Assessing Teaching OpenMP on the Raspberry Pi

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Workshops

Three 90-minute workshops (Tapia’16, CSE’17, SIGCSE’17)

- 15 minute intro on Raspberry Pi + multicore fundamentals
- 50 minutes patternlet exploration
- 20 minutes on drug design exemplar
- 5 minute discussion + wrap-up
## Assessment

<table>
<thead>
<tr>
<th>Questions/ Number of Responses</th>
<th>Pre-Survey</th>
<th>Post-Survey</th>
<th>p-values</th>
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<tbody>
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<tr>
<td>1. How confident are you that you can describe how to decompose a problem using multiple threads and implement it using a parallel loop?</td>
<td>2.15</td>
<td>2.38</td>
<td>2.88</td>
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<tr>
<td>2. How confident are you that you could describe the advantages and disadvantages of using parallel programming on shared memory multicore machines to someone familiar with programming?</td>
<td>2.55</td>
<td>3.06</td>
<td>3.17</td>
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<tr>
<td>3. How confident are you that you can define speedup and describe it to someone familiar with programming?</td>
<td>2.27</td>
<td>2.81</td>
<td>3.12</td>
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<tr>
<td>4. How confident are you that you can describe what a race condition is and how to avoid it when writing parallel programs that use shared memory?</td>
<td>2.48</td>
<td>2.81</td>
<td>3.12</td>
</tr>
<tr>
<td>5. To what extent did using an inexpensive multicore computer (e.g. the Raspberry Pi) to run parallel programs motivate you to learn more about parallel computing in the future?</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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Assessment

Q5: ... Raspberry Pi ... motivate you to learn more ...

- Post-Survey
Sample Open-Ended Responses

+ The impact of it is incredible, would love to learn more.

+ I love the Pis! Wonderfully motivating. Gets students closer to the hardware and powerful enough to motivate studying parallelism.

+ Not having to have an expensive system to try this on is really motivating.

- I think it’s easier on a workstation.

+ I am already very motivated because I plan to teach the course . . . But my expectation is using an inexpensive system will motivate the STUDENTS to do so and I am really interested in how much of that is true.
Conclusions

• Single board computers such as the Raspberry Pi promote “hands-on experiential” learning for parallel computing.
  – All our materials (including Pi image) are freely available online at: csinparallel.org.
  – Supports alternative laptop connection setup.

• SBCs offer a cost-effective way to teach students about especially multicore concepts.
  – Improvements in SoC technology will give rise to newer, inexpensive SBCs.
Backup Slides
WPMS Hour of Code