Bachelor's Thesis
An Educational Mobile Game about Sorting Algorithms

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The Institute for System Software at the Johannes Kepler University conducts workshops to teach various computer science topics to kids. To extend these workshops to include sort algorithms, a fun and informative approach is needed to engage the participants effectively. Using a game can be an excellent way to make the learning experience enjoyable and memorable for the kids.

The goal of this bachelor's thesis is to develop a browser game that teaches sort algorithms to kids in workshops. The game should be easy to understand without requiring extensive explanations, making it accessible to a wide range of participants. The following features should be implemented:

1. Cross-platform development:
- Develop the game using a cross-platform framework such as Ionic, Flutter, Xamarin, React Native, NativeScript, or Kotlin Multiplatform (Compose Multiplatform).
- The primary focus should be on creating a mobile app that can be played on phones. As a nice-to-have feature, explore the possibility of making the game playable on the web using the chosen cross-platform framework.

2. Gameplay mechanics:
- The game presents cards face-down, and the player can open two cards at a time.
- The player can decide whether to swap the two open cards or leave them in their current positions.
- When the taught search algorithm determines that a card is in the correct location, the player must mark it as "finalized", mimicking the behavior of the algorithm.
- The player can use a "pin needle" to remember specific cards, such as the smallest one, to simulate the behavior of certain sort algorithms.

3. Various play modes:
- *Numbers or letters*: The player can choose that the cards have either numbers or letters to sort.
- *Consecutive or random numbers/letters*: The game can generate either consecutive or random sequences of numbers or letters to be sorted.
- *Adjustable no. of cards*: The player can select the number of cards to be sorted, starting from 6.
- *Free mode*: In this mode, there are no forced rules, allowing the player to experiment and explore.
- *Simulating specific sort algorithms*: The game should include modes that require the player to simulate the steps of bubble sort, insertion sort, and selection sort.

4. Additional features:
- *Explanations for incorrect moves*: When the player performs an incorrect move (outside free mode), the game should provide explanations to help them understand their mistake and learn from it.
- *Counting swaps and comparisons*: The game should keep track of the number of swaps and comparisons performed by the player, helping kids learn about the performance tradeoffs between different sort algorithms.

The cross-platform mobile game should be developed using the chosen framework, ensuring compatibility with modern mobile devices. The user interface should be intuitive and visually appealing, with clear instructions and feedback to guide the player through the game.

Modalities:
The progress of the project should be discussed at least every four weeks with the advisor. A time schedule and a milestone plan must be set up within the first 3 weeks and discussed with the advisor. It should be continuously refined and monitored to make sure that the thesis will be completed in time. The final version of the thesis must be submitted not later than 28.02.2025.