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METHODS FOR HANDLING DEADLOCKS (Part-1)

Methods for Handling Deadlocks

- *Deadlock Prevention:* Ensure that the system will never enter a deadlock state.
- *Deadlock Avoidance:* Deadlock avoided at each request.
- *Deadlock Detection:* Let it happen, detect it and then deal with it.
- *Ignore the problem:* pretend that deadlocks never occur in the system; used by most operating systems, including UNIX (Ostrich Algorithm).

DEADLOCK PREVENTION

Deadlock Prevention

- Restrain the ways requests can be made and *negate one condition* for deadlock:

  - **Mutual Exclusion** – not required for sharable resources; must hold for non-sharable resources.

  - **Hold and Wait** – must guarantee that whenever a process requests a resource, it does not hold any other resources.

  - **No Preemption** – If a process that is holding some resources requests another resource that cannot be immediately allocated to it, then all resources currently being held are released.

  - **Circular Wait** – impose a total ordering of all resource types, and require that each process requests resources in an increasing order of enumeration.

DEADLOCK AVOIDANCE

Deadlock Avoidance 1/2

- Requires that the system has some additional *a priori* information available.
- Simplest and most useful model requires that each process declare the maximum number of *resources* of each type that it may need.
- The deadlock-avoidance algorithm dynamically examines the resource-allocation state to ensure that there can never be a *circular-wait condition*.

Deadlock Avoidance 2/2

- *Resource-allocation state* is defined by the number of available and allocated resources, and the maximum demands of the processes.

- *A deadlock-avoidance algorithm* dynamically examines the resource-allocation state to ensure that a circular-wait condition can never exist.

- The resource allocation state is defined by the number of available and allocated resources and the maximum demands of the *processes*.

References

1. Silberschatz, Galvin and Gagne, “Operating Systems Concepts”, Wiley.

2. William Stallings, “Operating Systems: Internals and Design Principles”, 6th Edition, Pearson Education.

3. D M Dhamdhere, “Operating Systems: A Concept based Approach”, 2nd Edition, TMH.

Thank You.