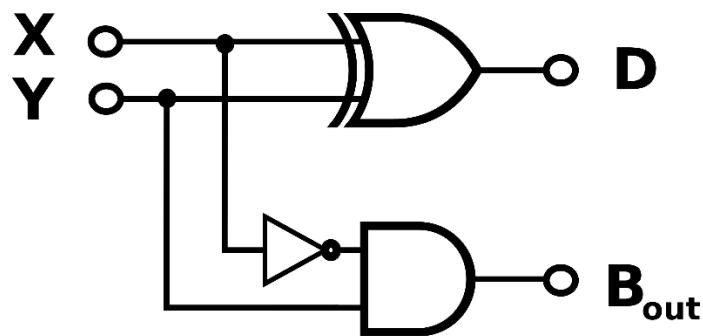


Computer Architecture and Technology Convergence Assignment

Q1: Binary Arithmetic:

Feel free to use any resources you need for the tasks below, but make sure to show workings.

- Q1.1. Add 11011 to 1011. Show your work (in particular, show where you get carries, and where you don't). You can check your work by translating the numbers into decimal, but I want to see the addition algorithm in base 2 instead of base ten. Hint: You can use MS Word tables to show calculations. Goto Insert->Table to insert a grid of desired size
- Q1.2. Rewrite the following base-10 numbers as 8-bit two's complement integers: -31, & -59.
- Q1.3. What does the bit pattern 11101001 represent if you interpret it as an 8-bit two's complement integer?
- Q1.4. Draw up the truth table for the circuit below (inputs are X and Y and outputs are B and D). From observing the result, what function do you think this circuit performs?



- Q1.5. Draw the circuit diagram for the Boolean logic equation: $(AB + C)D$ (Hint: you can use an online logic gate simulator such as: <https://academo.org/demos/logic-gate-simulator/> and screen-capture your drawing)

Q2: Linux Assignment

Q2.1:

Enter the commands below at the Linux terminal on the AWS VM (on which you completed your Linux Homework), and try to interpret the output.

For the submission:

In your own words, write a brief description of what each command does. Make sure to use Google as a resource and don't be afraid to experiment (as a normal user you cannot do much harm). Also include a screenshot of the output of the history command. Copy the screenshot into your ".docx" document for submission.

Commands:

- o `echo hello world` ←
- o `passwd` ←
- o `date` ← *
- o `hostname` ← *
- o `arch` ← *
- o `uname -a` ← *
- o `dmesg | more` ← (you may need to press `q` to quit)
- o `uptime` ← *
- o `whoami` ← *
- o `who` ← *
- o `last` ←
- o `finger` ← *
- o `w` ← *
- o `top` ← * (you may need to press `q` to quit)
- o `echo $SHELL` ←
- o `echo {con,pre}{sent,fer}{s,ed}` ←
- o `man ls` ← (you may need to press `q` to quit)
- o `man who` ← (you may need to press `q` to quit)
- o `clear` ←
- o `cal 2000` ←
- o `cal 9 1752` ← (do you notice anything unusual. Why is this the case?)
- o `yes please` ← (you may need to press `Ctrl-c` to quit)
- o `time sleep 5` ←
- o `history` ← *

Q2.2:

This is a research project. Use Google to help you identify a solution.

For each of the commands marked with an *, group them into a shell script so that you can automate execution of the commands. Write the shell script using the Vim text editor.

Once you have verified that the script works, add output redirection to append the output of each command to a file named as follows: **firstnameSurname.txt** (replacing firstname and surname with your own details). When writing to this text file, make liberal use of the echo command within the shell script to format the output nicely – i.e. insert blank lines or other demarcations and headings to make your file easily readable.

For the submission:

Copy and paste the contents of this auto-created “.txt” file into your “.docx” document for submission. You are also required to upload the shell script which you wrote and the text file which it generated.

Q2.3:

Q2.3.1:

When a user account is created on Linux, it is public to all users of the machine by default. That is, anyone can view your personal files. Change the access permissions using the 'chmod' command so that your personal folder is fully accessible to you (read, write and execute privileges) and totally inaccessible to the group and all other users.

Look at the lecture notes to work out how to do this.

Run the "ls -l" command to verify that the permissions have been set correctly (**Screenshot the result from this for submission**).

Q2.3.2:

Because there is no GUI installed on the VM, all programs have to run instead in text mode.

Use the 'lynx' text-based browser program on the VM. To run it, type:

- `lynx www.google.com`

In the lynx browser, search for an online IP location service to determine the city and country where the VM is located. Type the IP address of the VM into the IP locator website and it will tell you the VM's location (**Screenshot the result from this for submission**).

For the submission:

Copy the screenshots above into your ".docx" document for submission.

Q2.4:

This is a research project. Use Google to help you identify a solution.

The objective of the task is to (using the Vim text editor) write a shell script program that generates math tables for a hypothetical student.

The program first asks the user to enter the symbol corresponding to the following operations which are available.

Operator	Symbol
Addition	+
Subtraction	-
Multiplication	*
Division	/
Exponent	^

The program then asks the user to enter the operand (which can range from 1-15)

Following this, the programme will display the Maths tables for the operator in question acting on both:

- the input operand
- a second operand which will iterate from 1-15

In addition to shell scripting, this assignment examines your ability to use 'while loops' and 'if statements' correctly. It also examines your ability to research a solution.

For the submission:

Capture screenshots of the program in operation. Copy and paste the screenshots into your document for submission. Also, copy and paste the shell script code into your Word document for submission.

Submission Instructions

- Submit the following 3 files through the Moodle portal:
 - 1 .docx document
 - 1 shell script (from Q2.2)
 - 1 text file entitled: **firstnameSurname.txt** (replacing firstname and surname with your own details)
- Do **not** zip your submission or submit a PDF
- There is only one chance for submission so make sure you submit the correct version
- Ensure that you show workings
- Include all references used in your research (use a formal referencing style of your choice)
- Include table of contents
- Use MS Word's Headings – This will make it easier to generate table of contents and allow for easier navigation (see instructions in video)
- Hint: Use tables to demonstrate workings
- Marks will be awarded for following above instructions correctly