

Challenge #17: Sorting on a Systolic Array

Objective:

Implement and analyze the performance of Bubble Sort using a systolic array approach.

Design Summary:

- Simulated a 1D systolic array with alternating odd-even phases.
- Each 'processing element' compares and swaps neighbors, mimicking data movement.
- Implemented in Python for clarity and ease of visualization.

Benchmarking:

- Measured execution time for input sizes: 10, 100, 1000, and 2000.
- Execution time increases significantly with input size due to $O(n^2)$ complexity.

Conclusion:

Systolic array implementation of Bubble Sort is conceptually educational but inefficient for large inputs.

It showcases data movement and local computation well, which is the core idea of systolic arrays.

Performance Chart:

Systolic Array Bubble Sort Performance

