

CSE 335 - Spring 2019: Project 1

Project Description:

You work for a gaming company. Their newest product, a brawling game called *Super Squish Sisters*, is about to hit the shelves; however, due to a database malfunction, some of the code was corrupted. Your other team members already have the graphics working; it's up to you and your partner to rewrite the API (*Application Programming Interface*) responsible for giving a list of characters and their attributes (example output below).

You were about to start coding when you spilled coffee all over your UML diagram, so you must first recreate that. Each character has a name (string), weight (double), speed (string), hair length (int), and race (string). There are 3 different types of characters in the game, determined by their size: small, medium, and big. Small characters have a gun they can equip or unequip (bool), medium characters have a melee weapon (string for the name of the weapon), and big characters have special skills (e.g. 'karate', 'flying', 'morphing', etc).

The character list will be read from the file "sisters.txt". The website <http://www.cplusplus.com/doc/tutorial/files/> has a good example of reading from text files. The company is considering adding a "create your own character" feature in the future, so you design your code with this possibility in mind; use factories to handle character creation (one for each character type, and an abstract factory).

The program should print out a list of the sisters. Every attribute must be printed, including those that vary by character type (Virtual Functions for printing and a list of pointers is highly recommended). In order to ease selection of the overwhelming number of 12 characters, the list should be sortable. To do this, you'll also need to add some functions that will change the ordering of the list.

The characters should be able to be ordered by their:

- Race
- Speed
- Hair Length

To do this, you should implement the game functions specified in main.

- `getCharacters()`
- `getCharactersByRace()`

- getCharactersBySpeed()
- getCharactersByHair()

Each of these functions will print out the characters ordered as written. To show that this sorting works, print out each ordered list of characters as shown in the example output. As stated, the file with the characters is called "sisters.txt". There are 7 fields per character. In order they are: Name, Size, Weight, Speed, Hair Length, Race, Special. You have sorted before in the homeworks, you can modify and make use of that sorting algorithm here too.

Provided Files (project1.zip):

1. main.cpp
2. sisters.txt
3. coffeeUml.jpg
4. Project Description (this file)
5. TeamMeetingReport.docx

Coding Requirements:

1. Each class should have a separate design (.h) file and implementation (.cpp) file
2. Draw and Submit a UML Diagram
3. You cannot change the main.cpp file provided to you. Your program MUST compile and run with the main.cpp. Your output should match the sample output. Your output should be properly indented as shown in the sample output.
4. Ensure that your code has the correct access modifiers (public, private, protected) to maximize security and give clients only the interfaces they need.
5. There should be no memory leaks
6. Data members must be located in protected or, preferably, private sections of classes. Data members located in private sections should have the necessary getters and setters.
7. All member variables that are not intended to change should be defined as constant.
8. You should make use of the following design patterns
 - a. Abstract Factory
 - b. Inheritance
 - c. Virtual Functions
 - d. Polymorphism / Template
 - e. Constructors
 - f. Encapsulation

Team Meeting Report:

1. Each team must meet at least TWO times. You should document each meeting in your Team Meeting Report provided in project1.zip. If your teammate does not respond or participate in your project meeting, then you need to include email proof along with your submission.
2. There should be at least two of these sheets handed in.
3. For each meeting, give the date of the meeting, the duration of the meeting, and the location of it, along with the contributions of each partner.
 - a. An example of contribution could be, "Team member 1 created the UML diagram and made classes for factories"

Submission Guidelines:

1. Work in teams of two to design the UML and implement the project.
2. Your team member(s) must be the one(s) assigned to you by the instructors. You are not allowed to change your team. If you have issues or concerns about your team or the project, please email your TA, Daniel Shumaker, at shumak37@msu.edu.
3. Each team must submit a UML along with the project code and team meeting reports.
4. You must submit your UML design, team participation report, and project in a zip file:
 - a. A UML diagram (PDF document)
 - b. Team Meeting Report (at least two)
 - c. The whole Netbeans project directory. Ensure that NetBeans can open your project, compile, and run. Your project will not be graded if it does not compile.
5. This project is due via Handin (<https://handin.cse.msu.edu/>) by 11:59 PM on 02/25/2019.

Example Output:

Here is what you should aim to create with your program.

```
***** Printing Sisters *****
Name: Bertha      Size: big      Weight: 408.9   Speed: 2   HairLen: 0.3   Race: cow      Skill: stomp
Name: Cathy       Size: big      Weight: 168.3   Speed: 6   HairLen: 2.7   Race: human    Skill: chatterbox
Name: Grizelda    Size: big      Weight: 324.8   Speed: 5   HairLen: 1.1   Race: bear     Skill: badFurDay
Name: Isabella    Size: small    Weight: 22.1    Speed: 4   HairLen: 0.4   Race: dog      IsEquipped: 0
Name: Lancetta    Size: big      Weight: 150.5   Speed: 10  HairLen: 57    Race: witch    Skill: badHairDay
Name: Lily        Size: med      Weight: 130.5   Speed: 8   HairLen: 3.2   Race: princess Weapon: tennisRacket
Name: Moon        Size: small    Weight: 15.6    Speed: 7   HairLen: 0     Race: spaceRock IsEquipped: 1
Name: Nectarine   Size: med      Weight: 130.4   Speed: 8   HairLen: 3.5   Race: princess Weapon: golfClub
Name: Nes         Size: small    Weight: 49.3    Speed: 10  HairLen: 0.6   Race: human    IsEquipped: 1
Name: Rosaline    Size: med      Weight: 147.3   Speed: 9   HairLen: 4     Race: star     Weapon: whip
Name: Seamus      Size: med      Weight: 133.1   Speed: 9   HairLen: 4.3   Race: human    Weapon: wand
Name: Whispy      Size: big      Weight: 534.9   Speed: 1   HairLen: 140   Race: tree     Skill: appleBomb
*****
```

***** Printing Sisters: Order by Race *****

Name: Grizelda	Size: big	Weight: 324.8	Speed: 5	HairLen: 1.1	Race: bear	Skill: stomp
Name: Bertha	Size: big	Weight: 408.9	Speed: 2	HairLen: 0.3	Race: cow	Skill: chatterbox
Name: Isabella	Size: small	Weight: 22.1	Speed: 4	HairLen: 0.4	Race: dog	Skill: badFurDay
Name: Cathy	Size: big	Weight: 168.3	Speed: 6	HairLen: 2.7	Race: human	IsEquipped: 0
Name: Nes	Size: small	Weight: 49.3	Speed: 10	HairLen: 0.6	Race: human	Skill: badHairDay
Name: Seamus	Size: med	Weight: 133.1	Speed: 9	HairLen: 4.3	Race: human	Weapon: tennisRacket
Name: Lily	Size: med	Weight: 130.5	Speed: 8	HairLen: 3.2	Race: princess	IsEquipped: 1
Name: Nectarine	Size: med	Weight: 130.4	Speed: 8	HairLen: 3.5	Race: princess	Weapon: golfClub
Name: Moon	Size: small	Weight: 15.6	Speed: 7	HairLen: 0	Race: spaceRock	IsEquipped: 1
Name: Rosaline	Size: med	Weight: 147.3	Speed: 9	HairLen: 4	Race: star	Weapon: whip
Name: Whispy	Size: big	Weight: 534.9	Speed: 1	HairLen: 140	Race: tree	Weapon: wand
Name: Lancetta	Size: big	Weight: 150.5	Speed: 10	HairLen: 57.5	Race: witch	Skill: appleBomb

***** Printing Sisters: Order by Speed *****

Name: Whispy	Size: big	Weight: 534.9	Speed: 1	HairLen: 140	Race: tree	Skill: stomp
Name: Bertha	Size: big	Weight: 408.9	Speed: 2	HairLen: 0.3	Race: cow	Skill: chatterbox
Name: Isabella	Size: small	Weight: 22.1	Speed: 4	HairLen: 0.4	Race: dog	Skill: badFurDay
Name: Grizelda	Size: big	Weight: 324.8	Speed: 5	HairLen: 1.1	Race: bear	IsEquipped: 0
Name: Cathy	Size: big	Weight: 168.3	Speed: 6	HairLen: 2.7	Race: human	Skill: badHairDay
Name: Moon	Size: small	Weight: 15.6	Speed: 7	HairLen: 0	Race: spaceRock	Weapon: tennisRacket
Name: Lily	Size: med	Weight: 130.5	Speed: 8	HairLen: 3.2	Race: princess	IsEquipped: 1
Name: Nectarine	Size: med	Weight: 130.4	Speed: 8	HairLen: 3.5	Race: princess	Weapon: golfClub
Name: Seamus	Size: med	Weight: 133.1	Speed: 9	HairLen: 4.3	Race: human	IsEquipped: 1
Name: Rosaline	Size: med	Weight: 147.3	Speed: 9	HairLen: 4	Race: star	Weapon: whip
Name: Nes	Size: small	Weight: 49.3	Speed: 10	HairLen: 0.6	Race: human	Weapon: wand
Name: Lancetta	Size: big	Weight: 150.5	Speed: 10	HairLen: 57.5	Race: witch	Skill: appleBomb

***** Printing Sisters: Order by Hair *****

Name: Moon	Size: small	Weight: 15.6	Speed: 7	HairLen: 0	Race: spaceRock	Skill: stomp
Name: Bertha	Size: big	Weight: 408.9	Speed: 2	HairLen: 0.3	Race: cow	Skill: chatterbox
Name: Isabella	Size: small	Weight: 22.1	Speed: 4	HairLen: 0.4	Race: dog	Skill: badFurDay
Name: Nes	Size: small	Weight: 49.3	Speed: 10	HairLen: 0.6	Race: human	IsEquipped: 0
Name: Grizelda	Size: big	Weight: 324.8	Speed: 5	HairLen: 1.1	Race: bear	Skill: badHairDay
Name: Cathy	Size: big	Weight: 168.3	Speed: 6	HairLen: 2.7	Race: human	Weapon: tennisRacket
Name: Lily	Size: med	Weight: 130.5	Speed: 8	HairLen: 3.2	Race: princess	IsEquipped: 1
Name: Nectarine	Size: med	Weight: 130.4	Speed: 8	HairLen: 3.5	Race: princess	Weapon: golfClub
Name: Rosaline	Size: med	Weight: 147.3	Speed: 9	HairLen: 4	Race: star	IsEquipped: 1
Name: Seamus	Size: med	Weight: 133.1	Speed: 9	HairLen: 4.3	Race: human	Weapon: whip
Name: Lancetta	Size: big	Weight: 150.5	Speed: 10	HairLen: 57.5	Race: witch	Weapon: wand
Name: Whispy	Size: big	Weight: 534.9	Speed: 1	HairLen: 140	Race: tree	Skill: appleBomb

***** Printing Sisters *****

Name: Bertha	Size: big	Weight: 408.9	Speed: 2	HairLen: 0.3	Race: cow	Skill: stomp
Name: Cathy	Size: big	Weight: 168.3	Speed: 6	HairLen: 2.7	Race: human	Skill: chatterbox
Name: Grizelda	Size: big	Weight: 324.8	Speed: 5	HairLen: 1.1	Race: bear	Skill: badFurDay
Name: Isabella	Size: small	Weight: 22.1	Speed: 4	HairLen: 0.4	Race: dog	IsEquipped: 0
Name: Lancetta	Size: big	Weight: 150.5	Speed: 10	HairLen: 57	Race: witch	Skill: badHairDay
Name: Lily	Size: med	Weight: 130.5	Speed: 8	HairLen: 3.2	Race: princess	Weapon: tennisRacket
Name: Moon	Size: small	Weight: 15.6	Speed: 7	HairLen: 0	Race: spaceRock	IsEquipped: 1
Name: Nectarine	Size: med	Weight: 130.4	Speed: 8	HairLen: 3.5	Race: princess	Weapon: golfClub
Name: Nes	Size: small	Weight: 49.3	Speed: 10	HairLen: 0.6	Race: human	IsEquipped: 1
Name: Rosaline	Size: med	Weight: 147.3	Speed: 9	HairLen: 4	Race: star	Weapon: whip
Name: Seamus	Size: med	Weight: 133.1	Speed: 9	HairLen: 4.3	Race: human	Weapon: wand
Name: Whispy	Size: big	Weight: 534.9	Speed: 1	HairLen: 140	Race: tree	Skill: appleBomb

RUN FINISHED; exit value 0; real time: 50ms; user: 0ms; system: 0ms