Activity 1

1. Solving a sliding 15-puzzle

Recursive Decomposition, Exploratory Decomposition

Recursive Decomposition

Explanation: The sliding 15-puzzle can be broken down recursively by considering each move as a step that reduces the problem size. At each step, the puzzle can be divided into smaller subproblems, each representing a state of the puzzle after a move. This process continues until the puzzle reaches the solved state.

Exploratory Decomposition

Explanation: This technique involves exploring all possible moves and states of the puzzle to find the solution. It is useful in problems where multiple paths or solutions exist, and the goal is to explore different possibilities.

2. Find the frequency of usage of {'ch','de','des','th','es', 'ci'} in the sliding 15-puzzle Wikipedia page

Input Data Decomposition, Output Data Decomposition

Input Data Decomposition

Explanation: The problem can be divided based on the input data, which is the text of the Wikipedia page. The text can be partitioned into smaller segments, and each segment can be processed in parallel to find the frequency of the specified substrings.

Output Data Decomposition

Explanation: The problem can also be divided based on the expected output, which is the frequency count of each substring. Each substring's frequency can be computed independently.

3. Binary search

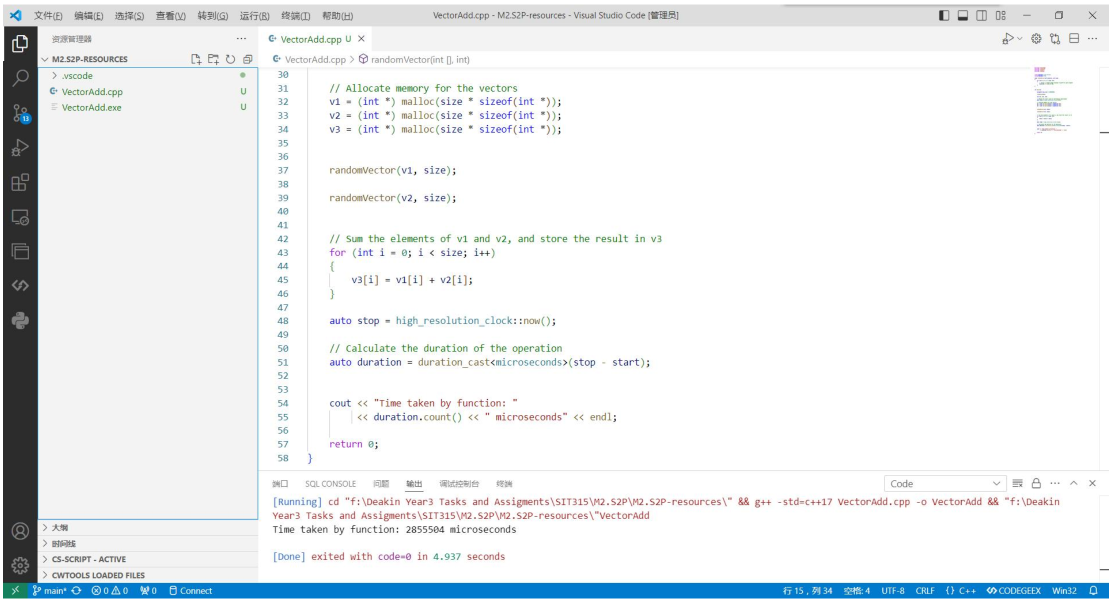
Recursive Decomposition

Recursive Decomposition

Explanation: Binary search is inherently a recursive process. At each step, the problem (searching an element in a sorted array) is divided into smaller subproblems by halving the array.

Activity 2

1.2.



3.

Problem Decomposition:

1. Data Initialization:

Random vector generation for v1 and v2.

2. Computation:

Summing the elements of v1 and v2 to produce v3.

3. Measurement:

Timing the execution of the tasks.

Sub-tasks Identification:

Parallelizable Tasks:

Random Vector Generation:

Both vectors v1 and v2 can be generated in parallel.

Vector Summation:

Summing elements of v1 and v2 to produce v3 can be divided into independent chunks and processed in parallel.

Sequential Tasks:

Memory Allocation:

Allocate memory for vectors v1, v2, and v3 (needs to be done before using them).

Timing Measurement:

Start and stop timing should encapsulate the parallel operations.

Memory Deallocation:

Freeing allocated memory.

Implementation Roadmap:

Step 1: Memory Allocation

Allocate memory for v1, v2, and v3. This step is sequential.

Step 2: Parallel Random Vector Generation

Generate v1 and v2 in parallel.

Step 3: Parallel Vector Summation

Divide the summation task into chunks that can be processed in parallel.

Step 4: Memory Deallocation

Free the allocated memory for v1, v2, and v3. This step is sequential.

4.5.

端口 SQL CONSOLE 问题 输出 调试控制台 终端 Code

```
[Running] cd "f:\Deakin Year3 Tasks and Assigments\SIT315\M2.S2P\M2.S2P-resources\" && g++ -std=c++17 VectorAdd.cpp -o VectorAdd && "f:\Deakin Year3 Tasks and Assigments\SIT315\M2.S2P\M2.S2P-resources\"VectorAdd
Time taken by function: 2855504 microseconds

[Done] exited with code=0 in 4.937 seconds

[Running] cd "f:\Deakin Year3 Tasks and Assigments\SIT315\M2.S2P\M2.S2P-resources\" && g++ -std=c++17 ParallelVectorAddition.cpp -o ParallelVectorAddition && "f:\Deakin Year3 Tasks and Assigments\SIT315\M2.S2P\M2.S2P-resources\"ParallelVectorAddition
Time taken by parallel function: 563051 microseconds

[Done] exited with code=0 in 1.687 seconds
```

6.

端口 SQL CONSOLE 问题 输出 调试控制台 终端 Code

```
[Running] cd "f:\Deakin Year3 Tasks and Assigments\SIT315\M2.S2P\M2.S2P-resources\" && g++ -std=c++17 ParallelVectorAddition.cpp -o ParallelVectorAddition && "f:\Deakin Year3 Tasks and Assigments\SIT315\M2.S2P\M2.S2P-resources\"ParallelVectorAddition
Chunk size: 1000, Time taken by parallel function: 53536550 microseconds
Chunk size: 10000, Time taken by parallel function: 1260344 microseconds
Chunk size: 100000, Time taken by parallel function: 495350 microseconds
Chunk size: 1000000, Time taken by parallel function: 449525 microseconds

[Done] exited with code=0 in 56.729 seconds
```