NYC Department of Education

Career Exploration Guide

Software Development Career Pathway

Information Technology Career Cluster

Summer 2018

What is software?

Computers and other smart devices are made up of hardware and software. **Hardware** includes all of the physical parts of a device, like the power supply, data storage, and microprocessors. **Software** contains instructions that are stored and run by the hardware. Other names for software are programs or applications.

Software includes operating systems—like Windows, Apple, and Google Android—and the applications that run on them— like word processors and games. Software applications can be run directly from a device or through a connection to the Internet.

What is Software Development?

Software development is the design and creation of software and is usually done by a team of people. In large businesses, people may specialize in a single function. In smaller businesses, people may take on multiple roles. Together, these functions make up "software development." They are:

Architects think about the purpose of the software and decide how to achieve it. Job titles in this field include software architect or solutions architect.

Developers create the software. They may do some programming, but they also may delegate some to programmers. They are called software developers or software engineers. Web developers can specialize in the front-end—or what users interact with—the back-end, or both. Web developers that do both are called full-stack developers.

Programmers enter the code that makes the software run using one or more programming languages. The language they use depends a great deal on the purpose of the software. Some programming languages are better suited to certain tasks. Programmers are also known as coders.

Quality Testers test the application to make sure it runs like it is supposed to. They are also called quality assurance (QA) analysts.

Designers create the look of the application. They also can be called user interface (UI) developers or designers. For web applications, designers are also involved in front-end development.

User Experience developers specialize in how the end user navigates through and experiences the application. They do a lot of testing with people to make sure that the software is easy to use and serves the intended purpose. They are sometimes called UX specialists or UI-UX developers.

Managers coordinate all of the people who are involved in the design and creation process. They delegate tasks and make sure the software gets completed on time and within budget. They are usually called IT Project Managers.

Software development teams may also include subject matter experts, writers, and sales and marketing professionals.

What Types of Software Can You Develop?

Web applications are websites that allow users to check email, share documents, and shop online, among other things. Users access them with a connection to the Internet through a web browser like Firefox, Chrome, or Safari. Web browsers are the platforms people use to find, retrieve, and display information online. Web browsers are applications too.

Enterprise software are off-the-shelf applications that are customized to the needs of businesses. Popular examples include Salesforce, a customer contact management system, and PeopleSoft, a human resources information system.

Mobile applications are programs that can be accessed directly through mobile devices like smart phones and tablets. Many mobile applications have web-based counterparts.

Desktop applications are programs that are stored on and accessed from a computer or laptop, like word processors and spreadsheets.

Where do Developers Work?

Software development happens in just about every industry. In New York City, the main ones are Information Technology (IT) Services and Solutions, Web Portals, and Software Publishing.

IT services and solutions companies like Cisco Systems, Data, Inc., and NTT Data hire people to develop and implement software and systems for clients or the general public.

Web portals bring information together from a variety of sources across the Internet to present to an end user. In New York City, Google, Yahoo, and Facebook are some of the biggest employers of software developers in this field.

Software publishers market, advertise, design and sell software. Many publishers employ developers to create the software in-house. A lot of New York City's tech start-ups are software publishers. The largest New York City employers in this field are Adobe, Salesforce, Oracle, and SAP.

Many other types of businesses need software developers. In fact, in New York City, most software developers work in places like **commercial and investment banks**, **television and cable broadcasting**, **online shopping**, and **hospitals**. Some of New York City's largest software development employers in these industries are JPMorgan Chase and Goldman Sachs in banking, CBS and NBC in broadcasting, Amazon and EBay in retail, and NYU Langone and Montefiore Hospitals.

Software Development Career Pathways

Where Can I Get More Information?

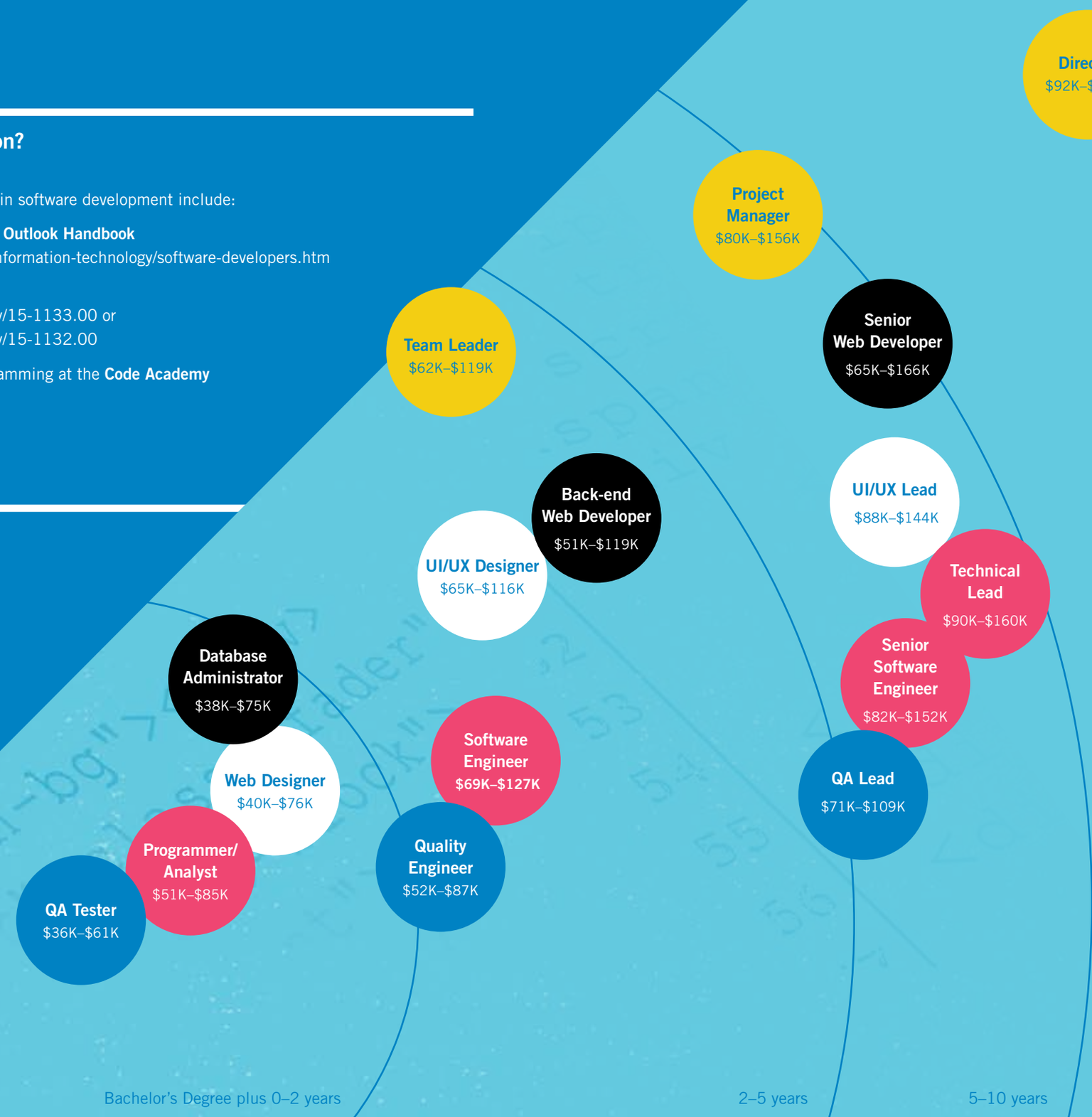
Some useful online tools to explore careers in software development include:

- **Bureau of Labor Statistics Occupational Outlook Handbook**
  https://www.bls.gov/ooh/computer-and-information-technology/software-developers.htm
- **O*NET Online**
  https://www.onetonline.org/link/summary/15-1133.00 or
  https://www.onetonline.org/link/summary/15-1132.00
- Beginners can explore coding and programming at the **Code Academy** online: https://www.codecademy.com/

Career Pathways

- Quality Assurance
- General Software Development
- User Interface-Front End
- Web Development
- Management

Salary ranges (in thousands) from Payscale.com, June 2017.



Quality Testing

Employers want entry-level testers to know SQL, Java, and a QA application called Selenium. It is helpful to understand the whole software development lifecycle, work well in teams, and have good problem-solving skills. Understanding and working with automation tools can help you advance in your career.

General Software Development

To get your first job as a developer, it helps to know Python, Ruby, or Perl and C++, C#, or Java. It will be helpful to have some knowledge of database management systems like Oracle or SQL Server. Communication skills and creativity will help you to advance in your career.

Front-End Web Development

If you use tools like WordPress and Bootstrap, you don't have to learn how to code, too. Most employers want candidates to know hypertext markup language (HTML), cascading style sheets (CSS), and JavaScript. HTML creates a web page's skeleton; CSS makes it look professional; and JavaScript makes it interactive. Adobe Photoshop and Illustrator are also helpful tools.

Back-End Web Development

Python and JavaScript are the most in-demand languages for back-end development. It's also important to know how to build and query databases with a structured query language like MySQL, NoSQL, or SQL. To advance, it is helpful to have good project management skills too.

Management

With the right skills and experience (usually, three to five years) you can choose to move into a management track from any specialization. You will need to show hat you have leadership potential, excellent written and oral communications, and planning and problem-solving skills.

How do I Get My Foot in the Door?

There are a few ways to become a software developer, but the best route includes the following steps:

Keep studying math. Software development often involves coming up with mathematical solutions to computing problems, so, it's important to have a good grasp of advanced math concepts.

Learn how to code. Even though developing software is more than coding, it will be important to know at least two or three languages very well. Some of the most in-demand languages in New York City include Java, JavaScript, Python, C#, and C++.

Create applications. Once you learn how to code, you should design and develop at least one product. It could be a website, a mobile app, or even a game. Employers appreciate practical experience just as much as good grades and lots of knowledge.

Get an internship. Internships are the best way to get trained and gain practical experience looking for a software development job.

Get a bachelor's degree. Most developers have four-year degrees in software engineering or computer engineering. If you major in Computer Science, make sure to complement your studies with practical experience. If you major in Computer Information Systems or Information Technology, make sure you take courses on the principles of computing. It is possible to get a developer job without the bachelor's degree, but you may earn less or have fewer responsibilities.

Would I Like to be a Software Developer?

There are many websites where you can go to explore what you like and what you are good at. Some useful tools include:

- O*NET Interest Profiler
  www.mynextmove/explore/ip
- Careerwise
  www.careerwise.mnscu.edu/careers/interestProfiler
  www.careerwise.mnscu.edu/careers/clusterAs-sessment
- Careerinfonet
  www.careerinfonet.org/skills/skills

Below are a few traits that you typically find in software developers that could also help you decide if this career is right for you.

Problem-solving. A lot of people overlook problems in the course of any given day. Software developers tend to be the people who see the problems when others don't and who then actively work to solve them.

Logical. If you are able to create arguments with sound logic, you have another skill important to software development.

Strategic. If you enjoy envisioning how different decisions lead to different conclusions, you have another interest that is critical to software development. A lot of software developers like to play strategy games like chess.

Social. Even though a lot of people think of software developers as introverts or loners, software development is a social field. Software is almost always developed by interdisciplinary teams.

Where Would I Go to School to Prepare for a Career in Software Development?

NEW YORK CITY HIGH SCHOOLS	CTE PROGRAM NAME
BRONX	
Academy for Language and Technology	Academy for IT/Computer Science
Bronx Academy for Software Engineering	Software Engineering
Herbert H. Lehman High School	Information Technology
BROOKLYN	
Academy of Innovative Technology	Information Technology/Game Systems Design
James Madison High School	Academy of Information Technology
MANHATTAN	
Academy for Software Engineering	Software Engineering
Inwood Early College for Health Information Technologies	Information Technology
Manhattan Bridges High School	Academy of Information Technology
Manhattan Early College for Advertising	Computer Programming
Urban Assembly Maker Academy	Computer Engineering Technologies
Urban Assembly Maker Academy	Computer Software and Media Applications
QUEENS	
Bayside High School	Computer Programming
Business Technology Early College High School	Computer Science and Technology
Grover Cleveland High School	Academy of Information Technology
The Young Women's Leadership School of Astoria	Software Engineering/Web Design

CITY UNIVERSITY OF NEW YORK	RELATED CONTINUING EDUCATION PROGRAMS			DEGREE PROGRAMS		
	Data-base	Design	Programming and Development	Associate	Bachelor's	Master's
BRONX						
Bronx Community College		●	●	●		
Herbert H Lehman College		●		●	●	●
BROOKLYN						
Brooklyn College					●	●
Kingsborough Community College				●		
Medgar Evers College		●		●		
New York City College of Technology		●		●	●	
MANHATTAN						
Baruch College	●	●	●		●	●
Borough of Manhattan Community College	●		●	●		
City College			●		●	●
Graduate School and Community Center					●	
Hunter College					●	
John Jay College		●	●		●	
School of Professional Studies					●	
QUEENS						
LaGuardia Community College	●		●	●		
Queens College					●	●
Queensborough Community College		●		●		
York College					●	
STATEN ISLAND						
College of Staten Island	●	●	●		●	●

Accurate as of Summer 2017