

Question 1:

struct lock *round_lock: I use the round_lock to lock that cats and mice are eating independently

struct cv *cateating: this use to lock the bowls when the cats are eating in their round

struct cv *mouseEating: this use to lock the bowls when the mice are eating in their round

struct lock *bowl_lock: It uses to locks one bowl when a cat or a mouse are using this bowl

volatile int cateatingnum: It uses to count the number of cat which are eating

volatile int mouseeatingnum: It use to count the number of mice which are eating;

int *bowl_array: It has Numbowls elements, if the bowls used by cat or mouse, the bowl_array in this index will be 1,otherwise, it will be 0.

Question 2:

when the cats are eating, we need to lock the round of cat to avoid the mice come in and check that the mice finished or not finished firstly. If there are no any mice or there have enough bowls, then the cats can come in and eat, otherwise, i need to use cv_wait to let them wait. When a cat can have a empty bowl to eat, I need to lock this bowl to the cat, because I need to make sure that this bowl only is used to this cat until it finish. And then we can release the lock of round and let this cat eat. after eat we need to use lock the round to avoid mouse come in because there maybe some cat are still eating, then release this bowl,and set it to 0 means empty. finally , we can use cv to wake up mice or other cats;

the mouse eating round are similarly as the cat eating round;

Question 3:

Because I use round_lock to make sure that there are no cat when mouse are eating, or there are no mouse when cats are eating. if there are mice in cat eating round, I use cv_wait for the cats and wake them up until all mice done. It is same to the mouse eating round.

THUS, it is not possible for two creatures to eat from the same bowl at the same time under my synchronization technique

Qusetion 4:

they cannot eat together. because I lock the mice when the cats did not finish. when the all cats leave and the all bowls are empty, I will let mice eat.

Question 5:

For my synchronization technique. when the cat finished eating, I will check mice that mice are starve. If they starve, I will wake them up and let them to eat. It is same as when the mice finished eating.

Question 6:

I have to balance fairness and efficient in my synchronization technique. I try to use all bowls in each eating round. And the cats round and mouse round take turn to eat. for example there are 5 bowls, I try to use 5 bowls in each round. and let 5 cats and 5 mice take turn to eat.