Computer Hardware and Software

Learn more about hardware and software, and then design your own app!

Overview

Grades 3-8

15 min

Topics

Computer Science

STEM

15 min Grades 3-8

About the Activity

Learn more about hardware and software, and then design your own app!

Hardware and software are two categories of computer systems, and they work together to perform different tasks.

In this activity, you will learn the difference between hardware and software. You will also learn about the software and apps that allow electronic devices to complete tasks. You'll even design a mockup of your own app!

Materials

- [ ] Any digital device
- [ ] Storyboard design worksheet
- [ ] Software categories worksheet
- [ ] Detailed app design worksheet

Activity Steps

1 Components of a Computer

Hardware? Software? What's the difference?

- **Hardware** refers to the physical components of a computer that you can touch
- **Software** refers to the programs, applications, and data that operate a computer. (You can't touch or handle these components.)

So why are they called that? There are a few different reasons.

- The *hardware* of a computer, which includes its processing chip, RAM and ROM, is *hard* to change. Some people say it is also called hardware to remind us that a computer's hardware is a physical object. Examples of hardware include video game systems, Google Home, or your computer's graphics card.
- The *software* of a computer, which includes the operating system, applications, and other programs, is easier to change and customize for a user's need, and *soft* is the opposite of hard. Examples of software include video games, Google Docs, or Instagram.

This explanation might sound a little silly, but in the 1960s, when computer science was brand new, referring to hardware and software was easiest for people to remember how the components were different.

There are many different categories of software. As part of the upcoming activity, take a moment to list the software that is on one of your devices. Then, take the software category printout and sort each piece of software, or each app, into one of the following categories:

- **Productivity:** Used to do work or school-related tasks
- **Social Networking:** Used to connect with friends and family, share photos and updates, and join groups and communities
- **Entertainment:** Used to access games, music, movies, TV shows, and other forms of entertainment
- **Fitness:** Used to track physical activity, monitor diet, and achieve health and fitness goals
- **Utility:** Used to access useful tools and resources, such as calculators, converters, and language translators
- **Creativity:** Used to edit music, photos, and videos to create new products

DID YOU KNOW?

Did You Know? Social media apps get money from your attention. If an app you use is from a company that gets money from you using it, like social media apps, think about limiting your time or taking a 30-day break from the app. Then, you can bring the app back with some goals and restrictions. You will probably develop a new APP-preciation for how you use it in your life. (And, who knows, maybe you'll get to the end of 30-days and find you don't need it anymore at all!)

2

Who Makes Software for Computers?

Most software for computers is developed by big companies like Apple, Microsoft, and Adobe. Although software and apps for mobile devices can be developed by big companies, they can also be developed by smaller teams or individuals!

- **Independent Developers:** These people create apps as a hobby, or even as a full-time job! Markus Persson, who is often known by his screen name, Notch, created Minecraft all by himself! He sold Minecraft to Microsoft for $2.5 billion dollars in 2014.
- **Small Teams:** These are groups of people who come together to develop an app. The game studio Innersloth, which developed Among Us, is a team of 22 people.
- **Large Tech Companies:** These are big companies like Apple, Google, or Facebook that develop their apps at the company
- **Non-technical Entrepreneurs:** These are people who have an idea for an app, but might not have the technical skills to develop it themselves. They hire developers to bring their idea to life.
- **Digital Agencies:** These are companies that make digital products, including apps. They may work with customers to make apps or develop their own apps.

As you can see, anyone with the necessary technical skills, resources, and creativity can develop an app! Even young people like you can create apps! Here are a few impressive stories that'll inspire you:

- **Mira Modi – DiceWARE Passwords:** In 2015, an 11-year-old girl named Mira Modi started her own business selling secure passwords. She created a website and sold passwords to people all over the United States for $2 each. She was inspired by her mom who was writing a book about cybersecurity.
- **Yuma Soerianto – Let's Stack AR!:** In 2017, a 9-year-old boy from Australia named Yuma Soerianto created an app called Let's Stack AR!, which is a game that uses augmented reality technology. He learned how to code from YouTube videos and books and had previously created other apps as well.
- **Aaron Soekiatno – Frogger:** In 2021, a 14-year-old boy named Aaron Soekiatno designed an app called Frogger. It lets people avoid standing in lines by hiring someone else to do it for them. Aaron was inspired by his dad, a computer programmer, and asked to be enrolled at a school where he learned to code.

There are probably other young people who have designed apps, but it can be hard to tell who designed an app and when to give them credit.

Isn't it so exciting that technology is inclusive for people of all ages and backgrounds?! Are you the next coding whiz?

DID YOU KNOW?

Did You Know? Between the Apple App Store and the Google Play Store, there are more than 3 million apps out there! And that doesn't even include apps that you may get from somewhere else.

3 Design Your Own App

1. Now, it's time to design your own piece of software. Start by taking a look back at your list of apps. Find a favorite app or software that you use every day. Then, go through the list of questions below.
    1. Does the app or software look nice?
    2. What are the features that make it helpful in completing a task?
    3. How easy is it to use?
    4. What was the cost of the product? Are there ads in the product that makes it free?
    5. Find the rating of the software or app on the app store. What are people saying are the pros and cons of the product? If you were the creator, what could you do to improve it and make it better?

    Most apps are designed to make life easier or to solve a problem. App designing usually starts with brainstorming an idea and sketching out what it might look like. Remember which aspects of your favorite app you enjoy the most. You don't need to copy its design, but recognize the size of the buttons and the text, and consider how its ease of use plays a part in why it may be your favorite piece of software.

2. Now is your chance to plan out an app that solves a problem. Can you think of any problems in your community that could be solved by an app?

3. Designing an app usually takes a few steps, and as you might guess, developing apps involves a lot of coding. But first, a lot of developers make something called a **paper prototype**. With a paper prototype, the developer draws out how they want their app to look on paper. They may even include what certain buttons will do. This helps them make changes before they start coding. Use the paper prototype worksheet to begin designing your app.

4. Next, software designers use a design worksheet to add context to their design. There are two types of design worksheets commonly used, and you can use one or both when you design your own app:
    - **Storyboard Design worksheet:** This worksheet is for you if you have a quick idea for an app. You'll be able to draw out multiple screens of what your app would like.
    - **Detailed App Design worksheet:** This worksheet is for you if you have a lot of ideas for your app. You'll have space to design the home screen of your app and write out some of its most important features.

5. Once your design is done, find someone in your community to share your app idea with. Ask them for their feedback, and see if they have their own ideas! By reaching out to someone, you can work together to make your community a better place.

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BONUS ACTIVITY

Find the most used app on your devices. Delete the app and see how many ways you can find to do that same thing without the app. This may seem hard, but you can be creative and find new ways to solve problems. For example, you could... Visit a website Use paper and pencil Visit a library Call someone Read a book Use a paper map

Test Your Knowledge

See how much you've learned about this theme

Question 1

Computer hardware is...

a. A store where you can buy computer parts
b. The physical parts of a computer system
c. A special computer that can handle being dropped
d. None of the above

Question 2

a. A comfortable computer seat
b. A computer keyboard that is soft to the touch
c. The programs and data used to operate a computer system
d. None of the above

Question 3

Apps can be developed by_____.

a. Individual people
b. Small teams
c. Large companies
d. All of the above

Note: Answers can be found on the last page of the PDF

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Reflection Questions

1. With our devices being so helpful in our daily lives, how can we balance time spent on our phones and time spent with others in real life?
2. Are there apps that you spend too much time on? What could you do to limit your time on these apps?
3. Did you know that the average time spent in front of a screen is 7 hours? That means we spend almost 30% of our day in front of a screen. How does that make you feel? Do you have goals for your screen time? You may even want to set a goal to reduce your screen time.

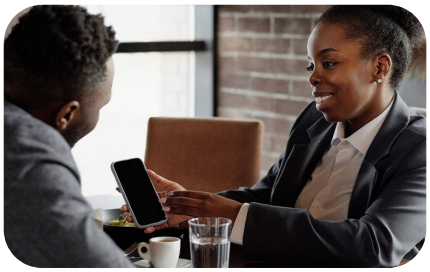
Investigate and Explore

Earlier, you learned about Yuma, Mira, and Aaron who each designed their own app at a young age, but they weren't just born knowing how to code! Computer Science (CS) First by Google is a free way for anyone to learn how to code. You don't need a login or a teacher to get started! Visit CS First and learn more.

Share It! Developing apps isn't something you have to do all on your own. With a group of friends or family members, share what you've learned about software and app design. Together, you might be able to brainstorm all new applications that would make life easier or more efficient. What can you come up with when you put your heads together?

Career Connections

As you learned in this activity, hardware and software work together to help a computer carry out tasks. There are many careers in both hardware and software. Software Developer: Responsible for designing, coding, testing, and maintaining software programs and applications Web Developer: Designs and develops websites and web applications using programming languages such as HTML, CSS, and JavaScript (you'll learn more about these in a later lesson) User Experience (UX) Designer: Designs and enhances the user experience of software applications and websites by conducting user research and testing and implementing user-centered design principles Artificial Intelligence (AI) Engineer: Designs and develops intelligent computer systems and applications that can perform tasks that typically require human intelligence, such as natural language processing and image recognition. Computer Hardware Engineer: Designs and develops computer hardware, including processors, memory, and other components These are just a few of the high-paying careers in the computer industry. Who knows, one day, when you're looking for a job, there may be computer jobs that don't even exist yet! Pick two of the careers above that interest you, and use the internet to research them.



Test Your Knowledge answers

1) b. The physical parts of a computer system. **2)** c. The programs and data used to operate a computer system. **3)** d. All of the above.

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