FAST – NUCES

Programming Fundamentals Lab Manual

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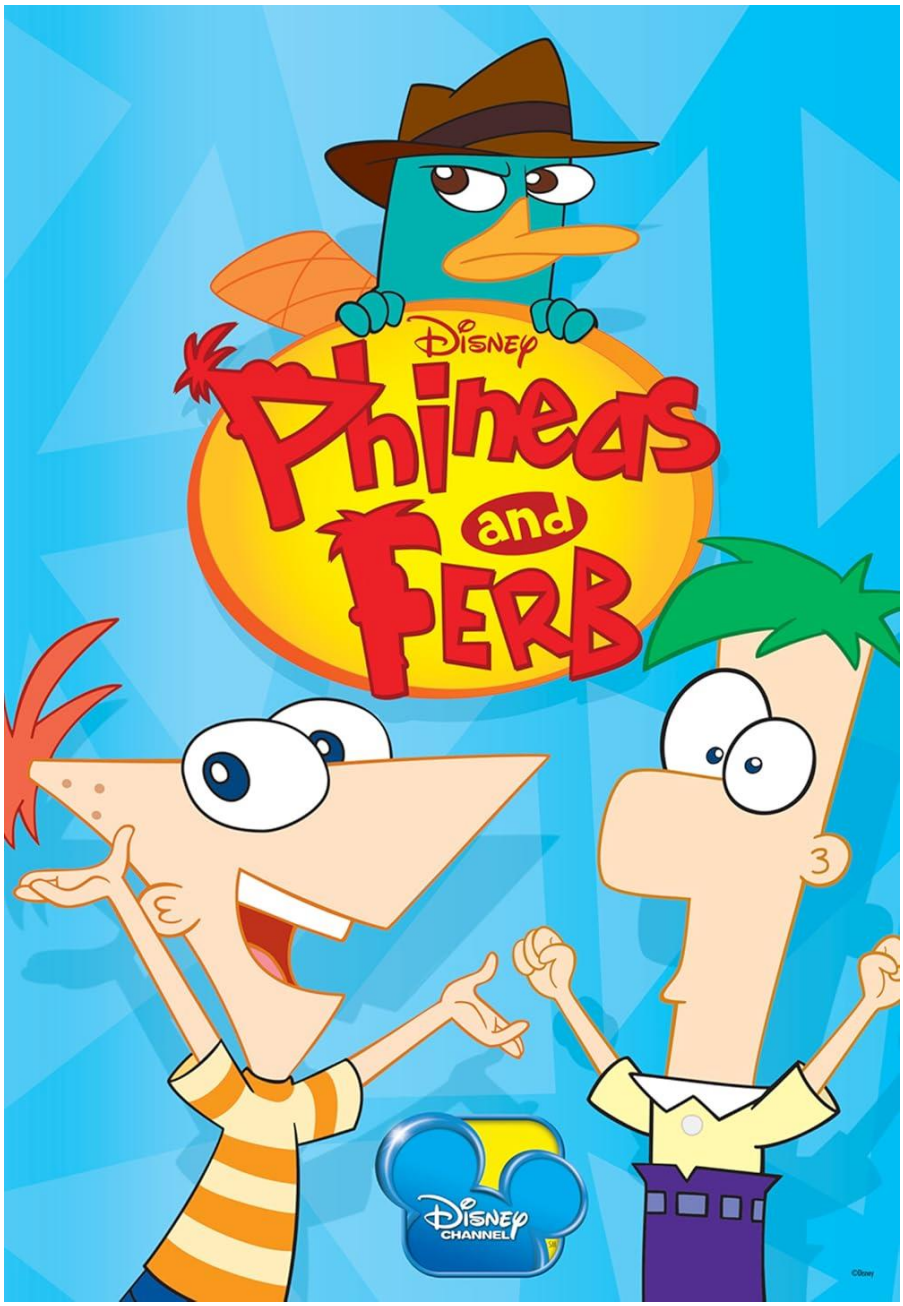
Lab 9 – Arrays

Objectives

- More practice of 1D arrays
- String functions



Read carefully and attempt following task - Phineas & Ferb's Array Adventures

"Ferb, I know what we're gonna do today… learn arrays, and maybe make something explode (educationally)!"

1. **The Bouncing Ball Sorter**
   "Phineas built a robot that sorts colorful bouncing balls by size — but it only knows how to swap two at a time!

- Create an integer array of size 8 (each number = ball size).
- Use the bubble sort method to arrange the balls in increasing order.
- Print the array before and after sorting.
- Count how many swaps the robot made.

2. **Agent P's Data Analyzer**
   "Major Monogram sent Agent P ten secret numbers representing spy performance scores. Find key stats for O.W.C.A.!"

   Input **10 integers** representing spy scores.
   You must find and print:

- **The highest** and **lowest** score
- **The average** score
- **All "Fair Split Indexes"** — positions in the list where the **average of all scores to the left** of that index is **equal** to the **average of all scores to the right** of that index.
  If **no such index** exists, print:
  No fair split found.
  A **Fair Split Index** is an index i where:
  average(scores[0:i]) = average(scores[i+1:])
  That means:
  - You take all scores **before** index i (left side)
  - You take all scores **after** index i (right side)
  - If both sides have the same **average value**, index i is a **fair split**

    You must check **every index** from **0 to 9** (the entire list).

3. **The Reversinator 2.0**
   "Doofenshmirtz accidentally reversed the control panel wiring in his machine - can you fix it?"
   - Input an array of 10 integers (wire codes).
   - Perform and print:
     - Reverse **all** wires.
     - Reverse only **wires at even positions**.
     - Reverse only **wires at odd positions**.
       Ferb hint: Use swapping — no extra arrays allowed!

4. **Ferb's Secret Message Decoder**
   "Ferb wrote an important secret message for Vanessa about their next big invention. But before he could send it, Candace found it — and now the message is all scrambled!"

   - Input a sentence (character array, up to 50 chars).
   - Count how many letters, digits, and spaces it contains.
   - Display the cleaned-up version without extra spaces at the end.
     Note: This shows how strings are just arrays of characters ending in '\0'.

5. **String Operations Lab (Using <string.h>)**
   "Phineas made a "Word Blender" that mixes and analyzes strings!"

   - Input two strings: word1 and word2.
   - Use <string.h> functions to:
     - Find which word is longer (strlen)
     - Join them into one (strcat)
     - Check if they're identical (strcmp)
   - Print all results clearly.

6. **The Case Converter Hat (Using <ctype.h>)**
   "Buford put on a hat that flips the case of every letter he says!"

   - Input a string (sentence).
   - Use <ctype.h> functions to:
     - Count uppercase letters, lowercase letters, and digits.
     - Convert uppercase letters to lowercase and vice versa.
   - Print both counts and the "converted" sentence.

   Ferb says: Try toupper() and tolower() to toggle each letter!

----------Good Luck ☺----------

----------**Submission Instructions**----------

- Submit your tasks on Google Classroom within given deadline
- Submit solution file of each task separately for example “LAB01-TASK01.cpp”, “LAB01-TASK02.cpp” and so on
- Also submit screenshots of each task for example “LAB01-TASK01.png”, “LAB01-TASK02.png” and so on
- “.cpp” is the actual file where all your code is saved.
- Always submit .cpp files when asked for submission
- Example path of .cpp file is
  Desktop\Your_Roll_No\LAB01-TASK01\LAB01-TASK01\LAB01-TASK01.cpp
  Copy your files from this path

----------**END**----------