CrystalBall
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Motivations

- model checkers can't search to any real depth in reasonable time
- subtle bugs can exist in running systems indefinitely
CrystalBall

- consistency checker for deployed distributed systems
- influences running system to avoid problems
Abstractions

- predicates
- consistent snapshots
- a node's “neighborhood”
Consistency violation detection

- check predicates against neighborhood
- checks as much as possible, runs until cut off
Execution steering

- event filters prevent inconsistent states before they happen
- proceeds along likely safer paths
Immediate safety checks

- check possible states from allowing handler to run
- if the result is an inconsistent state, don't
CrystalBall vs. $D^3S$

- less ambitious, but
- real-time
- benefits on first iteration
Results – bug detection
Results – performance impact
Results – performance impact

Consequence Search on RandTree

Increased Memory Size (kB)

Depth (levels)