

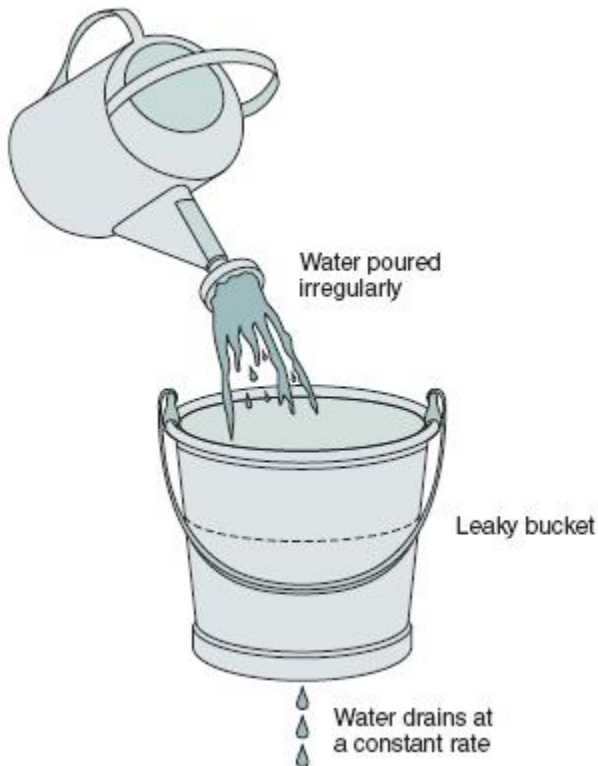
LEAKY BUCKET ALGORITHM

Policing

- Network monitors traffic flows continuously to ensure they meet their traffic contract.
- The process of monitoring and enforcing the traffic flow is called policing.
- When a packet violates the contract, network can discard or tag the packet giving it lower priority
- If congestion occurs, tagged packets are discarded first
- Leaky Bucket Algorithm is the most commonly used policing mechanism
 - Bucket has specified leak rate for average contracted rate
 - Bucket has specified depth to accommodate variations in arrival rate
 - Arriving packet is conforming if it does not result in overflow

Leaky Bucket algorithm can be used to police arrival rate of a packet stream

FIGURE 7.53 A leaky bucket



Let X = bucket content at last conforming packet arrival

Let t_a be last conforming packet arrival time = depletion in bucket

Leaky Bucket Algorithm

- The above figure shows the leaky bucket algorithm that can be used to police the traffic flow.
- At the arrival of the first packet, the content of the bucket is set to zero and the last conforming time (LCT) is set to the arrival time of the first packet.
- The depth of the bucket is $L+I$, where I depends on the traffic burstiness.

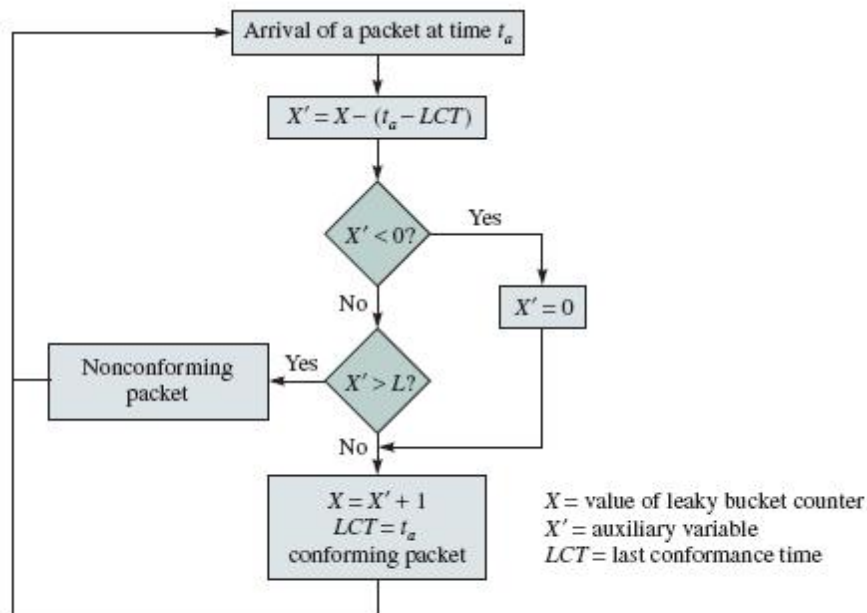


FIGURE 7.54 Leaky bucket algorithm used for policing

- At the arrival of the k th packet, the auxiliary variable X' records the difference between the bucket content at the arrival of the last conforming packet and the interarrival time between the last conforming packet and the k th packet.
- If the auxiliary variable is greater than L , the packet is considered as nonconforming, otherwise the packet is conforming. The bucket content and the arrival time of the packet are then updated.

Leaky Bucket Example: - The operation of the leaky bucket algorithm is illustrated in the below figure.

- Here the value I is four packet times, and the value of L is 6 packet times.
- The arrival of the first packet increases the bucket content by four (packet times).
- At the second arrival the content has decreased to three, but four more are added to the bucket resulting in total of seven.
- The fifth packet is declared as nonconforming since it would increase the content to 11, which would exceed $L+I$ (10).
- Packets 7, 8, 9 and 10 arrive back to back after the bucket becomes empty. Packets 7, 8 and 9 are conforming, and the last one is nonconforming.
- Non-conforming packets not allowed into bucket & hence not included in calculations.

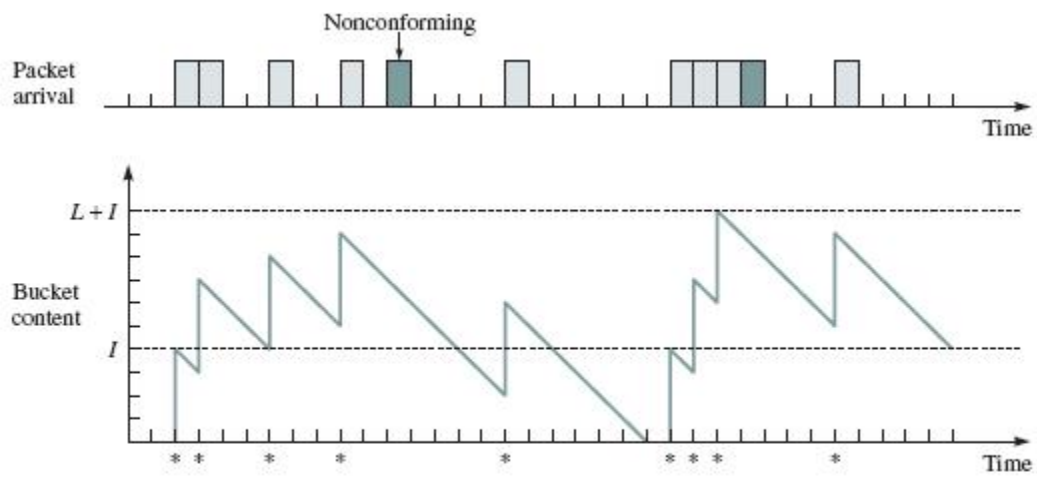


FIGURE 7.55 Behavior of leaky bucket