MonDe: Safe Updating through Monitored Deployment of New Component Versions

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Idea Paper
Software Updating
Software Updating

Inadequate verification (not representative)
- User profiles unknown
- User configurations unknown
- Too many profiles/configs
- Hard to prioritize/focus testing effort
Proposed Solution: MonDe

MonDe: Monitored Deployment

- Deploy updates at remote sites
- Run new version in a sandbox using actual workload
- Report the results back to developers
MonDe Framework

Development Site

Deployment Site(s)

- New Version Development
- New Version of Component
- Monitoring Environment
- Program Instance
MonDe Framework

Development Site

- Monitoring Output Analysis
- New Version Development

Deployment Site(s)

- Monitoring Environment
- New Version of Component
- Program Instance
- Capture Harness
- Old Version of Component

deployment → results
Capture Harness
Capture Harness

- Monitoring Environment
- New Version of Component
- Old Version of Component
- Program Instance
- Capture Harness
MonDe: Advantages

- Perform evaluation on real user data
- Leverage remote resources
- Protect user data privacy (mostly)
- Enable pre-processing of execution results
  - Avoid/limit false negatives (？)
  - Produce useful reports (？)
MonDe: Requirements

Capture capability
  • Identify boundaries SW/new component
  • Record interaction through boundaries

Execution and monitoring capability
  • Replay captured interactions in sandbox
  • Observe and report results

⇒ Two approaches proposed
  • Offline (SCARPE)
  • Online (DDL)
SCARPE: Selective CApture and Replay of Program Executions

Defined for Java applications
SCARPE: Capture Phase

- Input *observed set*
- Identify observed-set’s boundaries
- Collect interactions and data across boundaries
  - method calls/returns
  - exceptions
  - field accesses
  => *event log*
SCARPE: Replay Phase

• Provide *replay scaffolding*
• Process *event log*
  • Create classes
  • Replay interactions
DDL: Dynamic Dynamic Linker

- Enables dynamic wrapper binding, and reconfiguration
- Harness for C++ captures:
  - incoming method invocations and returns
  - constructors and destructors
  - outgoing method/function invocations
Conclusion

- MonDE for safe deployment of new versions
- Offline or online techniques possible
  - SCARPE and DDL
Open Issues

• Definition of oracles
  • What is a failure?
  • How can we filter?
• Identification of boundaries
  • Currently, hammocks, but other approaches possible (e.g., analyze how much flows across i/f, select low-flow cuts)
• Optimization of capture/interception
• Privacy issues
Questions?