CS139 C Programming Project

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The objective of this project is to practice the implementation of structures and functions in C.
The submission of the project requires the **source code** and a **readme.pdf** describing it.

Pokémon Database

Part 1 - Structure (4 points)

Implement a structure named **pokemon**, which contains the following elements

1. id (int)
2. name (char*)
3. height (float)
4. type (char*)

It is suggested to use an array of the designed structure as the database, for example:
struct pokemon pkdb[100]; or
*struct pokemon *pkdb*[100];

However, other forms such as linked list are also acceptable.

Part 2 - Basic Functions (4 points)

The following functions should be realized.

1. *int insert(int id, char *name, float height, char *type);*
   Add a new pokemon into the database. Return 0 if successful. Return 1 if the max size of the database is exceeded.
2. *int delete_id(int id);*
   Delete the pokemon of given id from the database. Return 0 if successful. Return 1 if the pokemon of given id doesn't exist in the database.
   Then print a sentence to describe the situation according to the return value.

Part 3 - Extended Functions (8 points)

The following functions should be realized.

3. *void find_height(int param);*
   $param \in \{1, 2\}$. Find the pokemons with maximum height (param=1) or minimum height

(param=2). Print the name of the found pokemons.
Make sure to print all the pokemons if they have the same maximum or minimum height.

4. *void sort_id();* Sort the database with id-ascending order. Print all pokemon names in order.
5. *void sort_id_plus(int param);*
   $param \in \{1, 2\}$. Sort the database with id-ascending order (param=1) or id-descending order (param=2). Print all pokemon names in order.
   Use pointer to function (such as the functions below) instead of duplicating the sort process.
   int ascending (int a, int b) { return b<a; }
   int descending (int a, int b) { return b>a; }
6. *void group(char* type);*
   Print the name of all the pokemons belonging to the given type.

Part 4 - Free Design (4 points)

Design and implement a feature for the database. Feel free to add any element in the structure and add any function. Explain this feature in detail in readme file.
For example, it could be a great idea to implement the evolutionary chains of pokemons. For pokemon *Eevee*, the function could find its evolution *Vaporeon*, etc.

Input and Output

The **main** function firstly reads the information of several pokemons, then reads a set of instructions and prints corresponding output.
The first line of input is an integer $n \leq 50$, indicating the number of pokemons in the following lines. For each pokemon, there are 4 lines containing its *id, name, height* and *type* respectively. Remark that each pokemon may have at least 1 *type* and at most 2 *types*. Types are separated with a single comma.
Then there's an integer $m \leq 20$, indicating the number of instructions. Each line contains 1 instruction, which is consisted of a number and a parameter, separated by a blank. The number is the enumeration of corresponding function: 2 *delete_id*, 3 *find_height*, 4 *sort_id*, 5 *sort_id_plus*, 6 *group*. The parameter is passed into the function as argument.

There's a sample of input and output in the appendix. Each instruction and its output is aligned. It could be used to validate the functions.
Remark that the format of the output is **not important**. Do not bother with order of print (except for *sort_id* or *sort_id_plus*), or number of blanks.

Reference

[1] **Pokédex** www.pokemon.com/us/pokedex/

Appendix

Sample input (2 columns)

```
5
004
Charmander
2.00
fire
006
Charizard
5.07
fire,flying
131
Lapras
8.02
water,ice
025
Pikachu
1.04
electric
029
Nidoran
1.04
poison
9
4
3 1
3 2
2 29
2 29
5 1
5 2
6 fire
6 ice
```

Sample output

```
Charmander Charizard Pikachu Nidoran Lapras
Lapras
Pikachu Nidoran
Deleted successfully !
Pokemon of id 29 doesn't exist in the database.
Charmander Charizard Pikachu Lapras
Lapras Pikachu Charizard Charmander
Charizard Charmander
Lapras
```