Low Latency Real-Time Computing on Multiprocessor Systems Running Standard Linux

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• Through proper configuration and application of real-time strategies, a standard Linux kernel can run many applications requiring low latency and fast interrupt response without the need for an underlying real-time kernel.

• Latency Effects
  – Interrupt Response - time to process an interrupt and wake a sleeping thread
  – Jitter - periods of cpu unavailability during thread execution
Steps to Achieving a Low Latency Linux OS Installation

• Install a distribution that is suitable to real-time work in an isolated processor configuration.
  – Modify the kernel with fixes to unexpected latencies
  or
  – Install a distribution already suited to real-time work (such as an SGI React supported distribution)

• Isolate a set of processors for real-time use:
  – Isolate from non-application processes and threads, load balancing effects, etc…
  – SGI React provides a configuration tool to easily accomplish this

• Design and run your application using recommended strategies
  – Pin to isolated cpu, lock memory, use shared memory for IPC, etc.
## Highest Interrupt Response Times

<table>
<thead>
<tr>
<th></th>
<th>4 CPU system</th>
<th>64 CPU system</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>without REACT</td>
<td>with REACT</td>
</tr>
<tr>
<td>no-load</td>
<td>349.30</td>
<td>11.95</td>
</tr>
<tr>
<td>load</td>
<td>556.95</td>
<td>11.15</td>
</tr>
</tbody>
</table>