From Laptop to Lambda: Outsourcing Everyday Jobs to Thousands of Transient Functional Containers

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https://snr.stanford.edu/gg
Even today, many applications remain far from interactive

- Software compilation & testing, video processing, simulations, 3D rendering, etc.
- Users who desire the results in seconds need to harness thousands of cores in parallel.
Supercomputing-as-a-service

- Serverless platforms: thousands of functions invoked in just a few seconds.

  A 10,000-core supercomputer that is billed by the second.

- A number of applications, such as ExCamera, Sprocket and PyWren, exploit this to achieve interactive speeds.

- Building applications on top of these platforms is difficult!
gg is a framework that helps application developers port new and existing applications to serverless platforms and execute them with thousands-way parallelism.
gg decouples application logic from its execution

Application developers express their jobs in gg’s intermediate representation, which abstracts the application logic from the details of placement, schedule, and execution.
gg decouples application logic from its execution

- gg takes care of the execution and provides runtime features for dependency management, straggler mitigation, placement, failure recovery and memoization.
Massively parallel execution can yield significant benefits!

<table>
<thead>
<tr>
<th>Tool</th>
<th>Time</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>single-core make</td>
<td>32m 34s</td>
<td>—</td>
</tr>
<tr>
<td>icecc to a warm 48-core EC2 machine</td>
<td>6m 51s</td>
<td>$2.30/hr</td>
</tr>
<tr>
<td>icecc to a warm 384-core EC2 cluster</td>
<td>6m 57s</td>
<td>$18.40/hr</td>
</tr>
<tr>
<td>gg to AWS Lambda</td>
<td>1m 27s</td>
<td>50¢/run</td>
</tr>
</tbody>
</table>
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