Code: 9A12803

| 1 |

B. Tech IV Year II Semester (R09) Regular Examinations, March/April 2013
DEVICE DRIVER DEVELOPMENT
(Information technology)

Time: 3 hours   Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Describe the role of a device driver.
  (b) Explain the difference between print f ( ) and print k ( ) with example routines.

2 (a) Explain how read and write operations are carried out on a scull device.
  (b) Write a short note on various types of scull devices with their merits and demerits.

3 (a) Explain the two techniques for querying the system.
  (b) How does a system call works? Explain with an example.

4 (a) Explain how to convert a linear address into physical address in the architecture
      independent memory model.
  (b) Differentiate between the following terms:
          malloc ( ), vmalloc ( ), kmalloc ( )

5 (a) Explain how concurrency is achieved using semaphores and mutexes.
  (b) Write a short note on atomic variables.

6 (a) What is a jiffy counter? How jiffies are used to measure time lapses?
  (b) Discuss various techniques for delaying an operation for a specified amount of time.

7 (a) Describe the functions for enabling and disabling interrupts into the Linux kernel.
  (b) What are the problems with interrupt handling? How they are resolved with top and
      bottom halves.

8 (a) Explain briefly about standard data types and interface specific data types in kernel.
  (b) Discuss about poll ( ) and select ( ) operations.

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2

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Time: 3 hours   Max. Marks: 70

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*****

1 (a) Explain how to build and link a module to the kernel with an illustrative example code.
(b) Discuss briefly about various classes of devices and modules.

2 (a) What are major numbers and minor numbers? How to allocate a major number?
(b) Write and explain various fields in FILE data structure used in device drivers.

3 (a) Describe the main algorithms for process management in kernel.
(b) What are oops messages? How they are used in debugging system faults?

4 (a) Explain the necessary data types, macros and functions related to page table and page directory for the kernel.
(b) Write a short note on brk ( ) and vmalloc ( ) system calls.

5 (a) Explain how semaphores are implemented in Linux and they can be used to avoid race conditions.
(b) What are spin locks? Explain various functions for declaring and initializing a spinlock in Linux.

6 (a) Explain various functions related to declare, register and remove kernel timers.
(b) Write down the similarities and dissimilarities between task lets and work queues.

7 (a) Describe the interrupt driven I/O data transfer mechanism with an example.
(b) Explain various functions available for using I/O ports.

8 (a) Explain the ioctl ( ) function and ∗ iocH ( ) driver method with clear syntax.
(b) Draw the internal representation of wait queue data structure and explain how it is used by kernel processes.

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| 3 |

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Answer any FIVE questions
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*****

1   (a)   Explain the differences between user application programs and kernel modules.
      (b)   Discuss the following terms:
             (i) insmod
            (ii) lsmod
           (iii) rmmod

2   (a)   Write the procedure for registering and unregistering a char device into and from the module.
      (b)   Explain the vector versions of read and write operations with clear syntax and example.

3   (a)   Describe briefly about various debugging techniques.
      (b)   What is a schedule? Explain briefly about schedule ( ) function.

4   (a)   Explain various system calls related to allocation and release of dynamic memory in the kernel segment.
      (b)   Write a short note on block buffering.

5   (a)   Explain various functions to initialize and declare reader/writer semaphores in Linux kernel.
      (b)   List and explain the purpose of various spin lock functions.

6   (a)   Describe various functions that serve for long delays and short delays.
      (b)   Explain various functions in initializing and declaring a task let.

7   (a)   How shored interrupts are installed and handled in Linux kernel?
      (b)   List and explain various directly mapped memory related functions.

8   (a)   Explain the linked list data structure, its representation and usage in the kernel.
      (b)   Discuss briefly about lseek ( ) and llseek ( ) system calls.

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| 4 |

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DEVICE DRIVER DEVELOPMENT
(Information technology)

Time: 3 hours   Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1   (a)   What is a device driver? State and explain the reasons for splitting the kernel's role into various tasks.
     (b)   Discuss various security issues associated with device drivers.

2   (a)   What are the advantages of the device file system?
     (b)   List and explain various operations of struct file-operations with clear syntax and usage.

3   (a)   Describe some important data structures of Linux kernel and also specify how they interact with the resources of kernel.
     (b)   Differentiate between gdb and kgdb commands.

4   (a)   Give the clear syntax of --get-free-pages ( ) function and also explain how it is used to reserve a page of memory in Linux.
     (b)   Explain the paging memory management technique under Linux.

5   (a)   What are reader/writer spinlocks? Write the similarities between reader/writer spinlocks and reader/writer semaphores.
     (b)   Differentiate between fine-grained locking and coarse-grained locking.
     (c)   Explain briefly about lock-free algorithms.

6   Describe how timing issues are addressed in Linux kernel.

7   (a)   Explain various functions used to install an interrupt handle into the Linux kernel.
     (b)   Give the syntax of ioremap ( ) and iounmap ( ) functions. Explain them briefly.

8   Describe the following system calls:
     (a)   ioctl ( )
     (b)   fcntl ( )
     (c)   select ( )
     (d)   poll ( )
     (e)   lseek ( )

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