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| Instructor | ***Prof. Luke Papademas*** | Due Date |  |

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| Part | **1** | **2** | **3** | **4** | Total |
| *Maximum Points* | **25** points | **25** points | **25** points | **25** points | **100**G101010 pointsG |
| ***Your Score*** |  |  |  |  |  |

**Textbook Reading Assignment**

Thoroughly read Chapter(s) 8 in your Computer Architecture and Organization textbook.

**Part 1 Glossary Terms - System Software**

Define, in detail, each of these glossary terms from the realm of computer architecture and computer topics, in general. If applicable, use examples to support your definitions. Consult your notes

or course textbook(s) as references or the Internet by visiting Web sites such as:

[**http://www.bing.com**](http://www.bing.com) or [**http://www.webopedia.com**](http://www.webopedia.com/)

**(a) 3 - Tiered Architecture**

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| 3-tiered architecture refers to the “well-established” pattern in software in which the presentation, application, and data layers are separated. All requests from the presentation layer for data must first pass through the application layer, and all responses from the data layer must also pass through the application layer. |

**(b) Parse Tree**

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| A parse (or syntax) tree is used by language compilers to analyze and order words from the token stream that particular to a programming language into a data structure that can be used to create a “pseudo-assembly” code that can then be used to run machine instructions. |

**(c) Resident Monitor**

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| A “resident monitor” was the precursor to modern Operating Systems, and was used in early computers to control computer hardware and manage system resources. |

**(d) Tightly Coupled Multiprocessors**

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| Tightly coupled multiprocessors share a single centralized memory which requires an OS to synchronize processes carefully to ensure protection. This is typically used in systems with 16 or fewer processors (Null et al. 487). |

**(e) Transaction Processing Monitor**

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| A TPM is a middleware that is used for monitoring transactions between system components to help in system resource management. |

**Part 2 Exercises - System Software**

For each of the following, enter True or False.

**TRUE (1)** Spooling is the simplest form of multiprogramming.

**FALSE (2)** A virtual machine is the real hardware of the real computer that is controlling the program.

**TRUE (3)** Absolute code is non - executable binary code that must always be loaded at a particular location in memory.

**TRUE (4)** Interpreted languages also have a many - to - many relationship between the source code statements and executable machine instructions.

**TRUE (5)** In Java, deallocation of heap memory is referred to as garbage collection, which is done by the JVM automatically.

**TRUE (6)** To speed up the performance of the java software, Java’s Just - In - Time ( JIT ) compiler is used.

**TRUE (7)** The goal of database management systems is to provide timely and easy access to a large volume of data efficiently.

**TRUE (8)** Real - time systems are used for process control in manufacturing plants, assembly lines, robotics and complex physical systems.

**FALSE (9)** Java programs are stored in an intermediate code called bytecode.

**FALSE (10)** A timesharing system does not permit the systems to be accessed by multiple concurrent users.

**Part 3 Exercises - System Software**

**(1)** **( Database Processing )**

Answer the following with respect to database processing:

(a) What is a race condition? Give an example.

(b) How can race conditions be prevented?

(c) What are the risks in race condition prevention?

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**(2)** **( Deadlocks )**

We said that the risk of deadlock is always present anytime a system resource is locked.

Describe how a deadlock can occur such as in the situation given below.

Suppose T1 has X locked, and T2 has Y locked.

Now suppose T1 needs Y and T2 needs X .

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**(3)** **( Operating Systems )**

What do you feel are the limitations of a computer that has no operating system? How

would a user load and execute a program?

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**(4)** **( Compilers )**

Match the analyzer relative to compilers:

\_\_\_\_\_ Semantic analyzer (a) the phase of a compiler that would give you a syntax error

\_\_\_\_\_ Lexical analyzer (b) the phase that complains about undefined variables

\_\_\_\_\_ Syntax analysis (c) the compiler phase that would emit an error message if you try to add an integer to a character string

**(5)** **( Java Virtual Machine )**

Why is the execution environment of a Java class called a virtual machine? How does this virtual machine compare to a real machine running code written in C ?

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**Part 4 Exercises - System Software**

Write a complete answer for each of these.

**(1) ( Mobile Operating Systems )**

What do you feel are the limitations of a mobile telephone that has no operating system? How would a user load and execute an application program?

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**(2) ( Multiprogramming, Multiprocessing and Multithreading )**

What is the difference between multiprogramming and multiprocessing?

Multiprogramming and multithreading?

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**(3) ( Subsystems )**

Under what circumstances is it desirable to collect groups of processes and programs into

subsystems running on a large computer? What advantages would there be to creating

logical partitions on this system?

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**(4) ( Dynamic Linking )**

Discuss the advantages and disadvantages of dynamic linking.

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**(5) ( Assembly Language )**

Why should assembly language be avoided for general application development? Under

what circumstances is assembly language preferred or required?

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