

Unit IV: Looking Forward: Careers & Technology

Chapter 18: Technology Careers

18.1: Goal

In this chapter, you will explore the wide variety of careers available in the technology field. You will learn about different career paths, the education and skills they require, and the opportunities available across many industries. Whether you plan to work directly in technology or use technology in another profession, this chapter will help you prepare for lifelong learning and career success.

18.2: Objectives

- Describe the wide variety of careers available in information technology.
- Explain the responsibilities of common technology professionals.
- Compare technical and nontechnical roles in IT.
- Identify the education, certifications, and skills needed for different technology careers.
- Explain the importance of communication, teamwork, ethics, and lifelong learning in technology professions.
- Explore career paths that align with their interests and strengths.

18.3: Think About It

When most people picture someone working in technology, they imagine a programmer writing code late into the night. But modern technology projects involve many different professionals. If a hospital wants a new patient scheduling system or a business needs a secure website, who decides what the software should do? Who designs the user interface? Who protects the data? Who trains employees to use the new system?

18.4: Opening Scenario

Jordan enjoys technology but isn't sure that becoming a programmer is the right fit. In a computer concepts course, Jordan discovers that technology careers include cybersecurity, networking, data analysis, systems analysis, technical writing, user experience design, and project management. After talking with professionals and researching career options, Jordan realizes that strong communication and problem-solving skills can be just as valuable as programming.

18.5: Why This Chapter Matters

Technology is one of the fastest-growing career fields, but not every technology professional performs the same work. Some write software, while others design networks, analyze data, manage projects, secure

information systems, or help organizations use technology more effectively. Understanding these careers can help you make informed decisions about your education, career goals, and future opportunities.

18.6: The World of Information Technology

Every day, people use technology to communicate, learn, shop, travel, receive medical care, manage finances, and entertain themselves. Behind these technologies are teams of professionals who design, build, secure, maintain, and improve the systems that modern society depends upon.

The field of **Information Technology (IT)** includes the people, hardware, software, networks, and data that organizations use to collect, store, process, and share information. Technology professionals work in nearly every industry, including healthcare, education, business, manufacturing, government, finance, entertainment, transportation, and nonprofit organizations.

Unlike many professions that focus on a single specialty, information technology offers a wide variety of career paths. Some professionals spend most of their day writing software, while others analyze business problems, design computer networks, protect systems from cyberattacks, manage databases, create websites, train users, or oversee technology projects.

One of the greatest strengths of the technology field is that it offers opportunities for people with different interests, personalities, and skills.

18.7: Systems Analyst

Why Systems Analysis Is Important

Many people assume that everyone who works in software spends all day writing computer code. In reality, successful software projects require professionals with a wide variety of skills. Some team members specialize in programming, while others focus on understanding users, organizing projects, designing user interfaces, testing software, or protecting data.

Systems analysts play a key role because they serve as a bridge between users and programmers. They work with customers to understand problems, gather requirements, and recommend technology solutions. Although systems analysts need a solid understanding of technology, they also rely heavily on communication, teamwork, interviewing, and problem-solving skills.

For students who enjoy working with people as much as they enjoy technology, systems analysis can be an excellent career choice.

Career Spotlight: Systems Analyst

What They Do

Systems analysts study how organizations use technology and recommend ways to improve business processes through information systems. They work with users, managers, and software developers to design solutions that meet organizational needs.

Typical Responsibilities

- Interview users and stakeholders
- Observe existing business processes

- Gather and document requirements
- Recommend technology solutions
- Create process diagrams and system specifications
- Work with programmers during software development
- Help test and implement new systems

Skills Needed

Technical Skills

- Understanding information systems
- Basic programming concepts
- Data analysis
- Database fundamentals
- Business software

People Skills

- Communication
- Active listening
- Interviewing
- Teamwork
- Problem solving
- Critical thinking
- Presentation skills
- Project organization

Education

Many systems analysts earn degrees in Information Systems, Information Technology, Computer Science, Business Information Systems, or related fields.

18.8: Technology Is Everywhere

Many people associate technology careers with large software companies, but information technology professionals work in organizations of every size. Examples include:

- Hospitals use technology to manage patient records and medical equipment.

- Schools rely on learning management systems, classroom technology, and online learning platforms.
- Banks protect financial information and process millions of transactions every day.
- Manufacturers use automation and robotics to improve production.
- Retail businesses manage inventory, online sales, and customer loyalty programs.
- Government agencies use technology to provide public services and protect critical infrastructure.

No matter where you work, technology has become an essential part of daily operations.

18.9: Technology Is a Team Sport

Movies often portray programmers working alone in dark rooms, writing code for hours without interacting with anyone. In reality, most technology projects are highly collaborative.

Consider the development of a mobile banking app. A successful project may involve:

- A systems analyst who gathers requirements from bank employees and customers.
- A UX designer who creates an intuitive and accessible interface.
- Software developers who build applications.
- Database administrators who organize customer data.
- Cybersecurity specialists who protect sensitive financial information.
- Quality assurance testers who identify and report problems.
- Project managers who coordinate schedules and resources.
- Technical writers who create documentation and training materials.

Each team member contributes unique knowledge and skills. Successful technology projects depend on collaboration, communication, and mutual respect.

18.10: Technical Skills and People Skills

Technology professionals need strong technical knowledge, but technical skills alone are not enough. Employers consistently value professionals who can communicate clearly, solve problems, work effectively with others, and adapt to changing technologies.

The table below compares examples of technical skills and professional (or "people") skills commonly used in technology careers.

Technical Skills	Professional Skills
Programming	Communication
Networking	Teamwork
Cybersecurity	Active listening

Database management	Problem solving
Cloud computing	Critical thinking
Data analysis	Adaptability
Artificial intelligence	Time management
Hardware troubleshooting	Leadership>
Web development	Customer service
System administration	Ethical decision-making

Many successful technology professionals say that their ability to communicate with users and coworkers is just as important as their technical expertise.

18.11: Lifelong Learning

Technology changes rapidly. New programming languages, cybersecurity threats, artificial intelligence tools, cloud services, and hardware platforms appear every year.

Because of this, technology professionals are lifelong learners. They regularly:

- Complete training courses.
- Earn professional certifications.
- Attend conferences and workshops.
- Read technical publications.
- Participate in professional organizations.
- Learn new software and programming languages.

Continuous learning helps technology professionals remain effective throughout their careers.

18.12: Finding the Right Career

There is no single "best" technology career. The right choice depends on your interests, strengths, and goals. Ask yourself questions such as:

- Do I enjoy solving technical problems?
- Do I like working directly with people?
- Am I interested in creativity and design?
- Do I enjoy analyzing data?
- Do I prefer planning projects or building solutions?
- Do I like learning new technologies?

Answering these questions can help you identify technology careers that match your skills and interests. As you read the rest of this chapter, remember that technology is a broad and diverse field. Whether you enjoy programming, design, communication, security, teaching, or business, there may be a technology career that is a good fit for you.

18.13: Technology in Practice

A community hospital may employ dozens of technology professionals. Some maintain the network, others support electronic health records, cybersecurity specialists protect patient information, database administrators manage medical data, and systems analysts work with doctors and nurses to improve software used for patient care. Although their responsibilities differ, they all work together to support the hospital's mission.

18.14: Software Development Careers

Every application, website, video game, and mobile app begins as an idea. Turning that idea into working software requires the creativity, technical knowledge, and teamwork of software developers.

Software developers design, build, test, and maintain computer programs that solve problems or provide useful services. Some develop applications used by millions of people around the world, while others create specialized software for a single business, hospital, or government agency.

Although software developers spend time writing code, programming is only one part of their job. They also work with systems analysts, designers, testers, cybersecurity specialists, project managers, and clients to create software that is reliable, secure, and easy to use.

What Does a Software Developer Do?

Software developers transform requirements and design documents into working computer programs. Typical responsibilities include:

- Writing and testing program code
- Designing software features
- Finding and fixing errors (bugs)
- Updating existing applications
- Improving performance
- Collaborating with other team members
- Documenting their work
- Participating in code reviews

Most developers work on projects as part of a team rather than independently.

Types of Software Developers

Software development offers many specialized career paths. Although these roles share common programming skills, each focuses on different types of software and technologies.

Application Developer

Application developers create software that helps people perform specific tasks.

Examples include:

- Word processors
- Accounting software
- Medical record systems
- Educational applications
- Banking software

These programs may be installed on computers or delivered through the web.

18.15: Mobile App Developer

Mobile app developers create applications for smartphones and tablets.

Examples include:

- Fitness tracking apps
 - Banking apps
 - Navigation apps
 - Social media platforms
 - Educational apps
- Mobile games

Because mobile devices vary in size and operating system, developers must ensure that applications function well on many different devices.

18.16: Game Developer

Game developers combine programming with creativity to build interactive entertainment. A game development team may include:

- Programmers
- Artists
- Animators

- Sound designers
- Writers
- User experience designers
- Quality assurance testers

Developing a modern video game often requires hundreds of professionals working together over several years.

18.17: Artificial Intelligence Developer

Artificial intelligence (AI) developers create software that enables computers to learn from data, recognize patterns, generate content, and make predictions. Examples include:

- Virtual assistants
- Language translation systems
- Recommendation engines
- Medical diagnostic tools
- Self-driving vehicle technology

AI developers often work closely with data scientists, machine learning engineers, and software developers to create intelligent applications.

18.18: Working as a Development Team

Working as a Development Team

Large software projects involve many professionals working together.

Consider the development of an online learning platform.

A systems analyst gathers requirements from teachers and students.

A UX designer creates an intuitive interface.

Software developers build the application.

Database administrators manage student records.

Cybersecurity specialists protect user accounts.

Quality assurance testers identify software defects.

Project managers coordinate schedules and resources.

Each role contributes specialized knowledge that helps create a successful product.

18.19: Tools Used by Software Developers

Software developers use a variety of professional tools to create and maintain software.

Common tools include:

- Integrated Development Environments (IDEs)
- Version control systems such as Git
- Bug tracking software
- Automated testing tools
- Cloud development platforms
- Collaboration software
- Artificial intelligence coding assistants

These tools help development teams collaborate efficiently and produce higher-quality software.

18.20: Education and Skills

Software developers typically study computer science, software engineering, information technology, or related disciplines.

However, employers also value practical experience gained through internships, personal projects, opensource contributions, and software portfolios.

Successful developers combine technical expertise with strong professional skills.

Technical Skills

- Programming languages
- Algorithms
- Data structures
- Databases
- Software testing
- Version control
- Cloud technologies

Professional Skills

- Communication
Teamwork
- Problem solving

- Adaptability
- Creativity
- Time management
- Ethical decision-making

Technology changes rapidly, so successful developers continue learning throughout their careers.

18.21: Network Administrator

What They Do

A **Network Administrator** designs, installs, monitors, and maintains an organization's computer network. Their goal is to ensure that computers, printers, wireless devices, servers, and internet connections communicate efficiently and securely.

Whether supporting a small business or a large university, network administrators help keep employees connected and productive.

Typical Responsibilities

Network administrators may:

- Install and configure network hardware
- Manage wired and wireless networks
- Monitor network performance
- Troubleshoot connectivity problems
- Configure firewalls and network security
- Manage user access to network resources
- Upgrade network equipment
- Document network configurations

Where They Work

Network administrators work in organizations of every size, including:

- Schools and colleges
- Hospitals
- Businesses
- Government agencies
- Manufacturing companies
- Financial institutions

- Internet service providers

Education and Certifications

Many network administrators begin with an associate or bachelor's degree in Information Technology, Networking, or Computer Science.

Industry certifications are commonly used to demonstrate technical knowledge. Examples include networking and vendor-specific certifications offered by major technology companies.

Technical Skills

- TCP/IP networking
- Routers and switches
- Wireless networking
- Network security
- Troubleshooting
- Virtual private networks (VPNs)
- Network monitoring tools

Professional Skills

- Problem solving
- Communication
- Organization
- Patience
- Teamwork
- Attention to detail

Career Profile

Best Fit For

People who enjoy solving technical problems, working with hardware, and understanding how computers communicate across networks.

18.22: Systems Administrator

What They Do

A **Systems Administrator** manages the servers, operating systems, and user accounts that organizations depend on every day. They ensure that computers and servers remain reliable, secure, and available. While network administrators focus primarily on connections between devices, systems administrators focus on the computers and servers that provide important services.

Typical Responsibilities

Systems administrators commonly:

- Install and update operating systems
Create user accounts and permissions
- Manage servers
- Perform system backups
- Monitor system performance
- Install software updates
- Troubleshoot server problems
- Plan disaster recovery procedures

Where They Work

Systems administrators are employed by:

- Businesses
- Universities
- Hospitals
- Government agencies
- Data centers
- Cloud service providers

Education and Certifications

Preparation typically includes an associate or bachelor's degree in Information Technology, Information Systems, or Computer Science. Many employers also value certifications related to operating systems, virtualization, or cloud technologies.

Technical Skills

- Windows Server
- Linux
- Virtualization
- User account management
- Backup and recovery

- System monitoring
- Automation tools

Professional Skills

- Organization
- Critical thinking
- Communication
- Dependability
- Time management

Career Profile

Best Fit For

People who enjoy maintaining reliable computer systems, solving technical problems, and keeping technology running efficiently.

18.23: Cloud Engineer

What They Do

Many organizations now store applications and data in the **cloud** instead of maintaining all of their own servers. A **Cloud Engineer** designs, implements, and manages these cloud-based systems.

Cloud engineers help organizations choose cloud services, migrate existing systems, monitor performance, and ensure that cloud resources remain secure and cost-effective.

Typical Responsibilities

Cloud engineers often:

- Design cloud infrastructure
- Migrate applications to the cloud
- Manage virtual servers
- Monitor cloud performance
- Automate routine tasks
- Improve system reliability
- Control cloud costs
- Collaborate with developers and cybersecurity teams

Where They Work

Cloud engineers work for:

- Technology companies
- Businesses
- Healthcare organizations
- Government agencies
- Financial institutions
- Cloud service providers

Education and Certifications

Cloud engineers often have degrees in Information Technology, Computer Science, or related fields. Many also pursue certifications offered by major cloud providers to demonstrate expertise with cloud platforms and services.

Technical Skills

- Cloud computing
- Virtual machines
- Storage services
- Networking
- Automation
- Security
- Scripting

Professional Skills

- Communication
- Adaptability
- Problem solving
- Teamwork
- Planning
- Continuous learning

Career Profile

Best Fit For

People who enjoy designing large-scale technology solutions and learning rapidly changing technologies.

18.24: Cybersecurity Analyst

Every day, organizations store enormous amounts of sensitive information, including financial records, medical histories, business plans, and personal data. Protecting this information is one of the most important responsibilities of today's technology professionals.

Cybersecurity professionals work to prevent unauthorized access to computer systems, detect potential threats, respond to security incidents, and help organizations recover from attacks. Their work protects not only computers and networks but also the people and organizations that depend on them.

As technology has become more connected, cybersecurity has become one of the fastest-growing and most important areas of information technology.

Cybersecurity Analyst

What They Do

A **Cybersecurity Analyst** helps protect an organization's computer systems, networks, and data from cyber threats. They monitor systems for suspicious activity, investigate security alerts, identify vulnerabilities, and recommend ways to improve security.

Rather than waiting for attacks to occur, cybersecurity analysts work proactively to reduce risks before problems develop.

Typical Responsibilities

Cybersecurity analysts may:

- Monitor network and system security
- Investigate suspicious activity
- Respond to security incidents
- Install and manage security software
- Conduct vulnerability assessments
- Recommend security improvements
- Help develop security policies
- Train employees on cybersecurity best practices

Where They Work

Cybersecurity analysts are employed by organizations of every size, including:

- Financial institutions
- Hospitals
- Government agencies
- Colleges and universities
- Technology companies

- Manufacturers
- Retail businesses • Consulting firms

Nearly every organization that stores digital information needs cybersecurity professionals.

Education and Certifications

Many cybersecurity analysts begin with an associate or bachelor's degree in Cybersecurity, Information Technology, Computer Science, or Information Systems.

Employers often value industry certifications that demonstrate knowledge of cybersecurity concepts, risk management, and security operations. Because cyber threats continually evolve, cybersecurity professionals participate in ongoing training throughout their careers.

Technical Skills

- Network security
- Operating systems
- Firewalls
- Security monitoring
- Vulnerability assessment
- Incident response
- Risk management
- Basic scripting

Professional Skills

- Critical thinking
- Problem solving
- Attention to detail
- Communication
- Ethical decision-making
- Teamwork
- Continuous learning

Career Profile

Best Fit For

People who enjoy solving complex problems, investigating unusual activity, protecting information, and staying current with rapidly changing technology.

18.25: Data Analyst, Data Scientist, and AI Engineer

Every day, organizations collect enormous amounts of data. Businesses analyze customer purchases, hospitals study patient outcomes, governments monitor public services, and scientists examine research data. Hidden within these data are patterns that can help organizations make better decisions.

Professionals who work with data transform raw information into meaningful insights. Some analyze existing data to answer questions, while others build artificial intelligence systems that can recognize patterns, make predictions, or generate new content.

As organizations increasingly rely on data-driven decision making, careers in data science and artificial intelligence continue to grow.

Data Analyst

What They Do

A **Data Analyst** collects, organizes, and analyzes data to help organizations make informed decisions. Rather than developing artificial intelligence systems, data analysts focus on answering business questions by examining existing data.

For example, a retailer might ask:

- Which products sell best during the holiday season?
- What time of day do customers shop most often?
- Which advertising campaign generated the most sales?

A data analyst uses data to answer these questions and communicate the results clearly.

Typical Responsibilities

Data analysts commonly:

- Collect data from multiple sources
- Clean and organize data
- Create charts and dashboards
- Identify trends and patterns
- Prepare reports
- Present findings to managers
- Support business decision making

Where They Work

Data analysts work in many industries, including:

- Healthcare
- Finance
- Retail
- Education
- Government
- Manufacturing
- Marketing
- Sports organizations

Education and Certifications

Many data analysts earn degrees in Data Analytics, Information Systems, Computer Science, Statistics, Mathematics, Business, or related fields.

Employers often value experience with spreadsheet software, databases, data visualization tools, and programming languages used for data analysis. **Technical Skills**

- Spreadsheets
- Databases
- SQL
- Data visualization
- Basic statistics
- Programming for data analysis

Professional Skills

- Critical thinking
- Communication
- Problem solving
- Organization
- Attention to detail

Career Profile

Best Fit For

People who enjoy solving puzzles, working with numbers, identifying patterns, and helping organizations make better decisions.