Café Simulation Report

Overview

The café simulation aims to replicate the operations of a small café, focusing on efficient coffee preparation and customer service. The implementation involves multiple types of threads, including a seconds counter, threads for customer arrival printing, threads for customer order handling, and threads for printing exit messages. The simulation also includes color coding to enhance the visual representation of events.

Implementation Details

Threading and Synchronization

1. Seconds Counter Thread (`counter_sec`):
   - Responsible for counting seconds and broadcasting the time to other threads.
   - Utilizes a conditional variable (`cond_sec`) to notify waiting threads about the passage of time.

2. Threads for Customer Arrival Printing (`arrival`):
   - An array of threads that ensure the accurate printing of customer arrival times.
   - Waits until its index arrives using the condition variable (`cond_arrival`).

3. Threads for Customer Order Handling (`customer_handler`):
   - An array of threads handling logical waiting, coffee preparation, and printing operations.
   - Employs a mechanism where threads wait until their index arrives, ensuring synchronized processing.

4. Threads for Printing Exit Messages (`exited`):
   - Handles the printing of exit messages for customers who leave early without their orders.
   - Communicates with the `customer_handler` thread in case a customer leaves early before getting a barista's attention.

Color Coding

- Colored output is utilized to distinguish various events during the simulation, making it visually informative:
  - White: Customer arrival.
  - Yellow: Customer order placement.
  - Cyan: Barista begins preparing the order.
  - Blue: Barista successfully completes the order.
  - Green: Customer leaves with the order.
  - Red: Customer leaves without the order.

Results and Insights

Wasted Coffee and Average Waiting Time

- The simulation tracks the number of wasted coffees (`wasted_coffee`), providing insights into resource efficiency.
- Average waiting time for customers (excluding coffee preparation time) is calculated and reported at the end of the simulation.

Observations

- Threads wait until their index is reached, ensuring synchronized and organized processing.
- The `exited_printing` thread communicates with the `customer_handler` thread in case a customer leaves early before getting attention from a barista.

Conclusion

The café simulation successfully models the café's operations, providing valuable insights into resource utilization and customer satisfaction. The inclusion of color-coded output and careful thread synchronization contributes to the realism of the simulation.

Question / answer:

1) Waiting time is implemented in code at end of simulation average time a customer spends waiting for their coffee is printed.
2) Number of coffees wasted gets printed after end of simulation.