Field Report

The purpose of this report is to identify among computer science, software engineering and information technology; to identify fields within computer science, and how will I use computer science in my field of interest.

*Computer science:

Computer science as defined by techterms.com "*is the study of computers and computing concepts. It includes both hardware and software, as well as networking and the Internet.*

The hardware aspect of computer science overlaps with electrical engineering. It covers the basic design of computers and the way they work. A fundamental understanding of how a computer "computes," or performs calculations, provides the foundation for comprehending more advanced concepts. For example, understanding how a computer operates in binary allows you to understand how computers add, subtract, and perform other operations. Learning about logic gates enables you to make sense of processor architecture.

The software side of computer science covers programming concepts as well as specific programming languages. Programming concepts include functions, algorithms, and source code design. Computer science also covers compilers, operating systems, and software applications. User-focused aspects of computer science include computer graphics and user interface design.

Since nearly all computers are now connected to the Internet, the computer science umbrella covers Internet technologies as well. This includes Internet protocols, telecommunications, and networking concepts. It also involves practical applications, such as web design and network administration." (https://techterms.com/definition/computer_science;)

*Software engineering:

Software engineering as defined by techopedia.com "*is the process of analyzing user needs and designing, constructing, and testing end user applications that will satisfy these needs through the use of software programming languages. It is the application of engineering principles to software development. In contrast to simple programming, software engineering is used for larger and more complex software systems, which are used as critical systems for businesses and organizations*." (https://www.techopedia.com/definition/13296/software-engineering;)

*Information technology:

Information technology as defined by WhatIs.com "*is the use of any computers, storage, networking and other physical devices, infrastructure and processes to create, process, store, secure and exchange all forms of electronic data. Typically, IT is used in the context of enterprise operations as opposed to personal or entertainment technologies. The commercial use of IT encompasses both computer technology and telephony.*

IT includes several layers of physical equipment (hardware), virtualization and management or automation tools, operating systems and applications (software) used to perform essential functions. User devices, peripherals and software, such as laptops, smartphones or even recording equipment, can be included in the IT domain. IT can also refer to the architectures, methodologies and regulations governing the use and storage of data.

Business applications include databases like SQL Server, transactional systems such as real-time order entry, email servers like Exchange, Web servers like Apache, customer relationship management and enterprise resource planning systems. These applications execute programmed instructions to manipulate, consolidate, disperse or otherwise affect data for a business purpose.

Computer servers run business applications. Servers interact with client users and other servers across one or more business networks. Storage is any kind of technology that holds information as data. Information can take any form including file data, multimedia, telephony data and Web data, data from sensors or future formats. Storage includes volatile random-access memory (RAM) as well as non-volatile tape, hard disk and solid-state flash drives.

IT architectures have evolved to include virtualization and cloud computing, where physical resources are abstracted and pooled in different configurations to meet application requirements. Clouds may be distributed across locations and shared with other IT users, or contained within a corporate data center, or some combination of both deployments." (https://searchdatacenter.techtarget.com/definition/IT;)

^Fields of computer science:

1- Theory: "*Computer science theory is often highly mathematical, concerning itself with questions about the limits of computation. Some of the major results in CS theory include what can be computed and how fast certain problems can be solved. Some things are simply impossible to figure out! Other things are merely difficult, meaning they take a long time. The long-standing question of whether "P=NP" lies in the realm of theory.*

A subsection of theory is algorithm development. For instance, theorists might work to develop better algorithms for graph coloring, and theorists have been involved in improving algorithms used by the human genome project to produce faster algorithms for predicting DNA similarity.

Cryptography is another booming area of the theory section of computer science, with applications from e-commerce to privacy and data security. This work usually involves higher-level mathematics, including number theory. Even given all of the work in the field, algorithms such as RSA encryption have yet to be proven totally secure.

Work in theory even includes some aspects of machine learning, including developing new and better learning algorithms and coming up with bounds on what can be learned and under what conditions." (http://aihorizon.com/essays/basiccs/general/cs_areas.html;)

2- Programming Languages: "*Programming languages are the heart of much work in computer science; most non-theory areas are dependent on good programming languages to get the job done.*

Programming language works focuses on several topics. One area of work is optimization--it's often said that it's better to let the compiler figure out how to speed up your program instead of hand-coding assembly. And these days, that's probably true because compiler optimizations can do amazing things.

Proving program correctness is another aspect of programming language study, which has led to a class of "functional" programming languages. Much recent work has focused on optimizing functional languages, which turn out to be easier to analyze mathematically and prove correct, and also sometimes more elegant for expressing complex ideas in a compact way.

Other work in programming languages deals with programmer productivity, such as designing new language paradigms or simply better implementations of current programming paradigms (for instance, one could see Java as an example of a cleaner object-oriented implementation than C++) or simply adding new features, such as garbage collection or the ability to create new functions dynamically, to languages and studying how this improves the programmer's productivity.

Recently, language-based security has become more interesting, as questions of how to make "safer" languages that make it easier to write secure code."
(http://aihorizon.com/essays/basiccs/general/cs_areas.html;)

3- Systems: "*Systems work deals, in a nutshell, with building programs that use a lot of resources and profiling that resource usage. Systems work includes building operating systems, databases, and distributed computing, and can be closely related to networking. For instance, some might say that the structure of the internet falls in the category of systems work.*

The design, implementation, and profiling of databases is a major part of systems programming, with a focus on building tools that are fast enough to manage large amounts of data while still being stable enough not to lose it. Sometimes work in databases and operating systems intersects in the design of file systems to store data on disk for the operating system. For example, Microsoft has spent years working on a file system based on the relational database model.

Systems work is highly practical and focused on implementation and understanding what kinds of usage a system will be able to handle. As such, systems work can involve trade-offs that require tuning for the common usage scenarios rather than creating systems that are extremely efficient in every possible case.

Some recent work in systems has focused on solving the problems associated with large-scale computation (distributed computing) and making it easier to harness the power of many relatively slow computers to solve problems that are easy to parallelize."
(http://aihorizon.com/essays/basiccs/general/cs_areas.html;)

4-Networking: "*Networking covers topics dealing with device interconnection, and is closely related to systems. Network design deals with anything from laying out a home network to figuring out the best way to link together military installations.*

Networking also covers a variety of practical topics such as resource sharing and creating better

protocols for transmitting data in order to guarantee delivery times or reduce network traffic.

Other work in networking includes algorithms for peer-to-peer networks to allow resource detection, scalable searching of data, and load balancing to prevent network nodes from exploiting or damaging the network.

Networking often relies on results from theory for encryption and routing algorithms and from systems for building efficient, low-power network nodes."
(http://aihorizon.com/essays/basiccs/general/cs_areas.html;)

^My field of interest: My field of interest is software engineering. Why:

1-Because I prefer actions to words, and software engineering is application.

2-Because it can provide high quality software.

3-Because it is essential for modern business.

4-Because it brings a new age.

5-Because it can be used to construct larger and more complex software systems.

Report Report

The purpose of this report is to describe the process I took to write my Field Report.

Skills used:

1-Writing: "*Writing is a form of communication that allows students to put their feelings and ideas on paper, to organize their knowledge and beliefs into convincing arguments, and to convey meaning through well-constructed text. In its most advanced form, written expression can be as vivid as a work of art. As children learn the steps of writing, and as they build new skills upon old, writing evolves from the first simple sentences to elaborate stories and essays. Spelling, vocabulary, grammar, and organization come together and grow together to help the student demonstrate more advanced writing skills each year*." (https://msu.edu/course/cep/886/Writing/page1.htm;)

2-Critical thinking: "the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action." (https://www.criticalthinking.org/pages/defining-critical-thinking/766;)

3-Information literacy: "the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning." (https://otterbein.libguides.com/c.php?g=429560&p=2936072;)

To write my Field Report:

I used my writing skills to write the report; as I was writing I used my critical thinking skills to critically think what I needed to write, and finally I used my information literacy skills to find the information.