CS6.302 - Software System Development

Lab Activity 11: Python Automation Challenge

Monsoon 2025

Objectives

This lab activity is designed for automated grading. Pay close attention to the output format.

- Implement functions and manipulate Python's core data structures.
- Perform File I/O to save structured results to a text file.

Instructions

Complete all exercises in a single Python script named `lab11_solution.py`. This script, when run, should generate a file named `results.txt` in the same directory. While submitting the activity, please follow the following format: While submitting the activity, please follow the following format:

```
Roll_Number.zip
    |-- lab11_solution.py
    |-- results.txt
```

Exercise 1: Functions and Data Structures (4 Marks)

1. **(2 Marks) String Scrambler:** Write a Python function `scramble_string(s)` that takes a string `s`. It should slice the string into two halves (first half longer for odd lengths), reverse the second half, and return the concatenation of the first half and the reversed second half.

2. **(2 Marks) Course Sorter:** Create a list of tuples with course names and student counts: `[('CS101', 50), ('MA202', 35), ('EE301', 45), ('PY451', 30)]`. Write a function `sort_courses(course_list)` that sorts this list in **descending order** of student count using a `lambda` function. It should return the sorted list.

Exercise 2: Dictionaries and Sets (4 Marks)

You are given two lists of club members:

```
robotics_club = ["Kunal", "Aditi", "Rohan", "Priya", "Vikram"]
ai_club = ["Priya", "Sameer", "Aditi", "Neha", "Rohan"]
```

1. **(2 Marks) Set Operations:** Using sets, find:
   - Students in **both** clubs (intersection).
   - All unique students across **both** clubs (union).
   - Students in the robotics club but **not** the AI club (difference).

2. **(2 Marks) Dictionary Creation:** Create a dictionary where keys are unique student names and values are a list of their clubs. Sort the clubs for each student alphabetically for consistent output.

Exercise 3: Saving the Output (2 Marks)

1. **(2 Marks) Save Results to File:** Create a main execution block that calls the functions from the previous exercises and saves their outputs to a file named `results.txt`. The file must follow this exact format, with each section header on a new line:

   `--- SCRABBLED STRING ---`
   <Result of calling scramble_string("AUTOMATION")>
   `--- SORTED COURSES ---`
   <Result of sort_courses()>
   `--- SET OPERATIONS ---`
   Intersection: <sorted list of students>
   Union: <sorted list of all students>
   Difference: <sorted list of students>
   `--- STUDENT DICTIONARY ---`
   <The student-club dictionary>

Note: Both your Python script and the `results.txt` file it produces will be graded. Ensure the output format is exactly as specified.