

Lab Assignment: Radix Sort

Problem Statement

Implement Radix Sort using counting sort as a subroutine. The algorithm should sort a given list of non-negative integers in ascending order.

Algorithm

1. Find the maximum number in the input array to determine the number of digits.
2. For each digit position (starting from the least significant digit to the most significant digit):
 - (a) Apply a stable counting sort based on the current digit.
3. Repeat until all digit positions are processed.

Function Signatures

```
// Function to get the maximum element in the array
int getMax(int arr[], int n);

// Function to perform counting sort on a specific digit
void countingSort(int arr[], int n, int exp);

// Function to implement radix sort
void radixSort(int arr[], int n);
```

Example

Input: arr = [170, 45, 75, 90, 802, 24, 2, 66]

Process:

1. Sort by 1st digit (units place) → [170, 90, 802, 2, 24, 45, 75, 66]
2. Sort by 2nd digit (tens place) → [802, 2, 24, 45, 66, 170, 75, 90]
3. Sort by 3rd digit (hundreds place) → [2, 24, 45, 66, 75, 90, 170, 802]

Output: arr = [2, 24, 45, 66, 75, 90, 170, 802]