

Deadlock problem

Cause of deadlock: each process need what the other process has

○ → process

□ → Resource

Ⓟ wait for [R]

Ⓟ has [R]

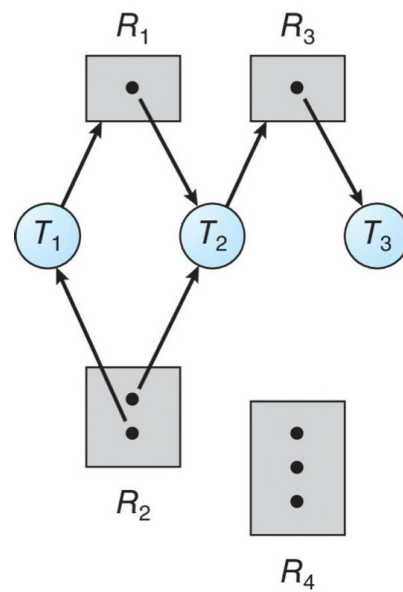
Process wait for Resource

process has Resource

- Deadlock is a situation where a set of processes are blocked because each process is holding a resource and waiting for another resource acquired by some other process.



- One instance of R1
- Two instances of R2
- One instance of R3
- Three instance of R4
- T1 holds one instance of R2 and is waiting for an instance of R1
- T2 holds one instance of R1, one instance of R2, and is waiting for an instance of R3
- T3 is holds one instance of R3



No Deadlocks

Try by yourself

Two instances of R1
Two instances of R2
One instance of R3
One instance of R4

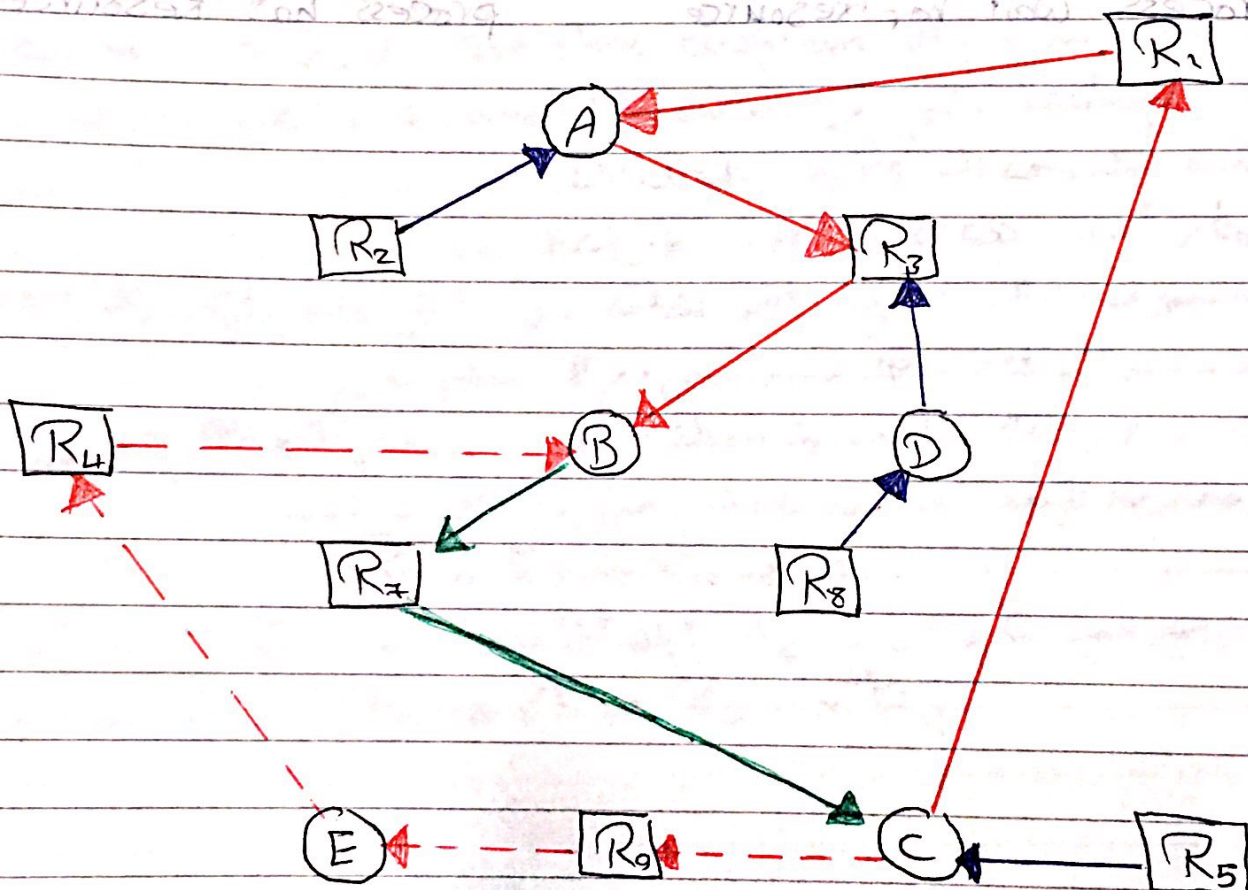
T1 hold instance of R2 and wait for instance of R1

T2 hold instance of R1 and wait for instance of R3

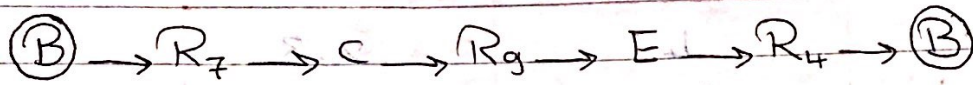
T3 hold instance of R1,R3 and wait for instance of R2, R4

T4 hold instance of R2 and wait for instance of R4

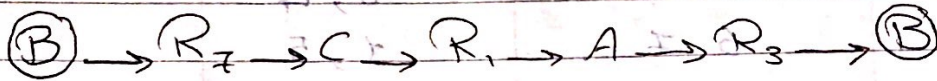
Process	Resources owned by	wait for
A	R_1, R_2	R_3
B	R_3, R_4	R_7
C	R_5, R_7	R_1, R_9
D	R_8	R_3
E	R_9	R_4



Dead lock Cycles



$$B, C, E \Rightarrow R_7, R_9, R_4$$



$$B, C, A \Rightarrow R_7, R_1, R_3$$

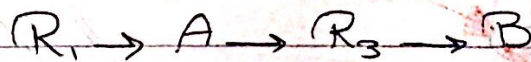
أول حاجة بنرسم ال Deadlock diagram بنشوف كل process having Resources ايه و Waiting Resources ايه ونخلص الرصة بعد كده بنشوف ال Deadlock cycles

بنختار أى Process هنا اخذت ال B بنشوف ايه ال cycles اللى حطت يعني دايرة مغلقة البداية والنهاية تكون نفس ال Process وبنمشي مع ال

هنا لما اخذت ال B مشيت مع ال C من مفتوحة طريقه اتجاوبه جفشن مرة من اتجاه

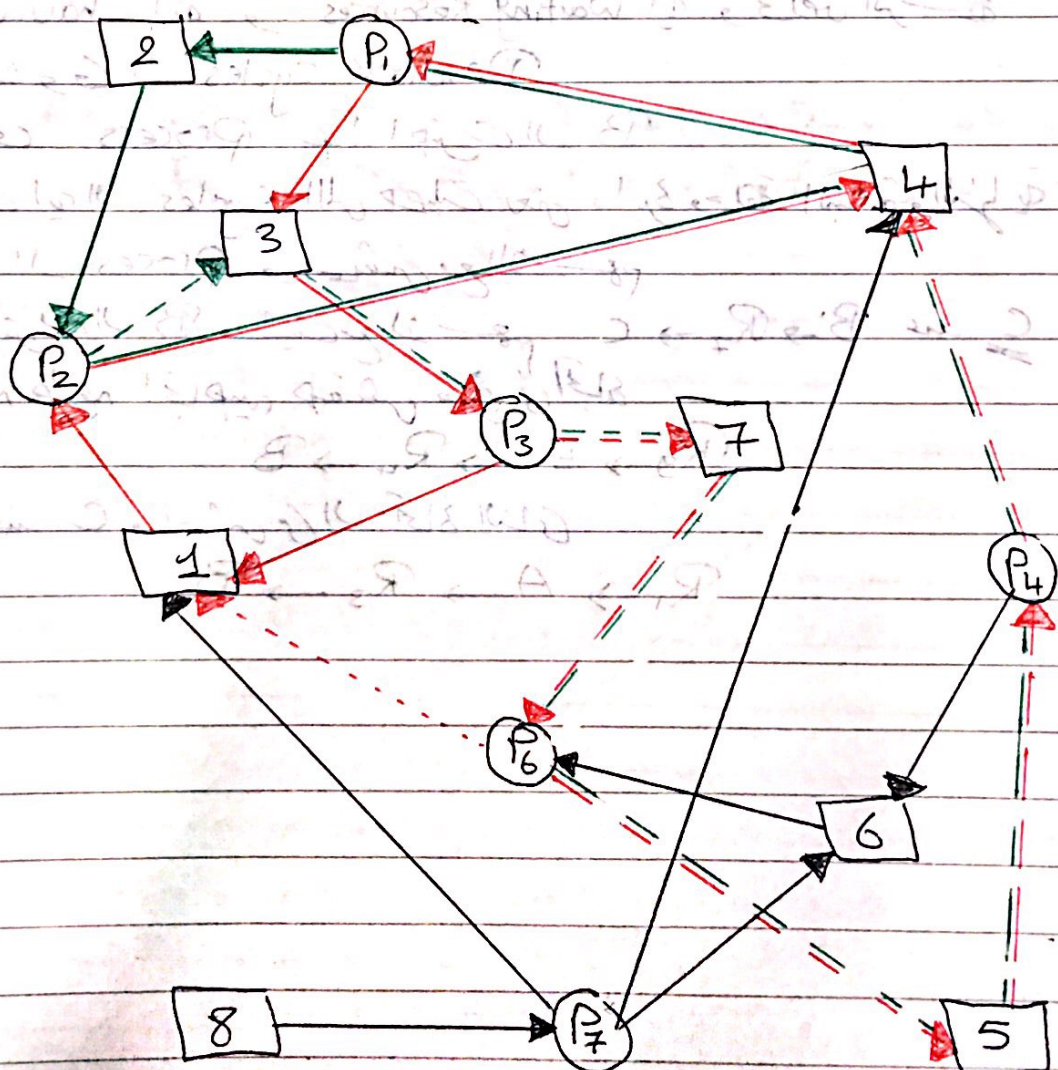


وارجع عند C وامش من ال اتجاه التاني



Process	owned by	wait for
P ₁	4	2, 3
P ₂	1, 2	4, 3
P ₃	3	1, 7
P ₄	5	6, 7
P ₆	6, 7	1, 5
P ₇	8	1, 6, 4

Investigate for possible deadlocks existence



Deadlock Cycles

$P_1 \rightarrow 3 \rightarrow P_3 \rightarrow 7 \rightarrow P_6 \rightarrow 5 \rightarrow P_4 \rightarrow 4 \rightarrow P_1$
 $P_1, P_3, P_6, P_4 \Rightarrow 3, 7, 5, 4$

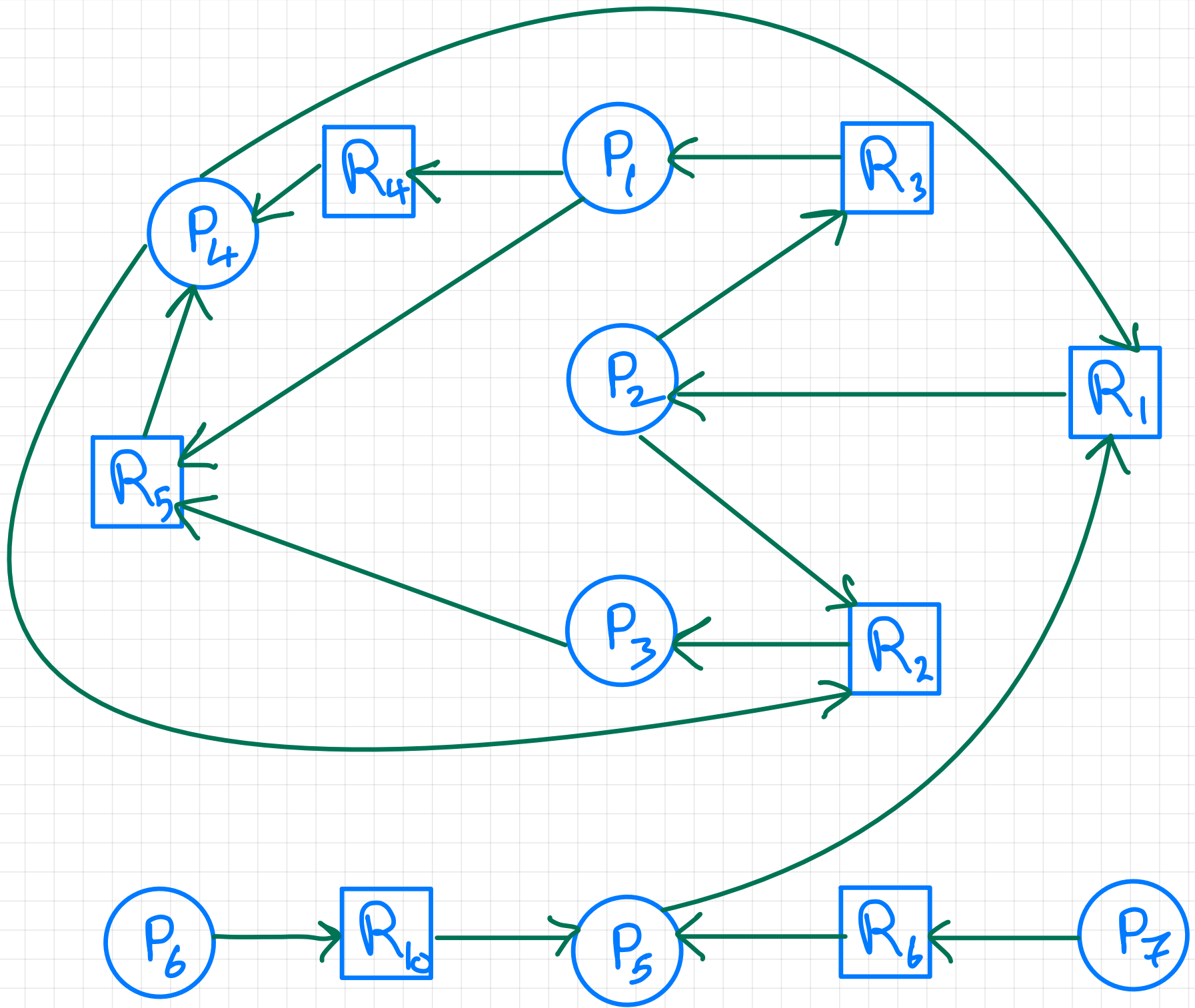
$P_1 \rightarrow 3 \rightarrow P_3 \rightarrow 7 \rightarrow P_6 \rightarrow 1 \rightarrow P_2 \rightarrow 4 \rightarrow P_1$
 $P_1, P_3, P_6, P_2 \Rightarrow 3, 7, 1, 4$

$P_1 \rightarrow 3 \rightarrow \cancel{P_3} \rightarrow P_2 \rightarrow 4 \rightarrow P_1$
 $P_1, P_3, P_2 \Rightarrow 3, 1, 4$

$P_1 \rightarrow 2 \rightarrow P_2 \rightarrow 4 \rightarrow P_1$
 $P_1, P_2 \Rightarrow 2, 4$

$P_1 \rightarrow 2 \rightarrow P_2 \rightarrow 3 \rightarrow P_3 \rightarrow 7 \rightarrow P_6 \rightarrow 5 \rightarrow P_4 \rightarrow 4 \rightarrow P_1$
 $P_1, P_2, P_3, P_6, P_4 \Rightarrow 2, 3, 7, 5, 4$

In some computer, the following information was taken from the blocked (wait) state, show the steps to search for all deadlocks, if there
 $H(2,1)$, $H(1,3)$, $H(3,2)$, $H(4,4)$, $H(4,5)$, $H(5,6)$, $H(5,10)$,
 $W(2,2)$, $W(2,3)$, $W(1,4)$, $W(1,5)$, $W(7,6)$, $W(3,5)$, $W(5,1)$, $W(4,1)$, $W(4,2)$, $W(6,10)$.
 Note: $H(1,3)$ means that the process number 1 have the resource 3. $W(3,5)$ means that process number 3 waiting for resource 5. Outline an algorithm for the process.



Deadlock Cycles

$R_1, R_4, P_4, R_1, P_2, R_3, P_1$

$P_1, R_5, P_4, R_2, P_3, P_5, P_4, R_1, P_2, R_3, P_1$

P_3, R_5, P_4, R_2, P_3

$P_3, R_5, P_4, R_1, P_2, R_2, P_3$

اذا في cycles تانيه
 ممكن تكونها