

Homework Assignment #3 – MIPS Assembly Programming

CDA 3100, Computer Organization I

The purpose of this assignment is to get you be familiar with assembly programming and calling conversions with MIPS.

You must test your code using SPIM. This homework must be finished by groups with maximum 3 members. All members in the same group will share the same grade.

In this homework, you are asked to find the longest uninterrupted speech uttered by a character in a part of a Shakespeare play I copied from <http://www.william-shakespeare.info/act2-script-text-henry-vi-part1.htm>, and highlight it by changing all lower case letters (from 'a' to 'z') in it to upper case.

I have provided the skeleton of the code at the end of this description of the homework. As you can see, any uninterrupted speech by any character begins with his/her name, followed one carriage return (in ascii "0x0a"), then followed by one or several lines of text, then ends with two carriage returns (in ascii "0x0a0x0a").

For simplicity, in this homework, we define a speech as a part of the text that begins name of the character and ends with 0x0a0x0a.

To practice MIPS calling conventions, you **must** implement **four** functions called "cov_longest," "find_next_sentence," "get_to_end", and "cov_str:"

- **cov_longest (30 points):** Accepts in \$a0 the address asciiz string to be searched and in \$a1 the address of the asciiz string storing of name of the character. Returns 1 in \$v0 if there is at least one speech by the character and 0 otherwise; in the former case, converts all lower case letters to upper case in the longest uninterrupted speech uttered by the character.
- **find_next_sentence (30 points):** Accepts in \$a0 the address asciiz string to be searched, and in \$a1 the address of the asciiz string storing of name of the character. Returns in \$v0 the address of the first byte of the name of the character found in the search string and 0 if no such name can be found.
- **get_to_end (20 points):** Accepts in \$a0 the starting address of a speech. Returns in \$v0 the length of the speech.
- **cov_str (20 points):** Accepts in \$a0 the starting address of a speech, in \$a1 the length of a speech. Converts all lower case letters to upper case in the speech.

```
.data

dialog      :.asciiz "BEDFORD
Coward of France! how much he wrongs his fame,
Despairing of his own arm's fortitude,
To join with witches and the help of hell!
```

BURGUNDY

Traitors have never other company.
But what's that Pucelle whom they term so pure?

TALBOT

A maid, they say.

BEDFORD

A maid! and be so martial!

BURGUNDY

Pray God she prove not masculine ere long,
If underneath the standard of the French
She carry armour as she hath begun.

TALBOT

Well, let them practise and converse with spirits:
God is our fortress, in whose conquering name
Let us resolve to scale their flinty bulwarks.

BEDFORD

Ascend, brave Talbot; we will follow thee.

TALBOT

Not all together: better far, I guess,
That we do make our entrance several ways;
That, if it chance the one of us do fail,
The other yet may rise against their force.

BEDFORD

Agreed: I'll to yond corner.

BURGUNDY

And I to this.

TALBOT

And here will Talbot mount, or make his grave.
Now, Salisbury, for thee, and for the right
Of English Henry, shall this night appear
How much in duty I am bound to both.

Sentinels

Arm! arm! the enemy doth make assault!

ALENCON

How now, my lords! what, all unready so?

BASTARD OF ORLEANS

Unready! ay, and glad we 'scaped so well.

REIGNIER

'Twas time, I trow, to wake and leave our beds,
Hearing alarums at our chamber-doors.

ALENCON

Of all exploits since first I follow'd arms,
Ne'er heard I of a warlike enterprise

More venturous or desperate than this.

BASTARD OF ORLEANS

I think this Talbot be a fiend of hell.

REIGNIER

If not of hell, the heavens, sure, favour him.

ALENCON

Here cometh Charles: I marvel how he sped.

BASTARD OF ORLEANS

Tut, holy Joan was his defensive guard.

Enter CHARLES and JOAN LA PUCELLE

CHARLES

Is this thy cunning, thou deceitful dame?
Didst thou at first, to flatter us withal,
Make us partakers of a little gain,
That now our loss might be ten times so much?

JOAN LA PUCELLE

Wherefore is Charles impatient with his friend!
At all times will you have my power alike?
Sleeping or waking must I still prevail,
Or will you blame and lay the fault on me?
Improvident soldiers! had your watch been good,
This sudden mischief never could have fall'n.

CHARLES

Duke of Alencon, this was your default,
That, being captain of the watch to-night,
Did look no better to that weighty charge.

ALENCON

Had all your quarters been as safely kept
As that whereof I had the government,
We had not been thus shamefully surprised.

BASTARD OF ORLEANS

Mine was secure.

REIGNIER

And so was mine, my lord.

CHARLES

And, for myself, most part of all this night,
Within her quarter and mine own precinct
I was employ'd in passing to and fro,
About relieving of the sentinels:
Then how or which way should they first break in?

JOAN LA PUCELLE

Question, my lords, no further of the case,
How or which way: 'tis sure they found some place
But weakly guarded, where the breach was made.

And now there rests no other shift but this;
To gather our soldiers, scatter'd and dispersed,
And lay new platforms to endamage them.

Soldier

I'll be so bold to take what they have left.
The cry of Talbot serves me for a sword;
For I have loaden me with many spoils,
Using no other weapon but his name.

Exit

SCENE II. Orleans. Within the town.

Enter TALBOT, BEDFORD, BURGUNDY, a Captain, and others

BEDFORD

The day begins to break, and night is fled,
Whose pitchy mantle over-veil'd the earth.
Here sound retreat, and cease our hot pursuit.

Retreat sounded

TALBOT

Bring forth the body of old Salisbury,
And here advance it in the market-place,
The middle centre of this cursed town.
Now have I paid my vow unto his soul;
For every drop of blood was drawn from him,
There hath at least five Frenchmen died tonight.
And that hereafter ages may behold
What ruin happen'd in revenge of him,
Within their chiefest temple I'll erect
A tomb, wherein his corpse shall be interr'd:
Upon the which, that every one may read,
Shall be engraved the sack of Orleans,
The treacherous manner of his mournful death
And what a terror he had been to France.
But, lords, in all our bloody massacre,
I muse we met not with the Dauphin's grace,
His new-come champion, virtuous Joan of Arc,
Nor any of his false confederates.

BEDFORD

'Tis thought, Lord Talbot, when the fight began,
Roused on the sudden from their drowsy beds,
They did amongst the troops of armed men
Leap o'er the walls for refuge in the field.

BURGUNDY

Myself, as far as I could well discern
For smoke and dusky vapours of the night,
Am sure I scared the Dauphin and his trull,
When arm in arm they both came swiftly running,
Like to a pair of loving turtle-doves
That could not live asunder day or night.
After that things are set in order here,

We'll follow them with all the power we have.

Enter a Messenger

Messenger

All hail, my lords! which of this princely train
Call ye the warlike Talbot, for his acts
So much applauded through the realm of France?

TALBOT

Here is the Talbot: who would speak with him?

Messenger

The virtuous lady, Countess of Auvergne,
With modesty admiring thy renown,
By me entreats, great lord, thou wouldst vouchsafe
To visit her poor castle where she lies,
That she may boast she hath beheld the man
Whose glory fills the world with loud report.

BURGUNDY

Is it even so? Nay, then, I see our wars
Will turn unto a peaceful comic sport,
When ladies crave to be encounter'd with.
You may not, my lord, despise her gentle suit.

TALBOT

Ne'er trust me then; for when a world of men
Could not prevail with all their oratory,
Yet hath a woman's kindness over-ruled:
And therefore tell her I return great thanks,
And in submission will attend on her.
Will not your honours bear me company?

BEDFORD

No, truly; it is more than manners will:
And I have heard it said, unbidden guests
Are often welcomest when they are gone.

TALBOT

Well then, alone, since there's no remedy,
I mean to prove this lady's courtesy.
Come hither, captain.

\n\n"

opening:.asciiz "BEDFORD"

.text
.globl main

main: la \$a0, dialog
li \$v0, 4
syscall

la \$a0, dialog
la \$a1, opening

```
jal cov_longest

beq $v0, $0, done

la $a0, dialog
li $v0, 4
syscall

done: li $v0, 10      # Exit
      syscall
```

```
#-----
cov_longest:
    jr $ra
#-----
#-----
find_next_sentence:
    jr $ra
#-----
#-----
get_to_end:
    jr $ra
#-----
#-----
cov_str:
    jr $ra
#-----
```