Assigning Work to Processors Satically

- Last time, we talked about rows, columns, and blocks
- Today, cycle and block cyclic
LU Decomposition

<table>
<thead>
<tr>
<th></th>
<th>P_0</th>
<th>P_1</th>
<th>P_2</th>
<th>P_3</th>
</tr>
</thead>
<tbody>
<tr>
<td>P_4</td>
<td>P_5</td>
<td>P_6</td>
<td>P_7</td>
<td></td>
</tr>
<tr>
<td>P_8</td>
<td>P_9</td>
<td>P_{10}</td>
<td>P_{11}</td>
<td></td>
</tr>
<tr>
<td>P_{12}</td>
<td>P_{13}</td>
<td>P_{14}</td>
<td>P_{15}</td>
<td></td>
</tr>
</tbody>
</table>

(a)  
(b)  
(c)
Cyclic Distribution
Block Cyclic Distribution
Block Cyclic for LU
Julia Set

Julia set generated from the site http://aleph0.clarku.edu/~djoyce
Irregular Allocations

Example of an unstructured grid representing the pressure distribution on two airfoils. Image from http://fun3d.larc.nasa.gov/example-24.html
Dynamic Allocation

Work Queue: A data structure for dynamically assigning work to threads or processes.

Simplest work queue is the FIFO queue, such as that used in the producers/consumers problem we saw earlier.
Collatz Conjecture

Consider the sequence $a$ defined for some $a[0]$: if $a[i]$ is odd
$$a[i] = 3a[i-1] + 1$$
else
$$a[i] = a[i-1]/2$$

Conjecture: For any positive integer $a[0]$, the sequence will converge to 1.

We know it is true for all numbers less than $3 \times 2^{53}$.
Collatz Conjecture

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$$a[i] = 3 \times a[i-1] + 1$$
else
$$a[i] = a[i-1]/2$$

What is the largest factor of expansion? Where the largest factor of expansion is defined to be
$$\max(a)/a[0]$$