CS110: Principles of Computer Systems

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Threading and Ice Cream Parlors

- Our ultimate multithreaded program simulates the daily activity in an ice cream parlor. The players are the clerks who make ice cream cones, the single manager who supervises, the customers who buy ice cream cones, and the single cashier who accepts payment from customers. A different thread is launched for each.
  - Each **customer** orders a few ice cream cones, waits for them to be made, gets in line to pay, and then leaves. **customer**s are in a big hurry and don't want to wait for one **clerk** to make several cones, so each **customer** dispatches one **clerk** thread for each ice cream cone he or she orders. Once the **customer** has all ordered ice cream cones, he/she gets in line at the **cashier** and waits his/her turn. After paying, each **customer** leaves.
  - Each **clerk** thread makes exactly one ice cream cone. The **clerk** makes a cone and then has the **manager** take a look to make sure it's all good. If the cone doesn't pass muster, it is thrown away and the **clerk** makes another. Once an ice cream cone is approved, the **clerk** hands the gem of an ice cream cone to the **customer** and is then done.
  - The single **manager** sits idle until a **clerk** needs his or her freshly scooped ice cream cone inspected. When the **manager** hears of a request for an inspection, he/she determines if it passes and lets the **clerk** know how the cone fared. The **manager** is done when all cones have been approved.
  - The **customer** checkout line must be maintained in FIFO order. After getting their cones, a customer "takes a number" to mark their place in the **cashier** queue. The **cashier** always processes **customer**s from the queue in order
  - The **cashier** naps while there are no **customer**s in line. When a **customer** is ready to pay, the **cashier** handles the bill. Once the bill is paid, the **customer** can leave. The **cashier** should handle the **customer**s according to number. Once all **customer**s have paid, the **cashier** is finished and leaves.
- We'll walk through the core of this problem and its solution together during lecture.