

INSTITUTE OF COMPUTER TECHNOLOGY
B-TECH COMPUTER SCIENCE ENGINEERING 2025-26
SUBJECT:-ALGORITHM ANALYSIS & DESIGN

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BRANCH: CYBER SECURITY

BATCH: 52

PRACTICAL_EXAM

```
terminal_practicenumpy > cd data
import time
import random
import matplotlib.pyplot as plt

def selection(array):
    n=len(array)
    for i in range(n):
        min_pos=i
        for j in range(i+1,n):
            if array[j]<array[min_pos]:
                min_pos=j
        array[i]=array[min_pos]
        array[min_pos]=array[i]
    return array

def merge_sort(arr):
    if len(arr) <= 1:
        return arr

    mid = len(arr) // 2
    left = merge_sort(arr[:mid])
    right = merge_sort(arr[mid:])

    return merge(left, right)

def merge(left, right):
    result = []
    i = j = 0

    while i < len(left) and j < len(right):
        if left[i] <= right[j]:
            result.append(left[i])
            i += 1
        else:
            result.append(right[j])
            j += 1
```

```

        while i < len(left):
            result.append(left[i])
            i += 1

        while j < len(right):
            result.append(right[j])
            j += 1

    return result

💡
data=[74,148,48,103,196,58,99,150]

sizes=[2,4,6,8,50]

selection_times=[]
merge_times=[]

for n in sizes:
    arr=data[:n]

    data1=data.copy()
    start=time.time()
    merge_sort=merge_sort(data1)
    end=time.time()
    merge_times.append(end-start)

    data2=data.copy()
    start=time.time()
    merge_sort=selection(data2)
    end=time.time()
    selection_times.append(end-start)

print("selection sort times:",selection_times)
print("merge sort times:",merge_times)
plt.plot(sizes,selection_times,marker='*',label="selection_sort")
plt.plot(sizes,merge_times,marker='+',label="merge_sort")

```

OUTPUT:

```

PS C:\Users\Hp\OneDrive\Desktop\exam> python .\internal_practical.py
Selection Sort Steps: [4950, 19900, 79800, 319600, 1279200, 5118400]
Merge Sort Steps: [554, 1288, 2968, 6743, 15029, 33300]

```

Figure 1

