Education that's transforming lives and communities

Technology Essentials – Resource Guide

Bank of America's training and professional development organization dedicated to the growth and success of our local communities and teammates

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Overview

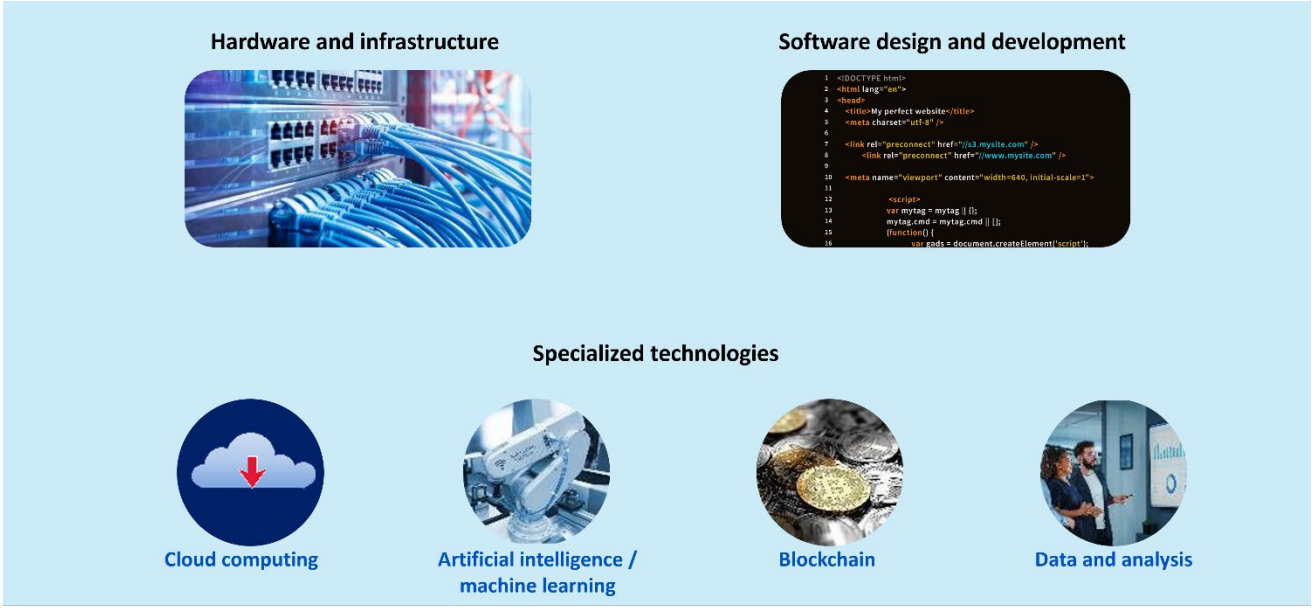
Description

This **Technology Essentials** guide will serve as a resource to provide you with ways to learn more about technology and pursue your technology goals. This guide is ideal for individuals looking to elevate their technical awareness in order to learn more about career opportunities, get help with their current careers or foster personal enrichment.

Technology Essentials explores what you can do with **information technology (IT)** as part of a larger **information system**.

Information systems are an integrated set of hardware, software and databases, as well as the people and processes involved with the collecting, storing and processing of information.

Generically, we will consider **information technology (IT)** to be the technology used in creating, maintaining, and making information accessible. For IT to be successful, it has to be part of an information system.



Introduction

This guide includes exercises and resources for the following:

- Hardware and infrastructure
- Software design and development
- Specialized technologies, such as cloud computing and artificial intelligence

Hardware and infrastructure

Review

Hardware components are physical technology, such as:

- Microchips
- Memory cards
- Motherboards
- Mice
- Monitors
- Keyboards

IT infrastructure is what allows a company to build and run processes that support its business operations. IT infrastructure typically consists of a combination of hardware, data centers and servers. Over the past 12 years, IT infrastructure has started to include a hybrid of cloud environments, data centers and computing devices connected by networks.

A computer **network** consists of two or more computing devices connected by cables or Wi-Fi.

Further reading

Computer Hardware and Software: A Definitive Guide | Indeed.com Canada*
What is IT Infrastructure? | IBM*
The Fundamentals of Networking | IBM*

Journaling activities: Throughout this resource guide, there will be several journaling activities. Keep a document with all of your answers so that you can refer back to it as you continue on your career journey.

Journal prompt: Research some of the common roles related to infrastructure, such as:

- **Infrastructure engineer**
- **Network engineer**
- **IT support engineer**
- **Platform engineer**
- **Cloud engineer**

What are the skills required to be considered for these jobs? What is preferred? What are some similarities and differences between the roles?

Software design and development

Review

Operating software: Manages the hardware, data and program files, and other system resources and provides means for the user to control the computer

Application software: Designed to handle specific tasks for users, such as smartphone apps or word-processing programs

Programming is the process of creating instructions for a machine to follow. Programming includes the development processes involved with building an app, such as planning, analyzing, coding, testing and releasing.

Journal prompt:

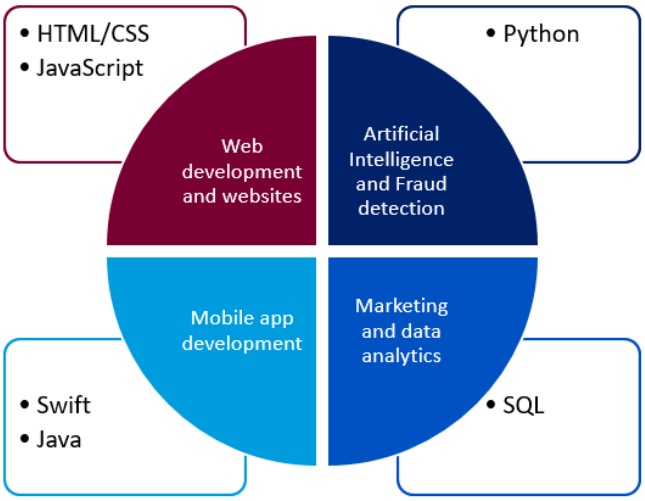
- **What's the difference between hardware and software?**

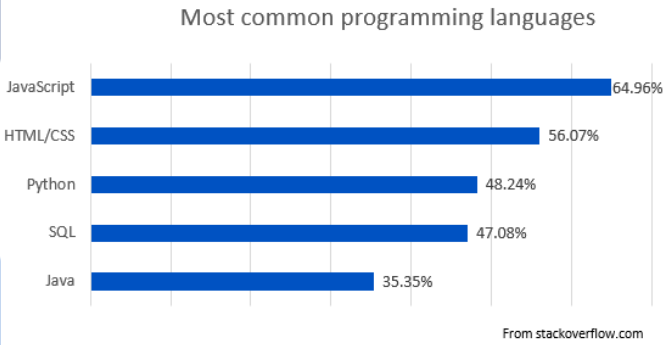
Programming, coding and software development resources

What is the Difference Between Coding and Programming? (freecodecamp.org)*
What is software development? | IBM*
Top 4 software development methodologies | Synopsys*

Explore coding and software development

Search for **free online coding courses** for a list of the best free coding resources.





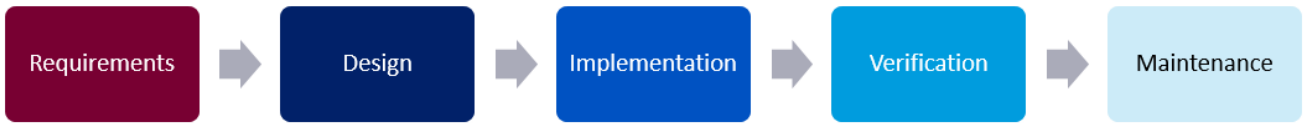
Journal prompts:

- **Do you already know a programming language?**
- **Do any free courses appeal to you to learn more or learn a new language?**

Visit Top 4 software development methodologies | Synopsys* to learn more about the four software development models:

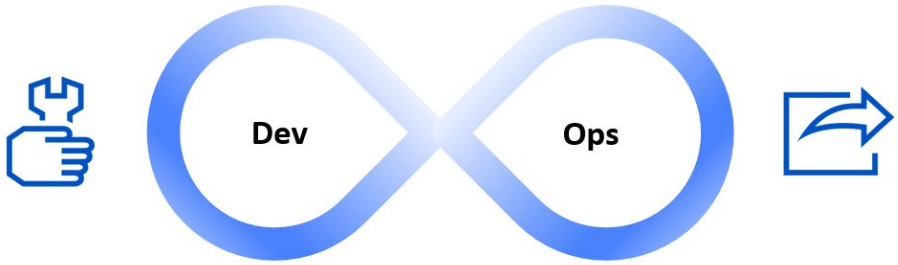
- Waterfall
- Agile
- DevOps
- Rapid Application Development

Waterfall is a simple, linear methodology where development stages are arranged into sequential, cascading processes.

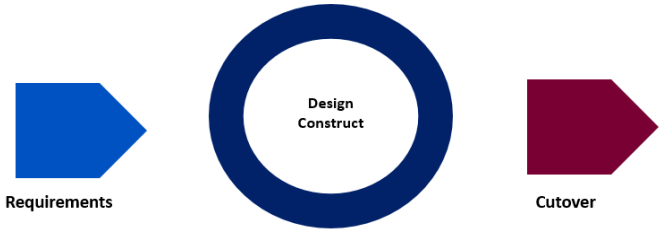


When you use the **Agile** development methodology, you develop small iterations at a time and then get feedback as you go. This minimizes the risk involved, but it is also more time intensive.

DevOps is a software development methodology where software developers and IT operations staff work together in the entire development lifecycle. This is an organizational mindset that increases collaboration between departments so the transition between building and deploying is more seamless.



Rapid application development is an adaptive software development model based on prototyping and quick feedback with less emphasis on specific planning. The goal of rapid application development methodology is to accelerate the entire software development process.



Specialized technologies


Cloud computing


Artificial intelligence / machine learning


Blockchain


Data and analysis

Cloud computing

Cloud computing allows users to use apps and shared infrastructure located in a remote data center. Examples of cloud computing:

- ❑ Google® Drive®
- ❑ Google apps
- ❑ iCloud®
- ❑ Social media
- ❑ Dropbox®
- ❑ Microsoft 365
- ❑ Salesforce®
- ❑ Zoom® video conferencing
- ❑ Streaming services, like Netflix® or Hulu®

Journal prompt: Look at the list above. What other types of cloud computing are you interested in trying?

Further reading

- What is cloud computing? | IBM*

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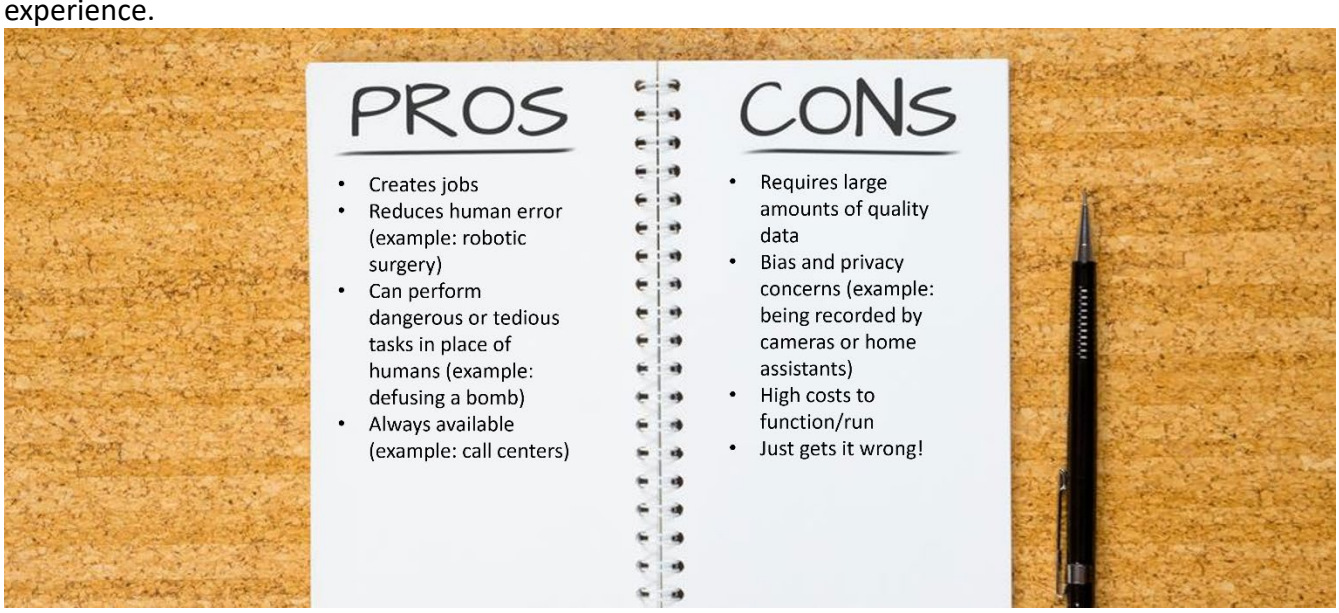
Artificial intelligence and machine learning

Artificial intelligence (AI) allows machines to simulate human intelligence. **Machine learning** is a subset of AI that focuses on the use of data and algorithms to imitate the way that humans learn. Machine learning uses algorithms to analyze large amounts of data, make informed decisions and improve from experience.



Further reading

- What are the advantages and disadvantages of artificial intelligence? | Tableau*
- How to use ChatGPT - step-by-step guide and tips - PC Guide*

Blockchain

Blockchain is a type of database that securely stores data in blocks. It connects the blocks through cryptography. Blockchain allows information to be collected, but not edited or deleted.

Further reading

- Blockchain.com | Be early to the future of finance*

Data and analysis

Data analytics involves analyzing data to gain insights and inform business decisions. Data analysis begins with collecting data and checking its reliability before preparing and analyzing the data to look for trends and patterns.

Data science is a multi-disciplinary field that uses advanced analytics to uncover information to help organizations make better decisions.

Data science often involves using data to build models that can predict future outcomes, while data analytics tends to focus more on analyzing past data to inform decisions in the present.

Business analytics involves collecting, categorizing and analyzing data through statistics to make better business decisions.

There are different types of business analytics:

- **Descriptive** analytics is the observation of changes in the business over time.
- **Predictive** analytics takes descriptive information and uses it to predict future changes.
- **Diagnostic** analytics identifies problems and attempts to determine the reasons behind them.
- **Prescriptive** analytics compares and tests different methods to help the company to determine next steps.

Further reading

- Data science vs data analytics: Unpacking the differences - IBM Blog*
- What is data science?*
- What is Business Analytics | Wake Forest University (wfu.edu)*

Enterprise Architecture

Enterprise Architecture is the understanding of the enterprise as a whole, including its data, its people, its systems, its functions and how they impact and influence the business.

Further reading

- What is IT Architecture & Types of Architectures*
- Why IT Architecture matters*

Cyber security

"**Cyber security** is the art of protecting networks, devices, and data from unauthorized access or criminal use and the practice of ensuring confidentiality, integrity and availability of information."

— Cyber Security and Infrastructure Security Agency (CISA)

Here are some types of cyber security technology:

- **Firewalls** are network security systems that regulate incoming and outgoing network traffic according to pre-established security rules.
- **Intrusion detection systems** are software that monitors network traffic and logs for signs of a cyber security attack.
- **Encryption** is the process of converting information from plain text to ciphertext so that only those authorized can see it.
- **Multi-factor authentication** is a multi-step process that requires users to enter additional information such as a code, fingerprint scan or question along with a password.
- Organizations use **training** to teach employees how to avoid phishing attacks.

For more information

For more information on cyber security, sign up for the **Cyber Awareness** course on our Career Events page.

Here are some entry-level roles in the specialized technologies fields. You can learn more from high-quality career sites, such as **Indeed** or **Glassdoor**.

Career	Description
Software engineer	**Software engineers** design, develop and implement technology applications, platforms and systems. Skills used on the job are: knowledge/training in contemporary programming languages, such as Java, Python, JavaScript, HTML/CSS, C++, Mobile iOS or Android and so on; basic understanding of database management systems; and background in software development life cycle (SDLC) methodologies, especially agile. There are many different types of software engineers. Some examples include video game designer, quality assurance engineer and mobile developer. This role could advance to a higher-level engineer or a technology team manager.
Cyber security analyst	Cyber security analysts may address multiple cyber-related responsibilities, including detection and analysis of cyber-related suspicious security events, escalation of incidents for immediate response, containment and recovery as well as providing technical support in the implementation of appropriate data security plans, procedures and products. Skills used on the job are: experience detecting and analyzing security events and/or responding to security incidents and knowledge of common cyber security analysis tools and techniques. This role could advance to a cyber security specialist or manager.

Career	Description
Help desk analyst	Help desk analysts provide technical support to customers and/or other employees. They resolve routine, basic technical problems and inquiries through various contact channels (voice, chat) and troubleshoot applications and systems. Skills used on the job are: customer service / call center experience; strong decision-making and problem-solving skills; experience in various technologies such as Windows 10/7/XP, Mac OS X, Cisco/VOIP telephony, Blackberry, Android, iOS (iPad/iPhone) and ticketing systems. Help desk analysts could advance to a role in help desk management, cyber security or network/systems administration.
Infrastructure analyst	Infrastructure analysts solve problems involving large, complex computer systems. These problems often involve network and server issues. Skills used on the job are: problem-solving, network administration knowledge and proficiency in programming languages. This role could advance to a more specialized, higher-ranking position or an infrastructure management role.
Data analyst	Data analysts collect information and use it to recommend solutions for the problems that companies face. Skills used on the job include: statistics, data visualization, data analysis and problem solving. While this job often requires a bachelor's degree, some companies honor work experience instead. Data analysts often acquire specialized certificates to further their career development, such as Certified Analytics Professional (CAP). This can lead them to higher, more specialized roles in the data analytics field.

Journal prompt: Are you interested in any of the careers above? What steps will you take next?

Check out our Careers Site or look at our Course Events page to discover opportunities and continue your technology journey!

Learn more about specialized/emerging technologies

The activity below may or not be included in your session depending on timing. If it is not included, use this an enrichment activity to extend your learning.

1. Select a topic.	2. Read your articles.	3. Answer the questions.	4. Present your findings.
• Robotic process automation (RPA) • Edge computing • Quantum computing • Augmented reality / virtual reality (AV/VR) • 5G • Serverless computing	• Robotic Process Automation (RPA) in plain English | The Enterprisers Project* • Edge computing in plain English | The Enterprisers Project* • What is Quantum Computing? (aidataanalytics.network)* • Virtual Reality and Augmented Reality in the Workplace | LinkedIn* • 5G Now and in the Future (LinkedIn.com)* • What is 5G and Why Does It Matter? | U.S. GAO* • Serverless in plain English | The Enterprisers Project*	1. What is it? 2. How is it used in the workplace? 3. What business challenge does it solve? 4. What career opportunities could come from this technology?	Recap your finding to the larger group.
Five minutes	Five minutes	Five minutes	Fifteen minutes

Journal prompt: Select a topic from the list above and research the topic using the links provided. Use the questions to guide you as you search for information.

Note: Most of the topics have one corresponding link, with the exception of 5G, which has two shorter articles instead of one.