# Domain Decomposition - How Many Different Ways?

**Goal:**

This lesson gives students a chance to think about different ways to do a **domain decomposition**, where a problem is split up into smaller chunks, to think about issues that arise when splitting up a problem this way, and to think about how this relates to parallel computing.

**Materials:**

- Computer connected to the Internet, 1 per student
- Parallel Computing Notebook, 1 per student

**Activity:**

1. Each student browses to the website: `http://shodor.org/~aweeden/domain-decomposition/`
2. The instructor asks the question, "How many different ways can you split up this forest into 4 colors?"
3. For each way the student comes up with, the student draws a picture of it, writes down the number of dependencies, and writes down the workload size for each color.

**Questions for your Parallel Computing Notebook:**

1. Which way did you come up with that uses the smallest number of **dependencies**?
2. Which way did you come up with that uses the smallest **average workload size**?
3. If we assumed each color is assigned to a researcher in a real forest, and each researcher is studying how a fire spreads through the forest, why do we call them **dependencies**? Why do we call them **workload sizes**?
4. If we assumed each color is assigned to a computer running a simulation for that part of the forest, why do we call them **dependencies**? Why do we call them **workload sizes**?
5. Why would we want to minimize the dependencies?
6. Why might we want to give more work to one of the colors/researchers/computers?