INTERNSHIP ASSIGNMENT

Driver Development and Linux Configuration

DEADLINE: 28 September , 2020

AUG 11, 2020

SAHIL SEMICONDUCTORS INC.

INSTRUCTIONS:

- There are three sections in this assignment which cover the essential skills needed by the software team in **Sahil Semiconductor**.
- Please note that this assignment judges the ability of the candidate to be research oriented and to have a drive towards learning. We assume no special pre-requisites.
- You will be given **45 days** to complete this assignment **(effective from 12/08/2020)**, at the end of which a viva shall be conducted from the research work done so far.
- Please try to work individually as performance shall be marked on individual basis.
- You can ask queries related to the questions. However, apart from that, no assisstance shall be given.
- All these exercises should be performed on the company designated laptop.
- You are allowed to refer relevant books and the internet.

SECTION A

DRIVER DEVELOPMENT

1. Write a linux kernel module that prints `Hello module` when inserted and prints `Bye module` when removed.
2. Write two kernel modules. In the first module, define a function that returns multiplication of two numbers. Call this function in second module and print the answer returned by the function. If the first module containing the definition of multiplication function is not loaded, second module should print `function not defined`.
3. Refer to the **linked list** topic from **Chapter 3** of **Linux Device Drivers Development by John Madieu** (or any other source) and make the following device driver programs.
    a) Instantiate 10 instances of the following `house` structure (`house1, house2, house3` and so on) and link them together as a linked list.

```
struct house{
int area;
char color[20];}
```

    b) Print the details of `house5` provided you are given the address of `house1` ONLY.
    c) Given the address of `house1`, calculate the total area occupied by all the houses.
    d) Insert a new house, `house11`, between `house5` and `house6` and print its details starting from `house1`.
    e) Delete `house8` and print the details of `house9` starting from `house1`.

4. Write a simple network driver that adversties one interface `sn0`. Assign an IP to this interface. Ping any outside IP using this interface (since there is no physical device attached with the driver so you will not receive any ping reply). Display ping packet contents in the driver.
5. Write a network driver (device independent) that advertises two netdev interfaces `sn0` and `sn1`. Packets sent on one of the interfaces should be received by the other interface. When testing loopback with driver, `lo` interface should be down `(ifconfig lo down)`.
6. Do research on work queues and schedule a function to a work queue. Please assume appropriate driver code.

SECTION B

LINUX CONFIGURATION

7. Make a GUI program (using any tool e.g. bash, python etc.) to check whether all the servers are up, how many people are logged into which server etc. Since servers are not provided, VM's should be considered as servers.
8. Study about linux system services and configure background scripts to be run as system services.
9. Upgrade/downgrade the kernel version of a machine.

SECTION C

PROBLEM SOLVING

10. Tom and Jerry are `d` distance apart. Tom starts running with velocity `v` on a line that is perpendicular to the line connecting them. At the Same time, Jerry starts running with velocity `u` such that its velocity is always directed towards Tom. Write a program that takes these three input parameters (`d`, `u` and `v`)and prints the total distance travelled by Jerry by the time it catches Tom.