

# Merge Sort

## 2. MergeSort

- **Why Important:** MergeSort is stable (preserves the relative order of equal elements) and handles large datasets efficiently with  **$O(N \log N)$**  time complexity.
- **Where It's Useful:**
  - Sorting animations or frames by timestamps.
  - **Material batching:** Sort objects by material to group draw calls efficiently.
  - **Texture Packing:** Arranging UV data or textures for optimal atlas generation.

### Why Choose MergeSort:

- It's stable, which makes it ideal for sorting when the **relative order** of objects matters (e.g., sorting multiple attributes like texture ID and distance).

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