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Independent Study and Mentorship, 2A

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Research Assessment #1

Subject: Software Developer - Career Outlook

MLA Citations:

Brown, Sue. "What Is MIS?" *Eller Arizona Management Information Systems*. The University of Arizona, Web.

Krueger, Brian. "Software Developers: Career, Salary and Education Information." *CollegeGrad.com*. CollegeGrad, 2016. Web.

Assessment:

I had glanced over what working a job in computer science was like before, but never went into detail on it. I knew companies needed people experienced with technology, and that I fit the criteria, but it is important I know the main traits of the job before diving any further into the study.

When I first started looking up jobs strictly under "Computer Science," like being a programmer or site developer, I did not feel as passionate as I should have, and that is because I was keeping my scope too small to start out. This led me to immediately change pace and decide to study the differences between MIS (Management Information Systems, what I plan to major in) and Computer Science (the topic that I initially declared as my topic of study). Once I

became comfortable with my knowledge of the differences and how I can incorporate either into a job, I looked into a job that was interesting to me and I saw as a happy medium between the two.

The first article was about the differences between MIS and Computer Science. Essentially, I found that MIS is very focused on the business approach to technology, such as making sure the company stays digitally updated and solving problems using new forms of technology. Computer Science, on the other hand, is focused more on producing software for a certain task with programming knowledge. Through learning this, I realized that my project likely will pertain more to Computer Science than to MIS. It seems that any career I obtain involving Computer Science will incorporate MIS, and vice versa. Therefore, if I embrace both, my path will be the same direction as intended, except even wider.

The second article is primarily what gave me all of the specifics I needed about a future job that balances the two fields, "Software Developer." The role is to be in charge of the creation of a particular software, but already has an end goal that has been determined. As reinforced in the first article, the availability of the job is dramatically increasing, by "22 percent, adding 758,000 new jobs from 2010 to 2020." This is very good news for me because even if one company does not want me to work for them, there will be another company looking for a person who can do the job. It also allows me to be more selective with the type of company I work for, in almost any top industry. Regardless of what industry I choose (the article provided multiple), the median salary is around \$100,000 for all of them, which is a salary I would be happy to make. The most typical education requirement is a bachelor's degree in Computer Science; most of what is required for the job is experience and staying informed of new programming

languages and tools as they arise. Essentially, the most crucial education for computer science will take place while I am already working, through experience, because the job tends to be one of the most rapidly changing jobs in the workforce.

I have become much more aware of the different studies involved in one career path, and learned more about the qualifications, salary, availability, and more relating to being a software developer. My only concern involving the job is that it requires long hours, but because the job is so diverse depending on the company and industry, I know I will be able to find hours that will allow me to work on out-of-work projects. Overall, I still have plenty to learn about Computer Science/Management in the workforce, and I hope to gain more knowledge and experience in it this year.

1. What is MIS?

The Study of People, Technology, and Organizations

Management Information Systems (MIS) is the study of people, technology, and organizations. If you enjoy technology like iPhones, iPods, and Facebook, you have what it takes to major in information systems. All you need is an interest in technology and the desire to **use technology to improve people's lives**. Many people think that MIS is all programming. However, programming is just a small part of our curriculum and there are many, many jobs in MIS where you do not program.

Everyone who works in business, from someone who pays the bills to the person who hires and fires, uses information systems. For example, a supermarket could use a computer database to keep track of which products sell best. And a music store could use a database to sell CDs over the Internet.

Information isn't worth much if it doesn't serve a purpose. MIS students learn how businesses use information to improve the company's operations. Students also learn how to manage various information systems so that they best serve the needs of managers, staff and customers. MIS students learn how to create systems for finding and storing data and they learn about computer databases, networks, computer security, and lots more.

Below are some common questions to help you find out more about management information systems.

What's the difference between MIS and CS (computer science)?

It is useful to compare MIS to some of the other fields related to information technology. Here at The University of Arizona there are at least three computer related departments and programs. The table below will help to show the differences.

	MIS (Management Information Systems)	CS (Computer Science)	ECE (Electrical Computer Engineering)
Focus	Organization	Software	Product
Objective	More efficient or effective business	Reliable computer program	Improved engineer product
Core Skill	Problem solving	Logic/Procedure	Engineering
Core Task	Determine business requirements for information systems	Deliver information systems to meet defined requirements	Determine information processing requirements for device
Theoretical vs. Applied	Balanced	Applied	Balanced

Comment [1]: This chart clearly goes over the differences between the two very well. It seems to me that MIS and CS are always working together, one always in need of the other.

Generic Job Title	Analyst/Designer	Builder	Architect and Builder
Typical Starting Job Title	Business Systems Analyst	Application Programmer	Engineer
Career Goals	Senior Organizational Manager	Programming Manager	Senior Engineer or Product Manager
College Home Business		Science	Engineering

All of these are great majors, however **MIS is the ONLY major that focuses on both business processes and information technology**. If you are interested in business and technology, like theory but not too much, like technology enough to want to keep up with what's hot but don't want to be writing programs or putting together chips all your life, then MIS is for you. We believe that the most upwardly mobile career path for those who like to work with business and technology is definitely in MIS.

Traits of MIS Professionals

There are a lot of different profiles, but there are some traits we've found make great MIS professionals. Do these describe you? If so, then our **MIS programs** are for you!

- Are good problem solvers
- Like to work with people
- Can think strategically about technology
- Like responsibility for developing and then implementing their ideas
- Can bridge both technology and business
- Can see both details and the big picture
- Are excellent communicators
- Can manage time and resources well

Comment [2]: I'm going to have to work on this part, obviously. However, there's nothing wrong with having something to improve on.

What jobs do MIS graduates go into?

As you can probably already tell, MIS is an integrative field. MIS professionals are the "communication bridge" between business needs and technology. This means that you will have to understand how to figure out how things work, solve problems, find things out, communicate what you found, and learn a lot of new things on a regular basis. It's a dynamic field, and it takes dynamic people to do well in it. People who can think fast, work hard, and balance a lot of things should really think about MIS. Here's only a sample of the kinds of MIS jobs.

- Business Analyst
- Business Application Developer
- IT Consultant

Comment [3]: This description fits my personality perfectly, and is also similar to a description of Computer Science. This is definitely what I want to go into.

- Systems Analyst
- IT Development Project Leader
- Database Administrator
- Business Intelligence Analyst
- Systems Developer
- Database Analyst
- Web Developer
- Network Administrator
- Technical Support Specialist
- Information Systems Manager
- IT User Liaison

How long will MIS jobs be around?

As per the U.S. Bureau of Labor Statistics [Occupational Outlook Handbook](#) (OOH) employment of computer and information occupations are projected to grow by 22 percent, adding 758,000 new jobs from 2010 to 2020.

Demand for workers in these occupations will be driven by the continuing need for businesses, government agencies, and other organizations to adopt and utilize the latest technologies.

Workers in these occupations will be needed to develop software, increase cybersecurity, and update existing network infrastructure.

Comment [4]: I've noticed that many of these jobs have to do with the running of a business. Essentially, it seems to be the management level of computer science.

Comment [5]: This means I'll always have an opportunity in the career field.

2. Software Developers

Career, Salary and Education Information

What Software Developers Do

Software developers are the creative minds behind computer programs. Some develop the applications that allow people to do specific tasks on a computer or another device. Others develop the underlying systems that run the devices or that control networks.

Duties of Software Developers

Software developers typically do the following:

- Analyze users' needs and then design, test, and develop software to meet those needs
- Recommend software upgrades for customers' existing programs and systems
- Design each piece of an application or a system and plan how the pieces will work together
- Create a variety of models and diagrams (such as flowcharts) that instruct programmers how to write software code
- Ensure that a program continues to function normally through software maintenance and testing
- Document every aspect of an application or a system as a reference for future maintenance and upgrades
- Collaborate with other computer specialists to create optimum software

Software developers are in charge of the entire development process for a software program.

They may begin by asking how the customer plans to use the software. They must identify the core functionality that users need from software programs. Software developers must also determine user requirements that are unrelated to the functionality of software, such as the level of security and performance needs. They design the program and then give instructions to programmers, who write computer code and test it.

If the program does not work as expected or if testers find it too difficult to use, software developers go back to the design process to fix the problems or improve the program. After the program is released to the customer, a developer may perform upgrades and maintenance.

Developers usually work closely with computer programmers. However, in some companies, developers write code themselves instead of giving instructions to the programmers.

Developers who supervise a software project from the planning stages through implementation sometimes are called information technology (IT) project managers. These workers monitor the project's progress to ensure that it meets deadlines, standards, and cost targets. IT project

Comment [6]: It seems that they take on a customer support role at times.

Comment [7]: This description is very similar to descriptions of MIS jobs, meaning they must strongly go hand-in-hand.

managers who plan and direct an organization's IT department or IT policies are included in the profile on [computer and information systems managers](#).

The following are examples of types of software developers:

Applications software developers design computer applications, such as word processors and games, for consumers. They may create custom software for a specific customer or commercial software to be sold to the general public. Some applications software developers create complex databases for organizations. They also create programs that people use over the Internet and within a company's intranet.

Systems software developers create the systems that keep computers functioning properly. These could be operating systems for computers that the general public buys or systems built specifically for an organization. Often, systems software developers also build the system's interface, which is what allows users to interact with the computer. Systems software developers are creating the operating systems that control most of the consumer electronics in use today, including the systems in phones or cars.

Work Environment for Software Developers

Software developers held about 1.1 million jobs in 2014. The industries that employed the most software developers were as follows:

Computer systems design and related services	33%
Software publishers	8
Finance and insurance	8
Computer and electronic product manufacturing	8
Management of companies and enterprises	4

Many software developers work for firms that deal in computer systems design and related services firms or for software publishers. Some systems developers work in computer- and electronic product-manufacturing industries. Applications developers work in office environments, such as offices of insurance carriers or corporate headquarters.

In general, software development is a collaborative process, and developers work on teams with others who also contribute to designing, developing, and programming successful software. However, some developers telecommute (work away from the office).

Software Developer Work Schedules

Most software developers work full time, and long hours are common.

How to Become a Software Developer

Get the education you need: [Find schools for Software Developers near you!](#)

Software developers usually have a bachelor's degree in computer science and strong computer programming skills.

Software Developer Education

Software developers usually have a bachelor's degree, typically in computer science, software engineering, or a related field. A degree in mathematics is also acceptable. Computer science degree programs are the most common, because they tend to cover a broad range of topics. Students should focus on classes related to building software in order to better prepare themselves for work in the occupation. For some positions, employers may prefer a master's degree.

Although writing code is not their first priority, developers must have a strong background in computer programming. They usually gain this experience in school. Throughout their career, developers must keep up to date on new tools and computer languages.

Software developers also need skills related to the industry in which they work. Developers working in a bank, for example, should have knowledge of finance so that they can understand a bank's computing needs.

Other Experience

Many students gain experience in software development by completing an internship at a software company while in college.

Some software developers first work as computer programmers and then are given more responsibility as they gain experience. Eventually, they become developers.

Advancement for Software Developers

Software developers can advance to become information technology (IT) project managers, also called computer and information systems managers, a position in which they oversee the software development process.

Important Qualities for Software Developers

Analytical skills. Developers must analyze users' needs and then design software to meet those needs.

Comment [8]: No extra college courses needed, which is perfect for me.

Comment [9]: Education seems to be an ongoing process in Computer Science/Management, because the field is changing so much more quickly than other fields.

Communication skills. Developers must be able to give clear instructions to others working on a project. They must also explain to their customers how the software works and answer any questions that arise.

Computer skills. Developers must understand computer capabilities and programming languages in order to design effective software.

Creativity. Developers are the creative minds behind new computer software.

Detail oriented. Developers often work on many parts of an application or system at the same time and must therefore be able to concentrate and pay attention to detail.

Interpersonal skills. Software developers must be able to work well with others who contribute to designing, developing, and programming successful software.

Problem-solving skills. Because developers are in charge of software from beginning to end, they must be able to solve problems that arise throughout the design process.

Software Developer Salaries

The median annual wage for software developers, applications was \$95,510 in May 2014. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10 percent earned less than \$56,310, and the highest 10 percent earned more than \$149,480.

The median annual wage for software developers, systems software was \$102,880 in May 2014. The lowest 10 percent earned less than \$63,250, and the highest 10 percent earned more than \$154,800.

In May 2014, the median annual wages for software developers in the top industries in which they worked were as follows:

Computer and electronic product manufacturing	\$109,810
Software publishers	106,580
Finance and insurance	98,060
Computer systems design and related services	95,270
Management of companies and enterprises	94,890

Most software developers work full time, and long hours are common.

Comment [10]: Regardless of the industry, the salary of a software developer definitely will not be a problem to me.

Comment [11]: This is the only part that I am hesitant about. Even if the job is enjoyable, I'd rather have free time to work on other projects while I'm in the job.

Job Outlook for Software Developers

Employment of software developers is projected to grow 17 percent from 2014 to 2024, much faster than the average for all occupations. Employment of applications developers is projected to grow 19 percent, and employment of systems developers is projected to grow 13 percent. The main reason for the rapid growth in both applications developers and systems developers is a large increase in the demand for computer software.

The need for new applications on mobile devices and tablets will help increase the demand for application software developers.

The health and medical insurance and reinsurance carriers industry will need innovative software to manage new healthcare policy enrollments and administer existing policies digitally. As the number of people who use this digital platform increases over time, demand for software developers will grow.

Systems developers are likely to see new opportunities because of an increase in the number of products that use software. For example, more computer systems are being built into consumer electronics and other products, such as cell phones and appliances.

Concerns over threats to computer security could result in more investment in security software to protect computer networks and electronic infrastructure. In addition, an increase in software offered over the Internet should lower costs and allow more customization for businesses, also increasing demand for software developers.

Some outsourcing to foreign countries that offer lower wages may occur. However, because software developers should be close to their customers, the offshoring of this occupation is expected to be limited.

Software Developers Job Prospects

Job prospects will be best for applicants with knowledge of the most up-to-date programming tools and for those who are proficient in one or more programming languages.

Occupational Title	Employment, 2014	Projected Employment, 2024	Change, 2014-24	
			Percent	Numeri c
Software developers	1,114,000	1,300,600	17	186,600
Software developers, applications	718,400	853,700	19	135,300
Software developers, systems software	395,600	447,000	13	51,300

Comment [12]: Finding a job won't be a problem, confirming the statement of the first article.