İSTANBUL TECHNICAL UNIVERSITY
Department of Computer Engineering
BLG101E – Introduction to Information Systems
Applied Lab Session 2 – Basic Concepts

Before the session

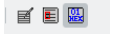
1. Acquire a laptop on which you can work during exercise sessions and for assignments.
2. Ensure that the following software is installed (see last week's lab instructions for details):
   1. Firefox (web browser)
   2. Geany (text editor)
   3. wxMEdit (hex editor)
   4. PCManFM (or similar GUI file manager)
   5. Xfce Terminal (or similar Linux "command line"/"shell"/"terminal" program)

During the session

1. Get into groups of 3-4.
2. Select one laptop from the group members. As space is limited, you will work with this laptop during the exercise session. The other laptops do not need to be on the desks if there is insufficient space for them.

> Wherever you see a 🕮 symbol:
> 1. Note down your answer to the question.
> 2. Check and discuss your answer with your group or desk mates.
> 3. As a group, check your answer with the lab assistant.

Section A: Character Encodings

3. Open this link in Firefox: http://files.djduff.net/BLG101E/Düzağaç1.txt
   The page opened at the link should have nonsense character sequences like "**sÄłcak aÄŸustos**". We are going to try to understand why.
4. Right click in the browser window over the text, choose "*Save Page As...*" and save it to disk as a text file.
5. Using your file manager (e.g. PCManFM), navigate to where in the file system you saved the file.
6. Open it in Geany (you may have to right click on it and choose "*Open With...*").
7. The file should look normal. We are going to try to understand why.
8. Open the file in wxMEdit. Choose "Hex Mode" from the toolbar:  . In the right column you should see the text and in the left the bytes encoding it are represented as hexadecimal digits. The text in the right column should be correct.
9. Using the "*View...Encoding...*" menu option, find an encoding that makes the text look exactly like it did in the browser. Some options: ISO8859-1, ISO8859-9, Windows-1252,UTF-8, UTF-16, UTF-32. 🕮 Which encoding was it interpreted as?
10. Using the same approach, determine what encoding the text should be interpreted with. 🕮 Which encoding should it be interpreted as?
11. When you click on characters in the right column in wxMEdit, the bytes used to encode that text are also hi-lighted in the left column. With the correct encoding for the text enabled, determine, in that encoding, how many bytes are used to encode the following characters: **U, u, Ü, ü, Ğ, ğ, I, ı.** 🕮 How many bytes are necessary for each character?
12. Using wxMEdit or an online table, and the ISO8859-1 encoding, find what is encoded by the hexadecimal string: 0x457863656C73696F7221. 🕮 What text string does it encode?
13. Using wxMEdit and the "Tools… Convert File Encoding..." menu option, convert the file to UTF-32 and then to ISO8859-9. Checking the hex listing in wxMEdit for each encoding, and the file size using your file manager, answer the following question: 🕮 Which of the 3 encodings (the original encoding, UTF-32 and ISO8859-9) requires the biggest and which requires the smallest file size? Why?

Section B: Command Line & File System

14. Using PCManFM or the file manager of your choice, navigate to your home folder (this might be /home/ubuntu or /home/mint or /home/itucs /home/vagrant or /home/yourname or similar, depending on how you installed your Linux (if you are a Windows or MacOS user, do the equivalent thing there).
15. Make a folder there called temp1, and navigate to inside the newly created folder.
16. There, create a new text file. Call it poem1.txt. Open the text file with Geany. Write into the file some awesome poetry and save the file to its original location.
17. Navigate to the previously downloaded file Düzağaç1.txt and copy that into temp1.
18. Create a folder called Poems. Move the file poem1.txt and the file Düzağaç1.txt into it. This can be achieved by selecting both files with the mouse and dragging both of them over the Poems folder icon.
19. Using the context sensitive (right click) menu and the "C*ompress...*" option, ***archive*** the folder Poems into a **tar** archive. Its extension should be **.tar**.
20. Now select the Poems folder again and again use the "*Compress...*" context sensitive menu option, but this time **compress** the tar file into "Tar achive (gzip-compressed)" file. Its extension should be **.tar.gz**.
21. Compare the size of the original folder to the size of the **.tar** archive file and the **.tar.gz** file using the context sensitive "*Properties*" menu option.
22. Delete your original Poems folder and use the "*Extract...*" option in the context sensitive (right click) menu of one of your archive files to replace it with the extracted archive files..
23. Now repeat **all of the above steps except using the command line** (to get started, using your program launcher, run Xfce Terminal or a similar terminal/command line program). Here is some extra help:
    - You can use the **pwd** command to print the current working directory.
    - You can use the **ls** command to list the contents of the current working directory. Use the command **ls -l** to list files with extra information including their file sizes.
    - You can use the **cd <directory>** command to change the current working directory. You need to substitute <directory> for the directory you want to change into. Try the following things in addition to the above steps:
        - You can use cd to change from the home directory into the temp1 directory using the relative path of the temp1 directory. E.g. **cd temp1**
        - Starting again, use cd to change from the home directory into the temp1 directory using the absolute path of the temp1 directory. E.g. **cd /home/<username>/temp1** (here <username> would be substituted with your username – you can find the current directory, which would include this information, by using the pwd command above).
        - Use cd to navigate to the folder "above" or "outside" the temp1 directory using **cd ..** 🕮 How does the current directory change if you type the following? **cd .**
    - Use the **mkdir <folder name>** command to create an empty folder. Here <folder name> would be substituted for the name of the folder you want to create.
    - You can use the **touch <newfile>** command to create an empty file. Here <newfile> must be substituted with the name of the file you will create. You can use absolute or relative paths for the file name.
    - You can use **geany <filename>** to open a file in Geany. You will need to replace <filename> with the name of the file you will open. You can use absolute or relative paths for the file name.
    - Use the command **tar -cf <archive filename> <files to archive>** to create a tar archive. Here, <archive filename> must be replaced by the name of the archive file you will create (e.g. **myarchive.tar**) and <files to archive> will be a list of filenames or folder names (separated by spaces) to be added to the archive.
    - You can use the command **tar -czf <archive filename> <files to archive>** to create a gzip-compressed tar archive. Here, <archive filename> must be replaced by the name of the compressed archive file you will create (e.g. **myarchive.tar.gz**). <files to archive> will be a list of filenames or folder names (separated by spaces) to be added to the compressed archive.
    - You can use the command **tar -xf <archive filename>** or **tar -xzf <archive filename>** to extract files from a tar or a gzip-compressed tar archive. Here, <archive filename> must be replaced by the name of the compressed archive file you will extract files from (e.g. **myarchive.tar** or **myarchive.tar.gz**).
    - You can use the command **file <filename>** to get information about the type of a file.