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* Bounded Buffer Producer consumer Problem → is of finite size

1) Producer Process → To produce an item and put it into a buffer of finite size.
2) consumer Process.
   ⇓
   To consume the item already placed in a buffer.

→ Producer cannot keep the item which is already full.

→ Consumer can't consume an item from an empty buffer.

* Buffer needs to be checked by both the producer and consumer.
  → shared item b/w the producer and consumer.
  → Variable related to the buffer is shared among producer and consumer.

∴ Buffer is implemented as circular queue

Var 1 Var 2

Modulus operator to check the status of the buffer.

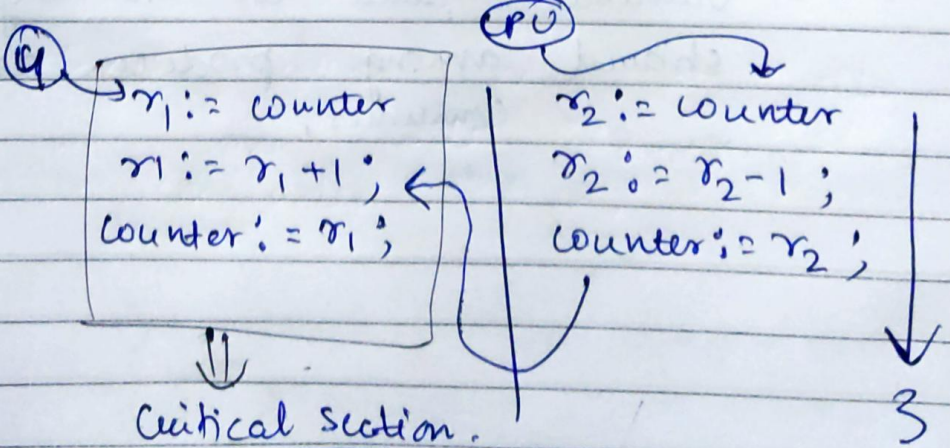
∴ Producer

↳ Possible check for the space.
↳ counter = counter + 1 ;
↳ Put the element in the buffer

∴ consumer

↳ Possible checking for empty
↳ consume item
↳ counter = counter - 1 ;

counter is a shared variable.



Process Synchronization

When two or more process execute concurrently then suitable means to be provided for execution of code involving a shared resource.

Producer	consumer
counter = counter + 1	Counter = counter - 1
r_1 = counter;	r_2 = counter;
r_1 = r_1 + 1;	r_2 = r_2 - 1;
counter = r_1	counter = r_2

↳ critical section
↳ critical section Problem.
↳ Protocols for the soln of CSP
↳ cond^n for the soln of CSP.
↳ Two process S/w. Soln (Peterson soln)
↳ Drawback of

$P_1, P_2, \dots P_n$ → n number of Processes. executes concurrently.

R → shared Resource.

Section of code in each of the processes involving the shared Resource

known as critical section.

The specialization problem associated to the process executing concurrently involving a shared resource R, known as critical section Problem.

↳ Protocol must be there for the solution of critical section Problem.

↳ It has to execute a section of code before entering into the critical section ⇒ entry section

↳ upon completion of critical section it executes a section of code allowing the other to enter their critical section } exit section.

↳ Exit section may be followed by some code known as remainder section.

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Conditions for the Solution of the critical Section Problem.

(1) Mutual exclusion :→

⇓

Processes are allowed to execute their critical section in a mutually exclusive manner.

(2) Progress :→ If the critical section is free then it must be granted to a requesting process in finite time.

(3) Bounded waiting :→ Max. no. of time a process is allowed to enter its critical section.

Two Process Software solution.

P_0 , P_1

R

* To develop Suitable code for entry section and exit section

i, j = i-1

P_i

repeat

entry section

critical section

exit section

remainder section

until false.

Peterson Soln (Two process s/w soln)

P_i: repeat

```
flag[i] := true;
turn := j
while (flag[i] and turn=j) do skip;
```

critical section

```
flag[i] = false
```

remainder section.

until false.

1.) P_j is already executing

2.) P_j has expressed its interest to execute.