Project-2: Single-Block Decomposition

- **Now that we have shown that we can develop a single-block engineering simulation code, let's break up the problem into multiple blocks.**

- **For your simulation code developed under project-1, you need to write a code that will break up the domain into multiple blocks that will still run on a single processor**

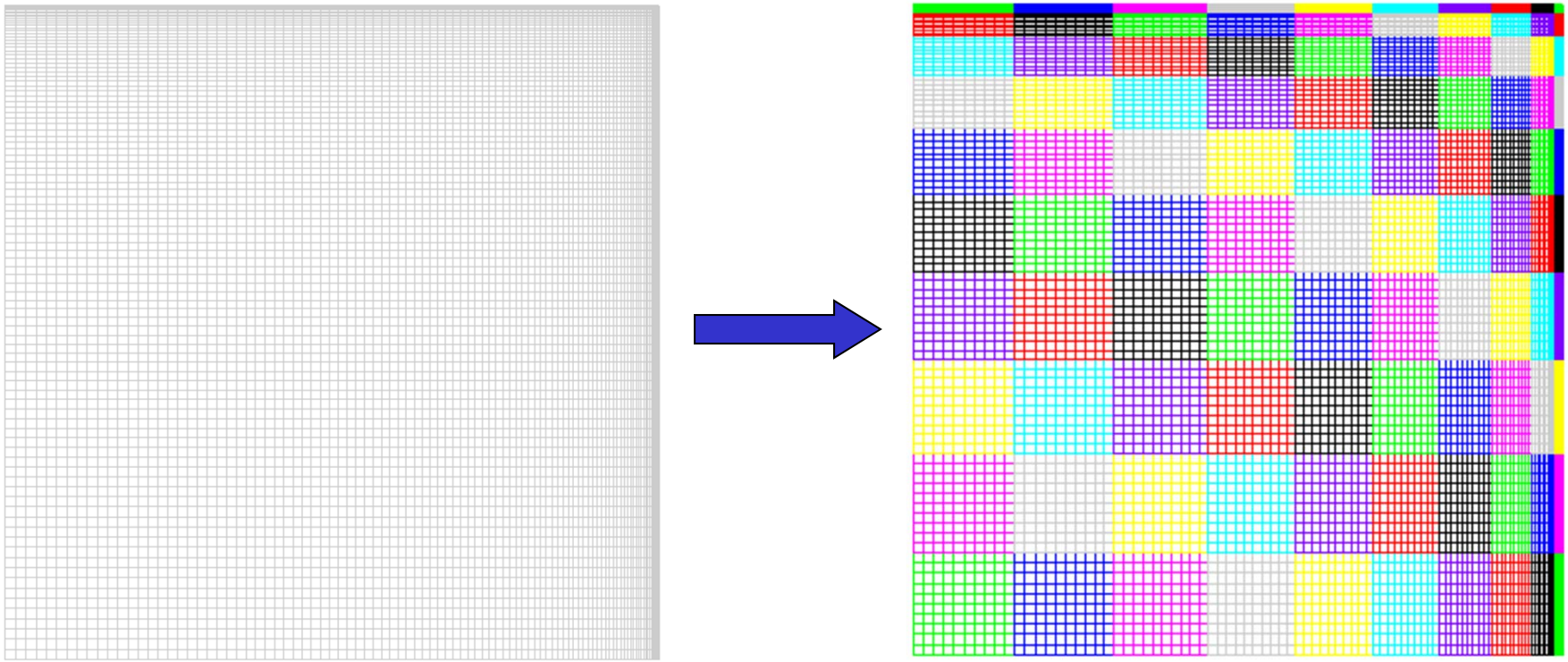
- **This is an intermediate step prior to developing a code for multiple processors**

Project-2: Single-Block Decomposition

- **For the Heat Conduction (Default) problem, develop a code that will divide the domain into N x M blocks, each with dimensions of 1+(IMAX-1)/N x 1+(JMAX-1)/M**
  - Where IMAX = JMAX = 101 and 501 for default heat-conduction problem
  - The code should be completely general so that N and M can be arbitrary
- **Develop a multi-block data structure that writes out a connectivity file with the following information for each block:**
  - Global block number of each block
  - Neighbor block numbers of each block
  - Boundary conditions for each side of block
    - Could be unique to each side
    - Could have regions for each side
      - Number of sub-regions for each side (if you decide to have sub-regions)
      - Dimensions of each sub-region (start and stop indices)
      - Boundary condition for each sub-region
    - Could be defined point-by-point
  - Block orientation (all blocks will probably have the same orientation for our problems).
- **And multi-block grid and temperature files (Plot3D or other format) that has the coordinates and initial temperature along with**
  - Number of global blocks
  - Block dimensions of each global block

Project-2: Single-Block Decomposition

- **You should end up with something similar to:**



in the x', y' frame with associated connectivity and boundary condition file(s)

- **Project-3 will be to write a multi-block serial code that will solve your simulation problem**

Project-2: Single-Block Decomposition

- **Due Tuesday 10/27:**
  - An overview of your simulation problem
    - Describe the problem, algorithm, and boundary conditions
  - Listing of your spatial/grid decomposition code
  - A plot of your decomposed computational grid (or data decomposition) for two-different decompositions:
    - 10 x 10 (N=10, M=10) grid for heat-conduction problem
    - 5 x 4 (N=5, M=4) grid for heat-conduction problem
    - Using the 101 x 101 and 501 x 501 grids
  - A sample listing of your connectivity/boundary condition file(s)