

Project-2: Single-Block Decomposition

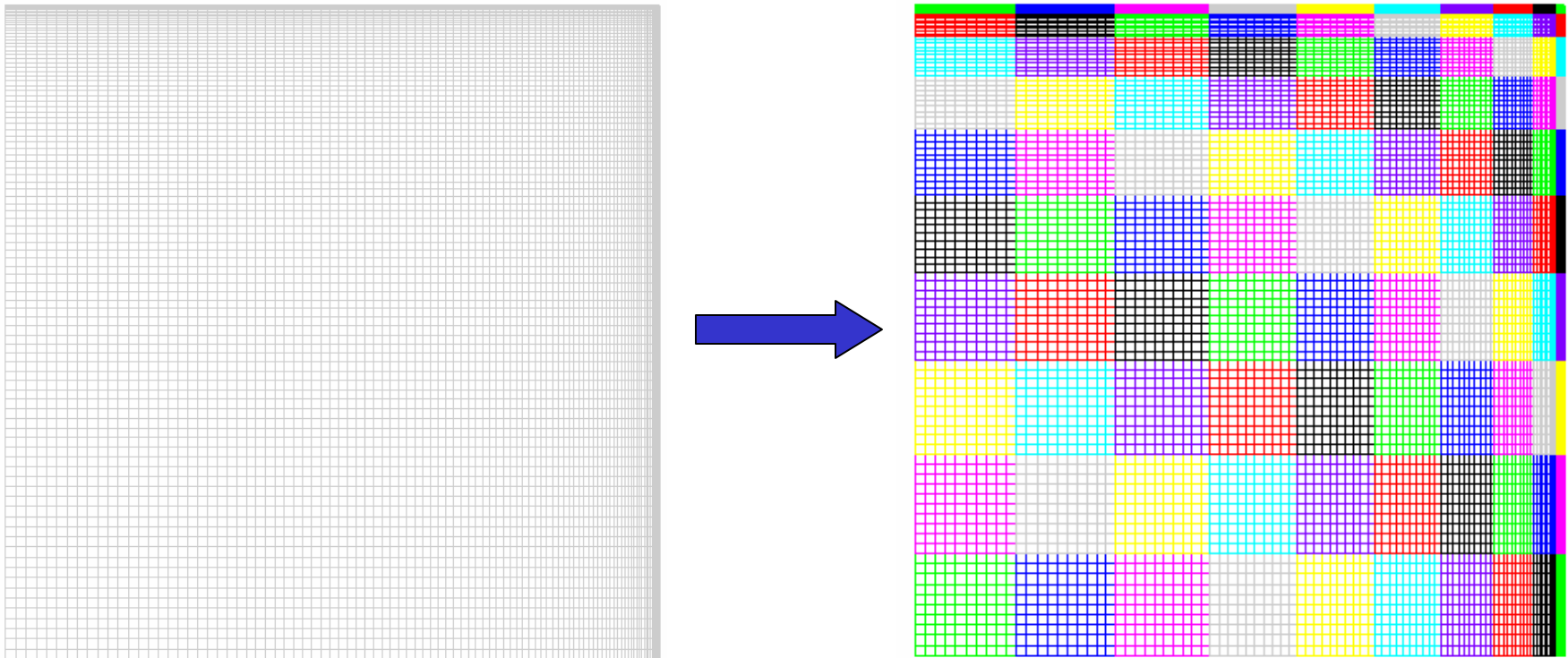
- **Now that we have shown that we can develop a single-block engineering simulation code, let's break up the problem into multiple blocks.**
- **For your simulation code developed under project-1, you need to write a code that will break up the domain into multiple blocks that will still run on a single processor**
- **This is an intermediate step prior to developing a code for multiple processors**

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- **For the Heat Conduction (Default) problem, develop a code that will divide the domain into $N \times M$ blocks, each with dimensions of $1+(IMAX-1)/N \times 1+(JMAX-1)/M$**
 - 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
 - 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

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- 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

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- **Due Monday 10/28:**
 - 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)