# **Deadlock**

1. A system has four processes and three allocated resources. The current allocation and request needs are as follows:

Process Allocated Currently Request Available

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A 002 000 100

B 201 202

C 301 001

D 201 100

How many resource instances(in each resource) does that system have after the currently request is provided?

2. A system has four processes and three allocated resources. The current allocation and request needs are as follows:

Process Allocated Currently Request Available

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A 002 000 100

B 201 202

C 301 001

D 201 100

What do the processes progress in sequence?

3. Consider the following state of a system with four processes, P1, P2, P3 and P4, and five types of resources RS1, RS2, RS3, RS4 and RS5 .

|  |  |  |  |
| --- | --- | --- | --- |
| Process | Allocated | Request |  |
| P1 | 01112 | 11021 |  |
| P2 | 01010 | 01021 |  |
| P3 | 00001 | 02031 |  |
| P4 | 21000 | 02110 |  |

Given A = (01021) What do the processes progress in sequence?



4. Consider the following snapshot of a system

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **A** | **B** | **C** | **D** | | **P1** | 0 | 0 | 1 | 2 | | **P2** | 1 | 0 | 0 | 0 | | **P3** | 1 | 3 | 5 | 4 | | **P4** | 0 | 6 | 3 | 2 | | **P5** | 0 | 0 | 1 | 4 | | |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **A** | **B** | **C** | **D** | | **P1** | 0 | 0 | 1 | 2 | | **P2** | 1 | 7 | 5 | 0 | | **P3** | 2 | 3 | 5 | 6 | | **P4** | 0 | 6 | 5 | 2 | | **P5** | 0 | 6 | 5 | 6 | |  |
| Resources assigned | Resources still requested | E = (3, 14, 12, 12) |

Choose the correct processes using **the deadlock detection algorithm**

5. Assume the following events and actions take place. The following statement\_\_\_\_ is true. Event Action

1) P1 requests and is allocated R1.

2) P2 requests and is allocated R2.

3) P3 requests and is allocated R3.

4) P1 requests R2.

5) P2 requests R3.

6) P3 requests R1.

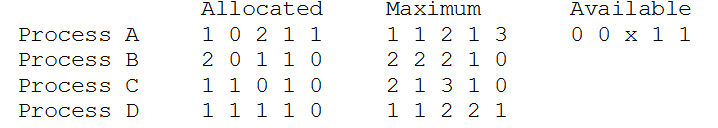
6. A system has three processes (P1, P2, P3) and three reusable resources (R1, R2, R3). There is one instance of R1, two instances of R2 and three instances of R3. P1 holds an R1 and an R3 and is requesting an R2. P2 holds an R3 and is requesting an R1 and an R2. P3 holds two R2 and an R3 and is requesting an R1.

**a)** Draw the resource allocation graph for this situation.

**b)** Write all the cycle(s) in the graph.

**c)** Does a deadlock exist? Why?

**7. A system has four processes and five allocatable resources. The current allocation and maximum needs are as follows:**

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**What is the smallest value of *x* for which this is a safe state?**