**Software and Hardware Development Model History Assignment**

**Read the following excerpts to learn about the Von Neumann Computer System Model:**

“The term Von Neumann architecture, also known as the Von Neumann model or the Princeton architecture, derives from a 1945 computer architecture description by the mathematician and physicist John von Neumann and others, First Draft of a Report on the EDVAC.[1] This describes a design architecture for an electronic digital computer with subdivisions of a processing unit consisting of an arithmetic logic unit and processor registers, a control unit containing an instruction register and program counter, a memory to store both data and instructions, external mass storage, and input and output mechanisms.[1][2] The meaning of the term has evolved to mean a stored-program computer.”

“A stored-program digital computer is one that keeps its programmed instructions, as well as its data, in read-write, random-access memory (RAM). Stored-program computers were an advancement over the program-controlled computers of the 1940s, such as the Colossus and the ENIAC, which were programmed by setting switches and inserting patch leads to route data and to control signals between various functional units.”

“The earliest computing machines had fixed programs. Some very simple computers still use this design, either for simplicity or training purposes. For example, a desk calculator (in principle) is a fixed program computer. It can do basic mathematics, but it cannot be used as a word processor or a gaming console. Changing the program of a fixed-program machine requires re-wiring, re-structuring, or re-designing the machine. The earliest computers were not so much "programmed" as they were "designed". "Reprogramming", when it was possible at all, was a laborious process, starting with flowcharts and paper notes, followed by detailed engineering designs, and then the often-arduous process of physically re-wiring and re-building the machine. It could take three weeks to set up a program on ENIAC and get it working.[4]

With the proposal of the stored-program computer this changed. A stored-program computer includes by design an instruction set and can store in memory a set of instructions (a program) that details the computation.

A stored-program design also allows for self-modifying code. One early motivation for such a facility was the need for a program to increment or otherwise modify the address portion of instructions, which had to be done manually in early designs.”

* Taken from: <http://en.wikipedia.org/wiki/Von_Neumann_architecture>

**Part A:**

Complete and hand in the following tasks in a Word Document. You may wish to complete a),b) and c) in one diagram:

1. With a graphics software of your choice create a block diagram of a stereotypical von Neumann machine. (5 marks)
2. List and Describe a number of typical devices associated with each block. (5 marks)
3. Label the flow of data through the computer under the direction of a program. (5 marks)
* Do not copy a diagram. Make your own.
1. Explain the main advantage of a Von Neumann computer system over its predecessors. How did it change the computer industry?(5 marks)

Read the following excerpts:

Waterfall Model of Software Development:

“Water The waterfall model is a sequential design process, often used in software development processes, in which progress is seen as flowing steadily downwards (like a waterfall) through the phases of Conception, Initiation, Analysis, Design, Construction, Testing, Production/Implementation, and Maintenance.

The waterfall development model originates in the manufacturing and construction industries; highly structured physical environments in which after-the-fact changes are prohibitively costly, if not impossible. Since no formal software development methodologies existed at the time, this hardware-oriented model was simply adapted for software development.[1]

The first known presentation describing use of similar phases in software engineering was held by Herbert D. Benington at Symposium on advanced programming methods for digital computers on 29 June 1956.[2] This presentation was about the development of software for SAGE. In 1983 the paper was republished[3] with a foreword by Benington pointing out that the process was not in fact performed in a strict top-down fashion, but depended on a prototype.

The first formal description of the waterfall model is often cited as a 1970 article by Winston W. Royce,[4][5] although Royce did not use the term "waterfall" in this article. Royce presented this model as an example of a flawed, non-working model.[6] This, in fact, is how the term is generally used in writing about software development—to describe a critical view of a commonly used software development practice.[7]fall Model”

* Taken From: <http://en.wikipedia.org/wiki/Waterfall_model>

Iterative and Incremental Model of Software Development

The basic idea behind this method is to develop a system through repeated cycles (iterative) and in smaller portions at a time (incremental), allowing [software developers](http://en.wikipedia.org/wiki/Software_developer) to take advantage of what was learned during development of earlier parts or versions of the system. Learning comes from both the development and use of the system, where possible key steps in the process start with a simple implementation of a subset of the software requirements and iteratively enhance the evolving versions until the full system is implemented. At each [iteration](http://en.wikipedia.org/wiki/Iteration), design modifications are made and new functional capabilities are added.

* Taken From: <http://en.wikipedia.org/wiki/Iterative_and_incremental_development>

**Part B:**

Complete and hand in the following tasks in a Word Document:

1. In a short paragraph, graphic or T table, compare and contrast the “iterative and incremental” and “waterfall” models of software development.(5 marks)
2. Explain how the von Neumann hardware model may have contributed to a shift from the waterfall model of software development to the iterative or incremental approach.(5 marks)

**Part C:**

Complete and hand in the following tasks in a Word Document:

1. With a graphics software of your choice, diagram a typical Systems Development Life Cycle Model for software development. Reference your sources.(5 marks)

