# Multiple process Got execution concurrently on parallely (it it stay 24, during their execution — GIGA- Shared data on variable 31/27 consupled 2/47 (ATO MAG, 2MA) Multiple process handle ATO 2/45.

GATE- 311(21, -Gra- Got ASSATILITY AMT 24 Data integrity. Got Data integrity problem prevent 2014 Opt process synchronization concept introduce 2014-247.

# Concurrent execution provide 77.77 OPU scheduler rapidly switch and process 3/6777 - 7185,

# A process may be interrupted at any point in its instruction stream.

Producer-Consumer Problem

# Produces & Consumer both side at courter of variable 12584 2MG and I Triffally Courter = 0

# Counter incremented every time when we add a new item to the buffer.

# Counter decremented every time when we remove one item from the buffer or consumer consume the item from the buffer.

while (true) {

/\* Producer produce an item
in next-produced \*/

while (counter == Buffer-size):

/\* do nothing \*\*/

buffer [in] = next-produced;
in = (In+1) %. Buffer-size

counter++;

while (true) {

while (counter = = 0):

/\* do nothing \*/

next-consumed = buffer[out],

out = (out+1) %. Buffer sitc;

Counter --;

A consume the item in

next-consumed \*/

AFSONOW PROCESS

Producer and consumer Panallely X ONGHT Code execute 74(00Mg)

Panallel execution 97 time 9 2747 Producer 97: Consumer

Grisher Counter GX value increment / decrement 7Mg

- 6547 Counter GX data integrity maintain 2(0 mg)

Data integrity problem.

"Counter + t" and "Counter-" in machine larguage ->

negister 1 = counter | negister 2 = counter |

negister 1 = negister 1 + 1

counter = negister 1

counter = negister 1

counter = negister 2

Rase Condition

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in American

- - - - (x1141 15) ho

# Several Process access and manipulate the same data concurrently.

# Multiple process ITAT same time ( Tamit Gart for should variable to Gart 311(21 Modify MAT, BIZ situation for Rose condition and 24,

\* Rase condition issue Tot solve Tall That and Gard process shared variable to modify that all and continue a that and process of Particular shared variable for modify that onals of the synchronized.

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# critical Saction

AMACT Shared variables modify ZH TITT, THE saction the Critical

\*ZISIT (MIT GOLT Process Gra- Critical section execute - ME OSIA - GAT (MAT Process (ITA ONLIA Critical section to execute क्रमा काल System का खान ensure न्या विमा

# Entry Section TOMA GARLY PROCESS GA- Coitical section & MODIA- HOAT - GIVENA few lines of code TUMENT execute TOTA - 200 THE THOUT THOUSE process at critical section execution start 20 - orang at lines of code year - year System ZATO ONTE Process or ora Critical section execute mot out out few lines of code of section Vot entry section.

# Bit section bon to salarna sulling mesong - man ( Critical section Tota TAT 24 MONTA Code Works Critical section of immidiate ayers - Varg cole

# Remainder Section Critical section, entry section, exit section was all and 717 Code 7/10 72/10 Remainder section

# Requirements of solution to Caitical Section Problem Mutual exclusion: If a process is executing it's critical section, no other process can be executing in their Critical

(2) Progress: Total Process & - OTA- Critical Soction execute MA AL, Tag Process 3/14 Het Pag Process OITH- Chilical Section execute 1740 tite, in that case, (IT Process That

- decide mater remainden section execute ma and material watering decide mater roman process to out critical section execution of 271(4) (0)2 selection process of the amount and materials
- Bounded waiting: Turn Garle process DONA OFA Critical section Charlet execute and Tubra Contr waiting time limitation 2112Mar, 1710 and OLA Process Milliam 410 Tarant time wait 2121
- # Coitical Section in Operating System

  OS G Critical Section hundle spara got protest general
  approach 1975.
  - Preemptive Kennel -> Allows a process to be preemptive while it is running in kennel mode.
  - 2) Non-preemptive kennel > (92 mode (9 Garler process
    running waypi znama, zyangy)

    complete a zon znam znama znama

    Process 7 an Run znam marco han an

\* Non-preemptive Kennel -> frace from Race condition

\* Preemptive Kennel mode @ Data integrity problem

20 MA, Oct MA OS @ Develop ANO 24 - O12/A

- CHAMO - 21/A (MA- Shared data. free

from Race condition.

I Hereber Land brocks & with Copied grapes was the I

property to some life to the count in you

with orange of the diam. In the court, for the will

# Peterson's Solution for Contical Section Problem	
* Software based solution in most live define by	
+ System Q 20th 42BYZ MOOT Process 211 TO 0826T (95	
solution applicable 11,	
* Pelenson's Solution Requires the two processes to share to	10
data items:	
bookean flag[2];	
1 () () () () () () () () () () () () ()	
* turn of turn at value the att The facess &	21 1111.
* turn of turn at value the gan- The tall Process a graff - Can't Process to out critical Section execute of	-
of Mag Get boolean value (true talse) (ht a	١ ^
THE ZOMA GART PROCESS - OF a Chitical section exec	ute
-anni- of Ready or not. (and) oliver?	
The Process 1-> Pi, Pi	
mitibos good slider (1=1,0=1) 0 20 2 pounts = 1	
do {	-1
flag [i] = truei flag = [T]	1
turn = j; while (flag[j] && turn == j);	
While Crifical Section	
flog[i] = fulse;	
Remainder section	
3 while (true);	

> Each statement takes 2ms to execute -> context switch will occur after 6ms - critical section contains 4 statements -> Remainde section emtains 2 statements

- Junn = 0

-> Flag[o] = False, Flag[1] = True . Slag->

do f

flag[i] = true:

tonn = j; FFF while (flag[j] · R& bunn = j);

critical section

flag[i]=fulse;

Remaindersection I while (time);

Process 1 (i=1, j=0) Process 0 (i=0, j=1) while loop condition CS1 stuck in while loop Flag[1] = False while loop condition CS1 C52 RS 1 R5.2 cs 3 C54 flag [0] = False

Process 2 / 101 - 800 -> Each statements takes 5 ms to execute -> Confext switch will occur after 20 ms -> Critical Section contains 5 statements -> Remainden section contains 9 statements -> turn =0 -> flag [0] = true, flag [1] = false do { flag[i] = true; turn = j; PTTF & form == j) critical section flag [i] = false; Remainder Jection 3 while (true);

Process1 (i=0, j=1)	Process 2 (1=1, 1=0)
flag [0] = true	
tunn = 1	
while loop condition	
C5 1	No. 517 - land
	f/ag[1] = true
	turn = 0 stuck in while loop
CS 2_	
C 3	
A STATE OF THE STA	1
05	
	Stuck in while loop
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \

Process 1 (1=0, J=1)	Process 2 (121, j=0)
Flog[o] = false	the west series and a standard of the
R5.1	All onthe mouse that private and in.
R52 R53	The same of the sa
The second secon	The loss and tellon
was rability	CS 1
Findle	6
	C53
R54	
	C54
	CS Sand Piles
	Flag[1] = Falle
11.	R31
	K51
	RS 2 RS 3
7.52	
	R59
	powerly deep decidion

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pol allow of himself

# Handware based solution for Cnitical Section Problem.

Got solution 72 (mr locking concept Got data Base 7M. To COUNT 24,

Go through on the Slides for better Understanding