# QNX Architecture

Refer slide deck 02\_nto\_architetecture.pdf for answers.

# General Questions on OS

1. What is the full form of the acronym POSIX?  
   Portable Operating System Interface for Unix
2. Which standards body defined POSIX?  
   IEEE
3. Briefly list two items defined by POSIX?  
   Signals  
   Message queues  
   Apis and interfaces for shell and kernel utilities\*\*
4. Briefly explain the “Traditional Executive Architecture” of a monolithic kernel. Write one advantage and one disadvantage of a monolithic kernel.  
   The monolithic kernel contains the main kernel, as well as all the device drivers. Advantage: kernel is protected from applications, and applications are protected from each other.  
   Disadvantage: Painful to write device drivers, and kernel is tightly coupled.
5. Briefly explain Microkernel Architecture. Write one advantage and one disadvantage of a microkernel kernel.  
   Microkernel architecture has a small microkernel with a set of cooperating processes to do many system tasks.  
   Advantage: The kernel is protected from the cooperating system processes.  
   Disadvantage: There is overhead involved with managing all of these processes
6. Name some device drivers in QNX. Refer to your OS to answer this question.  
     
   Hard disk drivers, printer drivers
7. What is the difference between the two device drivers **devb-eide** and   
   **devc-ser8250**? What does the letter **b** and **c** mean in devb and devc?  
     
   One is a block device such as a hard drive, while the other is a character device such as a printer.
8. What is the command to list the processes running on the system?  
     
   pidin
9. What is a daemon? List any three daemons in QNX?  
     
   A daemon is a service that runs constantly in the background  
   cron, inetd, mqueue, qconn
10. Describe a process in QNX? List some of the resources it owns. How is a process identified?  
    A process has its own block of memory, and can also be subdivided into multiple threads of execution. A process is identified with a Process ID(PID). It can own open files, timers, etc.
11. Does a process have priority in QNX?  
      
    No.
12. What is a thread in QNX?  
      
    A thread is an executing piece of code that is run alongside code from other threads. Unless the flow of execution is managed by the threads, then there is no guarantee as to which will run first.
13. Does a thread have priority in QNX? Does a thread have a scheduling algorithm?  
    Yes and yes.
14. True/False. A process must have at least one thread.  
    True
15. True/False. Threads in a process share all the resources owned by the process.  
      
    true
16. True/False. Threads run code, processes own resources.

True

# Microkernel

1. What is meant by the term *kernel call*?  
   A kernel call is simply when a process executes code contained in the kernel
2. What is meant by pre-emption?  
   Pre-emption means that a task can be interrupted by something of more critical importance.
3. Can QNX kernel calls pre-empted?

yes

1. Give an example of a *long* kernel call and an example of a *short* kernel call. (slide 20)  
   Long kernel call: Message passing  
   Short Kernel call: Thread state changes
2. What is the benefit of a kernel pre-emption? What is the disadvantage?

Advantage: Responsiveness increases

Disadvantage: Some tasks have to start again, making total throughput less efficient.

# IPC’s

1. List four IPC’s provided by the kernel?  
   Message Queues  
   Shared Memory  
   Semaphores  
   Signals
2. What is the full form of a commonly known chip PIC? (slide 30) Will you be able to find this chip on a modern PC’s motherboard? Explain.
3. Give examples of some sources of interrupts. (slide 30)  
   Keyboard events  
   Mouse events  
   Timers go off

# Process Manager

1. What is the name given to the process manager in QNX? (slide 33)  
   procnto
2. What does the term **ELF** mean with reference to executable files?  
   Executable and Linkable Format. The format describing how binary executables are structured so that they can also be linked together.
3. True/False. Pointers contain virtual address not physical addresses.  
   true
4. Does all hardware support virtual addresses?  
   No

# Scheduling

1. List the states of a process.  
   Blocked  
   Ready

Dead  
Stopped

1. What is the state of a process when it is using CPU?  
   Running
2. How many priority levels are permissible in QNX? For releases 6.3.0 and later, and for releases before 6.3.0  
   between 0 and 255 for 6.3.0 and later  
   between 0 and 63 for earlier
3. For releases before 6.3.0 what is different for a thread to have priority above 63? Hint: Permission  
   The thread must have root privileges
4. What is the name given to thread with priority zero? What process has this thread?  
   procnto (idle thread)
5. Consider this scenario. A thread **A** at priority 10 is running, it is blocked because it is waiting for a message reply. Will this thread **A** lose its priority?  
   Thread A will keep its priority, but will be moved to the end of the line. In other words, if there are other threads in the READY state, thread A will give up CPU time until all other threads with the same priority have run.
6. Explain the round robin scheduling algorithm.  
   In RR scheduling, threads are each given a timeslice on the CPU, and take turns using it. A thread may relinquish control by either blocking, terminating, being pre-empted by a higher priority thread, or using up its timeslice.
7. Explain the FIFO algorithm.  
   A thread using FIFO scheduling will run until it terminates, blocks, or is pre-empted by a higher priority thread.

# Adaptive Partitioning

1. Briefly describe adaptive partitioning.

Processes are grouped into partitions that are each given a certain percentage of the CPU. Processes borrow time from the future, and therefore are given less time the next time around.

# SMP

1. What is meant by Symmetrical Multiprocessor?  
   Symmetrical Multiprocessor means that threads will be executed simultaneously on multiple processors if they are available.
2. What is meant by tightly coupled? What is meant by loosely coupled?

# Resource Manager

1. What is a Resource Manager? What advantage does it offer? (slide 59)
2. What is meant by CIFS?
3. Which one of the two calls is a POSIX call?
4. timer\_settime()\*
5. TimerSettime()
6. Which one of the two calls is a kernel call?
   1. timer\_settime()
   2. TimerSettime() \*
7. Give an example of three resource managers in QNX? (slide 68)

# Shared Objects

1. What are Shared Objects? What are shared objects called in MS Windows? Write one advantage and one disadvantage of shared objects?