



ANALYSIS OF 3 CAREER PATHS

WHY A CAREER IN SOFTWARE DEVELOPMENT, COMPUTER PROGRAMMING, OR SECURITY ANALYSIS IS A GREAT CAREER PATH

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For CSUF Computer Science Graduates
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Formal Report Project
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Attention: Steven Cooper

This report will provide an analysis of three possible career paths for recent computer science graduates. The three career paths covered are software development, computer programming, and security analysis. Software development seems to be the most sensible career path based on salary, job satisfaction, and positive future career trends.

The main topics of discussion in this report will include a brief overview of each career, detailed salary information, detailed job requirements, and future career trends. Finally, all main topics will be summarized by career choice, and a recommendation of software development will be discussed.

Most of the information in this report is based on data collected by the U.S Bureau of Labor Statistics, U.S News and World Report, Indeed Career Guide, and other sources found with the Google search engine.

Regards,

Daisy Catalan

A handwritten signature in black ink that reads "Daisy Catalan". The signature is written in a cursive, flowing style.

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Executive Summary

This report gives an in-depth analysis of 3 career choices for new computer science graduates. The three career paths listed in this report include possible careers as a software developer, computer programmer, or security analyst. Sources come from reputable organizations such as the U.S Bureau of Statistics, U.S. News and World Report, and more.

A software developer creates, designs, deploys, and maintains software applications and programs. Software applications are designed for many reasons. Software developers have a median pay of \$107,510 as of May 2019. The industry with the highest annual wages includes software publishers and manufacturing. A degree in computer science is required. Software developers usually work in office settings, remotely at home, or a mixture of the two. Software developers need to be able to work well in teams to meet project goals. Software usually works between 40 and 50 hours and can work overtime to meet project deadlines required a client or employer. Job outlook is excellent at a projected growth of 22% from 2019 to 2029. There are 1,469,200 software development jobs and there is a projected growth of 316,000 new positions. Software developers have an above average degree of flexibility, average stress levels, and high degree of career advancement and salary growth.

A computer programmer writes, tests, debugs, and maintains code given as projects by an employer, contractor, or government agency. A computer programmer mostly needs to worry about writing code, not other aspects of software application design. Computer programmers have a median pay of \$86,550 as of May 2019. The industries with the highest annual wages are in finance and insurance, and computer system design and related services. A degree in computer science is usually required. Some employers are willing to accept experience paired with other degrees or bootcamp attendance. Computer programmers usually work in office settings, remotely at home, or a mixture of the two. Computer programmers tend to work alone and branch out for help when necessary. Computer programmers usually works between 40 hours from 9 to 5 and can work overtime to meet project deadlines required a client or employer. Job outlook is poor at a projected decline of 9% from 2019 to 2029. There are 213,900 computer programming jobs and there is a projected decline of 20,100 lost job positions. Computer programmers have an average degree of flexibility, above average stress levels, and above average degree of career advancement and salary growth.

A security analyst protects clients from cyber-attacks and data breaches by implementing security practices, monitoring attacks, and responding to attacks. Security analysts have a median pay of \$99,730 as of May 2019. The industries with the highest annual wages are in finance and insurance, and computer system design and related services. A degree in computer science is usually required. Security analysts tend to work alongside the IT department with administrators and network engineers. Software analysts usually works more than 40 hours and must be on call to respond to any cybersecurity emergencies. Job outlook is excellent at a projected growth of 31% from 2019 to 2029. There are 131,000 security analyst jobs and there is a projected growth of 40,900 new job positions. Security analysts have below average degree of flexibility, above average stress levels, and above average degree of career advancement and salary growth.

Software developers are paid the highest and have more job positions available. Security Analyst have the highest levels of stress and worse work life balance. Software development and Computer Programming are relatively similar in work life balance. Security Analysts have the highest projected rate of growth.

Based on the information in this report, I recommend a career in software development as the best choice for most computer science graduates. The salary is excellent, future growth is higher than average, and job satisfaction is high.

Introduction

I have conducted an analysis of three computer science career paths. This introduction provides a project description, project scope description, and a report format.

Project Description

Research was conducted entirely online using the Google search engine. Information provided is based on data collected by the U.S Bureau of Labor Statistics, U.S. News and World Report, and Indeed Careers advisement. The target audience is computer science graduates in need of career guidance.

Project Scope

The purpose of this project is to present three possible career paths for computer science students and provide a ranked recommendation. The three career paths for this report include:

1. Software Development
2. Computer Programming
3. Security Analysis

This report has the following objectives in mind:

- Provide a brief description for each career path
- Provide detailed salary information for each career path and salary comparison
- Provide detailed career requirements that includes technical requirements, time commitment requirements, job satisfaction, and a final comparison based on difficulty ranked from easiest to hardest
- Provide information regarding career growth for each path
- Provide a final recommendation by ranking all three from most recommended to least recommended.

Report Format

This report includes five main sections

1. Career Path Overviews
2. Salary Information
3. Career Requirements
4. Future Career Trends
5. Conclusions and Recommendations

Career Path Overviews

A brief description will be provided for each career path. The three paths include a career as a software developer, computer programmer, or security analyst. In this section, only vital information will be included.

Software Developer Overview

A software developer creates, designs, deploys, and maintains software applications and programs. Software applications are designed for many reasons; Most importantly to meet client or business needs and provide needed services to users.

Median Pay	Career Requirements	Job Outlook	Number of Jobs	Unemployment Rate
<ul style="list-style-type: none">•\$107,510•\$51.69 per hour	<ul style="list-style-type: none">•Bachelor's degree•Ongoing Training	<ul style="list-style-type: none">•22%•2019 - 2029	<ul style="list-style-type: none">•1,469,200	<ul style="list-style-type: none">•1.4%

Figure 1: Key Information Regarding Software Development

The Median Salary was \$107,510 in May 2019. The lowest 10 percent made less than of \$64,240.

Most employers will require a degree in computer science, software engineering, or another closely related field degree. A degree will help with the fundamentals of software development, but on the job training and ongoing self-education will be necessary to stay competitive in the workforce.

Job outlook is excellent at a projected growth of 22% with the next 8 years, starting from 2021.

Currently, there are 1,469,200 jobs and a 22% growth will result in 316,000 new software developer positions.

The largest employers are from the computer systems designs and related services industry.

This information is based on data collected by the U.S. Bureau of Labor Statistics. ^[2]

Computer Programmer Overview

A computer programmer writes, tests, debugs, and maintains code given as projects by an employer, contractor, or government agency. A computer programmer mostly needs to worry about writing code, not other aspects of software application design.

Median Pay	Career Requirements	Job Outlook	Number of Jobs	Unemployment Rate
<ul style="list-style-type: none">•\$86,550•\$41.61 per hour	<ul style="list-style-type: none">•Bachelor's degree•Ongoing Training	<ul style="list-style-type: none">•-9%•2019 - 2029	<ul style="list-style-type: none">•213,900	<ul style="list-style-type: none">•2.7%

Figure 2: Key Information Regarding Computer Programming

The median salary was \$86,550 in May 2019. The lowest 10 percent made less than of \$50,150.

Most employers will require a degree in computer science, software engineering, or another closely related field degree. A bachelor's degree will give an aspiring computer programmer a complete edge against their peers, but an associate's degree, work experience, or boot camp completion may be sufficient for an entry level position. The most important requirement for computer programming is a specialization in the programming language(s) required by an employer.

Job outlook is poor at a projected decline of 9% with the next 8 years, starting from 2021.

Currently, there are 213,900 jobs and a 9% decline will result in a loss of 20,100 computer programmer positions.

The largest employers are from the computer systems designs and related services industry.

This information is based on data collected by the U.S. Bureau of Labor Statistics. ^[1]

Security Analyst Overview

A security analyst protects clients from cyber-attacks and data breaches by implementing security practices, monitoring attacks, and responding to attacks. A security analyst takes the lead on ensuring confidentiality, integrity, and availability of an employer's information systems and networks.

Median Pay	Career Requirements	Job Outlook	Number of Jobs	Unemployment Rate
•\$99,730 •\$47.95 per hour	•Bachelor's degree •Ongoing Training	•31% •2019 - 2029	•131,000	•2.7%

Figure 3: Key Information Regarding Security Analysis

The median salary was \$99,730 in May 2019. The lowest 10 percent made less than of \$57,810.

Most employers will require a degree in computer science, information technology, or another closely related degree. Employers prefer candidates with additional security certifications since computer security updates are common.

Job outlook is poor at a projected decline of 9% with the next 8 years, starting from 2021.

Currently, there are 113,00 jobs and a 31% increase will result in 40,900 new security analyst positions.

The largest employers are from the computer systems designs and related services industry.

This information is based on data collected by the U.S. Bureau of Labor Statistics. ^[7]

Salary Information

Detailed description of salary information for each career path. Information with include median pay, salary range, highest paying industries, and highest paying locations. A final comparison of the three career choices will be given.

Software Developer Salary Description

The median pay is **\$107,510** as of May 2019, and the lowest ten percent make less than \$64,240, while the highest ten percent make more than \$164,590. Future salary outlook projects a growth. The industry with the highest annual wage is with software publishers and the second highest is in Manufacturing. ^[2] The best paying states include California, New York, and Washington. ^[3] According to U.S News and World Report, the best paying cities include:

- San Jose, California
- New York, New York
- San Francisco, California
- Seattle, Washington

Computer Programmer Salary Description

The median pay for a computer programmer is **\$86,550** as of May 2019, and the lowest ten percent make less than \$50,150, while the highest ten percent make more than \$140,250. Future salary outlook projects a decline. The industry with the highest annual wage is with software publishers and the second highest is in finance and insurance. ^[1] The best paying states include California, Washington, and Massachusetts. ^[4] According to U.S News and World Report, the best paying cities include:

- *Seattle, Washington*
- *San Jose, California*
- *San Francisco, California*
- *Redding, California*

Security Analyst Salary Description

The median pay for a security analyst is **\$99,730** as of May 2019, and the lowest ten percent make less than \$57,810, while the highest ten percent make more than \$158,860. Future salary outlook projects a steady growth. The industry with the highest annual wage is in finance and insurance and the second highest is in computer system design and related services. ^[7] The best paying states include California, New York, and New Jersey. ^[9] According to U.S News and World Report, the best paying cities include:

- *San Jose, California*
- *New York, New York*
- *San Francisco, California*
- *Bridgeport, Connecticut*

Salary Comparison

Software development is the highest paying career, security analysis is the second highest paying career, and computer programming is the lowest paying career. All three careers are relatively similar in pay, so other factors such as job satisfaction may be more important to an individual.

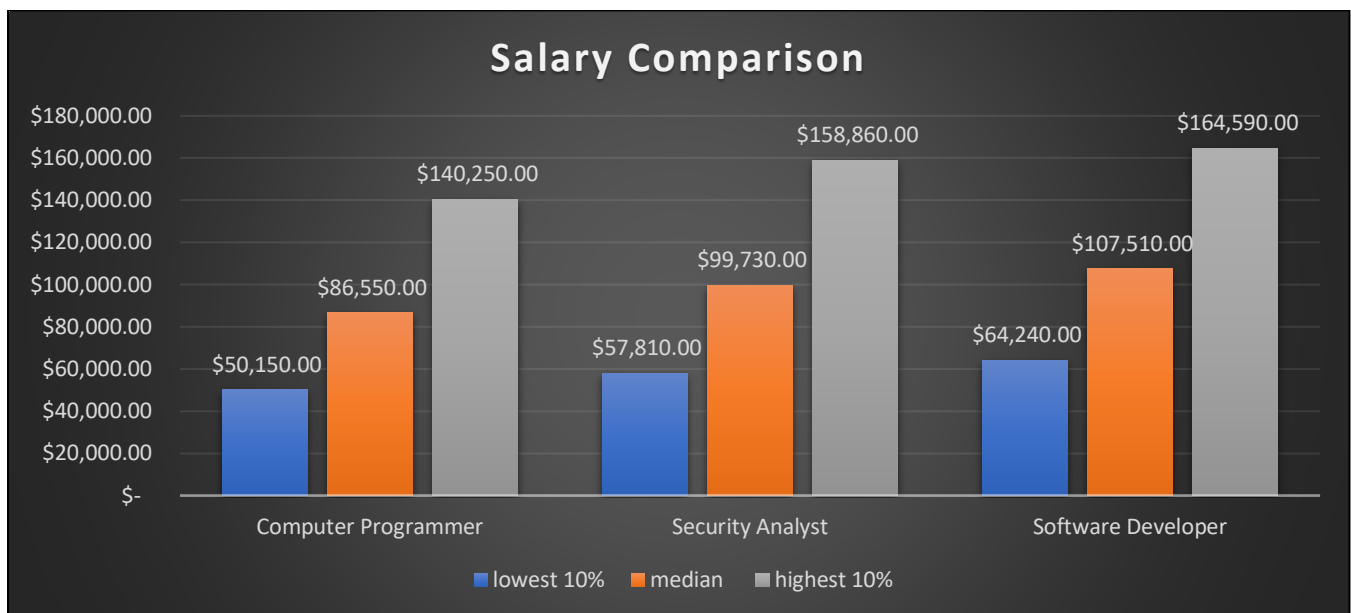


Figure 4: Salary Comparison Chart

Career Requirements

Relevant requirements that computer science students will need to apply for a specific career. Each career will describe technical requirements, work environment, time commitment, job satisfaction, and a final comparison ranked by observed difficulty.

Software Developer Career Requirements

A degree in computer science or a related degree is required for a career in software development. ^[2] A minor degree will help increase employment opportunities in specialized fields, but it is not commonly required. A computer science degree is necessary because it covers the fundamentals of computer science and usually has software development

specific classes to aid graduates in their careers. Usually, a master's degree and extensive experience is required for a leadership position. Ongoing training is necessary to meet the demands of an employer's specific development tools and processes. Certifications are helpful when job hunting for specialized positions. ^[6]

Software developers work in office settings, remotely at home, or a mixture of the two. Software developers work in teams to meet project goals. ^[3]

Software developers usually work 40-50 hours, and overtime can be required for meeting deadlines. ^[6]

As written by U.S. News and Media Report, software developers have an above average degree of flexibility, average degree of stress levels, and high degree of career advancement and salary growth. ^[3]

Computer Programmer Career Requirements

A degree in computer science or a related degree is usually required for a career in computer programming. ^[1] Some employers accept other degrees along with programming experience or bootcamp experience. A computer science degree will help computer programmers have an easier time at learning new languages and tools required by an employer. Certifications usually involve specific programming languages or tools. Certifications are not necessary but may be helpful when applying for a new job. ^[5]

Software programmers work in office settings, remotely at home, or a mixture of the two. Programmers tend to work alone, but still collaborate when necessary. ^[1]

Computer programmers usually work 40 hours from 9am to 5pm every weekday or self-dictated hours based on meeting project deadlines. ^[1]

As written by U.S. News and Media Report, program developers have an average degree of flexibility, above average degree of stress levels, and above average degree of career advancement and salary growth. ^[4]

Security Analyst Career Requirements

A degree in computer science or a related degree is required for a career in security analysis. A computer science degree will give security analysts fundamental knowledge on cybersecurity topics such as **cryptography** and **network security**. Certifications help validate knowledge of current best practices in cyber security, management proficiency, and more specific cyber security tasks. Certifications may be necessary depending on the job and are regarded highly by recruiters. ^[7]

Security Analysts work in office settings, usually in the **IT** department. Security analysts tend to work alongside network administrators, computer systems analysts, and possible the **IT** department of a business. ^[7]

Security analysts usually work more than 40 hours. A strict 9 to 5 workday is rare since security analysts must be on call for any cyber security emergencies that can occur at any moment. ^[9]

As written by U.S. News and Media Report, security analysts have a below average degree of flexibility, above average degree of stress levels, and above average degree of career advancement and salary growth. ^[9]

Career Requirements Comparison

Computer programmers are like software developers, but the scope of their job requirements and project handling is more limited. Programmers are mostly in charge of writing correct code and debugging. Software developers oversee more than just coding, they oversee the whole **life cycle of software application development**. Both computer programmers and software developers have a consistent work week; only working overtime to meet project deadlines. Security analysts are the emergency responders of the tech world and have a stricter work schedule. Security analysts must also be on call to respond to any disasters. The observed level of difficulty ranked from easiest to hardest is computer programming, software development, and finally security analysis.

Future Career Trends

Keeping up to date with new technology practices and programming tools will help boost job prospects in all three jobs. This section contains information on career prospect trends and rate of employment. Finally, a comparison will be given based on projected job growth.

Software Developer Career Prospect Trends

As of 2019, there are 1,469,200 software development jobs. Employment is expected to grow by 22 percent from 2019 to 2029. This growth translates to 316,000 new job openings. The projected growth can be attributed to an increased use of mobile devices, and an increased demand in digital policies, as well as new technology that will need software development. ^[2]

Computer Programmer Career Prospect Trends

As of 2019, there are 213,900 computer programming jobs. Employment is expected to decline by 9 percent from 2019 to 2029. This decline translates to 20,100 less job openings. The projected decline can be attributed to an increased use of overseas labor by U.S. Companies. The decline may be less severe since some companies have found that difficulties managing overseas employees offsets the lower wage salary savings. ^[1]

Security Analyst Career Prospect Trends

As of 2019, there are 131,000 security analyst jobs. Employment is expected to grow by 31 percent from 2019 to 2029. This growth translates to an increase in 40,900 new job openings. The projected growth can be attributed to an increased occurrence of cyber security attacks and data breaches. Another reason is an increased reliance on private digital documents such as medical records or financial information. ^[7]

Career Prospect Trends Comparison

All three careers still contain plenty of job openings for a recent graduate, so other key points may be more important in making a career decision.

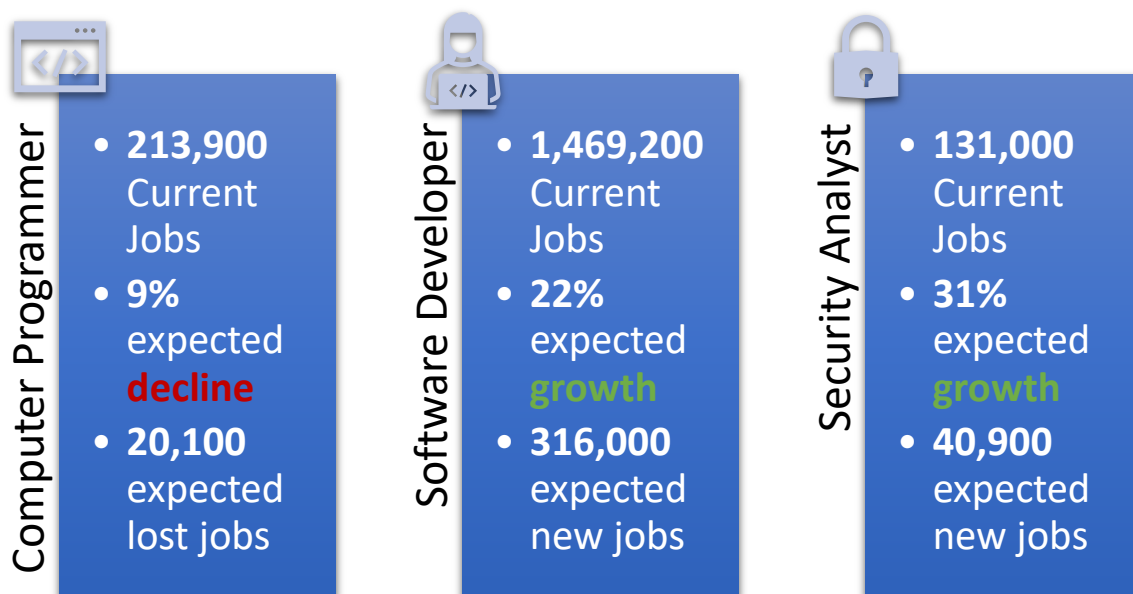


Figure 5: 2019 Job Figures, 19-2029 Rate of Growth: Percentage, 19-2029 Rate of Growth: Numeric

The careers ranked from least to highest rate of growth are computer programming, software development, and security analysis.

Conclusions and Recommendations

There are many possible computer science careers. This report gives an in-depth analysis of 3 career choices for new computer science graduates. The three career paths listed in this report include possible careers as a software developer, computer programmer, or security analyst. Information for this report was conducted entirely online using the Google search engine. This report was organized in March 2021, using sources no older than 2015. Sources come from reputable organizations such as the U.S Bureau of Statistics, U.S. News and World Report, and more. The following sections will give a full summary of each career path, a summary of career comparisons, and a final recommendation.

Software Developer Full Summary

This summary will provide key points for a software development career, detailed salary information, detailed career requirements, and future career trends.

A software developer creates, designs, deploys, and maintains software applications and programs. Software applications are designed for many reasons; Most importantly to meet client or business needs and provide needed services to users.

Software developers have a median pay of \$107,510 as of May 2019. The lowest 10 percent made less than \$64,240 and the highest ten percent made more than \$164,590. The industry with the highest annual wages includes software publishers and manufacturing. The best paying states are California New, York, and Washington. The best paying cities are San Francisco, New York, and Seattle, among others.

A degree in computer science, software engineering, or another closely related degree is required. A master's degree is commonly required for software development leadership positions. Certifications are not required but can help in obtaining entry to a specialized job position. Software developers usually work in office settings, remotely at home, or a mixture of the two. Software developers need to be able to work well in teams to meet project goals. Software usually works between 40 and 50 hours and can work overtime to meet project deadlines required a client or employer.

Job outlook is excellent at a projected growth of 22% from 2019 to 2029. There are 1,469,200 software development jobs and there is a projected growth of 316,000 new positions. The largest employers are from the computer systems designs and related services industry. The projected growth trend is due to an increased use of mobile devices, new digital policies, and new technologies in need of software development.

Software developers have an above average degree of flexibility, average stress levels, and high degree of career advancement and salary growth.

Computer Programmer Summary

This summary will provide key points for a computer programming career, detailed salary information, detailed career requirements, and future career trends.

A computer programmer writes, tests, debugs, and maintains code given as projects by an employer, contractor, or government agency. A computer programmer mostly needs to worry about writing code, not other aspects of software application design.

Computer programmers have a median pay of \$86,550 as of May 2019. The lowest 10 percent made less than \$50,150 and the highest ten percent made more than \$140,250. The industries with the highest annual wages are in finance and insurance, and computer system design and related services. The best paying states are California, Washington, and Massachusetts. The best paying cities are San Francisco, San Jose, and Seattle, among others.

A degree in computer science, software engineering, or another closely related degree is usually required. Some employers are willing to accept experience paired with other degrees or bootcamp attendance. Certifications are not required but can help in obtaining entry to a specialized job position. Computer programmers usually work in office settings, remotely at home, or a mixture of the two. Computer programmers tend to work alone, and branch out for

help when necessary. Computer programmers usually work between 40 hours from 9 to 5 and can work overtime to meet project deadlines required by a client or employer. Some programmers have a high degree in time flexibility, as long as project deadlines are met.

Job outlook is poor at a projected decline of 9% from 2019 to 2029. There are 213,900 computer programming jobs and there is a projected decline of 20,100 lost job positions. The largest employers are software publishers and the finance and insurance industry. The projected decline can be attributed to companies moving jobs overseas to pay lower salaries.

Computer programmers have an average degree of flexibility, above average stress levels, and above average degree of career advancement and salary growth.

Security Analyst Summary

This summary will provide key points for a security analyst career, detailed salary information, detailed career requirements, and future career trends.

A security analyst protects clients from cyber-attacks and data breaches by implementing security practices, monitoring attacks, and responding to attacks. A security analyst takes the lead on ensuring confidentiality, integrity, and availability of an employer's information systems and networks.

Security analysts have a median pay of \$99,730 as of May 2019. The lowest 10 percent made less than \$57,810 and the highest ten percent made more than \$158,860. The industries with the highest annual wages are in finance and insurance, and computer system design and related services. The best paying states are California, New York, and New Jersey. The best paying cities are San Francisco, New York, and Seattle, among others.

A degree in computer science, software engineering, or another closely related degree is usually required. Certifications are not required but can help in obtaining entry to a specialized job position. Software developers usually work in office settings. Security analysts tend to work alongside the IT department with administrators and network engineers. Security analysts usually work more than 40 hours and must be on call to respond to any cybersecurity emergencies.

Job outlook is excellent at a projected growth of 31% from 2019 to 2029. There are 131,000 security analyst jobs and there is a projected growth of 40,900 new job positions. The largest employers are in computer system and design industry and the finance and insurance industry. The projected growth can be attributed to an increase in cyber-attacks and data breaches.

Security analysts have below average degree of flexibility, above average stress levels, and above average degree of career advancement and salary growth.

Career Comparisons

Software developers are paid the highest and have more job positions available. Security analysts are paid the second highest and have the highest rate of future growth projections. Computer programmers are paid the lowest and is the only career of the three with a negative growth trend due to computer programming jobs being shipped overseas. Security Analysts have the highest levels of stress and worse work life balance. Software development and Computer Programming are relatively similar in work life balance, except that a software developer oversees the whole scope of an application project. Programmers are mostly in charge of meeting coding demands specified by employers. Security Analysts have the highest projected rate of growth. Software development is the second highest rate of growth while computer programming is projected to decline.

Career Recommendations

Based on the information in this report, I recommend a career in software development as the best choice for most computer science graduates. The salary is excellent, future growth is higher than average, and job satisfaction is high. Software programming and security analysis are still great career choices in 2021. If a recent graduate feels more comfortable working alone and prefers working on code more than other areas, then I would recommend a career in

computer programming. If a recent graduate is interested in working in cybersecurity, a security analyst is a great career choice. The student must be highly motivated and willing to be on call for any possible cyber security emergencies. Although there is a decrease in work life balance, security analysis can be rewarding to highly achieving individuals. A career in software development seems to be the best possible career path for recent computer science graduates.

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