1 Statement Motivation

After being declared "officially lost" in the Delta Quadrant for over fourteen months, there is finally hope on-board the USS Voyager (codename: CS253A). *Seven* has just discovered an abandoned relay station connected to a huge network that extends all the way to the edge of the Alpha Quadrant. Connected to this network, she spots a Starfleet vessel over sixty thousand light years away. However, this Vessel appears to be drifting away from network range, as *Captain Kathryn Janeway* speculates that it will go out of range in the next *2 hours*. Since the signal to the vessel is too weak, Klingon-Human hybrid *B'Elanna Torres* suggests that you (The Doctor), Voyager's Emergency Medical Hologram (EMH), be transmitted to the vessel so that you can inform Starfleet Mission Control that the USS Voyager was not lost; and to re-establish communication so that help can be sent to the Voyager. For your help in this endeavour you have been promised **100** holographic energy **Points**.

You are transmitted along with a secret **Message in a Bottle** to the Starfleet Vessel in the hope that you can inform Starfleet Mission Control of the fate of the USS Voyager and confirm to the Voyager that help will be sent to them. However, when you reach the vessel, which turns out to be the USS Prometheus, you notice that it has been hijacked by the Romulans. There, you meet Prometheus' EMH. Moreover, you realise that the secret message you needed to send back to the Voyager has been **broken** and de-graded in transmission. While he is trying to regain control of the ship, you must **re-assemble** the bottle, decrypt it and then recover the message, despite the de-gradation. You must accomplish this **before Prometheus drifts out of network** else Voyager will never know.

Statement. You have at your disposal all the combat skills that you learnt while aboard the Voyager (codename: CS253A) as it explored the Delta Quadrant (codename: SoftOps). You must use your skills and evolved self-awareness to accomplish your mission. Since the Prometheus is parallely under attack, the EMH on board will only agree to help you in exchange for some of your holographic energy **Points**. On the Starfleet portal you can download the broken pieces of the **Message in a Bottle**. You must join them together, and then, decode the bottle to find the package inside. Be aware that as there was a degradation in transmission so you may need to investigate the package's condition in order to open it. The mission that lies before you consists of three tasks.

2 Guidelines

1. You will need a Linux environment to complete this mission.
2. Accessing a hint will cost you some Points from your total. **Solving a task successfully, with or without hint, will fetch you full marks for that task. Then, the points corresponding to the hints taken will be deducted from your final total**. For example, in case you are able to

solve Task One with the hint, you will get 20 Points for solving the task, and simultaneously 30 Points will be deducted for taking the hint.

3. To receive a hint, you must write an email to subhajit@cse.iitk.ac.in along with cc to prantik@cse.iitk.ac.in and sumitl@cse.iitk.ac.in with :

```
Subject : CS253 MidSem Hint
Body :
    Name : <Your name>
    Roll Number : <Your Roll Number>
    Hint : <Task number>
```

4. Your total score will not be negative.

5. The window for taking hints opens after the first 30 minutes of the start and closes 30 minutes before the scheduled end of the exam. **We will not distribute any hint after 2:30 pm.** Depending on the traffic, there may be a delay of up to 5 minutes for us to issue the hint; if you don't receive the hint in 5 minutes of sending your request, send us a mail immediately.

3 Submission

Overall your submission should be a **zipped** folder that contains the following files:

1. Your Makefile, along with all the provided assembly code so that simply running *make* produces the executable.

2. Steps, including all code, you used to figure out your password, and a *password.txt* file actually containing your password.

3. The file generated by the executable when the correct password was provided.

4. A log file of how you were able to access the secret message, along with a file *secret.txt* containing the text of the actual message.

Instead of multiple logs, you can submit one *steps.txt* file that contains explanations for all three tasks together. All your files must be in a folder named

```
CS253_MidSem_YourRollNumber
```

4 Task One

In the downloaded package, you will find multiple pieces of assembly code. You must write a **Makefile** that stitches together the broken pieces into one executable. In effect, running

```
$ make
```

should create the required executable. The assembly files should not be modified in any manner.

Reward: 20 Points.
Hint : You can ask for the build commands in exchange for 30 Points.

Deliverable

For this task you must submit the **Makefile** you wrote that combines the several assembly files together into an executable.

5 Task Two

Once you have finished the first task of putting the binary together, you should get an executable. This executable will take two command-line arguments:

1. your IITK roll number.
2. password to retrieve the secret message; your password is your roll number with two of its digits replaced with small-case letters from {a-z}.

Reward: 60 Points.
Hint : You can ask for the password in exchange for 70 Points.

In effect, once you have the executable, running a command that looks like this:

```
$ ./secret 170830 17a80v
```

with your roll number and the **correct** password will generate a file containing the secret message.

Deliverable

For this task you must submit:

- a textfile named “password.txt” containing your password
- any scripts/steps that you used to figure out the password
- the file generated by the executable when the correct password was provided

No external password cracking utility can be used for this. Also, you are not allowed to write any code in languages like C/Java/Python.

6 Task Three

Once you have used the executable to generate the file, you must figure out a way to read the secret message from this file.

Reward: 20 Points.
Hint : We will give you a hint on how to access the secret message in exchange for 10 points.

Deliverable

For this task you must write down the secret message in a textfile “secret.txt” and a log of how you accessed it.

Live long and Prosper.
[Storyline inspired by the “Star Trek” movies and series]