Computer Architecture & Technology Convergence Assignment

Contents

Q. 1.1

Addition of two binary numbers. Carries are represented by superscripted digits. Calculation begins from the rightmost column, carries are moved to the next column on the left. For example, binaries 1 + 1 = 0 with a carry of 1. 1 + 1 + 1 = 1 with a carry of 1.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | 11 | 1 | 01 | 11 | 1 |
|  |  | + | 1 | 0 | 1 | 1 |
|  | 1 | 0 | 01 | 1 | 11 | 01 |
|  | ANS: |  |  |  |  |  |
|  | 1 | 0 | 0 | 1 | 1 | 0 |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Q. 2

-31 and -59 in 8 bit 2s complement.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 31: | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |  |
| 31: | (0 × 128) = 0 | (0 × 64) = 0 | (0 × 32) = 0 | (1 ×16) = 16 | (1 ×8) = 8 | (1 ×4) = 4 | (1 ×2) = 2 | (1 × 1) = 1 |  |
| -31: | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |  |
| +1: | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |  |
| ANS: | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |  |
| 59: | 0 | 0 | (1 ×32) = 32 | (1 ×16) = 16 | (1 ×8) = 8 | 0 | (1 ×2) = 2 | (1 ×1) = 1 |  |
| -59: | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |  |
| +1: | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |  |
| ANS: | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |  |

Q. 1.3

Representation of the pattern 11101001

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 × 128 | 1 × 64 | 1 × 32 | 0 | 1 × 8 | 0 | 0 | 1 ×1 |
|  | 128 + | 64 + | 32 + | 0 + | 8 + | 0 + | 0 + | 1 |
| = | 233 | = ANS |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

Q.1.4

A half adder circuit has two inputs and two outputs. It performs binary addition in arithmetic and logic section of computers and can be used in calculators. The output of the XOR gate is known as the sum, and the output of the AND gate is known as the carry.

|  |  |  |  |
| --- | --- | --- | --- |
| Input | Input | Output | Output |
| X | Y | D | Bout |
| X | Y | X ⊕ Y | x̅ .Y |
| 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 0 |

Q.2.1

echo hello world : outputs text.

passwd : lets the user change their password.

date : returns the current year, month day and 24-hour clock time to the nearest second.

hostname : returns computers IP address.

arch : returns the architecture of the computer, ie. x86\_64 is a 64 bit x86 processor.

uname –a : returns the names for the operating system, computer IP address, OS kernel version, OS kernel release, hardware platform, processor, machine.

dmesg | more : reads kernel buffer.

uptime : returns current time, the days since last login and time of last login, the number of logins, and load average.

whoami : returns users username.

who : returns username, login time and terminal connected to for both user and host.

last : returns information on the most recently logged in user.

finger : returns usernames, time idle, terminal type, last login and IP address or office for user and host.

w : is similar to finger but also returns time used by processes, JCPU; and time used by the current process, PCPU and the command line of the users current process.

top : displays how long your system has been up, average load times, how many tasks are running, CPU stats, physical memory stats, swap usage stats and a list of the tasks running on your system.

echo $SHELL : returns the path of the users shell.

echo {con,pre} {sent,fer} {s,ed} : returns combinations of words by concatinating the text in each of the curly brackets.

man ls : gives the user information on the ls command. Includes a synopsis and a description.

man who : gives information on the who command, the user logged in.

clear : clears the terminal screen.

cal 2000 : displays the calendar for the year 2000 including months, dates and days of the week.

cal 9 1752 : The digit 9 returns the 9th month of the year 1752. The dates between the 3rd  and the 13th are missing from the displayed calendar. It may be something to do with deleting leap year days.

yes please : returns the word please repeated until prompted to stop by the user.

time sleep 5 : delays running of a command by a number of seconds.

history : returns a user total command history, ordered by numbers.

Q. 2.2

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Automating Commands and Redirecting Them to a File

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Tue Apr 12 22:37:16 UTC 2022

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ip-172-31-2-235

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

x86\_64

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Linux ip-172-31-2-235 5.11.0-1022-aws #23~20.04.1-Ubuntu SMP Mon Nov 15 14:03:19 UTC 2021 x86\_64 x86\_64 x86\_64 GNU/Linux

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

22:37:16 up 22 days, 19:28, 2 users, load average: 0.00, 0.00, 0.00

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ruairimccool

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ruairimccool pts/0 2022-04-12 22:10 (216.73.161.103)

ritafatimaortegaperez pts/1 2022-04-12 21:40 (78.30.10.121)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Login Name Tty Idle Login Time Office Office Phone

ritafatimaortegaperez pts/1 56 Apr 12 21:40 (78.30.10.121)

ruairimccool pts/0 Apr 12 22:10 (216.73.161.103)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

22:37:16 up 22 days, 19:28, 2 users, load average: 0.00, 0.00, 0.00

USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT

ruairimc pts/0 216.73.161.103 22:10 3.00s 1.49s 0.00s w

ritafati pts/1 78.30.10.121 21:40 56:02 0.02s 0.02s -bash

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

top - 22:38:16 up 22 days, 19:29, 2 users, load average: 0.00, 0.00, 0.00

Tasks: 114 total, 2 running, 112 sleeping, 0 stopped, 0 zombie

%Cpu(s): 0.0 us, 0.3 sy, 0.0 ni, 99.7 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st

MiB Mem : 968.9 total, 119.5 free, 188.8 used, 660.6 buff/cache

MiB Swap: 0.0 total, 0.0 free, 0.0 used. 588.4 avail Mem

PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND

275540 ruairim+ 20 0 23608 9752 6376 R 0.7 1.0 0:01.50 vim

1 root 20 0 168616 10052 5680 S 0.0 1.0 0:37.85 systemd

2 root 20 0 0 0 0 S 0.0 0.0 0:00.04 kthreadd

3 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 rcu\_gp

4 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 rcu\_par+

6 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker+

9 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 mm\_perc+

10 root 20 0 0 0 0 S 0.0 0.0 0:00.00 rcu\_tas+

11 root 20 0 0 0 0 S 0.0 0.0 0:00.00 rcu\_tas+

12 root 20 0 0 0 0 S 0.0 0.0 0:05.43 ksoftir+

13 root 20 0 0 0 0 I 0.0 0.0 0:08.09 rcu\_sch+

14 root rt 0 0 0 0 S 0.0 0.0 0:11.26 migrati+

15 root -51 0 0 0 0 S 0.0 0.0 0:00.00 idle\_in+

16 root 20 0 0 0 0 S 0.0 0.0 0:00.00 cpuhp/0

17 root 20 0 0 0 0 S 0.0 0.0 0:00.00 kdevtmp+

18 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 netns

19 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 inet\_fr+

20 root 20 0 0 0 0 S 0.0 0.0 0:00.01 kauditd

21 root 20 0 0 0 0 S 0.0 0.0 0:00.50 khungta+

22 root 20 0 0 0 0 S 0.0 0.0 0:00.00 oom\_rea+

23 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 writeba+

24 root 20 0 0 0 0 S 0.0 0.0 1:03.64 kcompac+

25 root 25 5 0 0 0 S 0.0 0.0 0:00.00 ksmd

26 root 39 19 0 0 0 S 0.0 0.0 0:02.81 khugepa+

72 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kintegr+

73 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kblockd

74 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 blkcg\_p+

75 root 20 0 0 0 0 S 0.0 0.0 0:00.00 xen-bal+

76 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 tpm\_dev+

77 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 ata\_sff

78 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 md

79 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 edac-po+

80 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 devfreq+

81 root -51 0 0 0 0 S 0.0 0.0 0:00.00 watchdo+

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Q. 2.3.1



Q. 2.3.2





Q. 2.4

function! Mathtable()

let pattern = "-+\*/^"

let symbol = input("Enter a symbol: ")

if symbol =~# '-+\*/^'

continue

else

input("Please input a symbol: ")

endif

let num = input("Enter a number from 1 to 15: ")

if num not in len(range(15))

input("Wrong input, enter a num from 1 to 15: ")

endif

x = 1

def mathtable()

while x <= 15

result = num symbol x

echo "num symbol x = result"

let x += 1

endwhile

EOF

endfunction

References:

<https://www.tecmint.com/using-shell-script-to-automate-linux-system-maintenance-tasks/>

[https://www.gnu.org/software/bash/manual/html\_node/index.html#SEC\_Contents](https://www.gnu.org/software/bash/manual/html_node/index.html)

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<https://www.electrical4u.com/half-adder-circuit-and-truth-table-of-half-adder/>

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[https://www.gnu.org/software/bash/manual/html\_node/index.html#SEC\_Contents](https://www.gnu.org/software/bash/manual/html_node/index.html)

<https://gist.github.com/yegappan/16d964a37ead0979b05e655aa036cad0>