

# Microprocessor Systems HW2 Report

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## 1 Introduction

This assignment focuses on the use of the System Timer in the ARM Cortex M0+ and writing code in compliance with ABI rules. Compared to the previous assignment, a more comprehensive code was requested in a functional manner. This approach aimed to teach aspects such as optimizing register usage, converting functions to ASM, and utilizing the stack within functions.

## 2 Time Measurement Results

Input Size	Merge Sort	Bubble Sort
5	5	2
10	13	8
15	24	20
20	34	36
25	46	59
30	57	90
35	69	123
40	82	159
45	96	202
50	110	251
55	122	295
60	137	349
65	150	422
70	164	487
75	179	548
80	192	638
85	209	723
90	224	804
95	240	889
100	256	972

### 3 Complexity Analysis of Sorting Algorithms

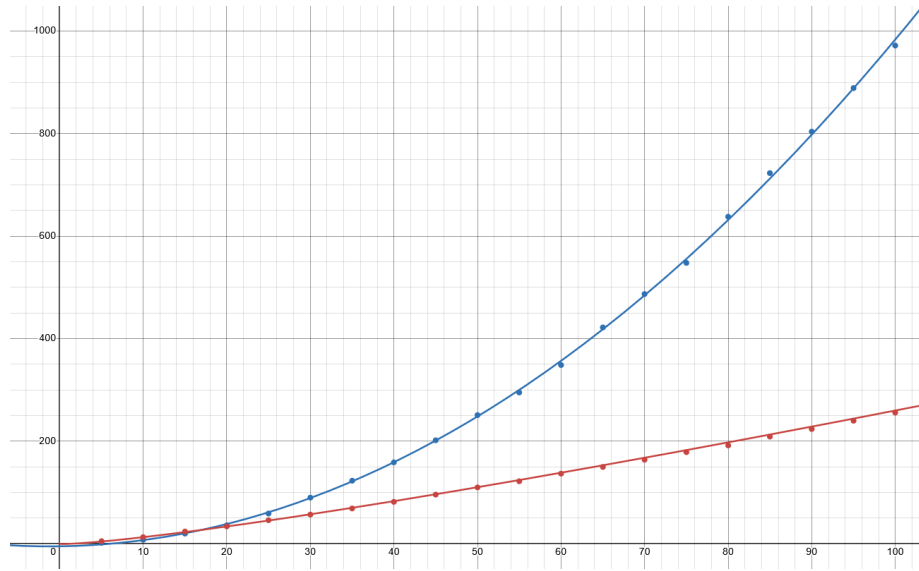


Figure 1: Time Calculation Result

Bubble Sort:  $y = 0.0963841x^2 + 0.246131x - 4.85$  : Blue Plot

Merge Sort:  $y = 1.3x \log x$  : Red Plot

Hence, Bubble Sort is  $O(n^2)$ , Merge Sort is  $O(n \log n)$ .