Dependable, Online Upgrades in Enterprise Systems

Tudor Dumitraș
tudor@cmu.edu

Carnegie Mellon University
http://www.ece.cmu.edu/~tdumitra

Software upgrades are unreliable, often causing downtime or data loss.

Leading Causes of Upgrade-Related Downtime

Upgrade-centric fault model

Unplanned downtime: • Broken dependencies

Planned downtime: • Data migrations

Current Approaches

• Dependency-tracking (needed for in-place upgrades)

• Rolling upgrades (create mixed, interacting versions)

Imago: Dependable, Online Upgrades

• Isolation: does not modify the dependencies of the production system

• Atomicity: either the old or the new version is available

• Fidelity: testing & deployment environments are identical

Experimental Evaluation*

Fault Impact

Latent error
Security vulnerability
Increased latency

Degraded throughout
Full outage

Rolling Upgrades

Imago

Fault type
Fault type

Faults injected

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Experiments conducted with Rice University Bidding Server (RUBiS)