

# Assignment 1 – SHELL Programming & SQL

Software System Development – Monsoon 2023

**Due Date: 31<sup>st</sup> August, 2023, 11.59 pm**

## Instructions:

- This assignment is an individual submission.
- Total Marks of 100 Marks with duration of 3 weeks.
- All script submissions should be submitted via moodle
- Inputs/output should fit the criteria mentioned in the respective question.
- All other conditions are open to your interpretations.
- Evaluation will be conducted based on a fixed grading rubric (syntax, logic, input and output) and the marks are divided as per prescribed weightage in respective questions.
- For queries, reach out to TAs via Moodle

## Submission Criteria:

- Please create one ZIP file as <rollnumber>\_A1.ZIP
- Include all your scripts inside the ZIP as follows <rollnumber>\_A1\_q1.sh, <rollnumber>\_A1\_q2.sh, <rollnumber>\_A1\_q3.sh, <rollnumber>\_A1\_q4.sql, <rollnumber>\_A1\_q5.sql and README.md (to provide any instructions to evaluator or your notes)
- For Example:

**2022201079\_A1.zip**

```
|__2022201079_A1
    |__2022201079_A1_q1.sh
    |__2022201079_A1_q2.sh
    |__2022201079_A1_q3.sh
    |__2022201079_A1_q4.sql
    |__2022201079_A1_q5.sql
    |__README.md
```

### Question 1: (20 Marks)

Two police women get the location coordinates of Jaggu – a wanted criminal, from their informer. They also got a tip that his plane leaves from that location in H hours. If they are not able to catch him in H hours, he would flee. You need to write a bash script to help them get to Jaggu within H hours.

Policewomen will inform you Jaggu's location coordinates, their location coordinates and H (hours they must catch him) in the beginning. Then after every hour, they'll send you their location coordinates and you need to reply with the distance and direction they need to move to reach his location. You should stop if their distance from Jaggu is less than 2 units or H hours are over.

#### Additional details:

- Locations will be given in (X, Y) float co-ordinations.
- 8 directions are possible (N, NE, NW, W, SW, SE, E).
- Euclidean distances to be used.
- All location coordinates and distances should be rounded off to 2 decimal places.
- Print "Location reached" if the distance from Jaggu is less than 2 units.
- Print "Time over" if X hours are completed and the distance from Jaggu is more than or equal than 2 units.

#### Example 1:

##### Initial Input-

Jaggu X = 10.00, Jaggu Y = 10.00

Police X = 0.00, Police Y = 0.00

H = 3

**Input after 1 hour (1st iteration):** Police X = 2.00, Police Y = 2.00

**Output:** 11.31 NE

**Input after 2 hours (2nd iteration):** Police X = 5.00, Police Y = 8.00

**Output:** 5.39 NE

**Input after 3 hours (3rd iteration):** Police X = 10.90, Police Y = 11.10

**Output:** Location Reached

## Question 2: (20 Marks)

Akshay, Simon, and Aditya, students of IIIT Hyderabad, recently got placed in one of the best Tech companies, "SSD Mania." They were enjoying their lunch in the canteen when a senior employee named "Rajesh" joined them. As they were talking, they discovered that Rajesh works in the finance department. During their conversation, Rajesh started discussing how they would also be giving a session on tax and savings.

As the lunchtime conversation continued, they started discussion on mutual funds, tax, and stock market etc. Rajesh, the senior employee from the finance department, noticed their enthusiasm and proposed an intriguing problem for all three of them to think over before their upcoming finance session.

Problem states "Imagine you have a certain amount of money that you want to invest in stock market So you began your analysis of the stock market and interested in one of the stocks as it is giving high return and performing well over the past few months, if I present you all with the prices of that particular stock in an array called prices where **prices[i]** is the **price of a given stock on the ith day**.

**Write a bash script to maximize the profit by choosing one day to buy that stock and choosing a different future day to sell that stock.**

Print the maximum profit earned. If not possible simply print 0.

### Input:

N=5

prices = [5,7,1,4,6]

### Output:

Maximum Profit: 5

Explanation: buying on day 3 and selling on day 5 will give the profit as 5, note that buying on day 3 and selling on day 2 is not possible as you should buy before sell.

### Constraints:

$1 \leq N \leq 106$

$0 \leq \text{prices}[i] \leq 105$

### Question 3: (20 Marks)

You will be given a sentence which will contain words from the English alphabet and a few special symbols ['#', '\$', '\*', '@']. Write a bash script to reverse the sentence in such a way, such that the order of the words in the sentence is reversed, but the order of the special symbols along with their relative position remains the same.

#### Example:

**Input** = "I am @ a # good boy"

**Output** = "boy good @ a # am I"

**For evaluation**, you will be given a text file containing the sentences (EOL separated). The file will be given as input. You must print the output sentences in the terminal (EOL separated). The output of the sentences should be case sensitive (i.e the capital letters should remain capital after conversion, same for small letters). The sentence might have other special symbols also, but you only need to maintain the order of the special symbols mentioned above.

**A test file will be provided to you for this question.**

### Question 4: (20 Marks)

#### Given Tables (as CSVs):

- Employee - (emp\_no, emp\_name, emp\_joining\_date, emp\_salary)
- Courses - (course\_id, course\_name)
- Certifications - (cert\_id, cert\_name)
- CourseCompletions - (course\_id, emp\_no, date\_completed)
- CertificateCompletions - (cert\_id, emp\_no, date\_completed)

#### Import the above tables from CSVs provided respectively.

ABC Tech is starting a skill tagging program for all Python Full-stack developers of various levels, ranging from entry-level to architects. Skill levels can be 'Beginner', 'Intermediate', 'Advanced', 'Expert'. Each employee's skill set is determined by the number of courses and certifications done.

Skill Level	# of Courses	# of Certifications
Beginner	2	2
Intermediate	4	4
Advanced	6	6
Expert	10	8

Also, salary increments are supposed to be given based on these skill levels.

Skill Level	Increment %
Beginner	10
Intermediate	15
Advanced	20
Expert	25

Increments are not supposed to be given to employees who's joining date is greater than 31st July 2022 even if they've completed the required number of courses and certifications to get a skill level.

You need to create an output table with the following attributes:

**UpdatedEmpSkills** - (emp\_no, curr\_salary, increment, new\_salary, skill\_level)

Design a stored procedure that utilizes cursors to create an **UpdatedEmpSkills** table and follow all the given conditions.

### Question 5: (20 Marks)

Once upon a time in the bustling city of Hyderabad, there was a marketplace in Gachibowli where people could buy and sell their favourite items. Each person had their own favourite brand, and they loved to share their passion for it with others.

One day, the data analysts of IIIT Hyderabad were given a special task to uncover interesting insights about the people and their favourite laptop brands. They wanted to find out whether the second item sold by each person, ordered by date, belonged to their favourite brand. It was said that if a person had sold less than three items, the answer for that person would be a disappointing "No".

Your task is to help those analysts by writing **SQL queries** and creating a table **"report"** with columns {UserID, UserName, Result ("Yes" or "No")} with respective reasonable data types.

**Note:** Import data from `users_table.csv`, `Orders_table.csv` and `laptop_brands.csv` into tables called **"userDetails"** with **"User ID"** as primary key, **"orderDetails"** with **"Order ID"** as primary key, **"Buyer ID"** & **"Seller ID"** as Foreign Key to **"User ID"** in `userDetails` table and **"Brand ID"** as foreign key to **"Brand ID"** in `brandDetails` table, **"brandDetails"** with **"Brand ID"** as primary key respectively.