Software Developer/ Quality Assurance Analyst/Tester

Snapshot

Career Cluster(s): Information Technology; Manufacturing; Science, Technology, Engineering & Mathematics

Interests: Software; Computers; Product Testing; Analysis

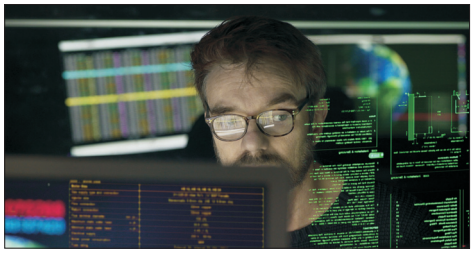
Earnings (Yearly Average): $110,140

Employment & Outlook: Much Faster Than Average Growth Expected

OVERVIEW

Sphere of Work

Software developers create the computer applications that allow users to do specific tasks and the underlying systems that run the devices or control networks. Software quality assurance analysts and testers design and execute software tests to identify problems and learn how the software works. These components are becoming more prominent in automobiles, especially in dashboard consoles and smartphone apps that control car functions.



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Work Environment

Software development takes place in office settings, and is a collaborative process with teams of people performing various duties to create the finished whole.

Occupation Interest

Software developers and quality assurance analysts and testers all have strong foundations in computer programming and coding, and apply that knowledge and interest in creating new software programs in different aspects of the process. They may have a specific interest in pushing the boundaries of technology in a specific industry, such as automotive.

Profile

Working Conditions: Inside Work
Physical Strength: Medium Work
Education Needs: Bachelor's Degree; Master's Degree
Licensure/Certification: Not Required
Opportunities for Experience: Coursework; Internship
Interest Score: ICR

Duties and Responsibilities

Software Developers

- Analyzing users' needs and then designing and developing software to meet those needs
- Recommending software upgrades for customers' existing programs and systems
- Designing each piece of an application or system and planning how the pieces will work together
- Creating a variety of models and diagrams showing programmers the software code needed for an application
- Ensuring that a program continues to function normally through software maintenance and testing
- Documenting every aspect of an application or system as a reference for future maintenance and upgrades

Software Quality Assurance Analysts and Testers

- Creating test plans, scenarios, and procedures for new software
- Identifying project risks and recommending steps to minimize those risks
- Implementing software testing, using either manual or automated programs and exploratory testing, and evaluate results
- Documenting and reporting defects or problems with software
- Providing feedback to software developers and stakeholders regarding usability and functionality

A Day in the Life—Duties and Responsibilities

Software developers, quality assurance analysts, and testers are involved in the entire process of creating a software program. Developers may begin by asking how the customer plans to use the software so that they can identify the core functionality the user needs. Software developers also determine other requirements, such as security. They design the program and then work closely with programmers, who write computer code. However, some developers write code themselves instead of giving instructions to programmers.

Software quality assurance analysts and testers design and execute systems to check the software for problems. As part of their testing, these workers document and track the software's potential defects or risks. They also assess its usability and functionality to identify difficulties a user might have. After completing testing, they

report the results to software or web developers and review ways to solve any problems they found.

After the program is released to the customer, a developer may perform upgrades and maintenance. Quality assurance analysts and testers run manual and automated checks to look for errors and usability problems once the software is released and after any upgrades or maintenance.

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.

OCCUPATION SPECIALTIES

Applications Software Developers
Applications software developers design computer applications, such as 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 databases or programs for use internally or online.

Software Engineers
Software engineers take a broad view of a project's system and software requirements, planning its scope and order of work. These workers may direct software developers, quality assurance analysts, and testers.

Systems Software Developers
Systems software developers create the operating systems for the public or specifically for an organization. These operating systems keep computers functioning and control most of the consumer electronics in use today, including those in cell phones and cars. Often, systems software developers also build the interface that allows users to interact with the computer.

WORK ENVIRONMENT

Immediate Physical Environment

Developing software is usually a collaborative process. As a result, developers, quality assurance analysts, and testers work on teams with others who also contribute to designing, developing, and programming successful software.

Most software developers, quality assurance analysts, and testers work full time.

Human Environment

Software developers and quality assurance analysts and testers must be able to maintain their focus and work with others for long periods during the development phase, and be meticulous about their testing during the end-phase and routine maintenance. Software is becoming ever more complex, and as these systems become more commonplace in everyday life, their safe and efficient operation is paramount. Developers and analysts must take direction from their clients, and may report to more senior developers.

Technological Environment

Software developers and quality assurance analysts and testers must be apprised of the latest developments in computer programming and software engineering in order to keep pace with trends, and the desires of their clients.

EDUCATION AND TRAINING

High School/Secondary

High school students interested in becoming software developers or quality assurance analysts or testers should concentrate on computer science, math, and other science-related courses, as well as participating in after-school computer activities to hone their skills. They should plan on attending college or university to further their knowledge of programming and software development.

Suggested High School Subjects

- Algebra
- Applied Physics
- Biology
- Calculus
- Chemistry
- Computer Programming
- Computer Science
- Earth or Life or Physical Science
- Economics
- English
- Geometry
- History

- Political Science
- Pre-calculus
- Trigonometry

Related Career Pathways/Majors

Information Technology Career Cluster

- Information Support & Services Pathway
- Programming & Software Development Pathway

Manufacturing Career Cluster

- Quality Assurance Pathway

Science, Technology, Engineering & Mathematics Career Cluster

- Engineering & Technology Career Pathway

Transferable Skills and Abilities

Analytical Skills

- Evaluating users' needs and then designing software to function properly and meet those needs

Communication Skills

- Giving clear instructions and explaining problems that arise to other team members involved in development
- Explaining to nontechnical users, such as customers, how the software works and answering any questions that arise

Creativity

- Being innovative in their approaches to designing, identifying problems with, and improving computer software

Detail-oriented

- Concentrating on many parts of an application or system at the same time, and paying attention to detail when looking for potential areas of user error

Interpersonal Skills

- Working well with others who contribute to designing, programming, and testing successful software

Problem-solving Skills

- Solving problems that arise throughout the design process

Postsecondary

Software developers, quality assurance analysts, and testers typically need a bachelor's degree in computer and information technology or a related field, such as engineering or mathematics. Computer and information technology degree programs cover a broad range of topics. Students may gain experience in software development by completing an internship, such as at a software company, while in college. For some software developer positions, employers may prefer that applicants have a master's degree.

Although writing code is not their primary responsibility, 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.

Related College Majors

- Business Administration
- Computer Science
- Data Science
- Entrepreneurship
- Information Technology
- Mathematics

- Software Development
- Software Engineering

Adult Job Seekers

Adults from related fields such as software engineering may be able to transition into development or analysis, however extensive coursework and practical experience may be required in order to gain familiarity with the coding and programming needed to perform the duties in this area.

EARNINGS AND ADVANCEMENT

Earnings of software developers, quality assurance analysts, and testers depend on their education and experience, employer, and the type of software being developed and tested. Median annual earnings of software developers, quality assurance analysts, and testers were $110,140 in 2020. The lowest 10 percent earned less than $65,210, and the highest 10 percent earned more than $170,100.

Software developers, quality assurance analysts, and testers may receive benefits such as paid vacations, holidays, and sick days; life and health insurance; and retirement benefits, usually paid by the employer.

Software developers can advance to become project management specialists or computer and information systems managers, positions in which they oversee the software development process.

EMPLOYMENT AND OUTLOOK

There were approximately 1,847,900 software developers, quality assurance analysts, and testers employed nationally in 2020. Employment is projected to grow 22 percent from 2020 to 2030, much faster than the average for all occupations.

The need for new applications on smart phones and tablets will help increase the demand for 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, quality assurance analysts, and testers will grow.

Software developers, quality assurance analysts, and testers are likely to see new opportunities because of an increase in the number of products that use software. For example, computer systems are routinely built into consumer electronics and other products, such as cell phones and cars.

Concerns over threats to computer security could result in more investment in security software to protect computer networks and electronic infrastructure.

Related Occupations

- Computer/Information Research Scientist
- Computer/Information Systems Manager
- Computer Hardware Engineer
- Computer Network Architect
- Computer Programmer
- Computer Support Specialist
- Computer Systems Analyst
- Database Administrator/Architect
- Information Security Analyst
- Mathematician/Statistician
- Postsecondary Teacher
- Web Developer/Digital Designer

MORE INFORMATION

American Society for Quality (ASQ)
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Milwaukee, WI 53201-3005
800.248.1946
asq.org

Association for Computing Machinery (ACM)
1601 Broadway, 10th Floor
New York, NY 10019-7440
212.869.7440
www.acm.org

Association for Software Testing (AST)
marketing@associationforsoftwaretesting.org
associationforsoftwaretesting.org

CompTIA
3500 Lacey Road, Suite 100
Downers Grove, IL 60515
866.835.8020
membership@comptia.org
www.comptia.org

Computing Research Association (CRA)
1828 L Street NW, Suite 800
Washington, DC 20036-4632
202.234.2111
cra.org

IEEE Computer Society
2001 L Street, NW, 700
Washington, DC 20036-4928
202.371.0101
help@computer.org
www.computer.org

National Center for Women & Information Technology (NCWIT)
1909 26th Street, 2nd Floor
Boulder, CO 80302
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info@ncwit.org
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Quality Assurance Association (QAA)
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Jacksonville, FL 32207
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154 Hansen Road, Suite 201
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Conversation With...

BRIAN THARP

Principal and co-founder
ZENxd, Santa Cruz, CA
Technology application design, 23 years

What was your individual career path in terms of education/training, entry-level job, or other significant opportunity?

I'm a principal and co-founder of a technology application design firm, but I didn't start in this field. I was a Fine Arts major at Arizona State University with an emphasis on printmaking. In the middle of my junior year, I left college. I was getting burned out because while a student I was working full-time to pay for school. I'd planned to take a break and return to college after earning more money to pay for it, but I never did. I realized there wasn't much opportunity in printmaking and instead I got a job designing circuit boards. I had a generous boss who taught me how to do the work. It was interesting, creative work that challenged me. Then I got a job testing software and networking equipment and learned about packet transfer and things I never expected to learn. I ended up setting up the company's intranet, and that's how I was introduced to web technology and design. As the industry evolved, so did a focus on human-centered design. That was my bridge back to my creative self. Before starting my company, I'd worked for more than a half dozen companies, designing systems that help people do things like comparison shop, or help businesses deploy campaigns faster, at lower costs and with higher interaction with their targeted audience.

In 2008, a colleague, Bill Daggett, and I partnered and founded ZENxd, a boutique UX Design firm. We are a distributed team, working from multiple locations, including Portland, Oregon, where I'm based, and Santa Cruz, California, where Bill is [based]. Bill and I had worked for a company called SideStep, Inc. where we designed the first application that allowed travelers to use a single website to search multiple sites for information on flights, lodging, car rental, guides, and deals. This was integrated into KAYAK's platform when KAYAK bought SideStep.

ZENxd designs applications for websites, mobile or any other type of device where there is human interaction required. We research users' needs, what they are looking for, how to engage them, and how long they interact with the applications. We focus on the human side, the users, and define strategies that help people solve a problem or reach a goal. Typically, a UX strategy defines several "digital touch points" that are needed to create a holistic experience. We just did a big project with Shutterfly. We helped redesign their manufacturing application

by unifying it into a single platform so it's easier for their workers to learn and operate. We work on projects that could be something as big as a whole production platform, to as small as a smart watch application.

I've always loved tackling big design problems. When you work for a company, the meaty problems get solved, and you are left to "maintain" the experience. I would get the itch to jump ship and find a new problem to solve. So, I co-founded ZENxd to ensure I'd always have new challenges and get to wear a lot of hats.

What are the most important skills and/or qualities for someone in your profession?
Understanding the fundamental principles of design is key to knowing how a design is perceived, how people will learn from it, how to make it more appealing and useful.

You don't need to learn everything; it's a matter of starting with your strengths. If you understand good design principles—visual, color—start with those.

A good application design also involves research. If you're inquisitive and a people person, you may want to focus on research. Start there and begin to broaden.

Empathy, active listening, observation, and curiosity are important traits. Think about the lived experience of someone who will use the application and how they perceive or understand the design.

You have to collaborate with people, facilitate and bring in different views. It's critical to communicate clearly with people who perform different functions of work on the project.

What do you wish you had known going into this profession?
How nebulous the profession would prove to be. Even today it's hard for people to understand what I do. People say "you make it look good" or "you make it look simple," and there's more to it. Making something look simple is extremely hard. Making design decisions is a challenge because you have lots of needs and resources that are in conflict.

Are there many job opportunities in your profession? In what specific areas?
There are a ton of opportunities, and they're becoming more specialized and diverse due to advances in technology and the proliferation of disparate devices. There are jobs that focus on user research, experience design (UX), visual design (UI), service design, design strategy, design leadership, etc. Areas to specialize in include mobile applications, voice enabled devices, augmented reality, artificial intelligence.

How do you see your profession changing in the next 5years? How will technology impact that change, and what skills will be required?
It's harder for companies to differentiate on technology. Today's consumers have grown up in a digital world. Technology has changed expectations. If a customer has a bad experience, another option is just a tap away. To maintain market share, companies have shifted their focus to customer engagement. As a result, Experience Design has become a critical component to achieving long-term success.

Voice assistance, machine learning, and artificial intelligence are becoming more predictive. We are focused on developing relationships, learning about the customer, and anticipating the customer's needs.

There's growing emphasis on healthy experiences—understanding an application's impact on the individual's well-being. How well did the experience promote healthy habits, or does it inhibit healthy habits? Thinking about well-being is a big part of what we do because we're designing for humans.

There's an overdue emphasis on design justice and inclusive design. We are hyper-focused on improving our methods and practices to ensure our designs produce quality experiences for as many people as possible. If you neglect a segment of the population, you miss reaching potential customers. You also risk damaging your brand if you lack the care to ensure your products are usable and accessible.

What do you enjoy most about your job? What do you enjoy least about your job?

I get to speak with and learn about people from all walks of life. It's fun, enlightening, and even emotional at times. It's my job to improve their lives, and that enriches me.

I like learning about a variety of topics. We've designed experiences in health care, travel, legal, production accounting—all kinds of domains. You're really trying to understand the industries and it's never boring.

What I enjoy least is feeling in a constant state of critique. As a designer, everything you produce is subject to evaluation and criticism. You must be prepared to provide a rationale for your designs. While critique can be hard, it continually presents opportunities for growth and improvement, so you learn to embrace it.

Can you suggest a valuable "try this" for students considering a career in your profession?

We all have that product or application that we hate to use. Find something you think could be better. Ask other people how they feel about it. Identify a problem for you to solve. Write down as many solutions you can think of. Sketch out your favorite. Test it. Refine it. There's no better way to learn than to just put it in practice. You can go to school, or go online to learn about it, but unless you're putting it to practice, you're not going to hone those skills. Nothing beats observing a problem, trying to understand it, and trying to solve it with other people.

This interview was originally published in 2021.

Conversation With...

JAY CORREIA

Founder and CEO
DreamCo Design, West Dundee, Illinois
Company owner, 11 years

What was your individual career path in terms of education/training, entry-level job, or other significant opportunity?

Simply put, I learned from experience. Every single day provides ample opportunity to learn. I didn't go to college. When I was 18 I wasn't 100 percent certain what, exactly, I wanted to do. I was leaning toward film school but a cosigner on a loan fell through and it never went any further. I contemplated other options but decided it made more sense financially to save money and learn via experience than go into debt without a specific career focus.

My first career-oriented position was with a digital printing company. I worked part-time during high school and though I began doing nothing more than making color copies, I ended up learning skills I still use to this day like Adobe Photoshop for graphic work.

I started DreamCo Design in 2006. After spending multiple years in the print/graphic design field, including working for a start-up, I came to the pragmatic realization that things were going digital. I was a self-taught/intern-taught graphic designer, a computer person, and full of ambition. I'd designed/developed a couple of successful websites and also excelled in sales related roles so I decided to fill a void by providing custom websites.

Within a couple of years, we reached the 7-figure mark for revenue. Our nationally recognized web/app/marketing agency has completed more than 1,500 projects for clients including Grammy Award winning musicians, TV personalities, the National Park Service, and a wide variety of small businesses.

In addition to marketing and web development, our company is, for example, currently developing social media platforms and apps. We've also done smaller networks that operate in a way similar to Facebook.

What are the most important skills and/or qualities for someone in your profession?

When being involved with social media, I think it's incredibly important to think like a business owner or decision maker. Social media is used as a reflection of an individual's or business' likeness. Having strong communication skills to extrapolate goals and deliver them digitally is a necessity.

What do you wish you had known going into this profession?
That no two clients are alike. While that may seem obvious, the amount of variance between the control some owners want to have as compared to the passiveness of others is striking.

Are there many job opportunities in your profession? In what specific areas?
There is a plethora of jobs in the social media industry.

Just as having a professional website is critical for most businesses, so is having a social media presence, especially for business-to-consumer (B2C) companies.

How do you see your profession changing in the next five years? How do you see platforms evolving? What skill sets will be required?
I think the concept of social media management will continue to grow, reaching maturity over the next decade.

Entrepreneurs are always dreaming up ideas that often involve social media. Privacy, issues involving who owns content, and users being paid for participating (whether real money, cryptocurrency, or other methods) will all likely play major roles in how the platforms evolve.

As basic as it sounds, having a general business understanding already helps. Social media management is a hybrid of putting technology to use for sales, branding, marketing, and public relations. In some cases, it is also customer service. Having a strong technological backbone will always be key.

What do you enjoy most about your job? What do you enjoy least about your job?
On the social media side, I enjoy seeing a campaign directly impact the success of a business or individual in a positive way. I least enjoy having to deal with unrealistic expectations. Not everything will go viral, no matter how much someone may want it to.

Can you suggest a valuable "try this" for a student considering a career in your profession?
Pick a company that you care about and develop a social media plan based around a hypothetical goal. For example, the goal might be "L.L.Bean wants to sell more boots while proving their boots outlast all of their competitors." With the goal in mind, choose the social media platforms you'd use to connect with consumers and plan the content accordingly. Think about every phase of carrying out the social media campaign. How are you going to get the content (photos, videos, etc.)? Are you going to schedule posts in advance? When are you going to post material? What demographics are you going to try to reach? How are you going to ensure that your strategy will help the company reach its goals?

Thinking through all these questions and putting a plan to paper is a great exercise that can also be hands on.

In addition to that, getting an internship with any marketing agency would also assist.

This interview was originally published in 2018.

Conversation With...

CRAIG KAHN

Software Developer, 34 years

What was your individual career path in terms of education, entry-level job, or other significant opportunity?

Although I have a bachelor's of arts degree, my education did not include any courses in computer science. I wish it had and I certainly recommend taking as many courses in computer science as possible if one's desired profession is to write software code. My education in software programming was strictly "on the job" at first, although I did take classes eventually. My first foray into programming came out of necessity. I was at a company that ran ski trips, via bus, to ski resorts in New England. We were dealing with multiple groups on multiple buses going to multiple resorts utilizing multiple rooms and types of lodging. In addition, some individuals needed rentals and/or lessons. This was 1979 and we were keeping track of all of this information by hand. The PC hadn't been invented yet (MS-DOS, the first popular operating system, had yet to be developed) but the desktop computer existed. It was actually the size of a desktop. Our company bought a dual 8" floppy disk drive computer running the CPM operating system. I learned how to program using a database program called dBase II.

Are there many job opportunities in your profession? In what specific areas?

I get the sense that there is a significant demand for programmers who can do more than merely write code. People are looking for programmers who can develop, or help develop, a complete application, including designing the user interface and developing the logic necessary for the program to work. The pure "coding" work seems to be going overseas.

What do you wish you had known going into this profession?

I wish I had taken classes and was more informed—there would have been less trial and error and I would have been up to speed much more quickly.

How do you see your profession changing in the next five years?

This is a tough one to call. My niche is developing small- to medium-scale applications for clients that want to move from keeping track of things on paper to being able to enter, retrieve and report on that information via computer. I think this will pretty much stay the same.

What role will technology play in those changes, and what skills will be required?

It's difficult to predict how the computer programming profession will change in the next five years. A lot will depend on the economy and the political environment, especially in regards to outsourcing. The good news is that certain types of programming cannot be shipped overseas because they require a lot of face-to-face meetings to go over and revise specifications. Basically, any development that would be considered "Agile Software Development," where requirements and solutions evolve over time as a result of working with others, would most likely need to be local.

As technology evolves, different skill sets will be needed. For example, 10 years ago a programmer didn't need to know much about web programming. These days it is essential to know how to develop for the desktop and for the web. I suspect that as smart phones become more powerful, and as tablets become more common, a requirement may be for an application to work among all platforms.

Do you have any general advice or additional professional insights to share with someone interested in your profession?

The most important requirement for a software developer is to be aware of what is going on in the world of technology and embrace the advances and changes. Even if you don't deem it necessary to learn how to use the newest technology, you should at least know it's out there and be ready to absorb and learn at a moment's notice.

Also, one of the things clients look for is someone with good communication skills—including being a good listener. If the choice is between two equally good coders, the one who the client feels can "get it"—and can explain what he or she is doing—will get the job.

Can you suggest a valuable "try this" for students considering a career in your profession?

I would suggest coming up with an idea for a program and spending time developing it in one's language of choice. Make mistakes and learn on your own time instead of on the client's time. If a potential client wants to know what you've developed in the past, you'll have something to show them.

This interview was originally published in 2015.