

REPORT OF QUESTION 2

The code uses multithreading and mutex locks to implement the question. Below are some major functions and the major idea of the logic behind them.

KEY POINTS

- Companies use the mutex for each company and is used to check on the company information by the zone so each company is checked only when all values are up to date.
- Zones is a similar mutex for the vaccination zones where each student uses this mutex to check value only when the values are up to date.
- Zones find the company through busy-waiting.
- Students find the zone through busy-waiting.

FUNCTIONS

- `make_vaccine()`
 - The function called by each company thread.
 - First, the function assigns the value to company variables like duration to make the vaccine, the number of batches produced etc.
 - Then sleeps for the making time of the vaccine and goes into an infinite loop in the function `batch_ready()` where it stays till the company runs out of vaccines through a while loop.
- `vaccinate()`
 - The function called by each vaccination zone thread.
 - The function contains an infinite loop in which the vaccination zone stays.
 - The functions keep looping over all the companies and if they can access their locks they check if the company had batches of vaccines to give.

- The slots are produced randomly until the batch of vaccines finishes and then the process looks for a new batch of vaccine
- take_vaccine(0)
 - The function called by each student thread
 - The function searches for all the zones and available slots in them
 - Student searches and whenever it encounters a zone which has slots available it takes the zones probability and computes the result of the antibody test using that probability
 - If the student tests positive the function returns
 - Else the round is incremented and the student goes through the process again till the round value is less than equal to 3
- main()
 - Creates a thread and waits for each thread to finish and prints the message if the student went to college or had been sent home

Assumptions:

- Variable names are in contrast to their meaning in the code so comments were omitted for them