**CIS 350 – INFRASTRUCTURE TECHNOLOGIES**

1. Describe briefly the term “web-based computing”.

Web-based computing is the utilization of the web to provide widespread interconnectivity and communication between users through web browsers that allow access to various web applications (such as e-mail, sales, and wikis), protocols (such as HTTP and SMTP), and standards. Web based computing embodies a client-server model (with the web browser as the client) and allows for the creation of internal organizational networks referred to as intranets. Cloud computing is a form of web based computing.

1. What are the differences between client-server computing and peer-to-peer computing?

The primary difference between client-server computing and peer-to-peer computing (p2p) is that, in the former, there is a distinguished server(s) that store and control access to information and applications from the clients who request such information. The client’s access is limited by the rights given to them by the server. Typically, the servers authenticate a client’s access though the utilization of a username and password combination; each unique combination has set access levels that are dictated by the system’s network administrator.

In a p2p network each system acts as a client and a server simultaneously (since there’s no central server). This means that there’s no access authentication and relatively little control between connected systems. Each system in a p2p network shares files equally and can access all shared document. The security is relatively lacking in p2p network which allow for an optional network password as the only barrier to access.

# Topics: Number systems and conversion between number bases

1. Convert to Binary:

decimal: 95 binary: \_\_\_\_\_\_1011111\_\_\_

octal: 253 binary: \_\_\_\_010101011\_\_\_

hexa: B4C binary: \_101101001100\_\_\_

2. Convert to Octal:

decimal: 183 octal: \_\_\_\_267\_\_\_\_\_

binary: 11110101 octal: \_\_\_ 365\_\_\_\_\_

hexa: AF92 octal: \_\_\_\_127622\_\_

3. Convert to Decimal:

binary: 11101101 decimal: \_\_237\_\_\_\_\_\_

octal: 624 decimal: \_\_404\_\_\_\_\_\_

hexa: B2A decimal: \_\_2858\_\_\_\_\_

4. Convert to Hexadecimal:

binary: 10101111001 hexa: \_579\_\_\_\_\_

octal: 716 hexa: \_1CE \_\_\_\_

decimal: 850 hexa: \_352\_\_\_\_\_

5. Convert Binary to Decimal and Hexa:

11101.111 decimal: \_\_\_29.875 \_\_\_\_\_

11101.111 hexa: \_\_\_1D.E\_\_\_\_\_\_\_

6. Convert from Decimal to Hexadecimal. If the answer is irrational, stop at four hexadecimal digits:

0.6640625 hexa: \_\_\_\_0.AA\_\_\_\_\_\_

7. Ex. 3.5, p. 92 (textbook).

How many bits will it take to represent the decimal number 3,175,000? How many

bytes will it take to store this number?

22 Bits

3 Bytes

**Topics**: The CPU and Memory (Chapters 7 and 8)

**Ex. 7.26, p. 231**

**Show an instruction format that could be used to move data or perform arithmetic between two registers. Assume that the instruction is 32 bits wide and that the computer has sixteen general-purpose data registers. If the op code uses 8 bits, how many bits are spares, available for other purposes, such as special addressing techniques?**

(10010100|1010101010101010)

This leaves 8 spare bits for other purposes.

**Ex. 7.2 a, b, pp. 231-232. The missing instructions are:**

**Suppose that the following instructions are found at the given locations in memory:**

**a. Show the contents of the IR, the PC, the MAR, the MDR, and A at the conclusion of instruction 20.**

**b. Show the contents of each register as each step of the fetch–execute cycle is performed for instruction 21.**

**20 LDA 50**

**21 ADD 51**

**--------------- Addresses 20-21 represent the program area**

**--------------- Addresses 50-51 represent the data area**

**50 724**

**51 6**

**Instruction: 20 LDA 50 (in decimal 550)**

PC MAR MDR IR A

1. PC→ MAR 20 20 550 or LDA 50 ? ?
2. MDR→ IR 20\_ 20\_ 550\_\_ 550 ?\_\_
3. IR[addr] → MAR 20\_ \_50 \_\_724 550\_\_ \_?\_
4. MDR→ A 20\_ \_50 \_\_724 550\_\_ 724
5. PC+1→ PC \_21 \_50 \_\_724 550\_\_ 724

**Instruction: 21 ADD 51 (in decimal 151)**

PC MAR MDR IR A

1. PC→ MAR \_21 \_21 \_\_151 \_550\_ 724
2. MDR→ IR \_21 \_21 \_\_151 \_151\_ 724
3. IR[addr] → MAR \_21 \_51 \_\_6\_\_ \_151\_ 724
4. MDR+A→ A \_21 \_51 \_\_6\_\_ \_151\_ 730
5. PC+1→ PC \_22 \_51 \_\_6\_\_ \_151\_ 730

**Ex. 7.3, p. 232**

**One large modern computer has a48-bit memory address register. How much memory can this computer address?**

2^48 = 281,474,976,710,656 memory locations

**Ex. 7.7 a (only), p. 232**

1. **What is the effect of shifting an unsigned number in a register 2 bits to the left? 1 bit to the right? Assume that 0s are inserted to replace bit locations at the end of the register that have become empty due to the shift.**

Shifting 2 bits to the left is the same as multiplying the number by 4 (2^2).

Shifting 1 bit to the right is the same as diving by 2 (2^1).

**Ex. 8.4 and 8.5, p. 263**

**8.4 Explain how pipelining serves to reduce the average number of steps in the execution part of the fetch–execute cycle.**

**8.5 Which class of instructions can reduce performance by potentially invalidating the instructions in a pipeline? Identify two methods that can be used to partially overcome this problem.**

8.4- Pipelining reduces the average number of steps in the execution phase because it allows the execution of multiple instructions simultaneously.

8.5- Branching can potentially invalidate instructions in a pipeline. This is solved using branch prediction; where the target instruction is fetched before it’s needed. Additionally, separating the pipelines for both possibilities can partially overcome this problem.

**Ex. 8.16, p. 263.**

**8.16 When a system has multiple levels of cache memory, L2 always has more memory than L1. Why is this necessary?**

**Also briefly explain how cache memory works.**

Cache memory is organized into blocks. Each block provides a small amount of storage. Memory requests go to the cache controller which checks the request against each tag. If there is a match, the cache location is used instead of memory. If there is no match, the cache controller replaces a line with the current memory request. After it’s replaced, the new cache line is treated as before.

L2 must have more memory than L1 otherwise they would contain the same information. L2 is larger than L1 which makes it relatively slower; however this is necessary because L2 is checked when L1 misses a memory request. The presence of L2 reduces how often memory requests must go to the main memory to be met (which reduces processing speed via stalling).

**Ex. 8.17, p. 263**

**8.17 Modern computers are usually described as multicore. What does this mean? Under Ideal conditions, what performance gain would be achieved using a four-core processor over a single-core processor?**

Multi-core means the computers has multiple core processing units. The performance gains for utilizing multiple core processors (over a single core processor) include:

1. Lower clock speeds
2. Reduced power consumption
3. Reduced heat
4. Reduced stress
5. More instructions can be executed simultaneously, increasing computational power
6. Programs can be divided into independent pieces that execute simultaneously
7. Data dependencies and cache misses are less likely to stall the pipelines in multi-core processors since each core has its own L1 memory cache in addition to L2 that is shared between the cores.

**Ex. 8.18, p. 263**

**8.18 Identify and brieﬂy explain two different ways of conﬁguring a multiprocessing system. Which conﬁguration is more effective for general-purpose computing? Which conﬁguration is more effective for handling specialized processing tasks, such as those used in game applications?**

Symmetrical multiprocessing (SMP)- Each CPU has identical access to the operating system and all system resources. Each CPU schedules its own work utilizing protocols determined by the operating system. Each CPU is identical.

Master – Slave Processing- One CPU acts as the master to manage the system and control all resources and scheduling. Only the master can execute the operating system. The master CPU assigns work to the other CPUs, referred to as Slaves.

SMP has more advantages in general-purpose computing. These include:

* Every CPU has equal operating system access
* Any CPU can process any task and can process any interrupt
* Processors are kept equally busy—better workload balance
* Easy to implement fault-tolerant computing
* Failure of a single CPU will decrease performance, but not cause a system failure

Master-Slave Processing is more effective for handling specialized processing tasks because the Master CPU satisfies the need for a master control program, while the Slave CPUs provide support through repetitive or continuous, computational and data-intensive, and time-critical tasks.

**Topics**: Input/Output (Chapter 9), Computer Peripherals (Chapter 10), and Modern Computer Systems (Chapter 11)

1. **Ex. 9.4, p. 293**

**Consider the interrupt that occurs at the completion of a disk transfer.**

1. **“Who” is interrupting “whom”?**

The I/O module interrupts the CPU to signal that the transfer is complete

1. **Why is the interrupt used in this case? What would be necessary if there were no interrupt capability on this computer?**

The interrupt signals the transfer is complete so the system that initiated the transfer may resume. Without interrupt capabilities, another mechanism would be needed to send the completion signals to the CPU and OS or program that initiated the transfer.

**c. Describe the steps that take place after the interrupt occurs.**

After it occurs the interrupt handler in the computer’s memory sends a signal to the program or OS letting it know it may resume.

1. **Ex. 9.6 and 9.7 on p. 293. These 2 questions are closely related. Answer them together.**

**What is an interrupt vector?**

**What is polling used for? What are the disadvantages of polling? What is a better way to perform the same job?**

An interrupt vector is the address of the interrupting device that is sent with the interrupt signal. When an interrupt vector is not used, polling helps the interrupt handler identify the device that requested the interrupt. Polling is slower than interrupt vectors because it requires sending a signal and waiting for a reply each time the handler tries to process an interrupt. Masking provides a better way to handle interrupts because it prevents critical interrupts from being interrupted in addition to storing the interrupts until a critical task has been completed.

1. **Ex. 9.14, p. 293**

**Describe the steps that occur when a system receives multiple interrupts.**

When a system receives multiple interrupts they are prioritized by the system manager. First, when an interrupt is received the original program is suspended; second the interrupt service is processed; if that service also becomes interrupted it will be suspended until the last interrupt processes. When the processes are complete, the process that was most recently suspended will resume in a first in first out fashion until all interrupts have been processed. Finally, control is returned to the original program.

1. **Ex. 10.2, p. 329 (under Exercises)**

**What are the advantages of ﬂash memory over hard disk storage? What are the advantages of hard disk over ﬂash memory storage? What are the advantages of both hard disk and ﬂash memory storage over RAM? What is the major advantage of RAM over other types of storage?**

Flash memory provides swifter access speeds and is more reliable than hard disk storage. This is partially due to the fact that it exists in a solid state, as opposed to a spinning disk, which critically reduces the chance of mechanical failure. The solid state also increases data access times since there’s no need to wait on a spinning platter to spin to the correct sector for access. This makes flash memory more expensive than hard disk storage. Hard disk storage is also available is larger sizes. Both types of memory are ROM so data is saved after the power is removed. RAM is much quicker than flash and, by extension, hard disks storage yet is cleared each time the computer loses power.

1. **Ex. 10.10, p. 330**

**A high-quality photographic image requires 3 bytes per pixel to produce sixteen million shades of color.**

1. **How large a video memory is required to store a 640×480 image during display? A 1600 × 900 image? A 1440 × 1080 image? A 2560 × 1440 image?**

3 x 640 x 480 = 921,600 bytes

3 x 1600 x 900 = 4,320,000 bytes

3 x 1440 x 1080 = 4,665,600 bytes

3 x 2560 x 1440 = 11,059,200 bytes

**b. How many 1920 × 1080 non-compressed color images will ﬁt on 4.7 GB DVD-ROM?**

3 x 1920 x 1080 = 6,220,800 bytes

4.7gb = 5,046,586,572.8 bytes

5,046,586,572.8/6,220,800 = 811.24

811 images

1. **Ex. 10.14, p. 331**

**A 1600-pixel by 900-pixel display is generated on a 14-inch (diagonal) monitor.**

1. **How many dots per inch are displayed on this monitor?**

sqrt(1600^2 + 900^2) / 14 = 131 pixels per inch

1. **What is the size of an individual pixel? Would a 0.26mm pixel resolution monitor be sufﬁcient for this display?**

14 / sqrt(1600^2 + 900^2) = .007626 in per pixel = 0.1937076644 mm per pixel

No it would not be sufficient.

1. **Repeat (a) and (b) for a 1280 × 720 display.**

Sqrt(1280^2 + 720^2) / 14 = 104.90 pixels per inch

14 / Sqrt(1280^2 + 720^2) = .009533 = 0.24213457796 mm per pixel

No it would not be sufficient

**Assume the “wide screen” (16:9) – see the textbook pp. 311.**

9

18.4"

14"

6.8478

16

12.1739

**The sides x and y could be calculated from simple proportions:**

**18.4/9=14/y → y=9\*14/18.4 and 18.4/16=14/x → x=16\*14/18.4**

1. **Ex. 11.2, p. 356 (under Exercises)**

**Figure 11.8 shows that a typical computer system is interconnected with a number of different buses, both internal and external. The diagram includes multiple cache buses, an external CPU bus, PCI-Express buses, a parallel PCI bus, SATA buses, USB ports, and more. What are the advantages of providing multiple buses rather than connecting everything together with a single bus?**

Running multiple buses is necessary because each bus has advantages due to specialization in carrying out specific tasks. This allows each bus to perform its specialized task in a much swifter fashion and outperform the capabilities of a generalized bus. The overall synergy and speed of a computer is improved due to having diverse bus capabilities since each bus can perform specialized tasks in a swift manner.

1. **Ex. 11.5, p. 357 (under Exercises)**

**As described in the text, the PCI-Express bus consists of thirty-two “lanes”. As of January, 2009, each lane is capable of a maximum data rate of 500MB per second. Lanes are allocated to a device 1, 2, 4, 8, 16, or 32 lanes at a time. Assume that a PCI-Express bus is to be connected to a high-deﬁnition video card that is supporting a 1920×1080 true-color (3 bytes per pixel) progressive scan monitor with a refresh rate of 60 frames per second. How many lanes will this video card require to support the monitor at full capability?**

3 bytes x 1920 x 1080 x 60fps = 373,248,000 bytes per second = 355.957 MB/second

1 lane is required for this video card to support the monitor at full capability.

1. **Ex. 11.18, p. 357**

**Cloud computing is a recent technology being marketed and used as a means to provide off-site computing power to an organization. Locate information about cloud computing and compare cloud computing with grid computing. In what ways are they similar? How do they differ?**

Grid computing involves combining the processing power of multiple individual computers to create a larger virtual machine that utilizes the combined processing power to provide supercomputer like processing. Cloud computing, on the other hand, involves having one large and powerful system provide computing power to a wide variety of smaller systems on an as needed (or as paid for) basis. Essentially, Grid computing utilizes the combined power of multiple individual machines to provide performance equal to the sum of borrowed resources (minus the resources needed to correlate the processing between machines) while cloud computing uses one powerful machine to power multiple smaller machines. The cloud computing can also be performed through utilizing grid computing to combine the processing power of multiple powerful systems to create an even more powerful system that can in-turn provide computing power to numerous smaller machines.

Topics: Networks and Data Communications (Chapter 12), Ethernet and TCP/IP Networking (Chapter

13), Communication Channel Technology (Chapter 14)

**Problem 1**

A mask representing some IP address is 255.255.240.0. Write the mask in

the binary form: 11111111.11111111.11110000.00000000

the prefix notation: /20

**Problem 2**

What is the class of the following IP addresses?

01111110.10000111.11001100.00000011 Class A

10000011.10000111.11001100.00000011 Class B

11000110.10000111.11001100.00000011 Class C

**Problem 3**

Your start-up company has been assigned the following IP address by IANA: 198.226.10.0. You are to design 30 subnetworks within this network, with each subnetwork supporting up to 28 hosts. Can these

subnetworks and hosts be designed? If not, which address class A, B, or C would allow for this particular design?

Class C

2^n – 2 >= 30

2^n >= 32

N = 5

197.226.10.xxxxx||xxx

2^3 – 2 >= 28

2^3 >= 30

8 >= 30

Not enough bits are left to support the number of hosts for Class C address.

2^n – 2 >= 28

2^n >= 30

N = 5

Class B would allow for this design because at least 10 bits are need and B provides 16 bits.

**Problem 4**

Your company has been assigned the following IP address by IANA: 130.200.0.0. Design a network that

consists of 300 subnetworks with each subnetwork having up to 100 hosts.

(a) What address class is it? Class B

Express this IP address in the binary form: 10000010.11001000.00000000.00000000

(b) What is the mask associated with this IP address? Write the mask in the decimal, binary and prefix form.

Mask in decimal 255.255.0.0

Mask in binary 11111111.11111111.00000000.00000000

Mask in prefix form /16

(c) Perform calculations below to check if this network can be designed.

2^n – 2 >= 300

2^n >= 302

N = 9

130.200.xxxxxxxx.x||xxxxxxx

2^7 – 2 >= 100

2^7 >= 102

128 >= 102

This network can be designed.

(d) What is the subnetwork mask? Write the subnetwork mask in the decimal, binary and prefix form.

Mask in decimal 255.255.255.128

Mask in binary 11111111.11111111.11111111.10000000

Mask in prefix form /25

For questions (e) through (h) do not follow the Cisco approach with AllZero and AllOnes addresses for

subnetworks briefly discussed in class and described at this link

http://www.cisco.com/en/US/tech/tk648/tk361/technologies\_tech\_note09186a0080093f18.shtml,

but rather use the approach covered in the class examples.

(e) Write the address for the 1st subnetwork as well as the 1 host, 2nd host, the last host, and the broadcast address for the 1st subnetwork. Present the addresses in the binary and decimal forms.

**Binary** **Decimal**

10000010.11001000.00000000.10000000 130.200.0.128 – 1st subnetwork

10000010.11001000.00000000.10000001 130.200.0.129 – 1st host

10000010.11001000.00000000.10000010 130.200.0.130 – 2nd host

10000010.11001000.00000000.11111110 130.200.0.254 – Last host

10000010.11001000.00000000.11111111 130.200.0.255 – Broadcast address

(f) Write the address for the 2nd subnetwork as well as the 1 host, 2nd host, the last host, and the broadcast address for the 2nd subnetwork. Present the addresses in the binary and decimal forms.

**Binary** **Decimal**

10000010.11001000.00000001.00000000 130.200.1.0 – 2nd subnetwork

10000010.11001000.00000001.00000001 130.200.1.1 – 1st host

10000010.11001000.00000001.00000010 130.200.1.2 – 2nd host

10000010.11001000.00000001.01111110 130.200.1.126 – Last host

10000010.11001000.00000001.01111111 130.200.1.127 – Broadcast address

(g) Write the address for the last subnetwork as well as the 1 host, 2nd host, the last host, and the broadcast address for the last subnetwork. Present the addresses in the binary and decimal forms.

**Binary** **Decimal**

10000010.11001000.11111111.00000000 130.200.255.0 – Last subnetwork

10000010.11001000.11111111.00000001 130.200.255.1 – 1st host

10000010.11001000.11111111.00000010 130.200.255.2 – 2nd host

10000010.11001000.11111111.01111110 130.200.255.126 – Last host

10000010.11001000.11111111.01111111 130.200.255.127 – Broadcast address

(h) Use the masking operation to show explicitly that the last host residing on the 2nd subnetwork indeed belongs to this subnetwork.

Subnet mask

255.255.255.128 11111111.11111111.11111111.10000000

IP address of last host on second subnetwork

130.200.1.126 10000010.11001000.00000001.01111110

Result of AND operation = IP address of second subnetwork

130.200.1.0 10000010.11001000.00000001.00000000

**Problem 5**

A signal travels from point A to B in a communication channel. The signal power at points A and B are 10000 and 100 Watts, respectively. Calculate the signal gain/loss in [decibels – dB] at point B. Was the signal attenuated or amplified?

Loss [dB] = 10log10(100/10000) = 10 \* log10(0.01) = 10 \* -2 = -20 dB

The signal was attenuated.

**Problem 6**

A signal travels from point A to B in a communication channel. The signal power at points A and B are 100 and 10000 Watts, respectively. Calculate the signal gain/loss in [decibels – dB] at point B. Was the signal attenuated or amplified?

Gain [dB] = 10log10(10000/100) = 10 \* log10(100) = 10 \* 2 = 20 dB

The signal was amplified.

**Problem 7**

You should know from the slides on chapter 14 covered in the classroom that the speed of data transmission over a communication channel depends on the bandwidth of the channel [expressed in Hz] as well as the power of the signal and noise of the channel [both expressed in Watts]. Shannon proposed a formula that allows one to calculate the maximum data rate [expressed in bps (bits/second)] for an analog signal with noise send over a channel.

S = f × log2 (1+W/N)

where:

- S – data transfer rate in bps

- f – signal bandwidth [expressed in Hz]

- W – signal power [in Watts], and

- N – noise power [in Watts]

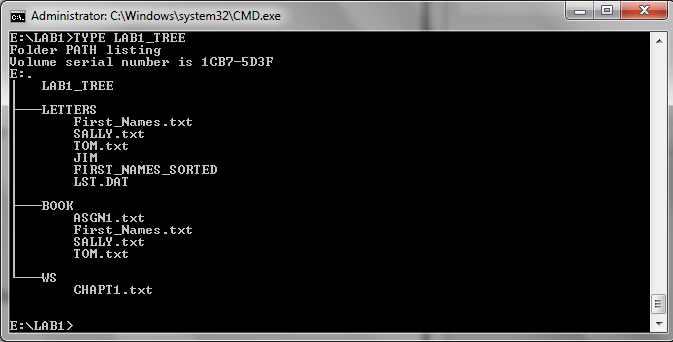
Calculate the data rate (speed of transmission) of the telephone signal of 4 KHz bandwidth, 0.2 Watts of

power, and 0.002 Watts of noise? (Note that the log function uses base 2.)

S = 4000Hz \* log2(1+0.2W/0.002W) = 4000Hz \* log2(101)= 4000Hz \* 6.6582114828 = 26632.846 bps

**CIS-350  
Infrastructure Technologies**

1. Insert the *Lab1\_Tree* file from p. 28 of the Lab1 instructions into the space provided or use the *Alt-PrtScr* keys to capture the full screen output (full window) from command *TYPE Lab1\_Tree* on p. 28 and paste that window here.



1. Write the output from two *ping* commands on p. 28 of the Lab 1 instructions.

URL address IP address

[www.louisville.edu](http://www.louisville.edu) 136.165.238.157

[business.louisville.edu](http://www.business.louisville.edu) 136.165.240.139

What class A, B, or C do these two addresses belong to? Class B

1. You have the following directory structure. ROOT (replaced by "\"), LETTERS, BOOK, BUSINESS, PERSONAL, CLUB, ROTARY, and JCC are names of directories/subdirectories, whereas MEMBER.1, MEMBER.2, and MEMBER.3 are names of files. Assume that the root directory ("\") stores the following files: *Go.bat*, *Paper1*, *Paper2*, *Paper3*, *Sheet1a*, *Sheet2*, *Sheet3*, *Sheet4*, *Shell1*, and *Shell2*. The system prompt displays"C:**\**>" which means that the current drive is C and the current directory is the root directory "**\**".



In the diagram above the word ROOT represents the root directory, i.e., "**\**". In all commands below, use the backslash "**\**" to represent the root directory. Do not to use the word ROOT. The root directory "**\**" is just the origin for other directories/subdirectories. All questions (a) through (j) are based on the above diagram.

1. Write a command to copy file *Go.bat* to directory *PERSONAL*. The copied file should have the same name as the original file.

COPY GO.BAT \LETTERS\PERSONAL

1. Write a command to copy a file *Go.bat* to directory *BUSINESS*. The copied file should have new name *Go\_copy.bat*.

COPY \GO.BAT \LETTERS\BUSINESS\GO\_COPY.BAT

1. Write a single command to copy all files starting with *She* to directory *BOOK*.

COPY \She\*.\* \BOOK

1. Write a single command to erase from the root directory all files that have digit *1* in their name.

ERASE \\*1\*

1. How many files would be erased by the command from p. (d) above? 3
2. Assume that *Paper3* is a large file. What command would you use to display the contents of the file one screen at a time (to prevent the output from scrolling off the screen)?

TYPE PAPER3 | MORE

1. Write two separate *SORT* commands. Both commands would accept input from file *Paper1*. However, the first command would route the output to file *Paper10*, and the second one would append the output to file *Paper10*.

SORT < PAPER1 > PAPER10

SORT < PAPER1 >>PAPER10

1. Look at the diagram. Assume that prompt "C:\LETTERS\CLUB>" is displayed. Write the command which would change the current directory to JCC.

CD JCC

1. Look at the diagram. Assume that prompt "C:\LETTERS\CLUB>" is displayed. In the space provided, sketch the directory structure with files which would command *TREE* /F generate.
2. Describe what a command *DIR | SORT /R > Dirlis* does.

This command would take the output for the DIR (directory) command, sort it in descending order by time, and store the resulting temporary file in a file named Dirlis. Dirlis will be created if it doesn’t exist and will be overwritten if it does exist.

**CIS-350  
Infrastructure Technologies**

1. Insert *Lab2\_Tree* file from p. 9 of the Lab 2 instructions into the space provided or use the *Alt-PrtScr* keys to capture the screen output (window) from command *TYPE Lab2\_Tree* on p. 9 and paste that window here.



1. Assume that the system prompt displays "C:\>", i.e., your current directory and current drive are the root directory and C drive, respectively. Write a batch file below that will include commands to:
2. prevent all commands from displaying on the screen
3. display the following message "A simple batch file"
4. display the directory hierarchy of the C disk
5. display the directory hierarchy of the C disk with all files
6. create sub directory named *CLASSES* in the root directory
7. erase subdirectory *BOOK* from the root directory
8. copy file *Go.bat* to directory *CLASSES*
9. pause the screen
10. display the directory and pipe it through the *MORE* command
11. sort data in the ascending order coming from file *Letter3* and route the output to file *Letter3\_Sorted*

The batch file, commands (a) through ( j):

**ECHO OFF**

**ECHO A SIMPLE BATCH FILE**

**TREE**

**TREE /F**

**MD CLASSES**

**RD BOOKS**

**COPY GO.BAT \CLASSES**

**PAUSE**

**DIR | MORE**

**SORT < LETTER3 > LETTER3\_SORTED**

1. Describe step by step what a file named MYBATCH does.

**ECHO OFF –** Prevents all commands from displaying on screen.

**REM STARTING BATCH FILE –** Displays ‘REM STARTING BATCH FILE’ on screen.

**TREE /F –** Displays the directory hierarchy with all files starting from current directory(E:).

**PAUSE –** Pauses batch execution and waits for user input.

**DIR –** Displays the directory of starting from current directory(E:).

**PAUSE –** Pauses batch execution and waits for user input.

**MD JOE MARY STACY-**creates directories JOE, MARY, and STACY in current directory(E:)

**TREE /F -** Displays the directory hierarchy with all files starting from current directory(E:). (This will include the newly created JOE, MARY, and STACY directories).

**PAUSE –** Pauses batch execution and waits for user input.

**COPY \*.BAT E:\LAB2\STACY** – copies all .Bat files in current directory(E:) to a directory STACY that exists in directory LAB2 in the E: drive.

**TREE /F -** Displays the directory hierarchy with all files starting from current directory(E:). (This will include the newly copied batch files in STACY)

**PAUSE –** Pauses batch execution and waits for user input.

**CD STACY –** Changes the current directory to E:\STACY.

**ERASE \*.BAT** – Erases all .BAT files in the STACY directory.

**PAUSE -** Pauses batch execution and waits for user input.

**CD ..-** Changes the directory up one level to E:

**TREE /F -** Displays the directory hierarchy with all files starting from current directory(E:). This will show the .BAT files have been erased from STACY.

**PAUSE -** Pauses batch execution and waits for user input.

**RD JOE MARY STACY –** Removes the directories JOE, MARY, and STACY from E:

**TREE /F -** Displays the directory hierarchy with all files starting from current directory(E:) to illustrate the directories in the previous step have been removed.

**PAUSE-** Pauses batch execution and waits for user input.

**REM CLOSING BATCH FILE-** Displays “REM CLOSING BATCH FILE” on screen.

1. What command displays your working directory? pwd

2. What command moves you to the parent directory? cd ..

3. What command allows one to go to the root directory? cd /

4. What command brings you back to the home directory (from anywhere)? cd

5. What command displays all files (including invisible files) and directories in a long form?

ls -la

6. What command displays the content of a file “tom”? cat tom

7. What command allows one to obtain the manual on-line help on the *who* command?

man who

8. What steps/commands does one to perform to move a task/process already running in foreground to background?

a. Ctrl-z b. jobname &

9. Say, that Unix assigned the id number = 752452 to a task running in background. What command would you use to move this process from background to foreground? fg 752452

10. What command would you use to sort data coming from a file “data” and reroute the sorted output to a file “datasor”? cat data | sort > datasor

11. Display the content of the directory in a long form. Include invisible files and protect the directory list from scrolling off the screen. ls –la | less

12. What command would you use to open the vi editor to create a file “tom”? vi tom

13. What command would you use to open the nano editor to create a file “tom”? nano tom

14. What command would you use to remove the directory “kim”? rmdir kim

**CIS-350  
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1. What command would you use to create a new file named *Names* using a *vi* editor?

vi Names

1. What command would you use to create a new file named *Names* using a *nano* editor? nano names
2. What command would you use to compile a program *SortItems.c* written in C language?

cc SortItems.c

1. What command would you use to display the directory in a long form, including invisible files? Use piping to prevent the listing to scroll off the screen.   
   ls –la | less
2. What command would you use to sort the data coming from a file named *NamesUnsorted* and routing the output to a file *NamesSorted*? Execute the command in foreground.  
   sort NamesUnsorted > NamesSorted
3. What command would you use to sort the data coming from a file named *NamesUnsorted* and routing the output to a file *NamesSorted*. Execute the command in background.  
   sort NamesUnsorted > NamesSorted &
4. What command would you use to add deny the write, read, and execute authority to a file named *NamesSorted* for users in the owner’s group?  
   ­­­­­­­­­­­­­­­­­­­­­­chmod g-rwx NamesSorted
5. How would you use the *alias* command to change the *ls* command to the *dir* command for the current log in session?  
   alias ls=dir
6. What command would you use to record your interactive session with Unix/Linux?

script filename

1. What command would you use to display the terminal control-key settings?  
   stty -a

**CIS-350  
Infrastructure Technologies**

1. What command would you use to find out which shell is your log in shell?

**set** or **env**

1. What command would you use to output the directory listing (in a long form and including invisible files) to the computer screen and file *dirlist* simultaneously?  
   ls –al | tee dirlist
2. Assume a file named *Names* that you created in your home directory contains several spelling errors. What command would you use to find these errors in *Names*?  
   spell Names
3. Assume that you created a script file named *menu*. What command would you use to execute the script file?  
   ./menu
4. What command would you use to display the first 7 lines in a file named *prog1.c*?  
   head -7 prog1.c
5. What command would you use to display the calendar for year 2014?  
   cal 2014
6. What command would you use to put a current shell to sleep for 30 seconds?  
   sleep 30
7. Assume that a file named *Addresses* exists in your home directory. What would the command *wc Addresses* generate? Describe.  
   The wc Addresses command would generate a line with three number values, separated by spaces, and finally the filename addresses after the three numbers. The first number would be a count of lines in the file, the second number, a count of words in the file, and the third number is a count of characters in the file.
8. Assume that a file named *Names* exists in your home directory. What command would you use to find all occurrences of a word *Mary* in *Names*?  
   grep Mary Names
9. What is the command to display the current date?  
   date