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Priority inheritance

In real-time computing, **priority inheritance** is a method for eliminating unbounded priority inversion. Using this programming method, a process scheduling algorithm increases the priority of a process (A) to the maximum priority of any other process waiting for any resource on which A has a resource lock (if it is higher than the original priority of A).

The basic idea of the priority inheritance protocol is that when a job blocks one or more high-priority jobs, it ignores its original priority assignment and executes its critical section at an elevated priority level. After executing its critical section and releasing its locks, the process returns to its original priority level.

Contents

Example

Consider three jobs:

Job Name	Priority
H	High
M	Medium
L	Low

Suppose H is blocked by L for some shared resource. The priority inheritance protocol requires that L executes its critical section at H's (high) priority. As a result, M will be unable to preempt L and will be blocked. That is, the higher-priority job M must wait for the critical section of the lower priority job L to be executed, because L has inherited H's priority. When L exits its critical section, it regains its original (low) priority and awakens H (which was blocked by L). H, having high priority, preempts L and runs to completion. This enables M and L to resume in succession and run to completion.

See also

- Priority ceiling protocol

References

- Lui Sha; Ragunathan Rajkumar & John P. Lehoczky (September 1990). "Priority Inheritance Protocols: An Approach to Real-Time Synchronization" (http://www.csie.ntu.edu.tw/~r95093/papers/Priority%20Inheritance%20Protocols%20An%20Approach%20to%20Real-Time%20Synchronization.pdf) (PDF). *IEEE Transactions on Computers*. **39** (9): 1175–1185. doi:10.1109/12.57058 (https://doi.org/10.1109%2F12.57058).

External links

- "Priority Inheritance: The Real Story (https://web.archive.org/web/20070706071045/http://www.linuxdevices.com/articles/AT5698775833.html)" by Doug Locke
- "Against Priority Inheritance (https://web.archive.org/web/20070706071207/http://www.linuxdevices.com/articles/AT7168794919.html)" by Victor Yodaiken
- "Implementing Concurrency Control With Priority Inheritance in Real-Time CORBA (http://rtdoc.cs.uri.edu/downloads/wohlever_thesis.pdf)" by Steven Wohlever, Victor Fay Wolfe and Russell Johnston
- "Priority Inheritance Spin Locks for Multiprocessor Real-Time Systems (http://citeseer.ist.psu.edu/108383.html)" by Cai-Dong Wang, Hiroaki Takada and Ken Sakamura
- "Hardware Support for Priority Inheritance (http://doi.ieeecomputersociety.org/10.1109/REAL.2003.1253271)" by Bilge E. S. Akgul, Vincent J. Mooney, Henrik Thane and Pramote Kuacharoen

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