Week 07, Lab 07	Weight: 1%	Due: End of your stream's week 7 lab session (via `sync`)

Pre-lab Preparation:

- **Week 1, 2, 3, 4, 5, 6 Lectures, Week 1, 2, 3, 4, 5, 6 Labs**

Lab Activities:

Remember to **`sync`** to obtain the lab starting code.

Exercise 1: Memory - Match - Pairs

For this lab, you may work individually, or in pairs to complete the exercise 1 task.

Implement the game "Memory" (also known as Match or Pairs) that has the following features:

- At the start of the game:
  - Ask how many players are participating.
  - Randomly lay out the game cards (standard pack of 52 playing cards) face down.
    - Ranks: 2, 3, 4, 5, 6, 7, 8, 9, T, J, Q, K, A
    - Suits: Heart (Red), Diamond (Red), Club (Black), Spade (Black)
- Each turn a player gets to choose to two cards to flip over.
  - The two cards are then revealed.
  - If the cards match (same rank and colour):
    - The player scores a point, which is added to their Pair tally.
    - And is then allowed another turn.
  - If the cards do not match:
    - The player's non-matching tally increases by one.
    - The cards are then placed face down again.
    - Then the next player takes a turn.
- Once all pairs have been made, the winner is the player with the most pairs!
  - Beware, a tie can occur!

You will need to use the following C programming skills and knowledge:

- Console output and input.
- ASCII character codes.
- Arrays.
- Selection.
- Loops.
- Functions.
- Random number generation.

Before you begin programming, conduct a design phase. Create flowcharts and structure diagrams to document the algorithms required by your program! Have these designs reviewed by the lab TAs.

Example output from a turn during the game:

```
Player 1: James       Pairs: 3      Non-matches: 4
Player 2: Steffan     Pairs: 2      Non-matches: 3

   A    B    C    D    E    F    G    H    I    J    K    L    M
  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+
1 |  | |  | |Jd| |  | |Jh| |  | |  | |  | |  | |7d| |  | |  | |  |
  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+

  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+
2 |  | |As| |  | |  | |  | |8c| |5c| |  | |  | |  | |  | |  | |  |
  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+

  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+
3 |  | |  | |Ac| |  | |  | |  | |  | |  | |7h| |  | |  | |  | |  |
  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+

  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+
4 |  | |  | |  | |  | |8s| |  | |  | |5s| |  | |  | |  | |  | |  |
  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+

Steffan's turn...

Choose the first card to reveal...
  Column? K
  Row? 1
Choose the second card to reveal...
  Column? K
  Row? 2

Revealing cards:

   A    B    C    D    E    F    G    H    I    J    K    L    M
  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+
1 |  | |  | |Jd| |  | |Jh| |  | |  | |  | |  | |7d| |6h| |  | |  | |
  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+

  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+
2 |  | |As| |  | |  | |  | |8c| |5c| |  | |  | |  | |Ad| |  | |  |
  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+

  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+
3 |  | |  | |Ac| |  | |  | |  | |  | |  | |7h| |  | |  | |  | |  |
  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+

  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+
4 |  | |  | |  | |  | |8s| |  | |  | |5s| |  | |  | |  | |  | |  |
  +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+ +--+

Sorry, Six-of-hearts [6h](K,1) does not match (Ace-of-Diamonds) [Ad](K,2)!

Next player's turn!
```

Ensure you complete the file header comment accurately. Remember to document the authors of your code, and any collaboration that occurred. If working in a pair, one student will submit the collaborative code, the other team member should document in the **`lab07ex01.c`** header who they worked with, and hence where their code solution is.

Review the Marking Criteria questions below, once you have a card drawing, have a TA review your progress.

Week 07, Lab 07 Submission:

Run the **`sync`** command to submit your completed lab work.

Shutdown your Raspberry PI by pressing **`ALT-CTRL-DEL`**. Power-down and pack up your Raspberry Pi kit.

Marking Criteria:

Have you completed each of the following? Have you submitted your code from lab?

Marking Criteria:	Week 07 Lab 07 Weight 1%	Yes	No
Ex 1:	Design documents presented to lab TA?		
	File header comment completed accurately?		
	Number of players queried at the start of the game?		
	Players can input their names?		
	Current score (matches, non-matches) displayed?		
	Can draw a card?		
	Cards are drawn face down?		
	Player queried for cards to reveal?		
	Queried cards are revealed?		
	Pair matches can be correctly made?		
	Pair mismatches tallied?		
	Player turns taken?		
	Program handles bad input, such as invalid column or row, already revealed card, etc?		
	Winner is announced?		

Next activity: Homework 6 and Final Week 7 Lecture