On Software Correlators

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NRAO

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Why?

- Short development time
  - 1 grad-student-year
  - *Does not include integration*
- Accuracy
- Flexibility
  - “Unlimited” $N_{\text{ant}}, N_{\text{chan}}, t_{\text{int}}, BW$
  - Special modes (e.g., pulsar, narrow-band radar, ...)
  - Efficient multiple passes
- Upgradability/scalability
- Compatibility
  - Mark5 / K5 / PCEVN / eVLBI / ...
  - Mixed media
- Integratibility
**Processing needs**

For VLBI, typically 200 to 300 ops per sample needed ->

<table>
<thead>
<tr>
<th>System</th>
<th>Bandwidth</th>
<th>Antennas</th>
<th>GFLOPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current VLBA</td>
<td>256 Mbps, 10 ant</td>
<td>156 GFLOPs</td>
<td></td>
</tr>
<tr>
<td>VLBA Max</td>
<td>512 Mbps, 20 ant</td>
<td>800 GFLOPs</td>
<td></td>
</tr>
<tr>
<td>VLBA++</td>
<td>4 Gbps, 10 ant</td>
<td>4340 GFLOPs</td>
<td></td>
</tr>
<tr>
<td>VLBA++++</td>
<td>16 Gbps, 10 ant</td>
<td>19 TFLOPs</td>
<td></td>
</tr>
<tr>
<td>WIDAR</td>
<td>96 Gbps, 27 ant</td>
<td>400 TFLOPs</td>
<td></td>
</tr>
</tbody>
</table>

- Fast desktop processor, single core -> 3 GFLOPs
- Fast 4-processor, multi-core node -> 24 GFLOPs
  - ~ $5000 per node *
- Single cell processor -> 40+ GFLOPs
  - Cost ???

*At this price, cluster cost is 25% of media cost*