

Communicating Sequential Processes

Case Studies

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Choose a case study and write a CSP specification for it. Implement your case study in the FDR language and check the absence of deadlock. Try to develop a refinement relation and verify it using FDR. The work should be done in groups of at most three students.

1. Consider that a fast-food restaurant has the following behaviour:
 - a. The restaurant can attend n clients and has m attendants.
 - b. The client orders the attendant the items they want.
 - c. The attendant receives the order, compute the price, receive the money and send the order to a server.
 - d. The restaurant has c cookers that check if there is any order open.
 - e. If there is an open order, a cooker attends the order.
 - f. An order can be attended if there is at least a cooker to do this.

2. Consider a restaurant in which the price of the food is defined by the weight of the food (In Brazil there are several ones). The restaurant has the following behaviour:
 - a. The restaurant can attend n clients.
 - b. When the client entering the restaurant he receives a number from an attendant that is at the front door.
 - c. The restaurant has four balances: two for deserts and two for food. The price of food and deserts are different.
 - d. There are two attendants for weighting the deserts and two for the food. These attendants weight the food or desert and send the weight to the server with the client number.
 - e. There are four waiters that serve the drinks required by a client. The waiter receives the order, sends the order to the server and gives the drink to the client.
 - f. The client enters a restaurant, takes a number, chooses the food, goes to a balance and after sits to eat. He may ask a drink or not. After eating the food he may or not choose the desert, weight the desert and sit again to eat. After finishing eat he goes to the cashier. Coffee and tea are available in the exit door, for free.
 - g. There are two cashiers. The cashier digits the number of the client and send to the server. The server computes the bill and sends to the cashier. The cashier print the bill, gives it to the client, receive the money, possibly gives change and finish the service for this number.

3. Consider a gymnastic competition with the following behaviour:
 - a. There are four modalities running in the stadium at the same time.
 - b. The n gymnastics performs all proofs and each one has an identification number.
 - c. For each modality there are m judges and a coordinator.
 - d. The gymnastic enters the proof, does the proof and receives the note.
 - e. The judge sees the presentation and sends the note to the server.
 - f. The coordinator initializes the display for his modality, when the competition begins and sends a message to the server when the competition finishes.
 - g. The server computes the mean of each presentation based on the notes of the judges, sends to the display and stores that mean to compute the total mean when the four competitions reach the end.
 - h. When all coordinators signalize the end of their competition, the server computes the global mean of each competitor and sends to a global display.

4. Consider a drugstore with the following behaviour:
 - a. The drugstore can attend n clients and has six attendants and two cashiers.
 - b. The client orders the attendant the items they want. Each client has an identification number the system furnishes.
 - c. When the attendant opens a computer section for a client, an identification number is associated with the client by the server. After that the attendant receives the order and may find or not the product required. If he finds he sends to the server the product code and puts the product in a basket. A client can order several products. At the end of the transaction the attendant finishes the order, prints the identification number, gives the identification number and the basket to the client.
 - d. After being attended the client goes to a cashier and gives the identification number.
 - e. The cashier enters the client number in the system and prints the bill. He receives the money and possibly gives change.
 - f. After paying, the client puts the products in a bag and exits the drugstore.