**Review CS: 1110 Spring 2016**

**Quiz Questions:**

Which of the following is the **OAM** command for getting keyboard input?

READ 0, GET 0, LOAD 0, LDA 0 **CORRECT ANSWER: LDA 0**

Which of the following is the **OAM** command for getting keyboard input?

PRINT 0, OUT 0, STA 0, PUT 0 **CORRECT ANSWER: STA 0**

What is the correct **OAM** program to store the value 25 in memory slot 10?

SET 5

STA 10

MLT 10

STA 10

HLT

Which of the following **OAMPL** commands will produce the value 25?

(15+10), ( / 100 4), (5 x 5), READ 5 MLT 5 PRINT **CORRECT ANSWER: ( / 100 4)**

How many bits are required to encode the **OAM** operation codes?

1, 4, 8, 16 CORRECT ANSWER: 16?

Which of the following is an example of a high-level programming language?

English, Python, OAM, Machine Language CORRECT ANSWER: Python

What is the result of the following OAMPL program? PRINT (+ 3 (\* 4 5))

12, 17, 23, PRINT ( + 3 ( \* 4 5)) CORRECR ANSWER: 23

What is the result of the following OAM program?

SET 10

STA 20

SET 15

ADD 20

STA 0

HLT

35, 15, 20, 25 CORRECT ANSWER: 25

What is the result of the following OAMPL line of code?

PRINT (+ 12 (- 5 2))

CORRECT ANSWER: 15

What will the following OAM code do?

SET 12

STA 6

DIV 6

STA 0

HLT

CORRECT ANSWER: It will print the value 1 to the screen.

Assembly language is also referred to as a…

Second generation language

Which of the following tasks does an assembler NOT perform?

Translate a program into machine language

What will the following OAM program print to the output window?

SET 10

STA 20

ADD 20

STA 0

What will the following OAM program print to the output window?

SET 1

BRP SKIP

STA 0

HLT

SKIP, SET 5

STA 0

HLT

CORRECT ANSWER: 5

Which of the following is TRUE about machine language?

CORRECT ANSWER: memory addresses must be numeric

Which of the following layers deals with rules for implementing the end-user services provided by a network?

Network Layer, Application Layer, Transport Layer, Data Link Layer

CORRECT ANSWER: Application Layer

Which of the following layers deals with error handling and framing?

Network Layer, Application Layer, Transport Layer, Data Link Layer

CORRECT ANSWER: Data Link Layer

TRUE OR FALSE: Networks can be used to share resources like printers and storage.

CORRECT ANSWER: TRUE

TRUE OR FALSE: Routers are used to connect networks. CORRECT ANSWER: TRUE

TRUE OR FALSE: The ARQ algorithm includes a provision for what to do if a packet is not received. CORRECT ANSWER: TRUE

TRUE OR FALSE: A DNS server is used to register domain names. CORRECT ANSWER: TRUE

A keystroke logger is an example of a:

CORRECT ANSWER: Trojan Horse

The science of secret writing is:

CORRECT ANSWER: Cryptography

Embedded computers can be found:

In a cell phone, in a credit card, in a microwave, all of the above

CORRECT ANSWER: all of the above

TRUE or FALSE: The model of a phenomenon must capture the full functionality of the real thing.

CORRECT ANSWER: FALSE

TRUE or FALSE: Models can only give us info about existing phenomena.

CORRECT ANSWER: FALSE

TRUE or FALSE: The Turing machine captures all of the properties that are essential for a computing agent.

CORRECT ANSWER: TRUE

TRUE or FALSE: A Turing machine can store information and retrieve it from memory.

CORRECT ANSWER: TRUE

A Turing machine that is executing an algorithm to solve some task must halt when begun on a tape containing input appropriate to that task.

A Turing machine always contains a special symbol for blank. (looks like a lowercase l sort of)

The Turing machine has sequential access as opposed to random access.

Awesome video about Turing machine: https://www.youtube.com/watch?v=gJQTFhkhwPA

TRUE OR FALSE: There are problems for which no algorithmic solution exists.

CORRECT ANSWER: TRUE

TRUE OF FALSE: A computing agent must be able to accept input.

CORRECT ANSWER: TRUE

Cybersquatting refers to the practice of registering a domain name that uses the name or trademark of an existing business, with the intent to sell the name to that business at a profit or to capitalize on that name for some other purpose.

Web personalization is possible using encryption.

Authentication refers to the process of verifying the identity of the receiver of the data.

TRUE OR FALSE: E-Bay and Craigslist are examples of e-commerce.

Spoofing is the practice of impersonating a legitimate site for the purposes of stealing money or stealing identity by collecting confidential information such as credit card numbers, names, and addresses.

When a system contains stochastic components, it means that there are parts of the system that display random behavior.

A discrete event simulation is one of the most popular and widely-used techniques for building computer models.

One reason to not construct a simulation model? Ethics, Time, Safety, or Realism

CORRECT ANSWER: Realism

Which of the following is NOT an example of a test used to determine if a sequence can be considered to be statistically random?

Frequency test, Poker test, Uniform test, or Gap test

CORRECT ANSWER: Uniform test

A model that uses a random number generator to introduce some variability into the data is considered to be? Stochastic, Discrete, Continuous, Static

CORRECT ANSWER: Stochastic

TRUE or FALSE: A brute force approach is commonly used for intelligent chess-playing strategy.

CORRECT ANSWER: FALSE

TRUE or FALSE: Any knowledge representation scheme we select must be relatively easy to etend to include new knowledge.

CORRECT ANSWER: TRUE

TRUE or FALSE: A robot must not only gather sensory information, but filter out the possibly vast amount of data its surroundings might present to it.

CORRECT ANSWER: TRUE

TRUE or FALSE: Game playing and image analysis are applications of artificial intelligence.

CORRECT ANSWER: TRUE

The test to see if a machine exhibits behavior indistinguishable from a human is called Turing test.

A rule-based system involves an attempt to mimic the human ability to engage pertinent facts and string them together in a logical fashion to reach some conclusion.

A neural network is presented with training data, for which the correct outputs are known.

In the commercial and office environment, the most widely-used broadband technology is Ethernet.

The first line of defense against illicit use of, or threats to, computer resources and sensitive information is a strong authentication and authorization process.

In assembly language, the programmer must take a microscopic view of a task, breaking it down into tiny subtasks at the level of what is going on in individual memory locations.

When a system contains stochastic components, it means that there are parts of the system display random behavior.

A discrete event simulation is one of the most popular and widely-used techniques for building computer models.

Cognitive Science is the study of how we as humans think and learn.

The reactive strategy uses heuristic algorithms to allow a robot to respond directly to stimuli from its environment without filtering through some line of reasoning based on its internal understanding of that environment.

A GPU executes instructions in parallel with the CPU, the main processor, and carries out all graphics operations including modeling, motion, rendering, and display.

Napster used peer-to-peer file sharing.

**Chapter Summaries (6-9 and 12-16):**

**Chapter 6: An Intro to System Software and Virtual Machines**

* An **operating system** communicates with users, determines what they want, and activates other system programs or applications to carry out the request.
* Types of **system software**:
  + User interface provides the user with an intuitive visual overview
  + Language services (assemblers, compilers, and interpreters) allow you to write programs in a high level
  + Memory managers distribute resources/duties for programs and data
  + Information managers handle the organization, storage, and retrieval of information on mass storage devices
  + I/O systems allow you to efficiently use the input/output devices that exist on a computer system
  + Scheduler keeps a list of programs ready to run on the processor and selects the one that will execute next
  + Utilities is the library that provides services to the user/other system routines
* Four problems with **machine language**

1. Uses binary
2. Is difficult tot read
3. Is difficult to change
4. Is difficult to create data

* **Assembly language** is low level programming language. Each symbolic assembly language instruction is **translated into ONE** binary machine language instruction. Better than machine language. Machine specific. An example of this is OAM. **Design decisions** for assembly language include choosing op codes and whether to include certain instructions.
  + A **source program** is written in assembly language
  + An **object program** must be translated into a corresponding machine language program
  + An **assembler** translates the assembly language into machine language
    - * An op table is an alphabetized list of all op codes and their binary equivalents
      * The term “pass” refers to the process by which examining and processing every op instruction in a program occurs, one instruction at a time.
      * **Binding** is the process of associating a symbolic name with a memory address. One “first pass” will occur where assembler looks at every instruction. This happens so that all symbolic names can be bound to address values. Those bindings are then entered to the symbol table.
      * a location counter is a variable used to find the address of an instruction
      * after the first pass, a second pass occurs which translates the source program into machine language
      * AFTER the first and second pass, the **OBJECT FILE** contains the translated machine language **object program**
  + The benefit of assembly language is that it uses **symbolic addresses**
* **Higher-Level** **Languages** are more abstract than assembly language, more user oriented, and not machine specific. They use both natural language and mathematical notation in their design. Examples: Python, OAMPL, C++
* The six basic tasks of an Operating System:
  1. Processor management
  2. Memory management
  3. Device management
  4. Storage management
  5. Application interface
  6. User interface

Another way she explained this was user interface manager(receptionist), Controller of access to system and files (a security guard), a program scheduler and activator (dispatcher), efficient resource allocator (efficiency expert), and deadlock and error detector (traffic officer)….

* + Operating systems wait for requests and activate other system programs to service these requests
  + System commands are used to translate, load, and run programs
  + The user interface has commands that request access to hardware resources, software services, or info. For user communication, a GUI supports visual aids and point-and-click operations.
  + It also controls access to the computer and its resources, safeguards passwords, and uses encryption for security.
    - * Access control is the use of a username and password
  + The operating system prevents programs or users from attempting operations that cause the computer system to enter a “frozen state”. A deadlock is when each program is waiting for a resource to become available that never will.

**Chapter 7: Computer Networks, the Internet, and the World Wide Web**

* **Networks** are used to share resources, communicate, and interact. A computer network is a set of independent computer systems (AKA nodes, hosts, or end systems) connected by telecommunication links.
* **Broadband** has been replacing modems and analog phone lines. 25 mbps
* **DSL** is provided by your telephone company 12-40 mbps
* **Cable modem** is offered by cable TV providers. 10-50 mbps
* **Fiber Optics** 1 gbps
* **Ethernet** was developed mid 70’s. 10mbps
* **Fast Ethernet** was developed in early 90’s. 100mbps
* **MOST COMPUTERS** come with built in Ethernet & most new houses are wired for phone, cable, Ethernet.
* **Wireless data communication** uses radio, microwave, and infrared signals.
* **Wireless local access network** allows user to transmit from their base computer to a local wireless base station
* **Wi-Fi** is used to connect a computer to the Internet when it is within range of wireless base station
* **Municipal Area Network** turns a city into a wireless access zone
* **Bluetooth** often used to support communication between wireless computer peripherals in proximity
* **Wireless wide area access network** is where a computer transmits messages to a remote base station provided by a telecommunications company
* **3G** offers voice services as well as data communication rates of 0.5 to 10 mbps
* **4G** offers download speeds of 100 Mbps to 1 Gbps
* **\*\*\*\*\* LOCAL AREA NETWORK (LAN)** connects hardware devices such as computers, prints, and storage devices that are all in close proximity
  + **Bus topology** is where all nodes are connected to a single shared communication line
  + **Ring topology** connects the network nodes in a circular fashion
  + **Star topology** has one node in the middle and the rest branching off
* **A repeater**  amplifies and forwards a signal
* **Shared media technology** has a wire strung around and through a building and users tap into the cable at the nearest point using a **transceiver**
* **Switch** located in a room called a wiring closet and contains a number of ports with wires leading to an Ethernet interface
* **Wide Area Network (WAN)** connects devices not in close proximity. Uses a collection of routers with point to point connections. Most use store-and-forward, packet-switched tech to deliver messages where info is send to a station and it is kept and then then sent to a different destination (sometimes the final). The intermediate station verifies the integrity of the message before forwarding it.
* **International International Service Provider** is also called a tier-1 network or Internet backbone. Provides global coverage.
* **Internet** is huge interconnected network of networks
* **Internet protocol hierarchy** has five layers (also called a protocol stack)
  1. **Application layer**
     + Firefox, Internet Explorer, Safari
     + Rules for implementing end-user services provided by a network
  2. **Transport layer**
     + TCP, UDP
     + Assigns port numbers to programs and remembers which port goes with which program
  3. **Network layer**
     + Nodes identify each other using a 32-bit IP address
     + Deliver message from the site where it was created to its ultimate destination
  4. **Data link layer**
     + Ethernet
     + Error detection and correction of problem
     + ARQ (Automatic Repeat Request) algorithm: this is the basis for all data link control protocols in current use. A sends a packet to B (with some additional info, like a sequence number to identify the packet, error checking bits, SOP, EOP delimiters) and waits. When B receives the packet, it sends an ACK If A does not receive the ACK, it re-sends the packet; otherwise, A sends the next packet
  5. **Physical layer**
     + Signal (wired, wireless, microwave, satellite)
     + Move bits across a physical communication layer, put a signal on a wire(binary encoding)

**Network Services and Benefits**

* Email, Bulletin boards, Social networks, Resource sharing, Client-server computing, Information sharing, Info utility, collaborative software, e-commerce
* Net Neutrality is the principle that Internet service providers (ISPs) and the government should treat all data on the Internet equally

**Chapter 8: Computer and Network Security**

* **Authentication** verifies who has the right to gain access to the computer (ex. checksum)
* **Social Engineering** is the process of using people to get the information you desire
* **A hash** is a one way operation and an **encryption** is a two way
* **Malware** is bad software
* **A virus**  is a computer program that infects a host computer
* **Worm** is something that can send copies of itself to other nodes on a computer network without having to be carried by an infected file
* **Trojan horse** is a computer program that contains code that performs malicious attacks
* **Cryptography** is the science of secret writing
* **DES** is the old encryption method now they use **AES, or more commonly RSA which is based on “number theory”**

**Chapter 9: Introduction to High-Level Language Programming**

* Programmer is able to take a macroscopic viewpoint
* Not machine specific
* Programmer does not need to be as conscious of storage management
* The process:
  1. The feasibility study
  2. Problem specification
  3. Program design
  4. Algorithm selection or development and analysis
  5. Coding
* The software development life cycle
  1. Debugging
  2. Testing and verification
  3. Documentation
  4. Maintenance

**Chapter 12: Models of Computation**

* **Models**
  + Capture essence of the real thing
  + Probably differ in scale from the real thing
  + Omit some of the details of the real thing
  + Lack the full functionality of the real thing
* An algorithm must…
  + Be a well-ordered collection
  + Consist of unambiguous and effectively computable operations
  + Halt in a finite amount of time
  + Produce a result

**Chapter 13: Simulation and Modeling**

* Why construct a simulation model?
  1. Existence, Physical realization, Safety, Speed of construction, Time scale, Ethical behavior, Ease of modification
* Issues in modeling:
  1. Achieving proper balance between accuracy and complexity
  2. The ability to articulate what you are trying to achieve
* Stochastic components are parts of the system that display random behavior
* Frequency Test = expect roughly same number of digits
* Serial Test = frequency test applied to 2 digits at a time
* Poker Test = analyze sequences of 5 numbers at a time, based on hands in poker
* Gap Test = analyze distances between zeroes
* A **deterministic model** has no randomness involved in development of future system states and will always produce the same output from a given set of initial conditions
* **Static models provide a macroscopic view of a single point in time**
* **Dynamic models change in response to input signals (require more data)**
* Discrete means the state variables change at a finite number of points in time. (abrupt change that triggers new events)
* Continuous means state variables change in a continuous way. Infinite number of states.

**Chapter 14: Electronic Commerce and Databases**

* **Benefits of E-Commerce:**
  1. Broaden your customer base
  2. Recapture customers you losing to competitors with online stores
  3. Better serve your existing customer base
  4. Better integrate departments departments/functions within your existing business
* Spoofing is the practice of impersonating a legitimate for the purposes of stealing money or stealing identity

**Chapter 15: Artificial Intelligence**

* Turing’s theory of computation: a machine, by shuffling symbols could simulate any conceivable act of mathematical deduction
* **Desirable Traits:**
  1. Deduction, reasoning, problem-solving
  2. Knowledge representation
  3. Planning
  4. Learning
  5. Natural language processing
  6. Motion and manipulation
  7. Perception
  8. Social intelligence
  9. Creativity
  10. General intelligence
* Decision tree for sequential search is linear whereas binary search is more tree-like
* In robotics there are two strategies:
  1. Deliberative strategy says that the robot must have an internal representation of its environment
  2. Reactive strategy uses heuristic algorithms to allow the robot to respond directly to stimuli from its environment

**Chapter 16: Computer Graphics and Entertainment: Movies, Games, and Virtual Communities**

* Computer-Generated Imagery (CGI) can produce extremely lifelike images called photorealistic animation
* Graphics pipeline used to create a CGI
  1. Object modeling is the creation of a mathematical/computational model that can be stored in memory and manipulated algorithmically
  2. Object motion
     + **Rigid motion is motion that doesn’t bend or deform an object (translation, rotation and reflection)**
     + **Control point is the point used to control the motion of an object**
     + **Key framing uses the first and last frame and the elapsed time**
  3. Rendering and display
     + **Taking an object stored as a mathematical model and converting it into a fully formed, visually pleasing three-dimensional image**
     + **Usually addresses issues like: lighting, color shading, shadows, texture, blur**