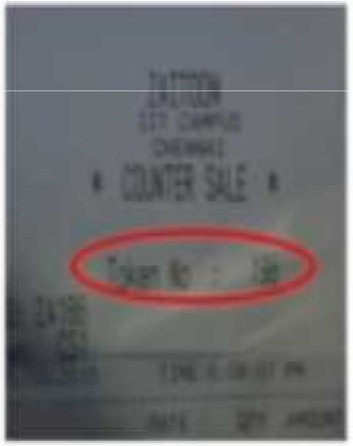
Lamport’s Bakery Algorithm for DSM

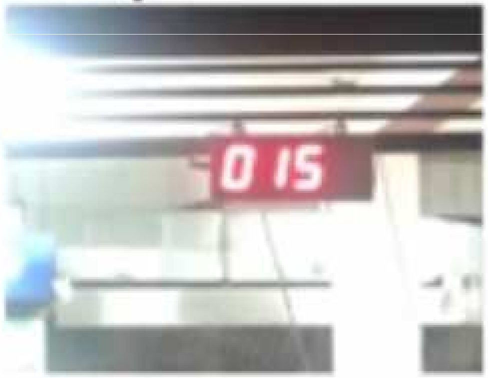
Bakery Algorithm for Mutually Exclusive access to the shared variables stored in DSM

Bakery Algorithm

- Synchronization between N > 2 processes
- By Leslie Lamport

Eat
when 196 displayed





wait your turn!!

http://research.microsoft.com/en-us/um/people/lamport/pubs/bakery.pdf

Simplified Bakery Algorithm

- Processes numbered 0 to N-1
- num is an array N integers (initially 0).
  - Each entry corresponds to a process

```
lock(i){
   num[i] = MAX(num[0], num[1], …., num[N-1]) + 1
   for(p = 0; p < N; ++p){
       while (num[p] != 0 and num[p] < num[i]);
   }
}
```

critical section

```
unlock(i){
   num[i] = 0;
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Simplified Bakery Algorithm (example)

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P1	P2	P3	P4	**P5**
0	4	1	2	3

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```

This is at the doorway!!!
It has to be atomic
to ensure two processes
do not get the same token

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Simplified Bakery Algorithm (why atomic doorway?)

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Original Bakery Algorithm

- Without atomic operation assumptions
- Introduce an array of N Booleans: *choosing*, initially all values False.

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doorway

critical section

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Choosing ensures that a process
Is not at the doorway
i.e., the process is not 'choosing'
a value for num

(a, b) < (c, d) which is equivalent to: (a < c) or ((a == c) and (b < d))

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check p<i

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References

- Leslie Lamport's Bakery Algorithm Paper.
  http://lamport.azurewebsites.net/pubs/bakery.pdf
- NPTEL Video Lecture:
  https://www.youtube.com/watch?v=YHQxp-XduS0