Salah Abdo
207SE
Student ID: 6179614

Name: Salah Abdo

Student ID: 6179614

Course: Computer Science

Module: 207SE Operating Systems, Security and Networks

Submission data: 3rd March

Portfolio 1

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207SE
Student ID: 6179614

Lab Activity 1 – Operating Systems Tasks and Programming

a) Future of operating systems.

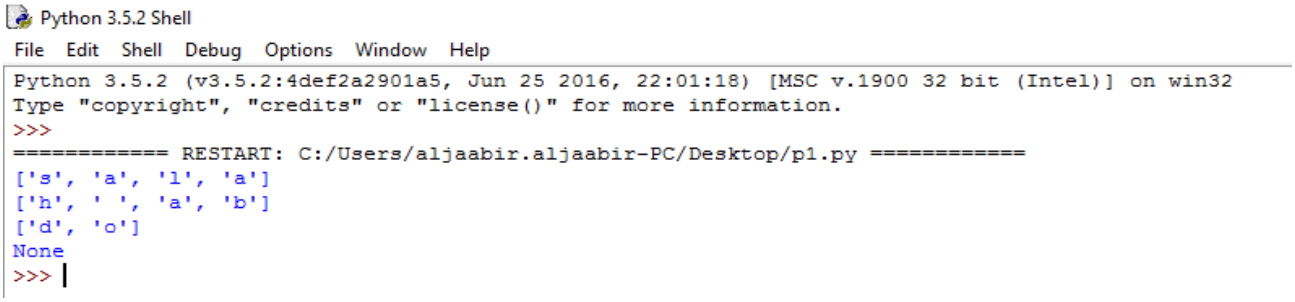
The operating systems, the most important program which run the computer. Evert general – purpose computer must have an operating system which will run other programs and application, it also performs many basic task like knowing what you are typing on the keyboard, keeping track of your files and directories on the disk and many other stuff (webopedia n.d). The way I see the future of operating system is that they will be mainly be AI based, so operating system comes with an AI which will study you and help perform task that you would be doing with current operating systems. The reason because I think AI will be integrated with operating system is currently windows 10 have kind of AI, Cortana. Cortana is a digital agent which will help get things done, the more you use Cortana the more personalised the experience will be (support.microsft 2017). The way I see future operating system using AI would be to defend and support the user, the way I think this could be done is by using data from other user who have been affected by viruses/malware and the AI could learn from that and come up with different solution. The way AI of the operating system could help user with their daily task is by using the way Cortana help its user, the more you use it the more helpful it become. This will change the way operating system could be use, it would be used for more complex task or even be left with certain task to do and it could be left to perform the task.

Salah Abdo
207SE
Student ID: 6179614

b) Programming activity

Python

```
'''
Salah Abdo
Student ID: 6179614

display my full name broken into blocks.
The length of the block is equal to the first/last digit in your
university user id

Program 1

'''

def splitter(name,idNum):
    n = list(name)
    # loops for the length of the name
    for i in range(0,len(n), idNum):
         print(n[i:i + idNum]) # prints the letter on each line, as
the length of id Num

print(splitter("salah abdo",4))

'
```



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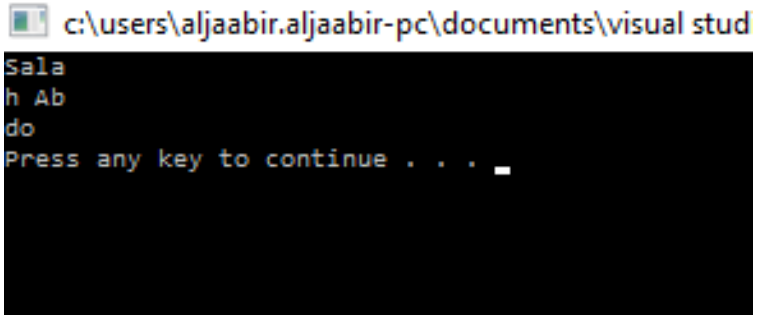
C++

```
/*

Salah Abdo
Student ID: 6179614

display my full name broken into blocks.
The length of the block is equal to the first/last digit in your university
user id

Program 2

*/
#include <iostream>
#include <string>

using namespace std;

void splitter(string name, int idNum)
{
        for (int i = 0; i < name.length(); i += idNum)
        {
                cout << name.substr(i, idNum) << endl;


        }
}

int main()
{
        string name = "Salah Abdo";  // Enter any name that you want to use
        int idNum = 4; // enter student ID first or last digit only

        splitter(name, idNum);
        system("pause");

        return 0;
}
```



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207SE
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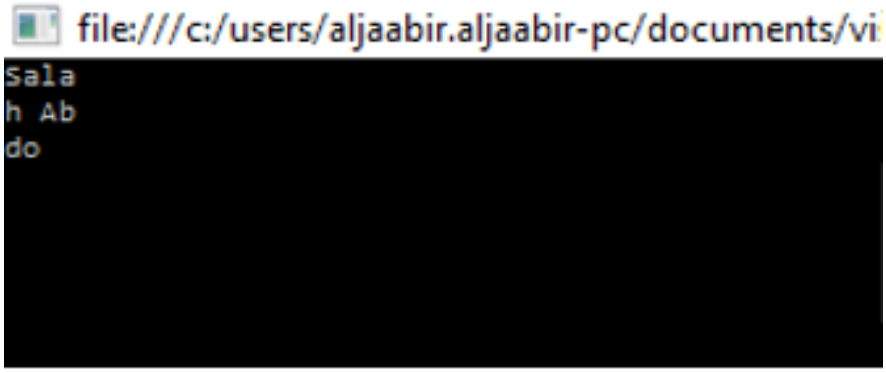
Visual basic

```
'Salah Abdo'
'Student ID :  6179614  '

'display my full name broken into blocks.'
'The length Of the block Is equal To the first/last digit In your university
user id'

'Program 3'

Module Module1

    Sub Main()
        Dim name As String
        Dim idNum As Integer

        name = "Salah Abdo"
        idNum = 4

        For i As Integer = 0 To Convert.ToInt32(name.Length / idNum) - 1
'Converts a specified value to a 32-bit signed integer.'
            Console.WriteLine((name.Substring(i * idNum, idNum)))
'Print each block on an individual line'
        Next
        Console.ReadLine()
    End Sub

End Module
```



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Lab Activity 2 – Linux Command Line (Commands and outcomes from a series of small tasks that require use of a number of Linux commands)

a) How made Portfolio1 directory read/write/executable only for you and your group. That is, not for others. Show evidence of this with ls command.

mkdir Portfolio1

```
abdos@hvs-its-lnx01:~$ ls -l
total 0
abdos@hvs-its-lnx01:~$ mkdir Portfolio1
abdos@hvs-its-lnx01:~$ ls -l
total 4
drwxr-xr-x 2 abdos domain users 4096 Feb 10 12:42 Portfolio1
abdos@hvs-its-lnx01:~$
```

b) How downloaded the script http://www.centerkey.com/tree/tree.sh to your home directory using wget and make it executable.

wget http://www.centerkey.com/tree/tree.sh

```
abdos@hvs-its-lnx01:~$ ls -l
total 4
drwxr-xr-x 2 abdos domain users 4096 Feb 10 12:42 Portfolio1
abdos@hvs-its-lnx01:~$ man wget
abdos@hvs-its-lnx01:~$ wget http://www.centerkey.com/tree.tree.sh
--2017-02-10 12:57:20--  http://www.centerkey.com/tree.tree.sh
Resolving www.centerkey.com (www.centerkey.com)... 66.185.31.194
Connecting to www.centerkey.com (www.centerkey.com)|66.185.31.194|:80... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: http://centerkey.com/tree.tree.sh [following]
--2017-02-10 12:57:21--  http://centerkey.com/tree.tree.sh
Resolving centerkey.com (centerkey.com)... 66.185.31.194
Reusing existing connection to www.centerkey.com:80.
HTTP request sent, awaiting response... 404 Not Found
2017-02-10 12:57:21 ERROR 404: Not Found.

abdos@hvs-its-lnx01:~$ wget www.centerkey.com/tree.tree.sh
--2017-02-10 12:57:52--  http://www.centerkey.com/tree.tree.sh
Resolving www.centerkey.com (www.centerkey.com)... 66.185.31.194
Connecting to www.centerkey.com (www.centerkey.com)|66.185.31.194|:80... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: http://centerkey.com/tree.tree.sh [following]
--2017-02-10 12:57:52--  http://centerkey.com/tree.tree.sh
Resolving centerkey.com (centerkey.com)... 66.185.31.194
Connecting to centerkey.com (centerkey.com)|66.185.31.194|:80... connected.
HTTP request sent, awaiting response... 404 Not Found
2017-02-10 12:57:58 ERROR 404: Not Found.

abdos@hvs-its-lnx01:~$ wget www.centerkey.com/tree/tree.sh
--2017-02-10 12:58:18--  http://www.centerkey.com/tree/tree.sh
Resolving www.centerkey.com (www.centerkey.com)... 66.185.31.194
Connecting to www.centerkey.com (www.centerkey.com)|66.185.31.194|:80... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: http://centerkey.com/tree/tree.sh [following]
--2017-02-10 12:58:18--  http://centerkey.com/tree/tree.sh
Resolving centerkey.com (centerkey.com)... 66.185.31.194
Reusing existing connection to www.centerkey.com:80.
HTTP request sent, awaiting response... 200 OK
Length: 2107 (2.1K) [text/plain]
Saving to: 'tree.sh'

tree.sh                                    100%[=======================================================================================================>]   2.06K  --.-KB/s    in 0s

2017-02-10 12:58:18 (170 MB/s) - 'tree.sh' saved [2107/2107]

abdos@hvs-its-lnx01:~$
```

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207SE
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c) Making Directories

- How created a 207se directory in your Portfolio1 directory.

  mkdir 207se

- How created numbered directories for the labs. i.e. lab1 and lab2 etc.

  mkdir lab1
  mkdir lab2
  mkdir lab3
  mkdir lab4

- How to transfer lab1 activity into appropriate directory

  mv week1.text Portfolio1/207se/Lab1

- How to make directory activities using tree.sh #

```
abdos@hvs-its-lnx01:~$ chmod 744 tree.sh
abdos@hvs-its-lnx01:~$ ls
c-code      lyrics      song2.txt      song.txt
c-code.zip  Portfolio1  song_name.txt  tree.sh
abdos@hvs-its-lnx01:~$
```

```
abdos@hvs-its-lnx01:~$ ./tree.sh

/home/207SE/abdos
    .
    |-c-code
    |-Portfolio1
    |---207se
    |-----Lab1
    |-----lab2
    |-----lab3
    |-----lab4
    |-------pragmalinux-img
    |-----lab6
    |-------c-code

abdos@hvs-its-lnx01:~$
```

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207SE
Student ID: 6179614

- Evidence

```
abdos@hvs-its-lnx01:~$ cd Portfolio1
abdos@hvs-its-lnx01:~/Portfolio1$ mkdir 207se
abdos@hvs-its-lnx01:~/Portfolio1$ cd 207se
abdos@hvs-its-lnx01:~/Portfolio1/207se$ mkdir Lab1
abdos@hvs-its-lnx01:~/Portfolio1/207se$ mkdir lab2
abdos@hvs-its-lnx01:~/Portfolio1/207se$ mkdir lab3
abdos@hvs-its-lnx01:~/Portfolio1/207se$ mkdir lab4
abdos@hvs-its-lnx01:~/Portfolio1/207se$ cd $HOME
abdos@hvs-its-lnx01:~$ ls
Portfolio1  tree.sh  week1.txt
abdos@hvs-its-lnx01:~$ mv week1.txt Portfolio1/207se/Lab1
abdos@hvs-its-lnx01:~$ ls
Portfolio1  tree.sh
abdos@hvs-its-lnx01:~$ cd Portfolio1/207se/Lab1
abdos@hvs-its-lnx01:~/Portfolio1/207se/Lab1$ ls
week1.txt
abdos@hvs-its-lnx01:~/Portfolio1/207se/Lab1$
```

d) Display todays date and using the cal command show the month that you were born.

Cal

```
abdos@hvs-its-lnx01:~/Portfolio1/207se/Lab1$ cal
   February 2017
Su Mo Tu We Th Fr Sa
            1  2  3  4
 5  6  7  8  9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28
```

Cal 07 1997

```
abdos@hvs-its-lnx01:~/Portfolio1/207se/Lab1$ cal 07 1997
     July 1997
Su Mo Tu We Th Fr Sa
        1  2  3  4  5
 6  7  8  9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31
```

Salah Abdo
207SE
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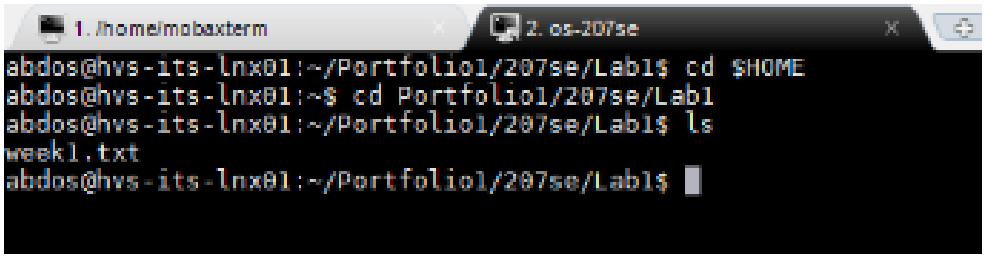
e) Move into the lab1 directory and use the appropriate command to show the current directory

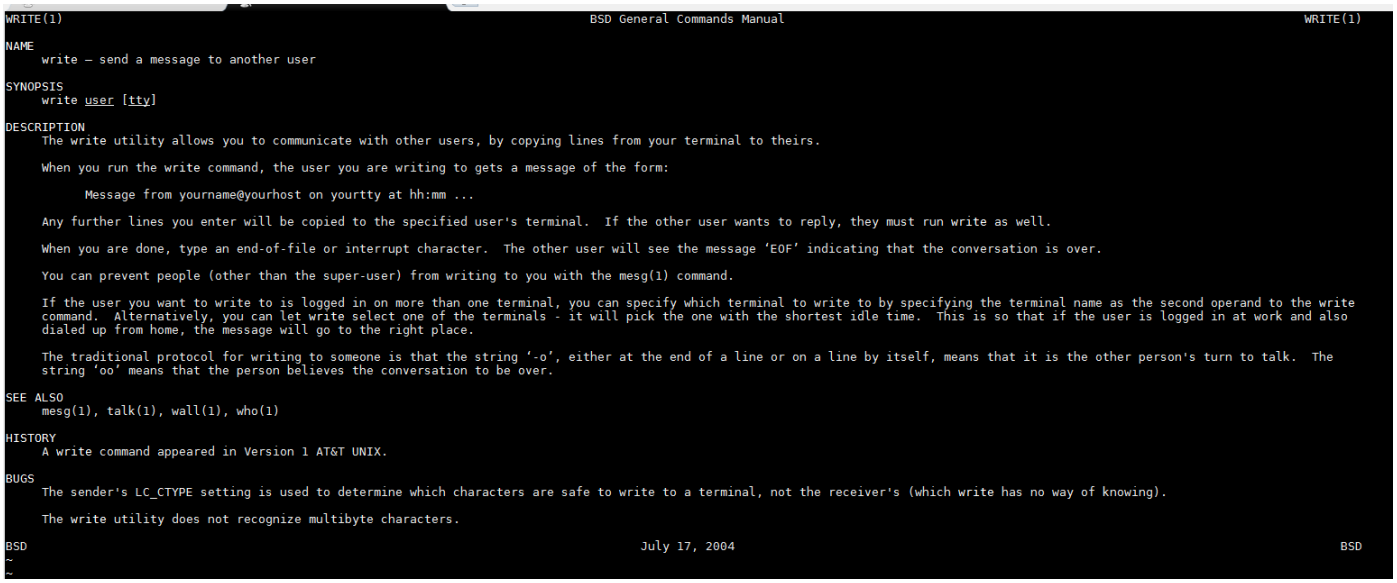
cd Portfolio1/207se/Lab1



f) What is talk, write and wall are for

Write

Write allows you to communicate with other users. By copying lines from your terminal to theirs when you run the write command, the user you are writing to gets a message of the forms. Any further lines you enter will be copied to the specified user's terminal. If the other user wants to reply, they must run write as well. This information was received by Linux by using the command "man write".



```
WRITE(1)                        BSD General Commands Manual                        WRITE(1)

NAME
     write – send a message to another user

SYNOPSIS
     write user [tty]

DESCRIPTION
     The write utility allows you to communicate with other users, by copying lines from your terminal to theirs.

     When you run the write command, the user you are writing to gets a message of the form:

          Message from yourname@yourhost on yourtty at hh:mm ...

     Any further lines you enter will be copied to the specified user's terminal.  If the other user wants to reply, they must run write as well.

     When you are done, type an end-of-file or interrupt character.  The other user will see the message 'EOF' indicating that the conversation is over.

     You can prevent people (other than the super-user) from writing to you with the mesg(1) command.

     If the user you want to write to is logged in on more than one terminal, you can specify which terminal to write to by specifying the terminal name as the second operand to the write
     command.  Alternatively, you can let write select one of the terminals - it will pick the one with the shortest idle time.  This is so that if the user is logged in at work and also
     dialed up from home, the message will go to the right place.

     The traditional protocol for writing to someone is that the string '-o', either at the end of a line or on a line by itself, means that it is the other person's turn to talk.  The
     string 'oo' means that the person believes the conversation to be over.

SEE ALSO
     mesg(1), talk(1), wall(1), who(1)

HISTORY
     A write command appeared in Version 1 AT&T UNIX.

BUGS
     The sender's LC_CTYPE setting is used to determine which characters are safe to write to a terminal, not the receiver's (which write has no way of knowing).

     The write utility does not recognize multibyte characters.

BSD                                     July 17, 2004                                     BSD
~
~
```

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207SE
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Wall

Wall displays a message, or the contents of a file, or otherwise its standard input, on the terminals of all currently logged in users. The command will wrap lines that are longer than 97 characters. Short lines are whitespace padded to have 79 characters. The command will always put a carriage return and new lines at the end of each line. Only the superuser can write on the terminals of users who have chosen to deny messages or are using a program which automatically denies messages. This information was received by Linux by using the command "man wall".

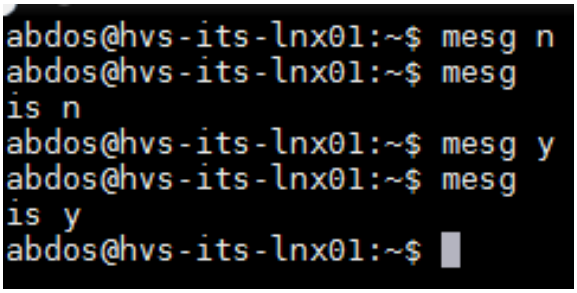
Talk

Talk is just a communication program, it copies lines from the terminal to that of another user. When it's called, talks contacts the talk daemon on the other user's machine (computerhope N.D).

Salah Abdo
207SE
Student ID: 6179614

g) What command prevents the effects of those three commands from interrupting you.

Mesg n



Mesg n prevents the effects of those three command from interrupting

Mesg y allows you to be interrupted.

Salah Abdo
207SE
Student ID: 6179614

h) The song in song.txt.

- Using wc the number of words and lines in the file.

  wget www.writerbot.com/lyrics
  cat lyrics > song.txt
  wc –l song.txt
  wc –w song.txt
  wc –c song.txt

```
abdos@hvs-its-lnx01:~$ wget www.writerbot.com/lyrics
--2017-02-10 13:58:10--  http://www.writerbot.com/lyrics
Resolving www.writerbot.com (www.writerbot.com)... 173.255.238.5
Connecting to www.writerbot.com (www.writerbot.com)|173.255.238.5|:80... connect
ed.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: http://writerbot.com/lyrics [following]
--2017-02-10 13:58:11--  http://writerbot.com/lyrics
Resolving writerbot.com (writerbot.com)... 173.255.238.5
Reusing existing connection to www.writerbot.com:80.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [text/html]
Saving to: 'lyrics'

lyrics                  [ <=>                ]   5.86K  --.-KB/s    in 0s

2017-02-10 13:58:11 (111 MB/s) - 'lyrics' saved [6002]

abdos@hvs-its-lnx01:~$ cat lyrics > song.txt
abdos@hvs-its-lnx01:~$
```

```
abdos@hvs-its-lnx01:~$ cat lyrics > song.txt
abdos@hvs-its-lnx01:~$ wc -l song.txt
156 song.txt
abdos@hvs-its-lnx01:~$ wc -w song.txt
564 song.txt
abdos@hvs-its-lnx01:~$ wc -c song.txt
6002 song.txt
abdos@hvs-its-lnx01:~$
```

- Using grep to get the lines containing "and" and the number of the lines contain “and” in the document

  Cat song.txt |grep “and” | wc -l

```
abdos@hvs-its-lnx01:~$ cat song.txt |grep "and" | wc -l
8
abdos@hvs-its-lnx01:~$
```

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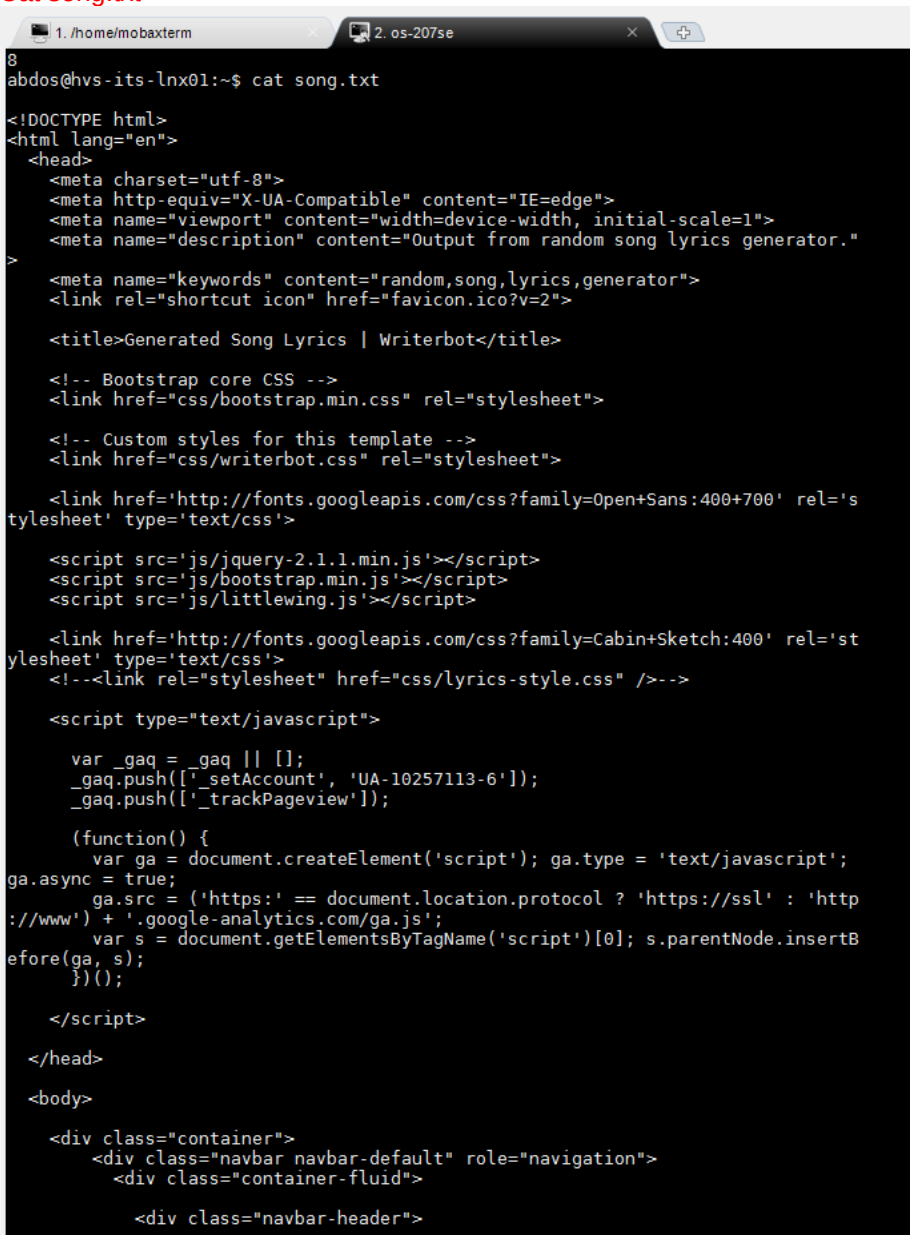
207SE
Student ID: 6179614

- Use cat to show the contents of the file.

Cat song.txt



Salah Abdo
207SE
Student ID: 6179614

- Appropriate Linux command to see if the two files differ and how they differ.

  cat song.txt > song_name.txt
  sed –i ‘s/and/salah/g’ song_name.txt
  sed –i ‘s/the/abdo/g’ song_name.txt

```
abdos@hvs-its-lnx01:~$ cat song.txt > song_name.txt
abdos@hvs-its-lnx01:~$ sed -i 's/and/salah/g' song_name.txt
abdos@hvs-its-lnx01:~$ sed -i 's/the/abdo/g' song_name.txt
abdos@hvs-its-lnx01:~$
```

```
1. /home/mobaxterm   2. os-207se
        <a href="/name-generator">Name Generator</a>
        </p>
      </div>

    </div> <!-- /container -->
  </body>
abdos@hvs-its-lnx01:~$ cat song.txt > song_name.txt
abdos@hvs-its-lnx01:~$ sed -i 's/and/salah/g' song_name.txt
abdos@hvs-its-lnx01:~$ sed -i 's/the/abdo/g' song_name.txt
abdos@hvs-its-lnx01:~$ diff song.txt song_name.txt
8,9c8,9
<     <meta name="description" content="Output from random song lyrics generator
.">
<     <meta name="keywords" content="random,song,lyrics,generator">
---
>     <meta name="description" content="Output from rsalahom song lyrics generat
or.">
>     <meta name="keywords" content="rsalahom,song,lyrics,generator">
58c58
<               <a class="navbar-brand" href="/">writerbot</a>
---
>               <a class="navbar-brsalah" href="/">writerbot</a>
83,84c83,84
<  Did night and I can't give<br />
<  Her what she left her and him and the<br />
---
>  Did night salah I can't give<br />
>  Her what she left her salah him salah abdo<br />
86,88c86,88
<  Don't need this but there's something in your eyes<br />
<  Thought I knew when I'm out on the wall when<br />
<  You will leave her arms and how the thought<br />
---
>  Don't need this but abdore's something in your eyes<br />
>  Thought I knew when I'm out on abdo wall when<br />
>  You will leave her arms salah how abdo thought<br />
93c93
<  Again the same old worn out track it's<br />
---
>  Again abdo same old worn out track it's<br />
97c97
<  Of my eyes and tell me why don't<br />
---
>  Of my eyes salah tell me why don't<br />
102c102
<  Kinda rush and I can't put out embers to ashes<br />
---
>  Kinda rush salah I can't put out embers to ashes<br />
106c106
<  Up to hold me every time the<br />
---
>  Up to hold me every time abdo<br />
108,109c108,109
<  She used to the whole thing blown apart it's<br />
<  Just another call from home when she walked away my...</p>
---
>  She used to abdo whole thing blown apart it's<br />
>  Just anoabdor call from home when she walked away my...</p>
abdos@hvs-its-lnx01:~$
```

Salah Abdo
207SE
Student ID: 6179614

- Use sort to sort the file and redirect the output to a new file called song2.txt

  Sort song.txt –o song2.txt
  Cat song2.txt

```
abdos@hvs-its-lnx01:~$ sort song.txt -o song2.txt
abdos@hvs-its-lnx01:~$ ca song2.txt
ca: command not found
abdos@hvs-its-lnx01:~$ cat song2.txt
```

```
>
    <meta name="keywords" content="random,song,lyrics,generator">
    <meta name="viewport" content="width=device-width, initial-scale=1">
 Morning's breaking my heart could kill yeah,<br />
 Of my eyes and tell me why don't<br />
 On oh oh oh baby why, tell me<br />
      <option value="ang" selected="selected">Angry/Boastful</option>
      <option value="cnt" selected="selected">Country</option>
      <option value="dep" >Depressed</option>
      <option value="emo" >Emo</option>
      <option value="hap" >Happy/Mellow</option>
      <option value="rbh" >Rap/R&amp;B</option>
      <option value="rck" >Rock</option>
        </p>
    <p class="lyrics">By you I try you left without saying I love<br />
        <p>&copy; 2016 writerbot    
 Run, can't hide what I was glad I<br />
 Sail that's where your journey starts you'll find better<br />
</script>
<script>
    </script>
<script async src="//pagead2.googlesyndication.com/pagead/js/adsbygoogle.js"></s
cript>
    <script src='js/bootstrap.min.js'></script>
    <script src='js/jquery-2.1.1.min.js'></script>
    <script src='js/littlewing.js'></script>
    <script type="text/javascript">
    </select>
    </select>
    <select class="form-control" name="e" id="emotion-select">
    <select class="form-control" name="g" id="genre-select">
 She used to the whole thing blown apart it's<br />
                  show_faces=false&amp;action=like&amp;colorscheme=light" scroll
ing="no" frameborder="0"
                <span class="icon-bar"></span>
                <span class="icon-bar"></span>
                <span class="icon-bar"></span>
                <span class="sr-only">Toggle navigation</span>
                  style="border:none; overflow:hidden; display:inline-block;" al
lowTransparency="true"></iframe>
     style="display:block"
 Things like I just want somebody to hold<br />
 Thought I knew when I'm out on the wall when<br />
    <title>Generated Song Lyrics | Writerbot</title>
                </ul>
                <ul class="nav navbar-nav">
 Up to hold me every time the<br />
 Us back fell down it's a roller coaster<br />
        var ga = document.createElement('script'); ga.type = 'text/javascript';
ga.async = true;
      var _gaq = _gaq || [];
        var s = document.getElementsByTagName('script')[0]; s.parentNode.insertB
efore(ga, s);
<!-- wb-responsive -->
 Whole world turns blue when a sailing ship<br />
 You anyway I'm gonna build a fire I can't<br />
 You leave all this time I'll move<br />
 You will leave her arms and how the thought<br />
abdos@hvs-its-lnx01:~$
```

Salah Abdo
207SE
Student ID: 6179614

- Use sort and rev to reverse the sorted contents of song.txt and append the output to song2.txt

  Sort –r song.txt –o song2.txt
  Cat song2.txt

```
abdos@hvs-its-lnx01:~$ sort -r song.txt -o song2.txt
abdos@hvs-its-lnx01:~$ cat song2.txt
 You will leave her arms and how the thought<br />
 You leave all this time I'll move<br />
 You anyway I'm gonna build a fire I can't<br />
 Whole world turns blue when a sailing ship<br />
<!-- wb-responsive -->
        var s = document.getElementsByTagName('script')[0]; s.parentNode.insertB
efore(ga, s);
      var _gaq = _gaq || [];
        var ga = document.createElement('script'); ga.type = 'text/javascript';
ga.async = true;
 Us back fell down it's a roller coaster<br />
 Up to hold me every time the<br />
                <ul class="nav navbar-nav">
                </ul>
    <title>Generated Song Lyrics | Writerbot</title>
 Thought I knew when I'm out on the wall when<br />
 Things like I just want somebody to hold<br />
     style="display:block"
                  style="border:none; overflow:hidden; display:inline-block;" al
lowTransparency="true"></iframe>
                <span class="sr-only">Toggle navigation</span>
                <span class="icon-bar"></span>
                <span class="icon-bar"></span>
                <span class="icon-bar"></span>
                  show_faces=false&amp;action=like&amp;colorscheme=light" scroll
ing="no" frameborder="0"
 She used to the whole thing blown apart it's<br />
    <select class="form-control" name="g" id="genre-select">
    <select class="form-control" name="e" id="emotion-select">
    </select>
    </select>
    <script type="text/javascript">
    <script src='js/littlewing.js'></script>
    <script src='js/jquery-2.1.1.min.js'></script>
    <script src='js/bootstrap.min.js'></script>
<script async src="//pagead2.googlesyndication.com/pagead/js/adsbygoogle.js"></s
cript>
    </script>
<script>
</script>
 Sail that's where your journey starts you'll find better<br />
 Run, can't hide what I was glad I<br />
       <p>&copy; 2016 writerbot    
    <p class="lyrics">By you I try you left without saying I love<br />
        </p>
      <option value="rck" >Rock</option>
      <option value="rbh" >Rap/R&amp;B</option>
      <option value="hap" >Happy/Mellow</option>
      <option value="emo" >Emo</option>
      <option value="dep" >Depressed</option>
      <option value="cnt" selected="selected">Country</option>
      <option value="ang" selected="selected">Angry/Boastful</option>
```

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207SE
Student ID: 6179614

- Total memory used and the total memory available

  Free -m

```
abdos@hvs-its-lnx01:~$ free -m
               total        used        free      shared  buff/cache   available
Mem:           32167         283       31239          18         644       31495
Swap:           1021           0        1021
abdos@hvs-its-lnx01:~$
```

- Find out how you can display your username on the screen.

  Echo “$USER”

```
abdos@hvs-its-lnx01:~$ echo "$USER"
abdos
abdos@hvs-its-lnx01:~$
```

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207SE
Student ID: 6179614

- List the processes that are running.

  Ps aux

```
abdos
abdos@hvs-its-lnx01:~$ ps aux
USER       PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root         1  0.0  0.0  37996  6160 ?        Ss   04:00   0:10 /sbin/init
root         2  0.0  0.0      0     0 ?        S    04:00   0:00 [kthreadd]
root         3  0.0  0.0      0     0 ?        S    04:00   0:00 [ksoftirqd/0]
root         5  0.0  0.0      0     0 ?        S<   04:00   0:00 [kworker/0:0H]
root         7  0.0  0.0      0     0 ?        S    04:00   0:13 [rcu_sched]
root         8  0.0  0.0      0     0 ?        S    04:00   0:00 [rcu_bh]
root         9  0.0  0.0      0     0 ?        S    04:00   0:00 [migration/0]
root        10  0.0  0.0      0     0 ?        S    04:00   0:00 [watchdog/0]
root        11  0.0  0.0      0     0 ?        S    04:00   0:00 [watchdog/1]
root        12  0.0  0.0      0     0 ?        S    04:00   0:00 [migration/1]
root        13  0.0  0.0      0     0 ?        S    04:00   0:00 [ksoftirqd/1]
root        15  0.0  0.0      0     0 ?        S<   04:00   0:00 [kworker/1:0H]
root        16  0.0  0.0      0     0 ?        S    04:00   0:00 [watchdog/2]
root        17  0.0  0.0      0     0 ?        S    04:00   0:00 [migration/2]
root        18  0.0  0.0      0     0 ?        S    04:00   0:01 [ksoftirqd/2]
root        20  0.0  0.0      0     0 ?        S<   04:00   0:00 [kworker/2:0H]
root        21  0.0  0.0      0     0 ?        S    04:00   0:00 [watchdog/3]
root        22  0.0  0.0      0     0 ?        S    04:00   0:00 [migration/3]
root        23  0.0  0.0      0     0 ?        S    04:00   0:00 [ksoftirqd/3]
root        25  0.0  0.0      0     0 ?        S<   04:00   0:00 [kworker/3:0H]
root        26  0.0  0.0      0     0 ?        S    04:00   0:00 [watchdog/4]
root        27  0.0  0.0      0     0 ?        S    04:00   0:00 [migration/4]
root        28  0.0  0.0      0     0 ?        S    04:00   0:00 [ksoftirqd/4]
root        30  0.0  0.0      0     0 ?        S<   04:00   0:00 [kworker/4:0H]
root        31  0.0  0.0      0     0 ?        S    04:00   0:00 [watchdog/5]
root        32  0.0  0.0      0     0 ?        S    04:00   0:00 [migration/5]
root        33  0.0  0.0      0     0 ?        S    04:00   0:00 [ksoftirqd/5]
root        35  0.0  0.0      0     0 ?        S<   04:00   0:00 [kworker/5:0H]
root        36  0.0  0.0      0     0 ?        S    04:00   0:00 [watchdog/6]
root        37  0.0  0.0      0     0 ?        S    04:00   0:00 [migration/6]
root        38  0.0  0.0      0     0 ?        S    04:00   0:00 [ksoftirqd/6]
root        40  0.0  0.0      0     0 ?        S<   04:00   0:00 [kworker/6:0H]
root        41  0.0  0.0      0     0 ?        S    04:00   0:00 [watchdog/7]
root        42  0.0  0.0      0     0 ?        S    04:00   0:00 [migration/7]
root        43  0.0  0.0      0     0 ?        S    04:00   0:00 [ksoftirqd/7]
root        45  0.0  0.0      0     0 ?        S<   04:00   0:00 [kworker/7:0H]
root        46  0.0  0.0      0     0 ?        S    04:00   0:00 [kdevtmpfs]
root        47  0.0  0.0      0     0 ?        S<   04:00   0:00 [netns]
root        48  0.0  0.0      0     0 ?        S<   04:00   0:00 [perf]
root        49  0.0  0.0      0     0 ?        S    04:00   0:00 [khungtaskd]
root        50  0.0  0.0      0     0 ?        S<   04:00   0:00 [writeback]
root        51  0.0  0.0      0     0 ?        SN   04:00   0:00 [ksmd]
root        52  0.0  0.0      0     0 ?        SN   04:00   0:00 [khugepaged]
root        53  0.0  0.0      0     0 ?        S<   04:00   0:00 [crypto]
root        54  0.0  0.0      0     0 ?        S<   04:00   0:00 [kintegrityd]
root        55  0.0  0.0      0     0 ?        S<   04:00   0:00 [bioset]
root        56  0.0  0.0      0     0 ?        S<   04:00   0:00 [kblockd]
root        57  0.0  0.0      0     0 ?        S<   04:00   0:00 [ata_sff]
root        58  0.0  0.0      0     0 ?        S<   04:00   0:00 [md]
root        59  0.0  0.0      0     0 ?        S<   04:00   0:00 [devfreq_wq]
root        65  0.0  0.0      0     0 ?        S    04:00   0:00 [kswapd0]
root        66  0.0  0.0      0     0 ?        S<   04:00   0:00 [vmstat]
```

Salah Abdo
207SE
Student ID: 6179614

- What are the differences between the Linux commands less, more and most.

The difference between less, more and most is that more is and old utility, so when text is passed to it is way too large to fit on the screen, so it pages it. You can't scroll up but you can scroll down (stackexchange 2013). Less is basically more, the difference between more and less. For comparisons less sources is over 27,000 lines long while more implementation are mainly only a little over 2,000 lines long (stackexchange 2013). Most can display multiple files at a time, it's supposed to be more than less.

Reference

Stackexchange(2013) *what are the differences between most, more and less.*[Online] Available from < http://unix.stackexchange.com/questions/81129/what-are-the-differences-between-most-more-and-less> [24/02/2017]

Salah Abdo
207SE
Student ID: 6179614

Lab Activity 4 Bootloader

a) Brief description of the Lab activity and what you did

For activity 4 I had to create a bootloader that displayed my name, email, my favourite second year module, date of birth, age and student ID. This had to be displayed on my bootloader on separate lines. I also had to display a triangle under my student ID, this triangle was shaped by using asterisk. To create the bootloader, I firstly downloaded the pragma-207.tgz from Moodle and used this to create pragmalinux-img directory. I went into this directory and created a new file called "task4.asm" this file had the code to complete the task. To compile the file, I used the command **"nasm task4.asm."** which then allowed me to create the image using "**dd if= task4 bs=512 of=a.img"**. Once that was all done I just needed to bootup, to do that I used the command **"bochs"** and **"c"** in the prompt to display my details and the triangle.

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207SE
Student ID: 6179614

b) Boot pragma linux with bochs

```
1. abdos@hvs-its-lnx01:~/Portfolio
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab4$ tar xvfz pragma-207.tgz
pragmalinux-img/
pragmalinux-img/README
pragmalinux-img/bootloader
pragmalinux-img/a.img
pragmalinux-img/bochsrc
pragmalinux-img/bochsrc1
pragmalinux-img/bochsout.txt
pragmalinux-img/TESTFORM.txt
pragmalinux-img/bootloader.asm
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab4$
```

```
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab4$ cd pragmalinux-img
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab4/pragmalinux-img$
```

```
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab4/pragmalinux-img$ pico task4.asm
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab4/pragmalinux-img$
```

```
[BITS 16]
[ORG 0x7C00]
top:
        ;; Put 0 into ds (data segment)
        ;; Can't do it directly
        mov ax,0x0000
        mov ds,ax
        ;; si is the location relative to the data segment of the
        ;; string/char to display
        mov si, name
        call writeString ; See below
        mov si, email
        call writeString
        mov si, studentID
        call writeString
        mov si, dobb
        call writeString
        mov si, age
        call writeString
        mov si, fav
        call writeString
        mov si, star1
        call writeString
        mov si, star2
        call writeString
        mov si, star3
        call writeString
        mov si, star4
        call writeString
        jmp $ ; Spin
writeString:
        mov ah,0x0E ; Display a chacter (as before)
        mov bh,0x00
        mov bl,0x07
nextchar:
        Lodsb ; Loads [SI] into AL and increases SI by one
        ;; Effectively "pumps" the string through AL
        cmp al,0 ; End of the string?
        jz done
        int 0x10 ; BIOS interrupt
        jmp nextchar
done:
        ret
        name db 'Salah Abdo',13,10,0 ; Null-terminated
        email db 'abdos@uni.coventry.ac.uk',13,10,0
        dobb db '30 july 1997',13,10,0
        studentID db '6179614',13,10,0
        age db '19',13,10,0
        fav db '207SE',13,10,0
        star1 db '*',13,10,0
        star2 db '**',13,10,0
        star3 db '***',13,10,0
        star4 db '****',13,10,0
        times 510-($-$$) db 0
```

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207SE
Student ID: 6179614

```
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab4/pragmalinux-img$ nasm task4.asm
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab4/pragmalinux-img$
```

```
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab4/pragmalinux-img$ dd if=task4 bs=512
of=a.img
1+0 records in
1+0 records out
512 bytes copied, 0.0003042 s, 1.7 MB/s
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab4/pragmalinux-img$
```

```
1+0 records out
512 bytes copied, 0.0003101 s, 1.7 MB/s
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab4/pragmalinux-img$ bochs
========================================================================
                       Bochs x86 Emulator 2.6
            Built from SVN snapshot on September 2nd, 2012
========================================================================
00000000000i[     ] LTDL_LIBRARY_PATH not set. using compile time default '/usr/lib/bochs/plugins'
00000000000i[     ] BXSHARE not set. using compile time default '/usr/share/bochs'
00000000000i[     ] lt_dlhandle is 0x3b343f0
00000000000i[PLGIN] loaded plugin libbx_unmapped.so
00000000000i[     ] lt_dlhandle is 0x3b35050
00000000000i[PLGIN] loaded plugin libbx_biosdev.so
00000000000i[     ] lt_dlhandle is 0x3b359d0
00000000000i[PLGIN] loaded plugin libbx_speaker.so
00000000000i[     ] lt_dlhandle is 0x3b35d80
00000000000i[PLGIN] loaded plugin libbx_extfpuirq.so
00000000000i[     ] lt_dlhandle is 0x3b378e0
00000000000i[PLGIN] loaded plugin libbx_parallel.so
00000000000i[     ] lt_dlhandle is 0x3b39590
00000000000i[PLGIN] loaded plugin libbx_serial.so
00000000000i[     ] lt_dlhandle is 0x3b3d170
00000000000i[PLGIN] loaded plugin libbx_gameport.so
00000000000i[     ] lt_dlhandle is 0x3b3dc10
00000000000i[PLGIN] loaded plugin libbx_iodebug.so
00000000000i[     ] reading configuration from bochsrc
00000000000e[     ] bochsrc:9: 'vga_update_interval' will be replaced by new 'vga: update_freq' option.
00000000000e[     ] bochsrc:10: 'i440fxsupport' will be replaced by new 'pci' option.
00000000000i[     ] lt_dlhandle is 0x3b3e4d0
00000000000i[PLGIN] loaded plugin libbx_sdl.so
00000000000i[     ] installing sdl module as the Bochs GUI
00000000000i[     ] using log file bochsout.txt
```

```
<bochs:1> c
```

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c) Make a bootloader that displays your student details and triangle

- Commented bootloader code to display your student details and triangle

```
BITS 16]
[ORG 0x7C00]
top:
        // Put 0 into ds (data segment)
        // Can't do it directly
        mov ax,0x0000
        mov ds,ax
        //si is the location relative to the data segment of the
        //string/char to display
        mov si, name // this moves the variable into si
        call writeString // this will call write string and prints what ever is in si
        mov si, email
        call writeString
        mov si, studentID
        call writeString
        mov si, dobb
        call writeString
        mov si, age
        call writeString
        mov si, fav
        call writeString
        mov dx,6

        outer_loop:
                mov cx,6  //size of the star will be moved into xc
                inner_loop:
                        mov si, star
                        call writeString
                        dec cx   // decrements the cx
                        cmp cx,dx  // this will compare cx with dx
                        jge inner_loop

        mov si,newLine
        call writeString
                dec dx
                cmp dx,0
                jne outer_loop // checks if  dx does not equal 0 go back to the outer  loop
                jmp done // if its equal to 0 then done
writeString:
        mov ah,0x0E // Display a chacter (as before)
        mov bh,0x00
        mov bl,0x07
nextchar:
        Lodsb ; Loads [SI] into AL and increases SI by one
        ;; Effectively "pumps" the string through AL
        cmp al,0 // End of the string?
        jz done
        int 0x10 // BIOS interrupt
        jmp nextchar
done:
        ret
        name db 'Salah Abdo',13,10,0 ; Null-terminated
        email db 'abdos@uni.coventry.ac.uk',13,10,0
        dobb db '30 july 1997',13,10,0
        studentID db '6179614',13,10,0
        age db '19',13,10,0
        fav db '207SE',13,10,0
        star db '*',0
        newLine db '',13,10,0
        times 510-($-$$) db 0
        dw 0xAA55
```

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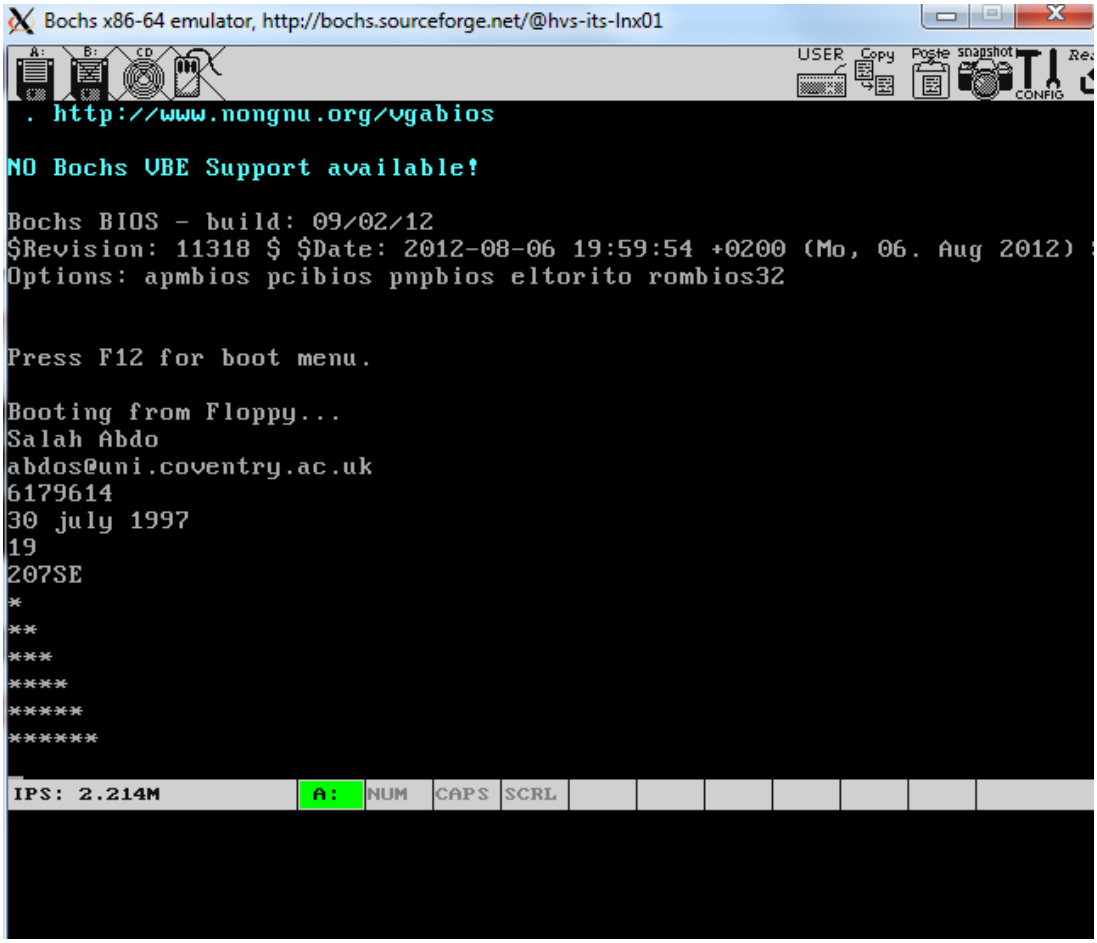
- Output from Bochs showing student details and triangle



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Lab Activity 6 Memory Management

a) Memory Allocation Activities

5 memory blocks available

5 processes require memory

Memory unallocated in block 1: 300

Memory unallocated in block 2: 500

Memory unallocated in block 3: 250

Memory unallocated in block 4: 220

Memory unallocated in block 5: 270

Process 1 requires memory size of: 300

Process 2 requires memory size of: 350

Process 3 requires memory size of: 450

Process 4 requires memory size of: 400

Process 5 requires memory size of: 150

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207SE
Student ID: 6179614

1:

First Fit

M1 (300)	M2 (500)	M3 (250)	M4 (220)	M5 (270)
300	350	150		

```
---------------------------------------
 First-Fit Memory Allocation Approach
---------------------------------------

 Put in the number of unallociated memory blocks available: 5
Put in the unallociated memory available in block 1 :300
Put in the unallociated memory available in block 2 :500
Put in the unallociated memory available in block 3 :250
Put in the unallociated memory available in block 4 :220
Put in the unallociated memory available in block 5 :270

 Put in the number of processes requiring memory: 5
Put in the memory size of process  1:300
Put in the memory size of process  2:350
Put in the memory size of process  3:450
Put in the memory size of process  4:400
Put in the memory size of process  5:150
---------------------------
The process number is 1
The process size is 300
The block size is 300
The block the process is allocated to is 1
The difference between the orignal block 1 and the allociated process 1 is 0

---------------------------
The process number is 2
The process size is 350
The block size is 500
The block the process is allocated to is 2
The difference between the orignal block 2 and the allociated process 2 is 150

---------------------------
The process number is 3
The process size is 450
The process is not allocated to a block

---------------------------
The process number is 4
The process size is 400
The process is not allocated to a block

---------------------------
The process number is 5
The process size is 150
The block size is 250
The block the process is allocated to is 3
The difference between the orignal block 3 and the allociated process 5 is 100

abdos@hvs-its-lnx01:~/Portfolio1/207se/lab6/c-code$
```

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Student ID: 6179614

2:

Best Fit

M1 (300)	M2 (500)	M3 (250)	M4 (220)	M5 (270)
300	350		150	

```
 Best-Fit Memory Allocation Approach
-------------------------------------

 Put in the number of unallocated blocks of memory available: 5
Put in the size of the unallocated memory available in block 1 :300
Put in the size of the unallocated memory available in block 2 :500
Put in the size of the unallocated memory available in block 3 :250
Put in the size of the unallocated memory available in block 4 :220
Put in the size of the unallocated memory available in block 5 :270

 Put in the number of processes requiring memory: 5
Put in the size of the memory required for process  1:300
Put in the size of the memory required for process  2:350
45Put in the size of the memory required for process  3:450
Put in the size of the memory required for process  4:400
Put in the size of the memory required for process  5:150
---------------------------
The process number is 1
The process size is 300
The block size is 300
The block the process is allocated to is 1
The difference between the orignal block 1 and the allocated process 1 is 0

---------------------------
The process number is 2
The process size is 350
The block size is 500
The block the process is allocated to is 2
The difference between the orignal block 2 and the allocated process 2 is 150

---------------------------
The process number is 3
The process size is 45450
The process is not allocated to a block
---------------------------
The process number is 4
The process size is 400
The process is not allocated to a block
---------------------------
The process number is 5
The process size is 150
The block size is 220
The block the process is allocated to is 4
The difference between the orignal block 4 and the allocated process 5 is 70

abdos@hvs-its-lnx01:~/Portfolio1/207se/lab6/c-code$
```

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207SE
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Worst Fit

M1 (300)	M2 (500)	M3 (250)	M4 (220)	M5 (270)
150	300			

```
---------------------------------
 Worst Fit Memory Allociation Model
---------------------------------

 Put in the number of unallocated memory blocks: 5
Put in the  of memory available in block 1 :300
Put in the  of memory available in block 2 :500
Put in the  of memory available in block 3 :250
Put in the  of memory available in block 4 :220
Put in the  of memory available in block 5 :270

 Put in the number of processes requiring memory: 5
Put in the memory size required for process 1:300
Put in the memory size required for process 2:350
Put in the memory size required for process 3:450
Put in the memory size required for process 4:400
Put in the memory size required for process 5:150
----------------------
The process number is 1
The process size is 300
The block size is 500
The block the process is allocated to is 2
The difference between the orignal block 2 and the allocated process 1 is 200

----------------------
The process number is 2
The process size is 350
The process is not allocated to a block

----------------------
The process number is 3
The process size is 450
The process is not allocated to a block

----------------------
The process number is 4
The process size is 400
The process is not allocated to a block

----------------------
The process number is 5
The process size is 150
The block size is 300
The block the process is allocated to is 1
The difference between the orignal block 1 and the allocated process 5 is 150

abdos@hvs-its-lnx01:~/Portfolio1/207se/lab6/c-code$
```

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207SE
Student ID: 6179614

3:

None of the approaches allocate all of the process, but best fit allocates the most process with the least fragmentation.

Best Fit

M1 (300)	M2 (500)	M3 (250)	M4 (220)	M5 (270)
300	350		150	

Salah Abdo
207SE
Student ID: 6179614

b) Paging Activities

1:

First-in-first-out

Paging Accessing Sequence: 42775639322

3 table entries

	4	2	7	7	5	6	3	9	3	2	2
Page Entry 0	4	4	4	4	5	5	5	9	9	9	9
Page Entry 1		2	2	2	2	6	6	6	6	2	2
Page Entry 2			7	7	7	7	3	3	3	3	3
Page Fault	*	*	*		*	*	*	*		*	

Page Fault total: 8

4 table entries

	4	2	7	7	5	6	3	9	3	2	2
Page Entry 0	4	4	4	4	4	6	6	6	6	6	6
Page Entry 1		2	2	2	2	2	3	3	3	3	3
Page Entry 2			7	7	7	7	7	9	9	9	9
Page Entry 3					5	5	5	5	5	2	2
Page Fault	*	*	*		*	*	*	*		*	

Page Fault total: 8

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207SE
Student ID: 6179614

2:

Paging Accessing Sequence: 42775639322

3 table entries

```
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab6/c-code$ ./fifo

-------------------------------------

 FIFO Paging Approach

-------------------------------------

Enter the number of entries in the page table: 3

 Enter the paging memory seqence with no spaces (e.g. 12343535) :42775639322

++++++++++++++++++++++++++++++++
 Step 0 of the process
++++++++++++++++++++++++++++++++

         The paging sequence
                4  2  7  7  5  6  3  9  3  2  2
 Page Frame 0 : 4

 Page Frame 1 :

 Page Frame 2 :

 There is a page fault

 Page fault score is 1

----Step end ------

 Press enter to continue:
```

```
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab6/c-code$ ./fifo

-------------------------------------

 FIFO Paging Approach

-------------------------------------

Enter the number of entries in the page table: 3

 Enter the paging memory seqence with no spaces (e.g. 12343535) :42775639322

++++++++++++++++++++++++++++++++
 Step 0 of the process
++++++++++++++++++++++++++++++++

         The paging sequence
                4  2  7  7  5  6  3  9  3  2  2
 Page Frame 0 : 4

 Page Frame 1 :

 Page Frame 2 :

 There is a page fault

 Page fault score is 1

----Step end ------

 Press enter to continue:
```

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207SE
Student ID: 6179614

4 table entries

```
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab6/c-code$
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab6/c-code$ ./fifo

--------------------------------------

 FIFO Paging Approach

--------------------------------------

Enter the number of entries in the page table: 4


 Enter the paging memory seqence with no spaces (e.g. 12343535) :42775639322

++++++++++++++++++++++++++++++++
 Step 0 of the process
++++++++++++++++++++++++++++++++

        The paging sequence
              4  2  7  7  5  6  3  9  3  2  2
 Page Frame 0 : 4

 Page Frame 1 :

 Page Frame 2 :

 Page Frame 3 :

 There is a page fault

 Page fault score is 1

----Step end ------

 Press enter to continue:
```

```
++++++++++++++++++++++++++++++++
 Step 10 of the process
++++++++++++++++++++++++++++++++

         The paging sequence
                 4  2  7  7  5  6  3  9  3  2  2
 Page Frame 0 : 4  4  4  4  4  6  6  6  6  6  6

 Page Frame 1 :    2  2  2  2  2  3  3  3  3  3

 Page Frame 2 :       7  7  7  7  7  9  9  9  9

 Page Frame 3 :             5  5  5  5  5  2  2

 No page fault

 Page fault score is 8

----Step end ------
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab6/c-code$
```

Salah Abdo
207SE
Student ID: 6179614

3:

Random page allocation approach

3 table entries

	4	2	7	7	5	6	3	9	3	2	2
Page Entry 0	4	4	4	4	4	6	3	3	3	3	3
Page Entry 1		2	2	2	5	5	5	5	5	2	2
Page Entry 2			7	7	7	7	7	9	9	9	9
Page Fault	*	*	*		*	*	*	*		*	

Page Fault total: 8

4 table entries

	4	2	7	7	5	6	3	9	3	2	2
Page Entry 0	4	4	4	4	4	4	4	9	9	9	9
Page Entry 1		2	2	2	2	2	2	2	2	2	2
Page Entry 2			7	7	7	7	3	3	3	3	3
Page Entry 3					5	6	6	6	6	6	6
Page Fault	*	*	*		*	*	*	*			

Page Fault total: 7

Salah Abdo
207SE
Student ID: 6179614

4:

3 table entries

```
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab6/c-code$ ./random

---------------------------------------

 Random Paging Allociation Approach

---------------------------------------

Enter the number of entries in the page table: 3


 Enter the paging memory seqence with no spaces (e.g. 12343535) :42775639322

++++++++++++++++++++++++++++++++
 Step 0 of the process
++++++++++++++++++++++++++++++++

        The paging sequence
              4  2  7  7  5  6  3  9  3  2  2
 Page Frame 0 : 4

 Page Frame 1 :

 Page Frame 2 :

 There is a page error

 Page fault score is 1

----Step end ------

 Press enter to continue:
```

```
++++++++++++++++++++++++++++++++++
 Step 10 of the process
++++++++++++++++++++++++++++++++++

        The paging sequence
                 4  2  7  7  5  6  3  9  3  2  2
 Page Frame 0 : 4  4  4  4  4  4  3  9  9  9  9

 Page Frame 1 :    2  2  2  2  2  2  2  3  2  2

 Page Frame 2 :       7  7  5  6  6  6  6  6  6

 No page faults

 Page fault score is 9

----Step end ------
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab6/c-code$
```

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207SE
Student ID: 6179614

4 table entries

```
----Step end ------
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab6/c-code$ ./random

---------------------------------------

 Random Paging Allociation Approach

---------------------------------------

Enter the number of entries in the page table: 4

 Enter the paging memory seqence with no spaces (e.g. 12343535) :42775639322

++++++++++++++++++++++++++++++++
 Step 0 of the process
++++++++++++++++++++++++++++++

        The paging sequence
              4  2  7  7  5  6  3  9  3  2  2
 Page Frame 0 : 4

 Page Frame 1 :

 Page Frame 2 :

 Page Frame 3 :

 There is a page error

 Page fault score is 1

----Step end ------

 Press enter to continue:
```

```
++++++++++++++++++++++++++++++++
 Step 10 of the process
++++++++++++++++++++++++++++++++

         The paging sequence
                 4  2  7  7  5  6  3  9  3  2  2
 Page Frame 0 : 4  4  4  4  4  4  4  4  4  4  4

 Page Frame 1 :    2  2  2  2  2  3  3  3  3  3

 Page Frame 2 :       7  7  7  6  6  6  6  6  6

 Page Frame 3 :             5  5  5  9  9  2  2

 No page faults

 Page fault score is 8

----Step end ------
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab6/c-code$
```

Salah Abdo
207SE
Student ID: 6179614

Explanation

The reason why the results are not the same as the exe file is because the page allocations is random so any page entry can be selected, and if the page entry that has been selected may be the same as the current value you won't get as many page faults. But, this can also have different affect if the page entry that is randomly selected is never the same as the current value then you will get more page faults.

Salah Abdo
207SE
Student ID: 6179614

Lab Activity 7 Buffer

a) Brief description of the Buffer Activity

For this activity simple buffer approach the copy a file from one location to another using a buffer. For this activity I had to comment and explain the code provided and then update the code so it prints an error that has occurred or if the file has been successfully created. I then adapted the code again but this time the code need to show how many character were read in total, how many character are read from the buffer at a time, how many words are in the document, and how many time the buffer is filled. Lastly, I change the buffer size to 2000 and explained how it influences the number of times the bugger has been filled.

Salah Abdo
207SE
Student ID: 6179614

b) Commented Buffer.c code

```
#include <fcntl.h>
#include <stdlib.h>
#include <unistd.h>
#include <stdio.h>

#define BUF_SIZE 500
#define OUTPUT_MODE 0700

int main(int argc, char *argv[])
{
        int in_fd, out_fd; /* stores the number associated with the input
file */
        int rd_size = 1, wr_size; /* stores the amount of data in the
buffer*/
        char buf[BUF_SIZE];

        if (argc != 3){/* will exit if there is no 3 arguments */
                exit(1);
        }
        in_fd = open(argv[1], O_RDONLY);
        if (in_fd < 0){/* if the file sis not there the number becomes
negative */
                exit(2);
        }

        out_fd = creat(argv[2], OUTPUT_MODE);
        if (out_fd < 0) { /* checks if file has been created */
                exit(3);
        }

        while (rd_size > 0) { /* loops until all info in the buffer and
printed it to a new file */
                rd_size = read(in_fd, buf, BUF_SIZE);
                if (rd_size <0){ /* putting input file into the buffer */
                exit(4);
                }

                wr_size = write(out_fd, buf, rd_size);
                if (wr_size<=0){  /* takes buffer writes to out put file*/
                        close(in_fd);
                        close(out_fd);
                        exit(5);
                }
        }
}
```

Salah Abdo
207SE
Student ID: 6179614

c) Update the code to so that it prints if an error has occurred or if a file is successfully created with the content of the review in it.

```
#include <fcntl.h>
#include <stdlib.h>
#include <unistd.h>
#include <stdio.h>

#define BUF_SIZE 500
#define OUTPUT_MODE 0700

int main(int argc, char *argv[])
{
        int in_fd, out_fd; /* stores the number associated with the input
file */
        int rd_size = 1, wr_size; /* stores the amount of data in the
buffer*/
        char buf[BUF_SIZE];

        if (argc != 3){/* will exit if there is no 3 arguments */
                printf("enter 3 arguments\n");
                exit(1);
        }
        in_fd = open(argv[1], O_RDONLY);
        if (in_fd < 0){/* if the file sis not there the number becomes
negative */
                printf("no file found\n");
                exit(2);
        }

        out_fd = creat(argv[2], OUTPUT_MODE);
        if (out_fd < 0) { /* checks if file has been created */
                printf("no file created\n");
                exit(3);
        }

        while (rd_size > 0) { /* loops until all info in the buffer and
printed it to a new file */
                rd_size = read(in_fd, buf, BUF_SIZE);
                if (rd_size <0){ /* putting input file into the buffer */
                printf("somethings gone wrong\n");
                exit(4);
                }

                wr_size = write(out_fd, buf, rd_size);
                if (wr_size<=0){  /* takes buffer writes to out put file*/
                        close(in_fd);
                        close(out_fd);
                        printf("success\n");
                        exit(5);
                }
        }
```

Salah Abdo
207SE
Student ID: 6179614

```
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab7/buffer$ ./buffer review.txt hamlet.txt
success
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab7/buffer$
```

```
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab7/buffer$ ./buffer review.txt hamlet.txt
success
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab7/buffer$ cat hamlet.txt
So, after all the hype, the Hamlet. Tonight we saw the first preview performance of Benedict Cumberbatch▒s interpretation of the great Dane, at London▒s Barbican theatre. Absent from the audien
ce were the shrieking fans, snatching selfies and chattering through soliloquies, that we▒d been led to expect.
Judging by the first batch of spectators, your typical Cumberbitch is a polite, plumpish lady in her mid thirties, hailing from Northern Europe. She might be more at home at Sherlock-con, the n
ow annual convention for fans of the BBC One show that has turned Cumberbatch into a global star, but she knows too to turn her mobile phone off during a play, and she may well be too sensible
to fork out the staggering ▒8.50 the theatre is charging for the programmes.
The audience, in summary, was as impeccably behaved as you▒d expect from a usual London theatre crowd, granting Cumberbatch only one mid-scene ovation, when he did a hilarious impression of a t
oy soldier. They stood up at the end, but only for a well-behaved minute.
Director Lyndsey Turner and designer Es Devlin have created a lavish, epic Hamlet for the Barbican▒s vast stage. Not perhaps since it held the barricades of revolution for the first performance
s of Les Miserables in the Eighties has this platform seemed quite so large.
Cumberbatch and his fellow cast members have a palatial hall in which to play out their tragedy. Panelled walls painted a rich dark turquoise reach to an enormous chandelier and a grand staircа
se descends stage right; the whole is reminiscent of a John Singer Sargent painting, with costumes to match. Oh and there▒s room for a huge dining table, a man-sized toy fort, and a grand piano
.
Before this tableau is unveiled however, we meet Hamlet on his own. Cumberbatch opens the play bent over boxes of old possessions with a record player crackling in the background. The first lin
e in this production is the most famous in the play, ▒To Be or Not to Be▒, not the more prosaic ▒Who▒s there▒, said by a soldier, that Shakespeare bequeathed us. Indeed, Cumberbatch delivers th
e whole speech there and then in the opening minutes, the first of several tweaks to the text where Turner has dropped the soliloquies into new places throughout the play. Although Shakespeare
novices may not realise this: the devastating keynotes of the plot are all present and correct.
A first preview is not the place to offer analysis of the performances. This play has three weeks to run in before it opens to the critics. Cumberbatch▒s interpretation of the title role is goi
ng to shift and develop. He already commands and surprises, there are laughs and shocks, and with a cast that includes the always moving and intelligent Ciaran Hinds as Hamlet▒s murdering uncle
 Claudius, he is ably supported.
Our theatre critic Dominic Cavendish wrote in these pages yesterday that to play Hamlet, such a protean character, is to take on the challenge of life itself. For Benedict Cumberbatch, still on
ly 39, life in recent months has meant bearing the pressure of leading the fastest selling London theatre show since records began. That is a challenge indeed and, with the first of some eighty
 performances he will give under his belt, one he has only just embarked upon. This both popular and hugely talented actor has staked out the greatest part in drama, it will be fascinating to s
ee how he masters it.abdos@hvs-its-lnx01:~/Portfolio1/207se/lab7/buffer$
```

Hamlet.txt contains everything from review.txt. The program loaded everything from review.txt to the buffer, which was then written to hamlet.txt. Which now contains the review of hamlet.

Salah Abdo
207SE
Student ID: 6179614

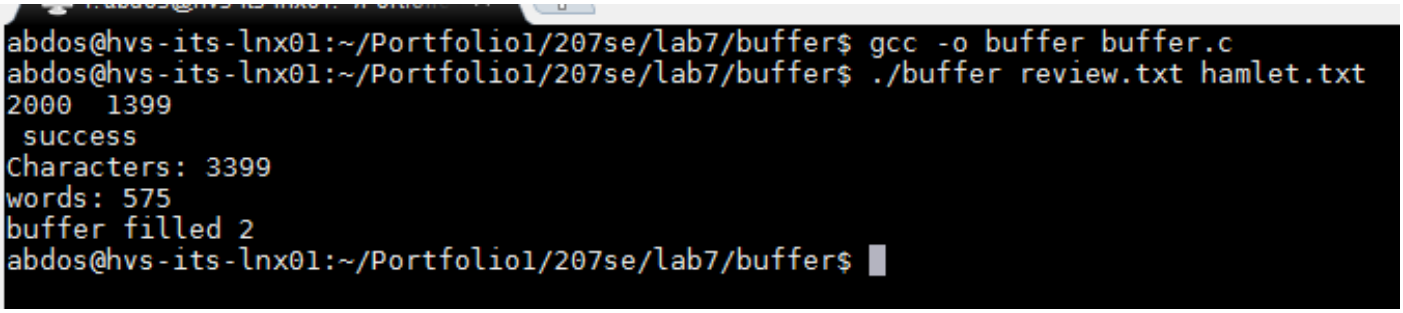
d) Updated buffer.c code to show how many character are read to buffer, how many character read at a time into the buffer, how many words in the document and how many times the buffer is filled

```c
#include <fcntl.h>
#include <stdlib.h>
#include <unistd.h>
#include <stdio.h>

#define BUF_SIZE 2000
#define OUTPUT_MODE 0700

int main(int argc, char *argv[])
{
	int in_fd, out_fd; /* stores the number associated with the input file */
	int rd_size = 1, wr_size; /* stores the amount of data in the buffer*/
	char buf[BUF_SIZE];
	int character = 0;
	int j;
	int count = 0;
	int filled = 0;
	if (argc != 3){/* will exit if there is no 3 arguments */
		printf("enter 3 arguments\n");
		exit(1);
	}
	in_fd = open(argv[1], O_RDONLY);
	if (in_fd < 0){/* if the file sis not there the number becomes negative */
		printf("no file found\n");
		exit(2);
	}

	out_fd = creat(argv[2], OUTPUT_MODE);
	if (out_fd < 0) { /* checks if file has been created */
		printf("no file created\n");
		exit(3);
	}

	while (rd_size > 0) { /* loops until all info in the buffer and printed it to a new file */
		rd_size = read(in_fd, buf, BUF_SIZE);
		if (rd_size > 0){
			character = character + rd_size; /* counts the character  */
			filled = filled +1; /* counts the filles buffers */
			printf("%d  ", rd_size); /* displays the filled buffers */
		}

		for (j = 0;j<rd_size;j++)
		{
			if(buf[j] == ' '){
				count +=1;
			}

			else if (buf[j]== '.'){
				count+=1;
				j+=1;
			}
		}
		/*
		* The first if statment checks if character j in the buffer is a space which will then increase the count (which is the word count) by 1
		*  else if the  j in the buffer is a full stop it wont count as a word and will be skipped and  the character after that since its a space.
		*/

		if (rd_size <0){ /* putting input file into the buffer */
		printf("somethings gone wrong\n");
		exit(4);
		}

		wr_size = write(out_fd, buf, rd_size);
		if (wr_size<=0){  /* takes buffer writes to out put file*/
			close(in_fd);
			close(out_fd);
			printf("\n success\n");
			printf("Characters: %d\n",character);
			printf("words: %d\n", count);
			printf("buffer filled %d\n", filled);
			exit(5);
		}
	}
}
```

```
1. abdos@hvs-its-lnx01: ~/Portfolio
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab7/buffer$ gcc -o buffer buffer.c
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab7/buffer$ ./buffer review.txt hamlet.txt
500  500  500  500  500  500  399
 success
Characters: 3399
words: 575
buffer filled 7
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab7/buffer$
```

Salah Abdo
207SE
Student ID: 6179614

e) Impact of changing buffer size.



The only impact it had by changing the buffer size to 2000 is the buffer size fills twice this is because the buffer size is bigger mewing it can hold more

Salah Abdo
207SE
Student ID: 6179614

Lab Activity 8 Cache Buffer

a) Brief Description of Cache Buffer Activity

For this activity I had to firstly complete the uncompleted function on the code provided. I needed to make the function return the next byte in the buffer each time it is called as well as the change the current position of the buffer. This function also needed to check whether the buffer is at the end of the buffer. Then I had to prove that the file output was being buffered. And also provided to show that each byte is being read and when the buffer is being refilled.

b) Commented implementation of the cr_read_byte function

```
char cr_read_byte(cr_file* f){
  // your code goes here
  // remember that this needs to return a char (a byte, put another way..)
  if (f->usedbuffer >= f->bufferlength){ // checks if the buffer needs
refilling
        refill(f);
  }
  return f->buffer[f->usedbuffer++]; // returns the character thats been
pointed at
  return EOF; // this is just so the compile works...
}
```

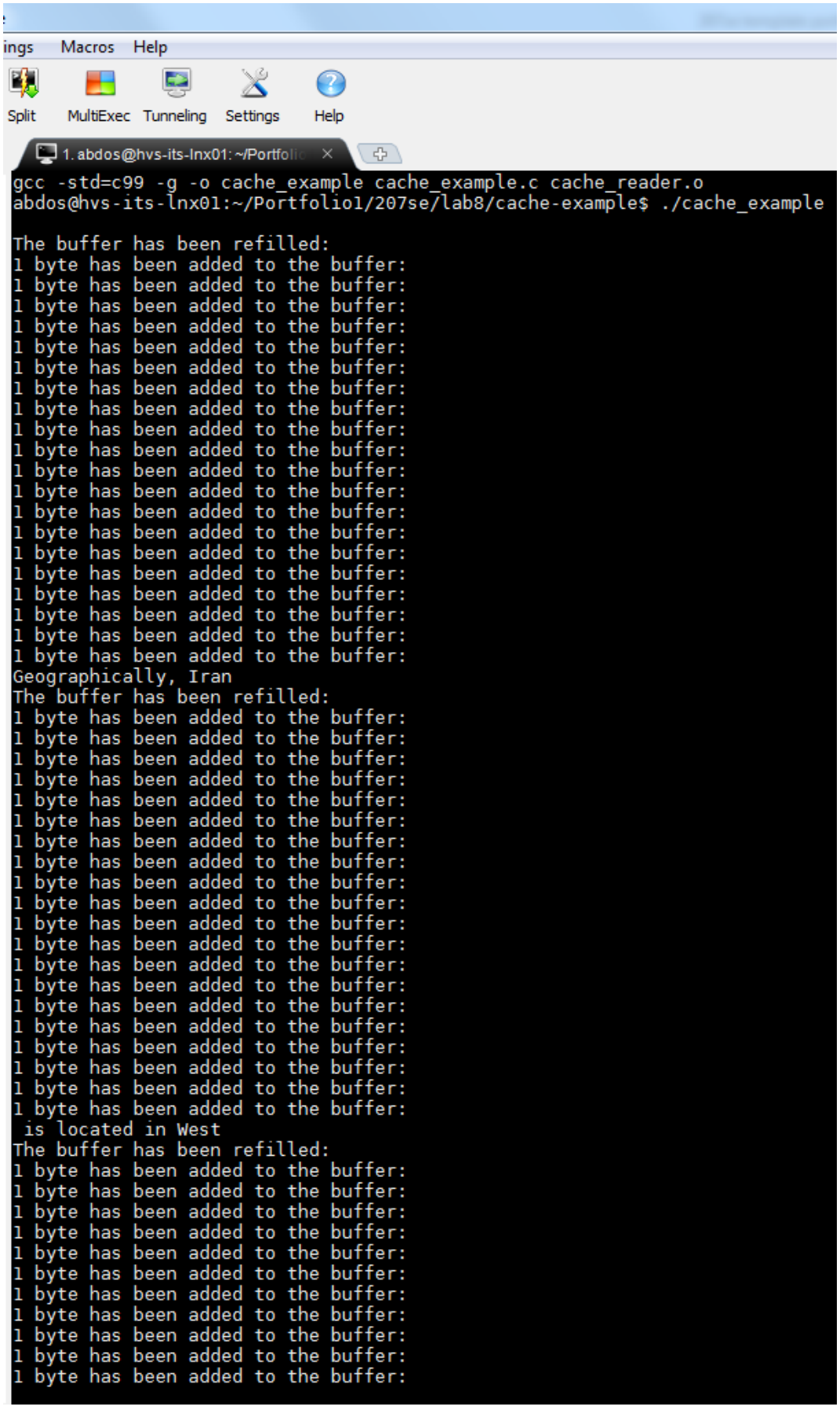
```
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab8/cache-example$ make
gcc -std=c99 -g -c cache_reader.c
gcc -std=c99 -g -o cache_example cache_example.c cache_reader.o
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab8/cache-example$ /clear
-bash: /clear: No such file or directory
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab8/cache-example$ clear
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab8/cache-example$ make
make: 'cache_example' is up to date.
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab8/cache-example$ ./cache_example
Geographically, Iran is located in West Asia and borders the Caspian Sea, Persian Gulf, and Gulf of Oman. Its mountains have helped to shape both the political and the economic history of the
ountry for several centuries. The mountains enclose several broad basins, or plateaus, on which major agricultural and urban settlements are located. Until the 20th century, when major highway
 and railroads were constructed through the mountains to connect the population centers, these basins tended to be relatively isolated from one another.  Typically, one major town dominated ea
h basin, and there were complex economic relationships between the town and the hundreds of villages that surrounded it. In the higher elevations of the mountains rimming the basins, tribally
rganized groups practiced transhumance, moving with their herds of sheep and goats between traditionally established summer and winter pastures. There are no major river systems in the country
 and historically transportation was by means of caravans that followed routes traversing gaps and passes in the mountains. The mountains also impeded easy access to the Persian Gulf and the C
spian Sea. With an area of 1,648,000 square kilometres (636,000 sq mi), Iran ranks eighteenth in size among the countries of the world. Iran shares its northern borders with three post-Soviet
tates: Armenia, Azerbaijan, and Turkmenistan. These borders extend for more than 2,000 kilometres (1,200 mi), including nearly 650 kilometres (400 mi) of water along the southern shore of the
aspian Sea. Iran's western borders are with Turkey in the north and Iraq in the south, terminating at the Arvand Rud. The Persian Gulf and Gulf of Oman littorals form the entire 1,770 kilometr
s (1,100 mi) southern border. To the east lie Afghanistan on the north and Pakistan on the far south. Iran's diagonal distance from Azerbaijan in the northwest to Sistan and Baluchestan Provin
e in the southeast is approximately 2,333 kilometres (1,450 mi). The history of Iran, commonly also known as Persia in the Western world, is intertwined with the history of a larger region, al
o to an extent known as Greater Iran, comprising the area from Anatolia, the Bosphorus, and Egypt in the west to the borders of Ancient India and the Syr Darya in the east, and from the Caucas
s and the Eurasian Steppe in the north to the Persian Gulf and the Gulf of Oman in the south.  Iran is home to one of the world's oldest continuous major civilizations, with historical and urb
n settlements dating back to 4000 BC.[1] The southwestern and western part of the Iranian Plateau participated in the traditional Ancient Near East with Elam, from the Early Bronze Age, and la
er with various other peoples, such as the Kassites, Mannaeans, and Gutians. Georg Wilhelm Friedrich Hegel names the Persians as the first Historical People.[2] The Medes unified Iran as a nat
on and empire in 625 BC.The Achaemenid Empire (550▒330 BC), founded by Cyrus the Great, was the first of the Persian empires to rule from the Balkans to North Africa and also Central Asia, spa
ning three continents, from their seat of power in Persis (Persepolis). It was the largest empire yet seen and the first world empire. The First Persian Empire was the only civilization in all
of history connect over 40% of the global population, accounting for approximately 49.4 million of the world▒s 112.4 million people in around 480 BC. They were succeeded by the Seleucid, Parth
an and Sasanian Empires, who successively governed Iran for almost 1000 years and made Iran once again as a leading power in the world. Persia's arch-rival was the Roman Empire and its success
r, the Byzantine Empire. The Persian Empire proper begins in the Iron Age, following the influx of Iranian peoples. Iranian people gave rise to the Medes, the Achaemenid, Parthian, and Sasania
 Empires of classical antiquity. Once a major empire of superpower proportions, having conquered far and wide, Iran has endured invasions too, by the Greeks, Arabs, Turks, and the Mongols. Ira
 has continually reasserted its national identity throughout the centuries and has developed as a distinct political and cultural entity. The Muslim conquest of Persia (633▒656) ended the Sasa
ian Empire and was a turning point in Iranian history. Islamization of Iran took place during the eighth to tenth centuries and led to the eventual decline of Zoroastrianism in Iran as well as
many of its dependancie. However, the achievements of the previous Persian civilizations were not lost, but were to a great extent absorbed by the new Islamic polity and civilization. Iran was
once again reunified as an independent state in 1501 by the Safavid dynasty, which converted Iran to Shia Islam[8] as the official religion of their empire, marking one of the most important t
rning points in the history of Islam. Functioning again as a leading power, this time amongst the neighboring Ottoman Empire, their arch-rival for centuries, Iran had been a monarchy ruled by
n emperor almost without interruption from 1501 until the 1979 Iranian Revolution, when Iran officially became an Islamic republic on April 1, 1979. Over the course of the first half of the 19
h century Iran lost many of its territories in the Caucasus (which it had been ruling intermittently encompassed for millennia), comprising modern-day Eastern Georgia, Dagestan, Azerbaijan, an
 Armenia, to its rapidly expanding and emerged neighboring rival the Russian Empire, following the Russo-Persian Wars between 1804▒13 and 1826▒8.

abdos@hvs-its-lnx01:~/Portfolio1/207se/lab8/cache-example$
```

c) Comment updated code to show that each byte is being read, and when the buffer is being refilled.

```
#include "cache_reader.h"


//http://www.phim.unibe.ch/comp_doc/c_manual/C/SYNTAX/struct.html
//http://vergil.chemistry.gatech.edu/resources/programming/c-
tutorial/structs.html


int refill(cr_file* buff){
  //Refills a buffer
  //Only works when completely used buffer
  printf("\nThe buffer has been refilled: \n");
  if(buff->usedbuffer!=buff->bufferlength){
    return 0;
  }

  else{
    buff->usedbuffer=0;
    int len=fread(buff->buffer, sizeof(char), buff->bufferlength, buff-
>file);
    //If we didn't fill the buffer, fill up with EOF
    for(int i=0;i<len;i++){ // for i in range 0 to length buffer, print for
each byte added to buffer
        printf("1 byte has been added to the buffer: \n");
        buff -> character++; // increments the character and counts all the
bytes that have been read
    }

    if(len<buff->bufferlength)
      for(int i=len;i<buff->bufferlength;i++)
        buff->buffer[i]=EOF;  //Accessing like an array!
    return len;
  }

}

void cr_close(cr_file* f){
  free(f->buffer);
  fclose(f->file);
}


cr_file* cr_open(char * filename, int buffersize){

  //Info on malloc
  //http://www.space.unibe.ch/comp_doc/c_manual/C/FUNCTIONS/malloc.html
  FILE* f;
  if ((f = fopen(filename, "r")) == NULL){
    0printf(stderr, "Cannot open %s\n", filename);
    return 0;
  }
```

```
  cr_file* a=(cr_file*)malloc(sizeof(cr_file));
  a->file=f;
  a->bufferlength=buffersize;
  a->usedbuffer=buffersize; //Start off with no characters, so refill will
work as expected
  a->buffer=(char*)malloc(sizeof(char)*buffersize);

  refill(a);
  return a;
}

//-----------------------------------------------------------------------
char cr_read_byte(cr_file* f){
  // your code goes here
  // remember that this needs to return a char (a byte, put another way..)
  if (f->usedbuffer >= f->bufferlength){ // checks if the buffer needs
refilling
        refill(f);
  }
  return f->buffer[f->usedbuffer++]; // returns the character thats been
pointed at
  return EOF; // this is just so the compile works...
}
```

Salah Abdo
207SE
Student ID: 6179614



Salah Abdo
207SE
Student ID: 6179614

d) Commented updated code showing to show how many bytes were read in total, and how many times the buffer was refilled

Commented updated code

```
#include "cache_reader.h"


//http://www.phim.unibe.ch/comp_doc/c_manual/C/SYNTAX/struct.html
//http://vergil.chemistry.gatech.edu/resources/programming/c-
tutorial/structs.html


int refill(cr_file* buff){
  //Refills a buffer
  //Only works when completely used buffer
  printf("\nThe buffer has been refilled: \n");
  if(buff->usedbuffer!=buff->bufferlength){
    return 0;
  }

  else{
    buff->usedbuffer=0;
    int len=fread(buff->buffer, sizeof(char), buff->bufferlength, buff-
>file);
    //If we didn't fill the buffer, fill up with EOF
    for(int i=0;i<len;i++){ // for i in range 0 to length buffer, print for
each byte added to buffer
        printf("1 byte has been added to the buffer: \n");
        buff -> character++; // increments the character and counts all the
bytes that have been read
    }

    if (len == buff ->bufferlength){  // checks if the buffer is full, if
it is it will increas the buffer size
        buff -> buffercount++;
    }
    if(len<buff->bufferlength)
      for(int i=len;i<buff->bufferlength;i++)
       buff->buffer[i]=EOF;  //Accessing like an array!
    return len;
  }

}

void cr_close(cr_file* f){
  printf("Bytes that have been read: %d\n", f->character);
  printf("Buffers that have been filled: %d\n", f->buffercount);
  free(f->buffer);
  fclose(f->file);
}
cr_file* cr_open(char * filename, int buffersize){

  //Info on malloc
```

```
  //http://www.space.unibe.ch/comp_doc/c_manual/C/FUNCTIONS/malloc.html
  FILE* f;
  if ((f = fopen(filename, "r")) == NULL){
    printf(stderr, "Cannot open %s\n", filename);
    return 0;
  }

  cr_file* a=(cr_file*)malloc(sizeof(cr_file));
  a->file=f;
  a->bufferlength=buffersize;
  a->usedbuffer=buffersize; //Start off with no characters, so refill will
work as expected
  a->buffer=(char*)malloc(sizeof(char)*buffersize);

  refill(a);
  return a;
}

//-----------------------------------------------------------------------
char cr_read_byte(cr_file* f){
  // your code goes here
  // remember that this needs to return a char (a byte, put another way..)
  if (f->usedbuffer >= f->bufferlength){ // checks if the buffer needs
refilling
        refill(f);
  }
  return f->buffer[f->usedbuffer++]; // returns the character thats been
pointed at
  return EOF; // this is just so the compile works...
}
```

```
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The buffer has been refilled:
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d 1826▒8.

Bytes that have been read: 5553
Buffers that have been filled: 277
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab8/cache-example$
```

Salah Abdo
207SE
Student ID: 6179614

Lab 10: The Cache Buffer from week 8 with system calls

a) Brief description of the activity

For this activity I changed the cache read library from using fopen, fread, fclose functions to the systems call versions open, read, close.

b) Changes the cache_reader library from using the fopen, fread, fclose functions to the system call versions open, read, close

Cache_reader.h

```
#include <stdio.h>
#include <stdlib.h>
#include <sys/types.h> // used for open()
#include <sys/stat.h>  // used for open()
#include <unistd.h>    // used for read and close()
#include <fcntl.h>     // used for open()
//These will are required for the open(), close() and read()

//The internals of this struct aren't important
//from the user's point of view
typedef struct{
  int file;         //File being read  // open only uses int
  int bufferlength;  //Fixed buffer length
  int usedbuffer;    //Current point in the buffer
  char* buffer;      //A pointer to a piece of memory
  int character;     //  same length as "bufferlength"
  int buffercount;
} cr_file;



//Open a file with a given size of buffer to cache with
cr_file* cr_open(char* filename, int buffersize);


//Close an open file
void cr_close(cr_file* f);

//Read a byte.  Will return EOF if empty.
char cr_read_byte(cr_file* f);
```

Salah Abdo
207SE
Student ID: 6179614

Cache_reader.c

```
#include "cache_reader.h"



//http://www.phim.unibe.ch/comp_doc/c_manual/C/SYNTAX/struct.html
//http://vergil.chemistry.gatech.edu/resources/programming/c-
tutorial/structs.html


int refill(cr_file* buff){
  //Refills a buffer
  //Only works when completely used buffer
  printf("\nThe buffer has been refilled: \n");
  if(buff->usedbuffer!=buff->bufferlength){
    return 0;
  }

  else{
    buff->usedbuffer=0;
    int len=read(buff->file, buff->buffer, buff->bufferlength); //attempts
to read up to count bytes from file descriptor fd into the buffer starting
at buf.

    //If we didn't fill the buffer, fill up with EOF
    for(int i=0;i<len;i++){ // for i in range 0 to length buffer, print for
each byte added to buffer
        printf("1 byte has been added to the buffer: \n");
        buff -> character++; // increments the character and counts all the
bytes that have been read
    }

    if (len == buff ->bufferlength){  // checks if the buffer is full, if
it is it will increas the buffer size
        buff -> buffercount++;
    }
    if(len<buff->bufferlength)
      for(int i=len;i<buff->bufferlength;i++)
        buff->buffer[i]=EOF;  //Accessing like an array!
    return len;

  }

}

void cr_close(cr_file* f){
  printf("Bytes that have been read: %d\n", f->character);
  printf("Buffers that have been filled: %d\n", f->buffercount);
  free(f->buffer);
  close(f->file); // closes a file descriptor, so that it no longer refers
to any file and may be reused.
}
cr_file* cr_open(char * filename, int buffersize){
```

```
  //Info on malloc
  //http://www.space.unibe.ch/comp_doc/c_manual/C/FUNCTIONS/malloc.html
  int f;  // needs to be int for open
  if ((f = open(filename, O_RDONLY)) < 0){ //Given  a  pathname for a file,
open() returns a file descriptor, a small, nonnegative integer for use in
subsequent system calls
    return 0;
  }

  cr_file* a=(cr_file*)malloc(sizeof(cr_file));
  a->file=f;
  a->bufferlength=buffersize;
  a->usedbuffer=buffersize; //Start off with no characters, so refill will
work as expected
  a->buffer=(char*)malloc(sizeof(char)*buffersize);

  refill(a);
  return a;
}

//-----------------------------------------------------------------------
char cr_read_byte(cr_file* f){
  // your code goes here
  // remember that this needs to return a char (a byte, put another way..)
  if (f->usedbuffer >= f->bufferlength){ // checks if the buffer needs
refilling
        refill(f);
  }
  return f->buffer[f->usedbuffer++]; // returns the character thats been
pointed at
  return EOF; // this is just so the compile works...
```

```
gcc -std=c99 -g -o cache_example cache_example.c cache_reader.o
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab8/cache-example$ clear
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab8/cache-example$ make
gcc -std=c99 -g -c cache_reader.c
gcc -std=c99 -g -o cache_example cache_example.c cache_reader.o
abdos@hvs-its-lnx01:~/Portfolio1/207se/lab8/cache-example$ ./cache_example

The buffer has been refilled:
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Geographically, Iran
The buffer has been refilled:
```

Salah Abdo
207SE
Student ID: 6179614

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