

Test Problems

You are allowed to use ChatGPT/Claude or any other AI tool for these problems. In your presentation you should answer the following questions for each problem:

1. How did you use AI to assist you?
2. Did you make any modifications to the AI-suggested code? Why?

1. Data Structures: Implement a Custom Queue

1. Write a custom implementation of a queue with the following operations:
 - o enqueue: Add an item to the end.
 - o dequeue: Remove an item from the front.
 - o peek: View the front item without removing it.
 - o is_empty: Check if the queue is empty.
2. Add a feature to support **reversing the queue**.

2. Algorithm Challenge with Optimizations

- Implement a function that finds the **longest substring without repeating characters** in a string.
 - o Optimize for time complexity.
 - o Candidates must explain if and how ChatGPT's suggestions improved their solution.

Example:

Input: "abcabcbb"

Output: 3 (substring: "abc")

3. Open-Ended Problem-Solving

- **Scenario:** "You are designing a small utility to batch process images."
 - o Write a program that:
 1. Takes a directory path as input.
 2. Applies a grayscale filter to all images in the directory.
 3. Saves the processed images to a new directory.
 - o Include error handling (e.g., non-image files, missing directories).

4. Final Problem: Movie & TV Show Recommender using OpenAI API

Objective:

Create a user-friendly application that uses the OpenAI API to provide movie and TV show recommendations. The application should:

- Accept user input through an interface.
 - Send the input along with a predefined prompt to OpenAI's API.
 - Parse the response and display the top 2 recommended movies and top 2 recommended TV shows.
1. Create a simple user interface (web-based):
 - An input field for the user to type their query (e.g., actor name, director, genre, or basic plot points).
 - A "Submit" button or command to process the query.
 2. Use the OpenAI API to get recommendations:
 - **Construct a structured prompt to fetch highly rated movies and TV shows based on the user's input.**
 - The prompt should guide the AI to return separate lists for movies and TV shows.
 3. Display the results:
 - Parse the response to extract and display:
 - **Top 2 Movies** (title and a short description).
 - **Top 2 TV Shows** (title and a short description).
 - Show the recommendations clearly and in a user-friendly manner.
 4. Handle errors:
 - Invalid API keys.
 - Empty or unclear user queries.
 - Network issues or API errors.

OpenAI API Key to use in the app:

sk-proj-00XiZzQ6jK7LQjZzQplcuEh96vcbp575q-
ImpRZE8WxsIONXLSQ2E9av6W4braos2e7f5wPsvcT3BlbkFJDBmWIQzt6GyLr4mnOtxiitx2E
qFddKnATorgUQk3liFKawvghwyKoVI7oYzRprukTukarKSsoA

Example Input/Output

User Input:

"Show me movies and TV shows starring Keanu Reeves or about time travel."

Example Output (UI):

Movies:

1. *The Matrix* - A hacker discovers the truth about reality and his role in the battle against its controllers. (1999)
2. *John Wick* - A retired hitman seeks revenge for the killing of his beloved dog. (2014)

TV Shows:

1. *Dark* - A German family drama with a supernatural twist, centered on time travel and its consequences. (2017)
2. *Travelers* - A team of agents from the future takes over the bodies of people in the present to prevent a global catastrophe. (2016)