

Lesson 7: Storage

Overview

Question of the Day: Why is storage an important part of the computing process?

This lesson introduces the final component of the unit's model of computing: storage. After trying out an "outfit picker" app, students discuss what information should be stored in the app versus input every time the app is run. They then look at a series of apps and use their decisions about what should be stored to create guidelines for deciding what information to store. They then review the four components of this chapter's model of computing: input, output, storage, and processing. Afterwards, they have one last opportunity to revise their decisions about which items should be classified as a "computer" from earlier in the chapter. The lesson ends with a reflection on their own app ideas and how storage could be used.

Purpose

In Chapter 1 of this unit, students learned the problem solving process. In Chapter 2, students learned how computers solve problems. At this point, students know that computers are information processing machines that can do four things with information: input, output, store, and process. In this final lesson before the unit project, students look at types of input that may be needed to solve a particular problem and describe the processing and storage that a computer would do to produce the desired output. This should prepare them to eventually design their own app to address a problem and explain how that app would work.

Assessment Opportunities

1. **Determine whether some input should be stored or not.**

Input In the activity guide, check student answers and reasoning for what information should be stored.

2. **Identify guidelines regarding which kinds of input should and should not be stored.**

Check the guidelines that each group writes together.

3. **Use the IOSP model to identify some of the input, output, storage, and processing used in a given computer.**

Objectives

Students will be able to:

- Determine which information in a computing problem should be stored for later use.
- Identify guidelines regarding what information should and should not be stored as part of the computing process.
- Use the input-output-storage-processing model to describe a computing process.

Preparation

- Print a copy of the activity guide for each student

Links

Heads Up! Please make a copy of any documents you plan to share with students.

For the teachers

- **CSD Unit 1 - Problem Solving and Computing** - Slides

For the students

- **Apps with Storage** - Activity Guide
- **What Do Computers Do** - Video (Download)

Vocabulary

- **storage** - saving information to use in the future

The two journal prompts after the IOSP video ask students to identify the different parts of IOSP in an app they commonly use and in a smartphone.

Standards

Full Course Alignment

CSTA K-12 Computer Science Standards (2017)

- ▶ **AP** - Algorithms & Programming
- ▶ **IC** - Impacts of Computing

Agenda

Lesson Modifications

Warm Up (5 minutes)

Analyzing an App (Outfit Picker)

Activity (35 minutes)

Apps with Storage

Outfit Picker

Friend Finder

Choose a Kid's Movie

Guidelines

Introducing the IOSP Model

Wrap Up (5 minutes)

Journal

Teaching Guide

Lesson Modifications



Attention, teachers! If you are teaching virtually or in a socially-distanced classroom, please **click here** to access modifications that can be used during this lesson.

Warm Up (5 minutes)

Analyzing an App (Outfit Picker)

Journal Prompt: Go on Code Studio to look at the outfit picker app. What is one input, one output, and one kind of processing it might use? Let's say you used this app every day. What information would you want this app to remember?

Circulate: The first part of this reflection serves as a review of input, output, and processing. As students reflect on the prompt, check their answers to ensure that they understand how input, output, and processing are used in the app.

Students may identify the weather, favorite color, or season as the input, and the pictures of outfits as the output. Although the exact processing of the app may not be clear, students may point out that there are several likely if/then scenarios ("If the weather is rainy, then include an umbrella.") or matching between the user's input and features of the outfits.

Ask students to share out what information they thought should be stored and why.

Discussion Goal

While it's not important that students agree on the answers, this discussion introduces them to the idea of storing information for later and prompts them to think about what information should and should not be stored in an app.

Remarks

This example app asks for some information that won't change very often, such as your favorite color. Instead of being required to enter this data every time, it would be helpful if the app could remember our answers by storing it. All computers can save information for later and read saved information through **storage**.

Key Vocabulary:

- **Storage** - saving information to use in the future

Question of the Day: Why is storage an important part of the computing process?

Activity (35 minutes)

Apps with Storage

Remarks

We're going to look at a few apps that use a few kinds of information. We want to identify which information could be stored so that we don't have to enter it every time.

Group: Put students in groups of 2-3. Each group will need access to one computer for this activity.

Distribute: Give each group one copy of the activity guide.

As a class, complete the first section of the activity guide, which references the outfit picker app used in the warm-up.

Send students to Code Studio to see the sample apps.

Circulate: Allow students to complete the rest of the activity guide in their groups. As they fill out the charts, ask them to elaborate on why they thought each input should be stored or not.

Assessment Opportunity

There is some flexibility about what should and shouldn't be stored, since that is a choice that the app designer could make. The most important part is their explanation. They should be reasoning about whether that information will change frequently.

Outfit Picker

The first app asks users to input their favorite color, the current season, and the weather, then outputs a picture of an outfit based on the user input.



App: Outfit Picker

Friend Finder

The second app asks users to input which friends should be on their friends list, then outputs a map that displays the locations of the friends on the list.



App: Friend Finder

Choose a Kid's Movie

The third app asks users to input several preferences around movies, then outputs a movie recommendation based on the user's preferences.



App: Choose a Kid's Movie

Guidelines

As groups move on to the final activity, you may need to briefly explain what a guideline is and what the question is asking for. Make sure that all groups have time to come up with guidelines, even if they have to skip parts of the earlier chart.

Circulate: If groups get stuck writing their guidelines, ask them about which inputs they said should be stored in the other apps. Ask them to see if they can find any similarities between which inputs were stored and were not stored. Remind them that they can also write guidelines about which inputs were not stored.

✓ Assessment Opportunity ▲

Student answers may vary, but in general, they should realize that whether information should or should not be stored relates to how frequently it changes, if changes at all.

Once most of the groups are done writing their guidelines, bring the class back together and ask if any group would like to share one of their guidelines.

Introducing the IOSP Model

Remarks

Now we can understand a computer as a machine that does four things: input, output, storage, and processing

Show them the video introducing the IOSP model.



Video: IOSP Model

Prompt for discussion with two discussion questions.

💡 Teaching Tip

If you are using journaling, prompt the students to write their answers down in their journals

1. Think of something you do on the computer. What sort of input, output, storage, and processing are happening?
2. What kinds of input, output, storage, and processing are used in a modern smartphone?

Finally, look at the poster from the "What is a Computer?" lesson and check to see if any of the machines should be reclassified as computers or not computers based on this new IOSP model.

Wrap Up (5 minutes)

Journal

Prompt: Think of an app you would like to make. What information would it store?

Share: Time permitting, allow students to share out their ideas.

💬 Discussion Goal

As student share their ideas, ensure that they are using the key vocabulary of the lesson:

storage - saving information to use in the future