CSC369 Week 3 Notes

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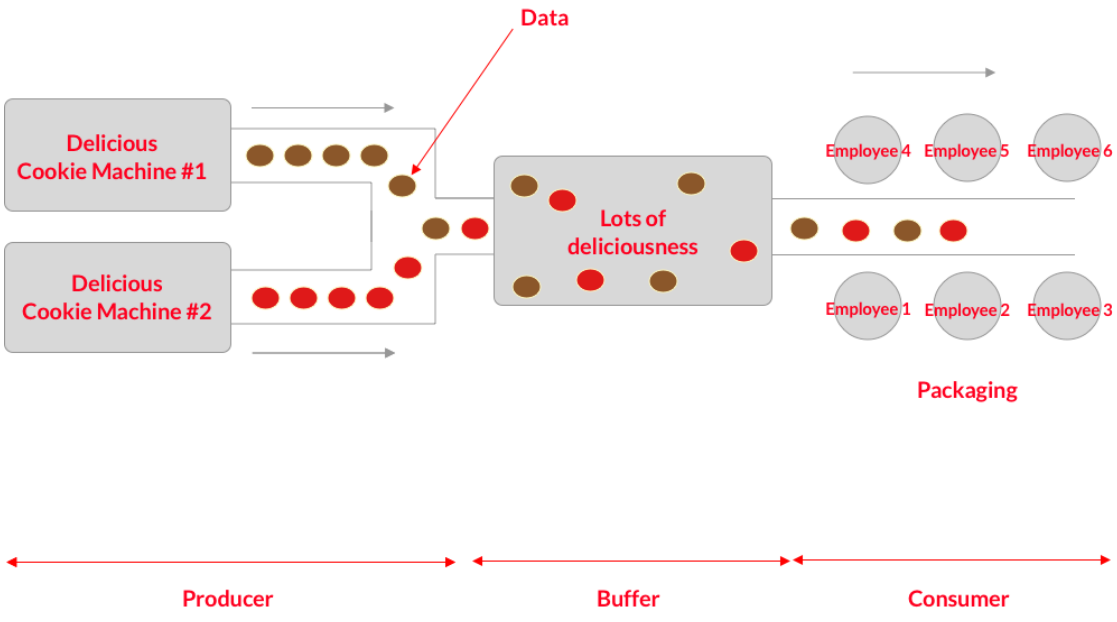
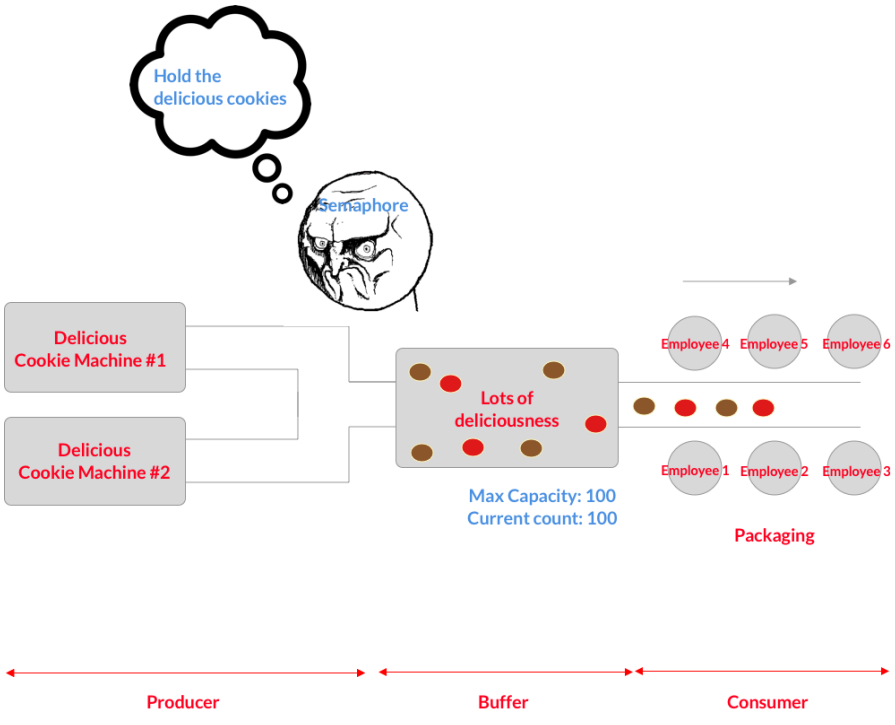
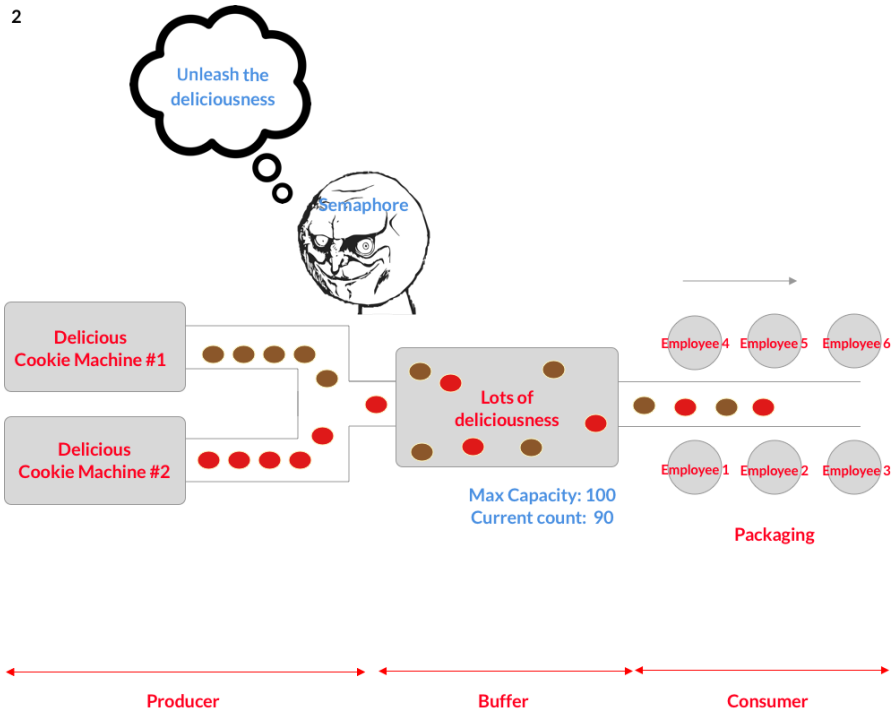
1 Synchronization

- Producer and Consumer Problem
  - Is also known as **bound-and-buffer** problem
  - Achieves synchronization
  - Has two types of processes
    1. **Producer**
       * Produces data
       * Puts data into buffer
    2. **Consumer**
       * Consumes data
       * Removes data from buffer, one piece at a time
  - It's like kimchi factory, or delicious cookie factory :)

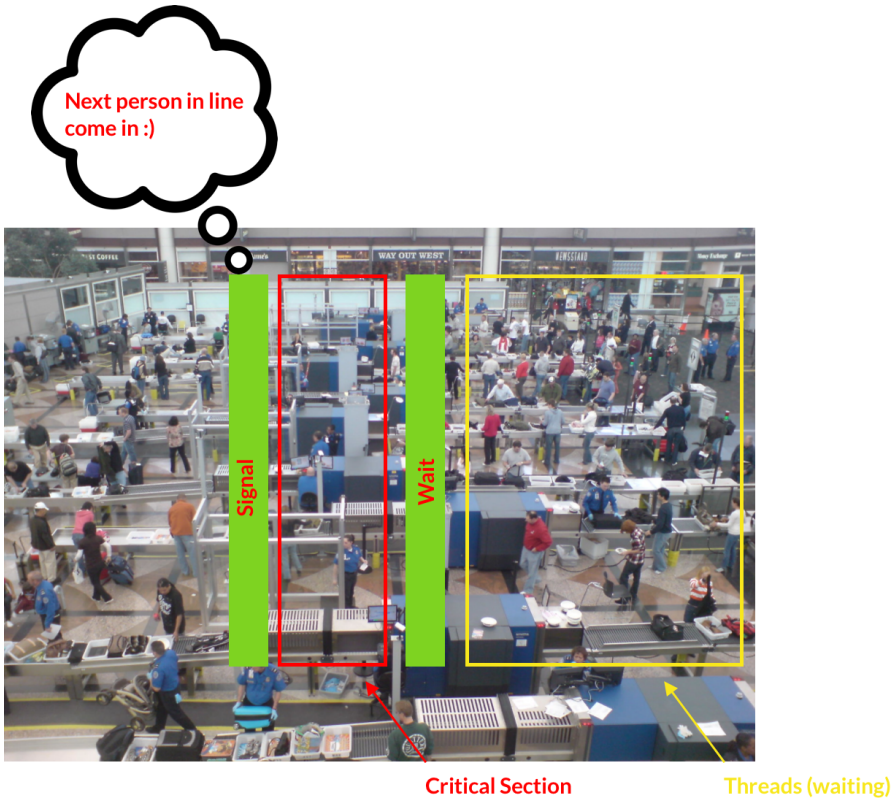


- Semaphore
  - Developed by Dijkstra in 1962.
  - is a signal
    - Uses a non-negative integer variable that is shared between threads [*Note: Need to come back later*]
    - Has two "**atomic**" operations
      1. **Wait** (Also called P, or decrement)
      2. **Signal** (Also called V, or increment)
  - Is easy to understand
  - Is difficult to use
    - Creates a lot of buggy codes
- Types of Semaphores
  1. Counting Semaphore
     - $count = N \Rightarrow$ Max number of resources
     - $count \uparrow$ when resource added
     - $count \downarrow$ when resource used
     - $count = 0 \Rightarrow$ No resources available $\Rightarrow$ **Wait** until $count > 0$





2. Binary Semaphore
   - *count* = *1* ⇒ Unlocked / Available
     - A thread can go in
   - *count* = *0* ⇒ Locked / Unavailable ⇒ **Wait** until *count* > *0*
     - Other threads must wait
   - It's like the security at airport, or the portable bathroom from week 1 notes



- Using Binary Semaphores
- Atomicity of wait() and signal()
- Read-write problem
- Reader's operation
- Writer's operation
- Reader's and Writer's Operation
- Notes on Readers/Writers
- Monitors
  - Is solution to semaphore
    - Is easier to implement
    - Creates less bugs