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Design 3

Problem Statement:

For this assignment I will be implementing a small game where a player acts as if they were the owner of a city zoo. This zoo contains exhibits for sea lions, tigers, and black bears. As the owner of the zoo, it is the responsibility of the player to ensure the welfare of the animals as well as to generate as much profit as possible. In order to accomplish these tasks, the user must invest in the animals, feed them, care for them when they are sick, and raise their babies when they have been born. Each species in the zoo has specific traits, such as age, cost, babies, food cost, and revenue.

Understanding the Problem:

Age- For all species an animal is considered a baby if it is less than 6 months old. For all species an animal is an adult if it is at least 4 years old. Between 6 months and 4 years old will be labeled as adolescence. The animal is not capable of reproducing until after adolescence.

Cost- Sea Lions cost \$700 each, Tigers cost \$12000 each, and Black Bears cost \$5000 each.

Babies- Sea Lions can produce 1 baby per pregnancy, Tigers can have 3 babies per pregnancy, and Black Bears can have 2 babies per pregnancy.

Food Cost: The base food cost per species varies based upon a month to month basis. Tigers have a monthly food cost of 5 times the base food cost. Black Bears have a monthly food cost of 3 times the base food cost. Sea Lions have a monthly food cost which is equivalent to the base food cost.

Revenue- Each animal generates a monthly revenue equivalent to a percentage of the initial cost of ones of its species. All of the species except for sea lions generate 10% of the cost of one of its species. Which means that each Tiger generates \$1200 each month, each Black Bears generates \$500 each month, and each Sea Lion generates \$140 each month. On specific month the Sea Lion is capable of generating bonus revenue when the attendance at the zoo is high.

The game begins with the user having no animals in the zoo, but having \$100000 in the bank, this game plays one month at a time. Each month is a turn for the user to decide their moves. Each month the following occurs:

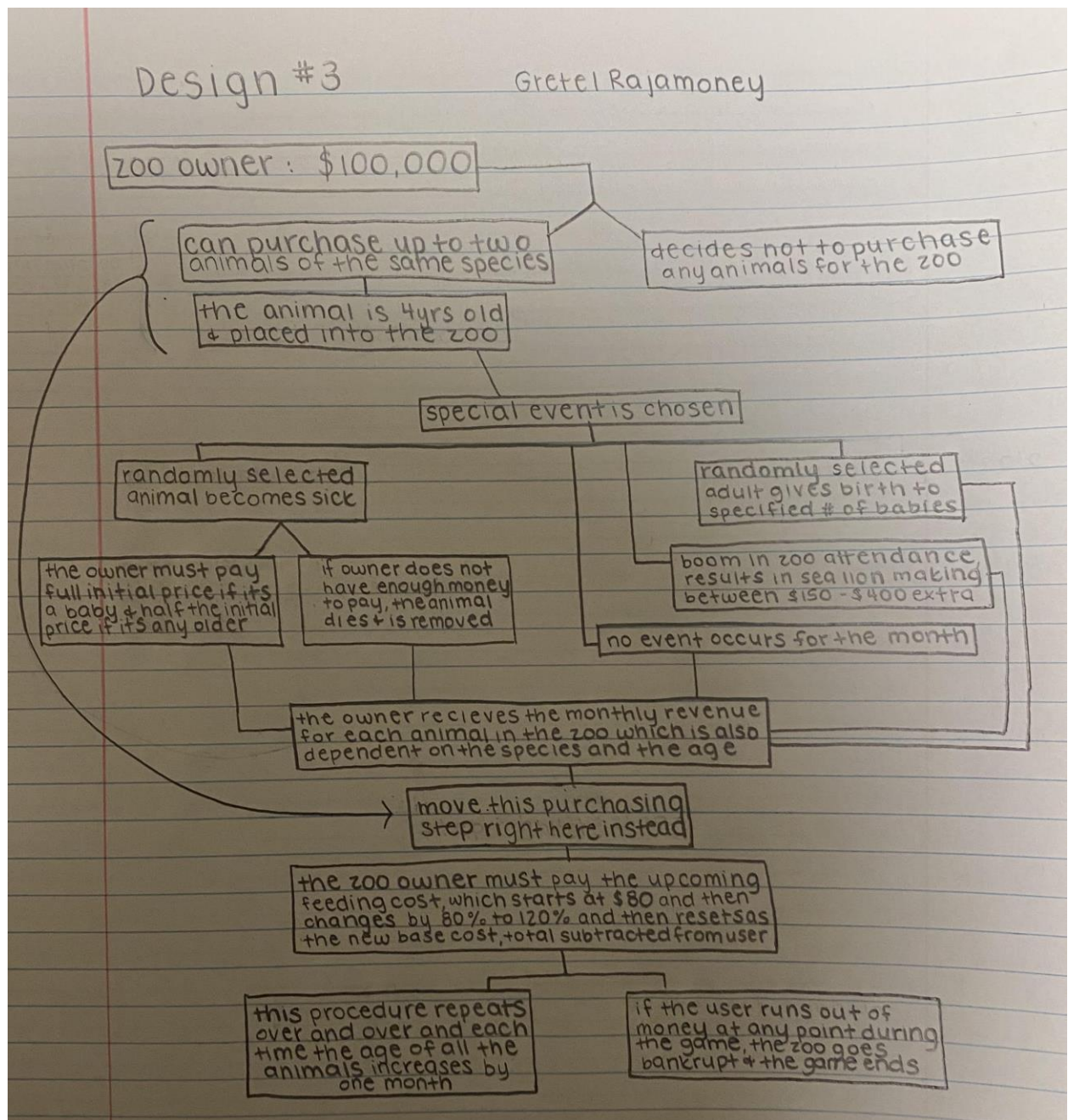
1. The age of each animal that is currently in the zoo increases by 1 month.
2. A special event is chosen randomly each month. These are the options:

- One randomly selected animal becomes sick. In order to take care of the sick animal the owner must pay half of the initial cost of the animal. If the owner does not have enough money to pay for the sick animal, the animal dies and is removed from the zoo.
 - One randomly selected adult animal gives birth to the (listed above in the 'babies' category) stated number of babies for its species. Animals that aren't adults are ineligible to produce babies. Each produced baby starts at age 0 and are added into the zoo.
 - A boom in zoo attendance occurs, which means that each sea lion receives an extra bonus revenue between \$150 to \$400 dollars.
 - No special event occurs for the month.
3. The owner receives the monthly revenue for each animal in the zoo (which is specified above in the 'revenue' category) dependent upon each species.
 4. The owner has the opportunity to purchase up to two adult animals of one specific species. The user is only allowed to purchase from a single species each month, but the user is not required to purchase animals if they aren't interested. Each animal that the owner buys is exactly 4 years old, is placed in the zoo, and is subtracted from their owner's bank account.
 5. The user must pay the upcoming feeding cost for each of the animals present in the zoo, this includes the animals which the user just purchased. The cost of food for each animal is calculated using the base cost, which starts out as \$80. Each month, the base cost changes to a random percentage between 80% to 120% of the prior base cost. The total food cost for all of the animals is subtracted from the owner's bank account.

In addition to creating a game that completes all of the listed specifications, the game must also calculate that animals in the zoo which are less than 6 months old generate twice as much revenue as adult animals generate. But also, when a baby animal is sick, it costs twice as much to recover than an adult animal costs. This game ends when the user runs out of money, because without the owner having money to take care of the zoo, it will go bankrupt.

The program is required to have a class called zoo, animal, sea lion, tiger, and bear. Using inheritance, the sea lion, tiger, and bear classes must inherit traits and behaviors from the animal class. The program must also take account of all of the differences and unique traits for all of the different species as well as the different ages. All of the animals in the zoo must be represented as a dynamically allocated array of objects within their appropriate species class. At the beginning of each turn/month the program must let the player know how much money is in their bank account, as well as how many adults and babies they have of each species. The program must not contain any memory leaks, and must implement the Big 3 as appropriate. The program must also contain one header file, and one interface file for each class, and a makefile for the compilation of the program.

Devising a Plan/Design:



Testing:

Actual	Expected	Actual Meets Expected
when the game begins	zoo owner starts with \$100,000	
owner decides to purchase animals for the zoo	only two animals of the same species are allowed to be bought per turn/month, they are placed in the zoo, next the special event step displays	
owner decides not to purchase any animals for the zoo	the special event is randomly selected, and is then displayed to the owner	
if special event is that a randomly selected animal becomes sick, and owner can afford the recovery cost	the recovery cost is the full initial cost if the animal is a baby, and half the initial cost if older, the cost is immediately subtracted from the owner's bank account, next the revenue step begins	
if special event is that a randomly selected animal becomes sick, and owner can afford the recovery cost	if the owner is unable to pay the cost of the sick animal, then the animal dies, the animal is immediately removed from the zoo, next the revenue step begins	
if the special event is that a randomly selected animal gives birth to babies	the animal selected must be an adult and the defined number of babies are added to the zoo with an age of 0, next the revenue step begins	
if the special event is that a randomly selected animal gives birth to babies	if there are no adults present in the zoo, the owner is ineligible to participate in this special event, next the revenue step begins	
if the special event is that there is a boom in attendance	the sea lions in the zoo receive between \$150 - \$400 in bonus revenue for the month, next the revenue step begins	
if the special event is that no event occurs for the month	the revenue step begins	
when the revenue step occurs	the revenue is automatically added into the owners bank account, next the purchasing step occurs	

when the feeding step occurs	the zoo owner pays 80% to 120% of the base cost (which begins at \$80), the total is automatically subtracted from the owners bank account, and the previous base cost is replaced with the newer one, next the new move begins	
when a new turn begins	one month is added to all of the animals currently in the zoo	
if at any point in the game the owner is unable to pay or runs out of money	the zoo goes bankrupt and the game ends	