Request Tracking in Server Systems (cont.)

Kai Shen
Dept. of Computer Science, University of Rochester

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Magpie [Barham et al. OSDI2004]

- Tracking requests transparently
  - dumping bunch of system events
  - analyze the events afterward to find out request context propagations
    - process A sends something into a socket and process B reads out of the same socket a bit later
    - an interrupt handler is linked to a page cache entry which is later read by process C
- Flexibility
  - a framework with user-defined rules
  - Extending this into application level
    - user-level synchronization with explicit tracing
- Not on-the-fly
  - why not?

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Utilization of Magpie Request Tracking

- Request classification
  - each request is identified by its events
    - tree or chain?
    - put similar ones into groups/clusters
      - what is the good metric to quantify the difference between requests?
- Request modeling
  - given an online workload, you can say
    - 80% are like this ...
    - 19% are like this ...
    - a couple of really weird ones

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On-the-Fly Transparent Request Tracking [URCS work, ASPLOS2008]

- On-the-fly tracking allows immediate system reaction
  - adaptive OS management policy
  - anomaly detection and quarantine
- Most request propagations are through inter-processing communications
  - tag request contexts to messages
  - problem with tagging message
    - message may be asynchronous
    - message boundaries in stream-based communications
    - more problems?
- Other request propagations?
An Example of Request Propagation

- Server request context propagation [with help from Chris Stewart]

Distributed Request Tracking

- Identify request contexts across machines
- Overhead of passing tags and distributed analysis
- Issues related to distributed management

Discussions

- Request tracking mechanisms
  - transparency
  - on-the-fly vs. offline
  - flexibility
  - robustness
  - support for distributed tracking

- Utilization of request tracking
  - request-granularity resource allocation
  - workload modeling
  - request-granularity OS management, anomaly detection