Introduction to data structures

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- So far we've talked about ints, doubles, booleans, and other primitive types, but what happens if we want to store more than one int or more than one character? Or what happens if we want to store a list of doubles or a series of numbers? This is where data structures come in. Data structures are containers. They allow us to combine several pieces of data into a single structure. If you've ever been to the container store, you'll know there are a lot of different ways to organize things. There are containers that are wide, containers that are tall, skinny, and short. There are containers with different types of bins and organizers with different types of inserts. There are a lot of different ways to organize your stuff with various containers, and there are a lot of different ways we can store and organize our data with different data structures. Data structures are made up of pieces of data, so those ints and doubles and booleans and characters we were talking about before, and have a specialized way and format of organizing and storing these pieces. Let's say we wanted to keep track of the number of pets each student had in a given class. We would need a way to store and access each individual student's number of pets. To start, we could use a data structure to store our data. We won't introduce any formal terminology just yet, but consider this row of numbers. Here, each number represents the number of pets one student has in a class. The entire row represents the entire data set of how many pets each individual student has. Now why use a data structure? We could have created individual variables for every student and store the appropriate number of pets each student has in each variable. However, when we try to do anything with that data like compute the average number of pets each student has or try to find out which value is most common, it will be very difficult because the variables are not linked in any way. Furthermore, if we did not have this row and didn't use an encompassing data structure, it would be hard to keep track of which variables and which numbers to use in our computations. Ultimately, each variable would be an isolation, and the overall data set would not be organized in any way. We need data structures because they help us connect and group our data. Different data structures are not only designed to organize and store data to suit a specific purpose but also give a way to access and work with that data in an efficient manner. Now if this idea seems intimidating, don't worry. This entire course is all about the different ways you can organize, store, and access your data. That's what data structures are all about. Let's take a look at one specific data type called a string that's implemented with a data structure.