

**Parallel Quick Sort** (Possible project task)

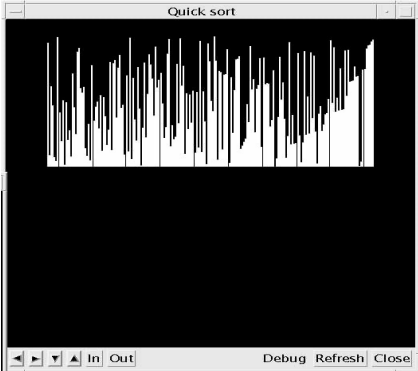
Algorithm:

1. Divide the data into  $p$  equal parts
2. Sort the data locally in each processor
3. Perform global sort
  - 3.1 Select pivot in each processor set
  - 3.2 In each processor, divide the data into two sets (smaller or larger)
  - 3.3 Split the processors into two groups and exchange data pair-wise
  - 3.4 Merge data into a sorted list in each processor
4. Repeat 3.1-3.4 recursively for each processor group

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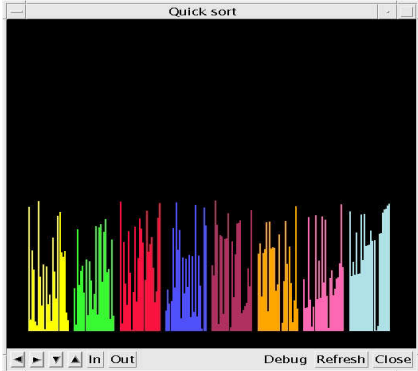
Unsorted data



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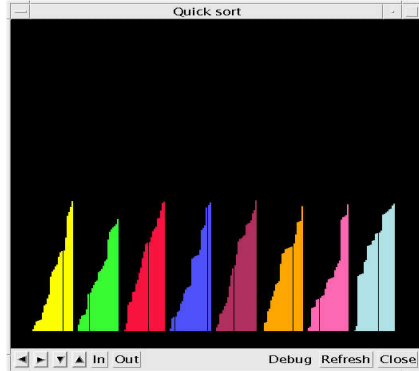
Step 1, Divide data into  $p$  equal parts



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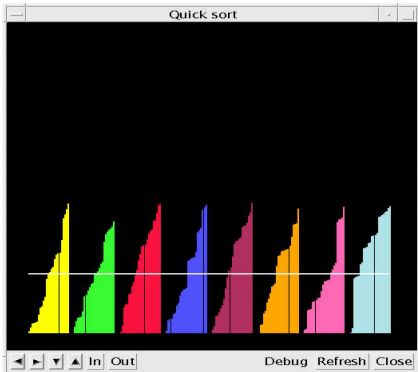
Step 2, Sort locally in each processor



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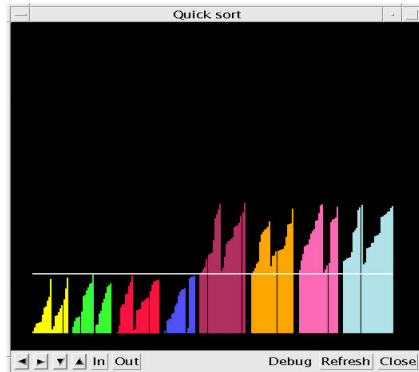
Step 3.1 Select pivot



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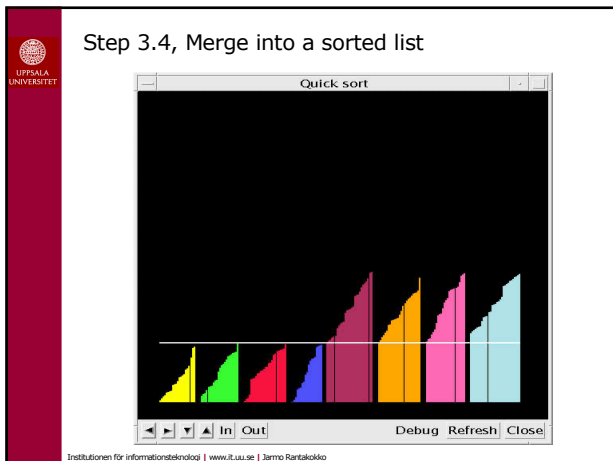
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Step 3.2, 3.3 Divide and exchange

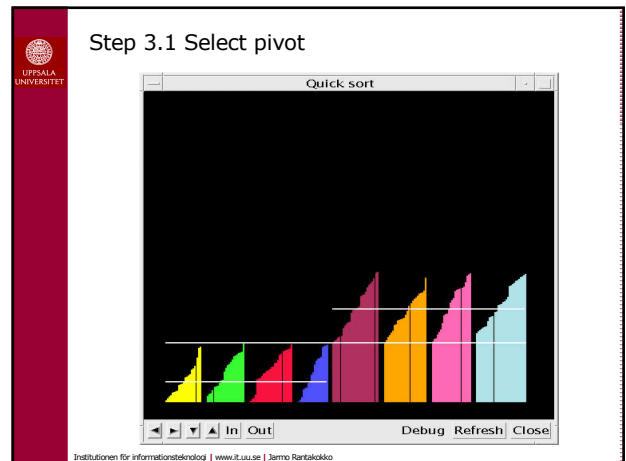


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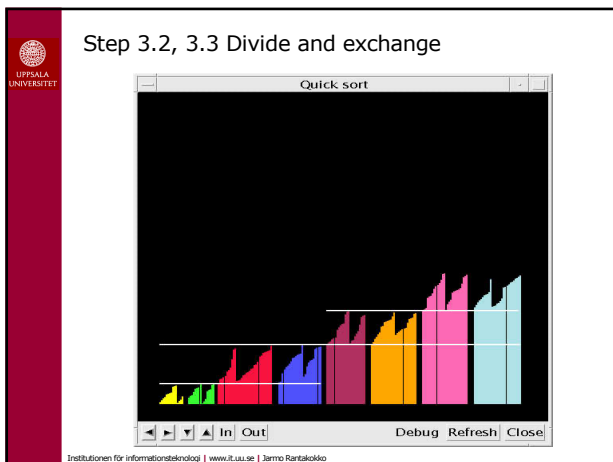
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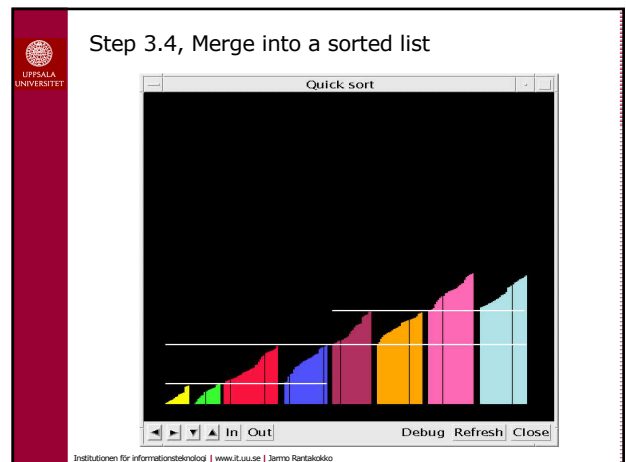
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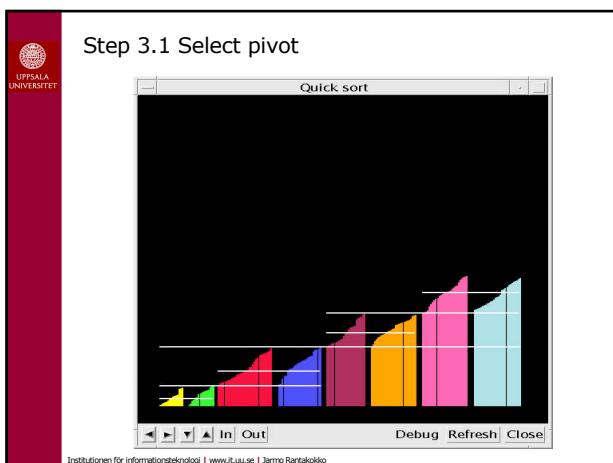
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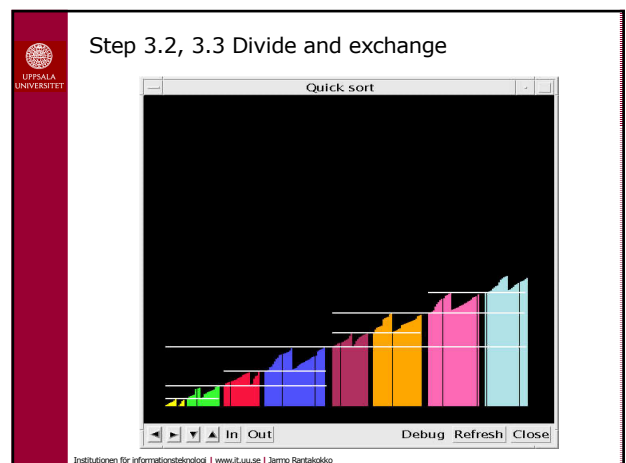
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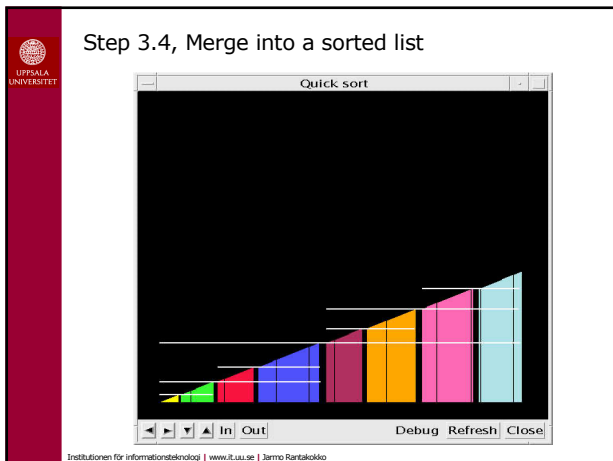
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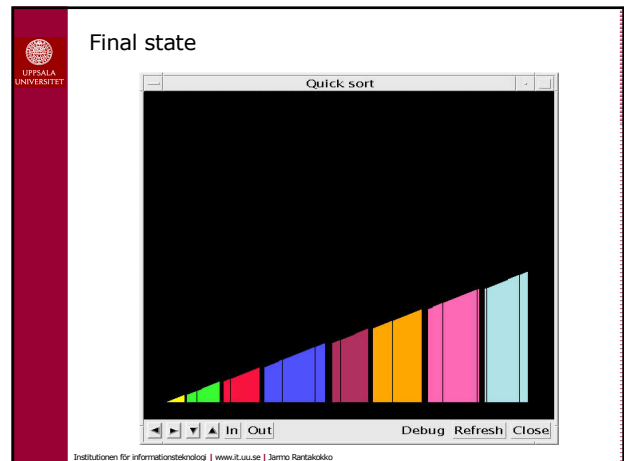
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### Pivot selection strategies:

**Strategy 1:** Select median in processor 0 in each processor set (communicator) and step.  
(OK if data equally rand, bad if almost sorted)

**Strategy 2:** Select the mean of all medians in respective processor set and step.  
(Can give too much weight to extreme medians)

**Strategy 3:** Sort the medians and select the mean value of the two middlemost medians in each processor set and step.  
(Independent of dist but more costly strategy)

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