

# Unit OS9: Real-Time and Embedded Systems

## 9.4. Quiz

Windows Operating System Internals - by David A. Solomon and Mark E. Russinovich with Andreas Polze

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## Performance Measures

Objectives for Real-Time Scheduling differ from those imposed on general purpose computing systems. Which one is not a RT scheduling goal:

- a) Fairness
- b) Maximum throughput
- c) Maximum CPU utilization
- d) All of the above

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## Structure of a Real-Time System

Which of the following is not part of a typical real-time control system:

- a) Sensors
- b) Controller performing job execution
- c) Actuators
- d) Cache manager

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## Periodicity

Which of the following task classes in a system are not predictable in terms of maximum CPU usage?

- a) Periodic
- b) Sporadic
- c) Aperiodic

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## Uniprocessor Scheduling

Which of the following statements are wrong?

- a) Rate Monotonic Scheduling (RMS) is a static scheduling algorithm
- b) Earliest Deadline First (EDF) is a dynamic scheduling algorithm
- c) RMS is optimal and will produce a feasible schedule for  $n$  tasks if load is less than  $n(2^{1/n}-1)$
- d) EDF will always produce a feasible schedule

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## Priority Inversion

Priority inversion is a situation when a low priority task prevents a high priority task from running. Which of the following protocols does not resolve the priority inversion problem?

- a) Priority Ceiling
- b) Processor Consistency
- c) Priority Inheritance

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## RT OS Requirements

Which of the following is not a requirement for a real-time operating system?

- a) The OS must be multithreaded and preemptive
- b) The OS must support thread priority
- c) A system of priority inheritance/priority ceiling must exist
- d) The OS must support multiple processors

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## Windows Real-Time Behavior

Windows is not a real-time operating system because:

- a) There are too few real-time priorities
- b) Real-time priorities are not fixed
- c) Device interrupts are not prioritized in any controllable way
- d) The kernel has no real-time scheduler

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## Avoiding Priority Inversion

Windows real-time threads are not affected by the priority inversion problem because:

- a) The balance set manager will boost priorities of ready RT threads that have not run lately
- b) The scheduler implements priority ceiling
- c) The scheduler implements priority inheritance
- d) None of the above

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## Windows Real-Time Threads

How can a real-time thread in Windows possibly miss its deadline?

- a) Its priority is lowered due to aging
- b) DPC activity prevents the thread from running
- c) The scheduler boosts another thread's priority
- d) The computer's real-time clock is set to the wrong timezone

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## Windows CE Features

Windows CE fulfills the minimum requirements of a real-time OS. Which of the following is not a feature of Windows CE?

- a) It has 256 priorities
- b) It implements priority ceiling
- c) It has predictable synchronization mechanisms
- d) It implements priority inheritance

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## Windows CE Memory Management

Memory Management cannot break Windows CE real-time scheduling guarantees because:

- a) There is no virtual memory in CE
- b) RT threads are always locked in memory
- c) CE has a slot model of memory management
- d) Paging I/O occurs at a lower priority level than the real-time priority process levels

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## Windows XP Embedded Design Goals

Which of the following was not among the Windows XP Embedded design goals?

- a) Binary compatibility with Windows XP
- b) Suitable for hard real-time control systems
- c) Small size, modular and compact
- d) Embedded enabling features

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## Embedded Enabling Features

Which of the following is not an embedded enabling feature for Windows XP Embedded?

- a) Run on PowerPC hardware
- b) Boot from CD-ROM
- c) Allow for headless operation
- d) Use Enhanced Write Filter technology to operate on read-only storage