Cuckoo: a Computation Offloading Framework for Smartphones

Author(s)

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The problem
Possible Solution
• Cuckoo framework
• Cuckoo Design and Implementation
• Applications
• Conclusions
Cuckoo framework

- A complete framework for computation offloading
- It supports local and remote execution
- Targeted to the Android platform
Why Android?

• Easier if the user activities and computational background services can be differentiated by the OS

• An Android application consists of more components and Chuckoo focuses on two of them: activities and services
Outline

• Cuckoo framework
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• Separation of the components through an AIDL interface
• Interception of all the method calls
• Remote implementation can differs from the local one
• Enable the remote resource to be used for offloading
• The remote resource has to register its address to the Resource Manager
• The Cuckoo framework will query the Cuckoo Resource Manager for any available resources
• The client will request the server to execute a particular method from a service
• The client can install the service onto the server
• Cuckoo can switching to another remote resource.
• When should be the service installed?
• When should be the service installed?
  It depends....
When should be the service install?
It depends.

For gaining speed: **Early binding**
For improving energy consumption: **Late binding**
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• Object recognition of images captured by the camera
• Converts an image into a feature vector
• Compute and memory intensive
• The parameters used for the local implementation and remote implementation are different

<table>
<thead>
<tr>
<th></th>
<th>image size</th>
<th>receptive fields</th>
<th>color models</th>
<th>bins</th>
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<tr>
<td>local</td>
<td>64 x 48</td>
<td>19</td>
<td>1</td>
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</tr>
<tr>
<td>remote</td>
<td>512 x 384</td>
<td>37</td>
<td>3</td>
<td>1000</td>
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</table>
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Conclusions

- A framework that allows local and remote implementations
- It allows a single interface from both implementations
- It can use more remote servers and it can switch between them if there are disconnections
• With no big programming effort we can...
Conclusions

- With no big programming effort we can...increase the speed of compute intensive operations
• With no big programming effort we can...increase the speed of compute intensive operations and reduce the energy consumption.