Debugging Session Preview

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Session: 3:50 pm - 5:10 pm, Tuesday
Why Care About Debugging?

- More than 50% of development time are on debugging
- Service down time is critical

Google’s blackout in 2013 caused 40% drop in global Internet traffic

Amazon service down on prime day
Debugging is twice as hard as writing the code in the first place. So if you write the code as cleverly as possible, you are, by definition, not smart enough to debug it.

– Brian Kernighan
Topics of Tomorrow’s Papers

- Speedup Failure Resolution
- Bug localization
- Identify the energy hotspot
- Performance debugging
- Cluster-fueled debugger
Quick service recovery by reverting the buggy commit

Traditional Debugging

- Collect Information
- Understanding Failure
- Fixing Bug
- Deploy Fix
Quick service recovery by reverting the buggy commit

Traditional Debugging

- Collect Information
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Orca

- Collect Information
- Locate Buggy Commit
- Revert to Pre-bug Version
Differential Energy Profiling: Energy Optimization via Differing Similar Apps

Abhilash Jindal and Y. Charlie Hu
Purdue University and Mobile Enerlytics, LLC

- Power is the most constraining resource on mobile devices
- both iOS and Android provide following user interfaces
Differential Energy Profiling: Energy Optimization via Differing Similar Apps

Abhilash Jindal and Y. Charlie Hu
Purdue University and Mobile Enerlytics, LLC

- Power is the most constraining resource on mobile devices
- Which part of the application is the energy hotspot?
  - Breakdown the app into basic execution units called application tasks.

Observation
Energy consuming pattern can be very different even for similar application tasks.

Example: energy consumption breakdown of two IM apps

<table>
<thead>
<tr>
<th></th>
<th>UI Task</th>
<th>Other App Tasks</th>
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<tbody>
<tr>
<td>WhatsApp</td>
<td>UI Task</td>
<td>Other App Tasks</td>
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<tbody>
<tr>
<td>TextNow</td>
<td>UI Task</td>
<td>Other App Tasks</td>
</tr>
</tbody>
</table>
Key Question

- Where is the bottleneck?
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On-CPU Analysis: does not reveal the blocking pattern
Key Question

- Where is the bottleneck?

![Diagram showing timed events and bottlenecks]

Off-CPU Analysis: result could be misleading
wPerf: Generic Off-CPU Analysis to Identify Bottleneck Waiting Events

Fang Zhou, Yifan Gan, Sixiang Ma, Yang Wang
The Ohio State University

Key Question

- Where is the bottleneck?

wPerf: correctly identify bottlenecking wait events
Sledgehammer: Cluster-fueled debugging

Andrew Quinn, Jason Flinn, and Michael Cafarella
University of Michigan

Highlights

- The best way to understand a failure is to replay it
- First distributed deterministic replay tool
- Debugging distributed systems as easy as GDB
Conclusion

Attend the 3:50pm session on Tuesday!

3:50 pm–5:10 pm

Debugging

Session Chair: Rebecca Isaacs, Twitter

Orca: Differential Bug Localization in Large-Scale Services
Ranjita Bhagwan, Rahul Kumar, Chandra Sekhar Maddila, and Adithya Abraham Philip, Microsoft Research India

Differential Energy Profiling: Energy Optimization via Differing Similar Apps
Abhilash Jindal and Y. Charlie Hu, Purdue University

WPerf: Generic Off-CPU Analysis to Identify Bottleneck Waiting Events
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Sledgehammer: Cluster-Fueled Debugging
Andrew Quinn, Jason Flinn, and Michael Cafarella, University of Michigan