* Producer Consumer Problem and its solution

- Bonded Buffer Problem.
- A classic multithreading synchronization problem, there is a shared buffer (like a queue) of finite size between two threads :-

① Producer => Produces data/items and puts them into buffer,

② Consumer => Consumes data/items from the buffer.

- Constraints :-

ⓐ Producer cannot add if the buffer is full.

ⓑ Consumer cannot remove if the buffer is empty.

ⓒ Must avoid race condition and busy waiting.

~~Problem~~

- Solution using Semaphore.

① Mutex / Binary Semaphore :- ensures only one thread accesses the buffer at a time.

② Counting Semaphores :- track buffer state :-

ⓐ empty → no. of empty slots,

ⓑ full → no. of filled slots.

	Producer	Consumer
1)	While (true) {	While (true) {
2)	produce item	Wait (full)
3)	Wait (empty)	acquire (mutex)
4)	acquire(mutex)	remove item from buffer
5)	add item to buffer	release (mutex)
6)	release (mutex)	Signal (empty)
7)	Signal (full)	Consume item
	}	}