Programming Assignment 2

Preliminary Class Diagram

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1. MendelianSim
   1. This class parses the “xml” file to read the list of genes in order to create an instance of GeneMaster.
   2. Calls functions in MasterGeneFactory, OrganismFactory, and ChromosomeFactory to read data from GeneticsSimDataParser
   3. It also retrieves the amount of offspring the user desire to create.
2. MasterGeneFactory
   1. Contains all MasterGene objects for all the genes from data parser
3. MasterGene
   1. This class contains all the genes definition and the corresponding trait, dominant allele, dominant symbol, recessive allele, and recessive symbol.
4. OrganismFactory
   1. Contains all Organism objects
   2. Reads data from data parser to generate each Organism object
5. Organism
   1. This class represents a parent organism. It contains its genus, species, common name, as well as its genotype. For each gene in the genotype, it creates new instances of Gene.
   2. It has a vector of Chromosomes, each represents a Chromosome pair
   3. It passes a random Chromosome to Breed
6. ChromosomeFactory
   1. Contains all Chromosome objects
   2. Reads data from data parser to generate each Chromosome object
   3. Sets pointer to MasterGene to Chromosome vector
7. Chromosome
   1. Represents a Gene pair. It was a vector of Genes
   2. This also contains the information of chances of crossover
8. Gene
   1. Contains the information of each gene for a parent. This includes its allele
   2. It has pointer to its MasterGene to obtain definition from there
9. Breed
   1. This class asks each parent (instance of Organism) to send a random chromosome strand. It also checks the crossover flag of the parent to determine if the gene on the chromosome will get crossover or not. It will also determine the crossover flag of the offspring.
   2. The list of new Offsprings are contained in a vector, which then gets sent to OffspringReader to analyze the offspring.
10. Offspring
    1. Inherits everything from Organism, but the information is changed to the data generated by Breed
11. OffspringReader
    1. This class goes through the vector sent from Simulation and analyzes each offspring. It contains multiple counters for each case of the offspring.
    2. For each gene, it checks the gene definition with GeneMaster.
    3. It ensures cases such as “Tt” and “tT” is interpreted correctly.