**Divide and Conquer**

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A waiter likes to play a little game with unsuspecting customers. When someone asks for cream for their coffee, he places one container on the table and asks if they need more. When they say yes, he places another container on top of the first and asks again if they need another. Even if the customer tells him exactly how many creams they need, he plays this little game. Once the customer indicates no additional cream is needed, he opens each container, one at a time from the top of the stack to the bottom, and pours it in their coffee. As he walks off, he says, "And that’s recursion," … unless of course they also need sugar! Customers who "get it" like to reciprocate and recursively stack change for his tip. Once recursion sinks in, it is hard to ignore.

You probably experience recursive procedures frequently, without realizing it. For example, read through this scenario:

**Scenario**

Dr. V. greets everyone from the podium as they arrive to take the final exam for Computer Science 101. Everyone is seated and ready to begin on time. After some brief instructions, Dr. V. hands the first person in the first row the stack of tests. The first person takes six test packets and passes the rest of the stack to the student to their left. The first person in each row takes a test packet from the top of their small stack and passes the remaining tests to the student behind them. When time is up, tests are collected in the reverse order of distribution.

As you develop a recursive perspective, for now simply keep in mind that you want to divide a big task into one very simple step, plus the rest of the task.

For recursion, always keep the big picture in mind.

* Are we there yet?
* Divide and conquer.
* There and back again.

With recursion, the destination and the journey both matter.

As you move through the rest of this module on your journey, keep three simple rules in mind when solving recursive problems:

1. Know when to stop. This is the destination (the base case).
2. Decide how to take one step in the direction of the destination (the recursive call).
3. Break the journey down into one step plus the rest of the journey.

The sooner you ingrain this pattern in your thinking, the sooner you will understand recursion. Then you can apply the concept to solve common problems needing the divide and conquer strategy.

* A high school band is made up of several different sections (e.g., woodwinds, brass, percussion, etc.). Describe how divide and conquer can be used by a band so that everyone learns play a new piece.
* The computer club is sponsoring a car wash and needs 12 posters. Normally, one officer gets stuck making all the posters. Describe how divide and conquer could be employed to get the posters made.
* Most collegiate dictionaries contain over 100,000 words. Describe how you would use a divide and conquer strategy to efficiently locate a word in the dictionary.
* The U.S. Army is comprised of units of different size from the squad through the division. Explain how this structure fosters efficient organization.