

Cat and Mice Design:

Q1: I have locks for every bowl to check whether the bowl can be selected or not. Also I have locks to protect numbers of eating cats/mice. I have two critical values, cat(check whether there is any cat eating) and mouse(check whether there is any mouse eating)

Q2: Locks are used to ensure every bowl is used by one creature only(So if not, lock it). There are two other locks for cs values for numbers of eating cats and mice. Critical Value is used to tell whether it is the mouse/cat's turn to check for bowls.

Q3: There is a lock for every bowl to avoid using the same one.

Q4: There are 2 values(ceat, meat) to count how many cats/mice are eating now, whenever signaling a CV, these are checked to ensure only one creature is eating.

Q5: Whenever a bowl is finished, the lock is released and the related eat value(meat, ceat) will decrease. Thus at some point, all locks are released and the eat value will be 0. Then the other creature can eat.

Q6: For fairness, whichever is eating has the privilege. So if the cat is eating, then any cat can join to it, and the mice have to wait until all cats finish eating. For efficiency, I will update the bowl number until I get one that is free. So if bowl1 is used, then the creature will look for other bowls before it tries to eat. I sacrifice some fairness to efficiency because I allow the same creature to jump over any previous other creature if there is another creature eating. So if there is a cat eating and tons of mice are waiting for eating, any other cat will be able to eat regardless of any previous waiting mice.