0,4		
	0x00400010	0x3c011001	lui \$1,4097		
	0x00400014	0x34240000	ori \$4,\$1,0		
	0x00400018	0x0000000c	syscall		
	0x0040001c	0x24020001	addiu \$2,\$0,1		
	0x00400020	0x34010000	ori \$1,\$0,0		
	0x00400024	0x02012020	add \$4,\$16,\$1		
	0x00400028	0x0000000c	syscall		
	0x0040002c	0x24020004	addiu \$2,\$0,4		
	0x00400030	0x3c011001	lui \$1,4097		
	0x00400034	0x34240000	ori \$4,\$1,12		
	0x00400038	0x0000000c	syscall		
	0x0040003c	0x24020001	addiu \$2,\$0,1		
	0x00400040	0x34010000	ori \$1,\$0,0		

mips2.asm	
theSum	0x10010000
And	0x1001000c
is	0x10010012

☒ Data ☒ Text



### Bài 3:

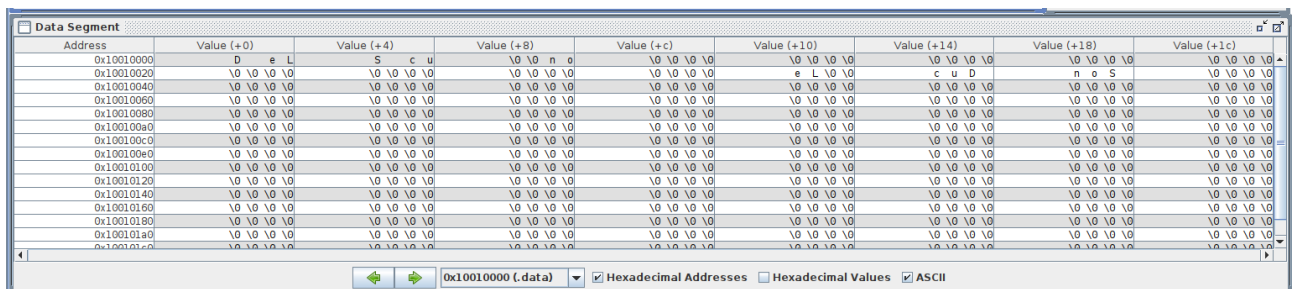
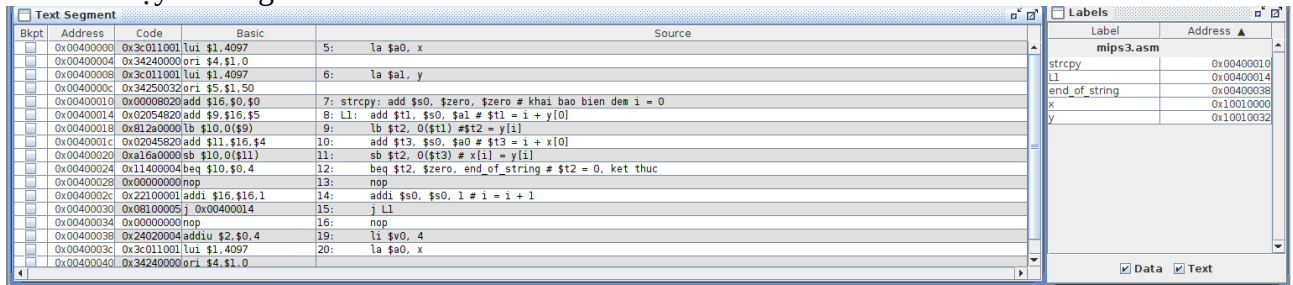
- Source code:

```

1 .data
2 x: .space 50
3 y: .asciiz "Le Duc Son"
4 .text
5     la $a0, x
6     la $a1, y
7 strcpy: add $s0, $zero, $zero # khai bao bien dem i = 0
8 L1:    add $t1, $s0, $a1 # $t1 = i + y[0]
9        lb $t2, 0($t1) # $t2 = y[i]
10       add $t3, $s0, $a0 # $t3 = i + x[0]
11       sb $t2, 0($t3) # x[i] = y[i]
12       beq $t2, $zero, end_of_string # $t2 = 0, ket thuc
13       nop
14       addi $s0, $s0, 1 # i = i + 1
15       j L1
16       nop
17 end_of_string:
18     # in ra chuoai x
19     li $v0, 4
20     la $a0, x
21     syscall
22
23

```

- Chạy chương trình:



## Bài 4:

- Source code:

```
1 .data
2 string: .space 100
3 Message1: .asciiz "Nhap xau: "
4 Message2: .asciiz "Do dai xau la: "
5 .text
6 main:
7 get_string: li $v0, 54 # ham in ra hop thoai de doc chuoai
8             la $a0, Message1 # dia chi thong bao 1
9             la $a1, string # de chi chuoai nhap vao
10            la $a2, 100 # do dai max chuoai nhap vao
11            syscall #goi ham
12 get_length: la $a0, string # load dia chi cua chuoai nhap vao
13             add $t0, $zero, $zero # Khai bao bien dem i ( la bien luu do dai chuoai )
14 check_char: add $t1, $a0, $t0 # $t1 la dia chi string[i]
15             lb $t2, 0($t1) # $t2 = str[i](gia tri)
16             beq $t2, $zero, end_of_string # khi gap ki tu ket thuc, ket thuc chuong trinh va in ra man hinh do dai chuoai
17             nop
18             addi $t0, $t0, 1 # i = i + 1
19             j check_char
20             nop
21 end_of_string:
22 print_length: li $v0, 56 # in ra hop thoai de in ra do dai chuoai
23              la $a0, Message2 # dia chi thong bao 2
24              addi $t0, $t0, -1 # loai bo ki tu ket thuc
25              la $a1, 0($t0) # do dai chuoai
26              syscall # goi ham
27
28
29
```

- Chạy chương trình:

The screenshot displays the MIPS simulator interface. The 'Text Segment' window shows the assembly code with line numbers 1 through 29. The 'Data Segment' window shows memory addresses from 0x10010000 to 0x10010120, with a hex dump and ASCII view. The 'Input' dialog box is open, prompting 'Nhap xau:' (Enter string:), and the user has entered 'Le Duc Son'. The 'Labels' window on the right shows the symbol table for 'mips4.asm', including labels like 'main', 'get\_string', 'get\_length', 'check\_char', 'end\_of\_string', 'print\_length', 'string', 'Message1', and 'Message2' with their corresponding addresses.

Text Segment

Bkpt	Address	Code	Basic	Source
	0x00400000	0x24020036	addiu \$2,\$0,54	7: get_string: li \$v0, 54 # ham in ra hop thoai de doc chuoai
	0x00400004	0x3c011001	lui \$1,4097	8: la \$a0, Message1 # dia chi thong bao 1
	0x00400008	0x34240064	ori \$4,\$1,100	
	0x0040000c	0x3c011001	lui \$1,4097	9: la \$a1, string # de chi chuoai nhap vao
	0x00400010	0x34250000	ori \$5,\$1,0	
	0x00400014	0x24060064	addiu \$6,\$0,100	10: la \$a2, 100 # do dai max chuoai nhap vao
	0x00400018	0x0000000c	syscall	11: syscall #goi ham
	0x0040001c	0x3c011001	lui \$1,4097	12: get_length: la \$a0, string # load dia chi cua chuoai nhap vao
	0x00400020	0x34240000	ori \$4,\$1,0	
	0x00400024	0x00004020	add \$8,\$0,\$0	13: add \$t0, \$zero, \$zero # Khai bao bien dem i ( la bien luu do dai chuoai )
	0x00400028	0x00884820	add \$9,\$4,\$8	14: check_char: add \$t1, \$a0, \$t0 # \$t1 la dia chi string[i]
	0x0040002c	0x812a0000	lb \$t2,0(\$t1)	15: lb \$t2, 0(\$t1) # \$t2 = str[i](gia tri)
	0x00400030	0x11400004	beq \$t0,\$0,4	16: beq \$t2, \$zero, end_of_string # khi gap ki tu ket thuc, ket thuc chuong trinh va in ra man hinh do da...
	0x00400034	0x00000000	nop	17: nop
	0x00400038	0x21080001	addi \$8,\$8,1	18: addi \$t0, \$t0, 1 # i = i + 1
	0x0040003c	0x0610000a	j 0x00400028	19: j check_char
	0x00400040	0x00000000	nop	20: nop

Labels

Label	Address
mips4.asm	
main	0x00400000
get_string	0x00400000
get_length	0x0040001c
check_char	0x00400028
end_of_string	0x00400044
print_length	0x00400044
string	0x10010000
Message1	0x10010064
Message2	0x1001006f

Data Segment

Address	Value (+0)	Value (+4)	Value (+8)	Value (+c)	Value (+14)	Value (+18)	Value (+1c)
0x10010000	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0
0x10010020	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0
0x10010040	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0
0x10010060	\0 \0 \0 \0	p a h M	u a x	D \0	\0 \0 \0 \0	a x i	\0 \0 \0 \0
0x10010080	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0
0x100100a0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0
0x100100c0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0
0x100100e0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0
0x10010100	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0
0x10010120	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0	\0 \0 \0 \0

Do dai xau la: 10

OK

## Bài 5:

- Source code:

```
mips1.asm mips2.asm mips3.asm mips4.asm mips5.asm
1 .data
2 string: .space 80
3 message1: .asciiz "Nhap vao chuoi: "
4 message2: .asciiz "Chuoi dao nguoc:\n"
5 .text
6 addi $s0, $zero, 21 # chieu dai toi da chuoi co the nhap vao i
7 la $a1, string
8 li $v0, 4 # in ra thong bao 1
9 la $a0, message1
10 syscall
11 read:
12 li $v0, 12 # goi ham doc tung ky tu
13 syscall
14
15 addi $s0, $s0, -1 # giam so ky tu co the doc vao i = i -1
16 beq $v0, 10, end_read # gap dau enter, ket thuc doc vao
17 beqz $s0, end_read # nhap qua 20 ky tu, ket thuc doc vao
18
19 add $t1, $s0, $a1 # lay dia chi cua string[i]
20 sb $v0, 0($t1) # gan ki tu vua doc vao t1
21 j read
22 end_read:
23 #in ra thong bao 2
24 li $v0, 4
25 la $a0, message2
26 syscall
27 #in ra chuoi nguoc
28 li $v0, 4
29 la $a0, 0($t1)
30 syscall
31
```

- Chạy chương trình:
  - Dưới 20 ký tự:

### Text Segment

Bkpt	Address	Code	Basic	Source
	0x00400000	0x20100015	addi \$16,\$0,21	6: addi \$s0, \$zero, 21 # chieu dai toi da chuoai co the nhap vao i
	0x00400004	0x3c011001	lui \$1,4097	7: la \$a1, string
	0x00400008	0x34250000	ori \$5,\$1,0	
	0x0040000c	0x24020004	addiu \$2,\$0,4	8: li \$v0, 4 # in ra thong bao 1
	0x00400010	0x3c011001	lui \$1,4097	9: la \$a0, message1
	0x00400014	0x24240000	ori \$4,\$1,80	
	0x00400018	0x0000000c	syscall	10: syscall
	0x0040001c	0x2402000c	addiu \$2,\$0,12	12: li \$v0, 12 # goi ham doc tung ky tu
	0x00400020	0x0000000c	syscall	13: syscall
	0x00400024	0x2210ffff	addi \$16,\$16,-1	15: addi \$s0, \$s0, -1 # giam so ky tu co the doc vao i = i -1
	0x00400028	0x20010006	addi \$1,\$s0,10	16: beq \$v0, 10, end_read # gap dau enter, ket thuc doc vao
	0x0040002c	0x10220004	beq \$1,\$2,4	
	0x00400030	0x12000003	beq \$16,\$0,3	17: beqz \$s0, end_read # nhap qua 20 ky tu, ket thuc doc vao
	0x00400034	0x02054820	add \$9,\$16,\$5	19: add \$t1, \$s0, \$a1 # lay dia chi cua string[i]
	0x00400038	0xa1220000	sb \$2,0(\$9)	20: sb \$v0, 0(\$t1) # gan ki tu vua doc vao t1
	0x0040003c	0x08100007	j 0x0040001c	21: j read
	0x00400040	0x24020004	addiu \$2,\$0,4	24: li \$v0, 4

### Labels

Label	Address
mips5.asm	
read	0x0040001c
end_read	0x00400040
string	0x10010000
message1	0x10010050
message2	0x10010061

☒ Data ☒ Text

### Byte Segment

Address	Value (+0)	Value (+4)	Value (+8)	Value (+c)	Value (+10)	Value (+14)	Value (+18)	Value (+1c)
0x10010000	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x10010020	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x10010040	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x10010060	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x10010080	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x100100a0	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x100100c0	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x100100e0	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x10010100	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x10010120	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x10010140	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x10010160	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x10010180	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x100101a0	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00
0x100101c0	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00

```
Mars Messages  RUN
Nhap vao chuoai: Le Duc Son
Chuoai dao nguoc:
noS cuoi eL
-- program is finished running (dropped off bottom) --

Clear
```

- Trên 20 ký tự:

### Text Segment

Bkpt	Address	Code	Basic	Source
	0x00400000	0x20100015	addi \$16,\$0,21	6: addi \$s0, \$zero, 21 # chieu dai toi da chui co the nhap vao i
	0x00400004	0x3c011001	lui \$1, 4097	7: la \$a1, string
	0x00400008	0x34250000	ori \$5,\$1,0	
	0x0040000c	0x24020004	addiu \$2,\$0,4	8: li \$v0, 4 # in ra thong bao 1
	0x00400010	0x3c011001	lui \$1, 4097	9: la \$a0, message1
	0x00400014	0x34240050	ori \$4,\$1,80	
	0x00400018	0x0060000c	syscall	10: syscall
	0x0040001c	0x2402000c	addiu \$2,\$0,12	12: li \$v0, 12 # goi ham doc tung ky tu
	0x00400020	0x0000000c	syscall	13: syscall
	0x00400024	0x2210ffff	addi \$16,\$16,-1	15: addi \$s0, \$s0, -1 # giam so ky tu co the doc vao i = 1
	0x00400028	0x2001000a	addi \$1,\$0,10	16: beq \$v0, 10, end_read # gap dau enter, ket thuc doc vao
	0x0040002c	0x10220004	beq \$1,\$2,4	
	0x00400030	0x12000003	beq \$16,\$0,3	17: beq \$v0, end_read # nhap qua 20 ky tu, ket thuc doc vao
	0x00400034	0x02054020	addi \$9,\$16,\$5	19: add \$t1, \$s0, \$a1 # lay dia chi cua string[i]
	0x00400038	0xa122000b	sb \$v0, 0(\$t1)	20: sb \$v0, 0(\$t1) # gan ki tu vao doc vao t1
	0x0040003c	0x08100007	j 0x0040001c	21: j read
	0x00400040	0x24020004	addiu \$2,\$0,4	24: li \$v0, 4

### Labels

Label	Address
mips5.asm	
read	0x0040001c
end_read	0x00400040
string	0x10010000
message1	0x10010050
message2	0x10010061

☒ Data ☒ Text

### Data Segment

Address	Value (+0)	Value (+4)	Value (+8)	Value (+c)	Value (+10)	Value (+14)	Value (+18)	Value (+1c)
0x10010000	d o v	d u c	n l e	c s o	e d u	v v v l	v v v v	v v v v
0x10010020	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v
0x10010040	v v v v	v v v v	v v v v	v v v v	v v v v	p a h N	e a v	u h c
0x10010060	h c v n	i o u	e a d	e u g n	v v v v	v v v v	v v v v	v v v v
0x10010080	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v
0x100100a0	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v
0x100100c0	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v
0x100100e0	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v
0x10010100	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v
0x10010120	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v
0x10010140	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v
0x10010160	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v
0x10010180	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v
0x100101a0	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v
0x100101c0	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v	v v v v

0x10010000 (.data)

☒ Hexadecimal Addresses
 ☐ Hexadecimal Values
 ☒ ASCII

```
Mars Messages | RunIU
Nhap vao chuoi: le duc son le duc don
Chuoi dao nguoc:
od cud el nos cud el
-- program is finished running (dropped off bottom) --

Clear
```