Optimization of Embedded Linux systems without FPU

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High Performance Embedded Computing (HPEC)
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Approved for public release; distribution is unlimited.
Embedded Software

- Low cost
  - GNU Tools and Linux OS
  - Multi-architecture support
- With or without GUI
- High performance expectations
- Long battery life expectations
- May run with or without FPA/FPU
  - ARM vs. XScale

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Software FPE vs. FPU

- **FPU/FPA**
  - NetWinder Floating Point Emulator (NWFPE)
  - Fast Floating Point Emulator (FastFPE)
- **Software FPE**

<table>
<thead>
<tr>
<th>Call: Add two floats</th>
<th>FPU/FPA</th>
<th>FPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disassembly</td>
<td>ldfs f0, [r3, #0]</td>
<td>ldr r0, [sl, r4, asl #2]</td>
</tr>
<tr>
<td></td>
<td>ldfs f1, [r1, #0]</td>
<td>ldr r1, [r8, r4, asl #2]</td>
</tr>
<tr>
<td></td>
<td>adfs f0, f0, f1</td>
<td>bl __addsf3</td>
</tr>
<tr>
<td></td>
<td>stfs f0, [r2, #0]</td>
<td>str r0, [r5, r4, asl #2]</td>
</tr>
</tbody>
</table>

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Performance Chart

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