MonDe: Safe Updating through Monitored Deployment of New Component Versions

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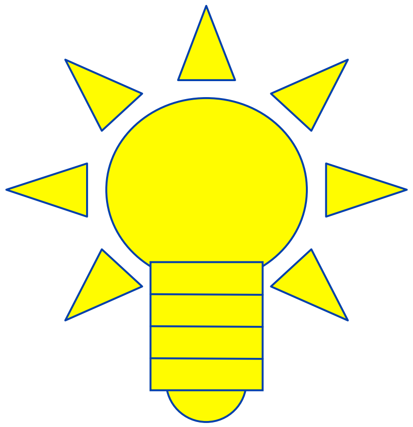
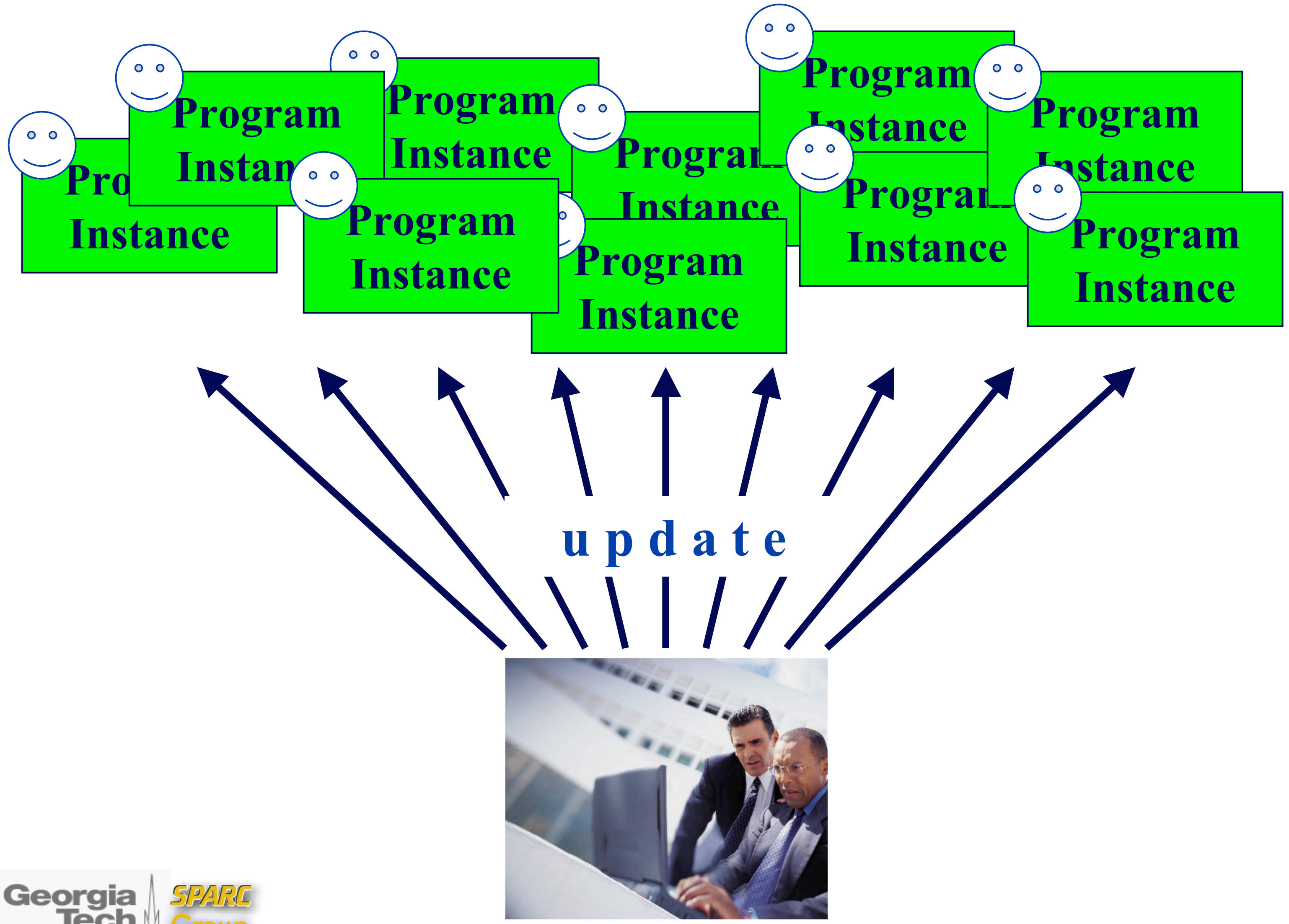
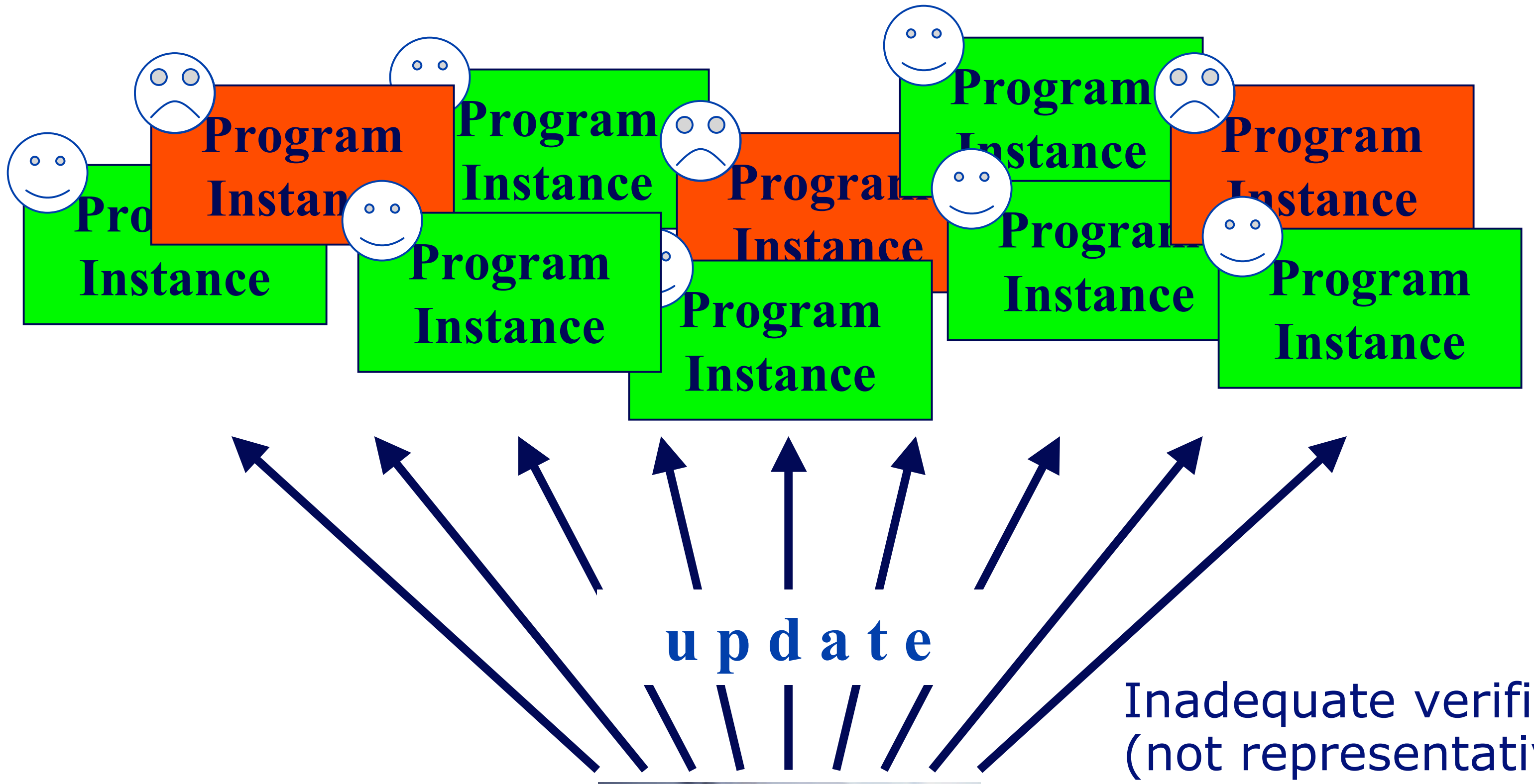
Idea Paper

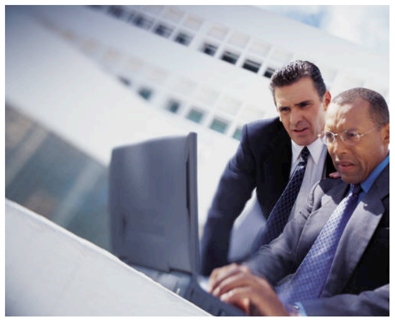


Software Updating



Software Updating





Inadequate verification (not representative)

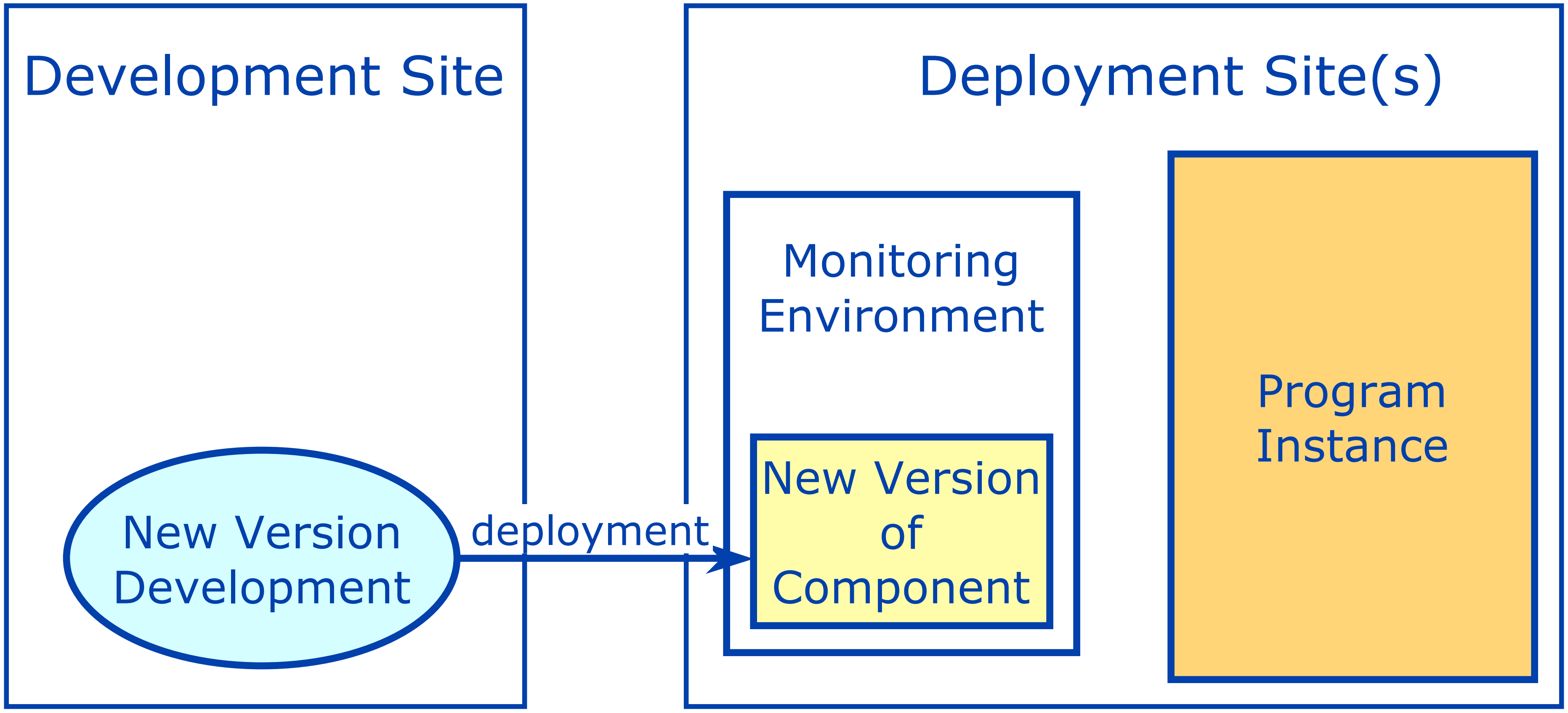
- User profiles unknown
- User configurations unknown
- Too many profiles/configs
- Hard to prioritize/focus testing effort

Proposed Solution: MonDe

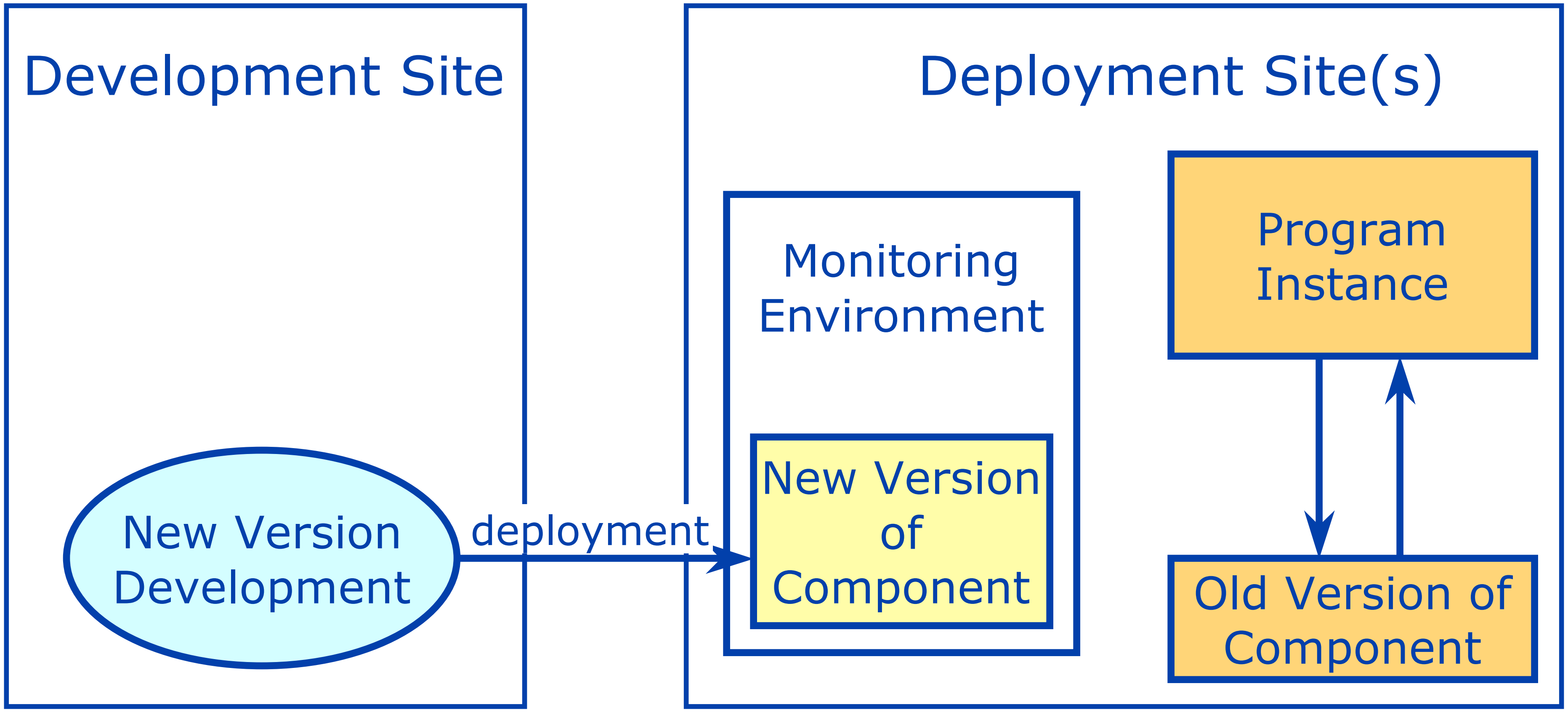
MonDe: Monitored Deployment

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

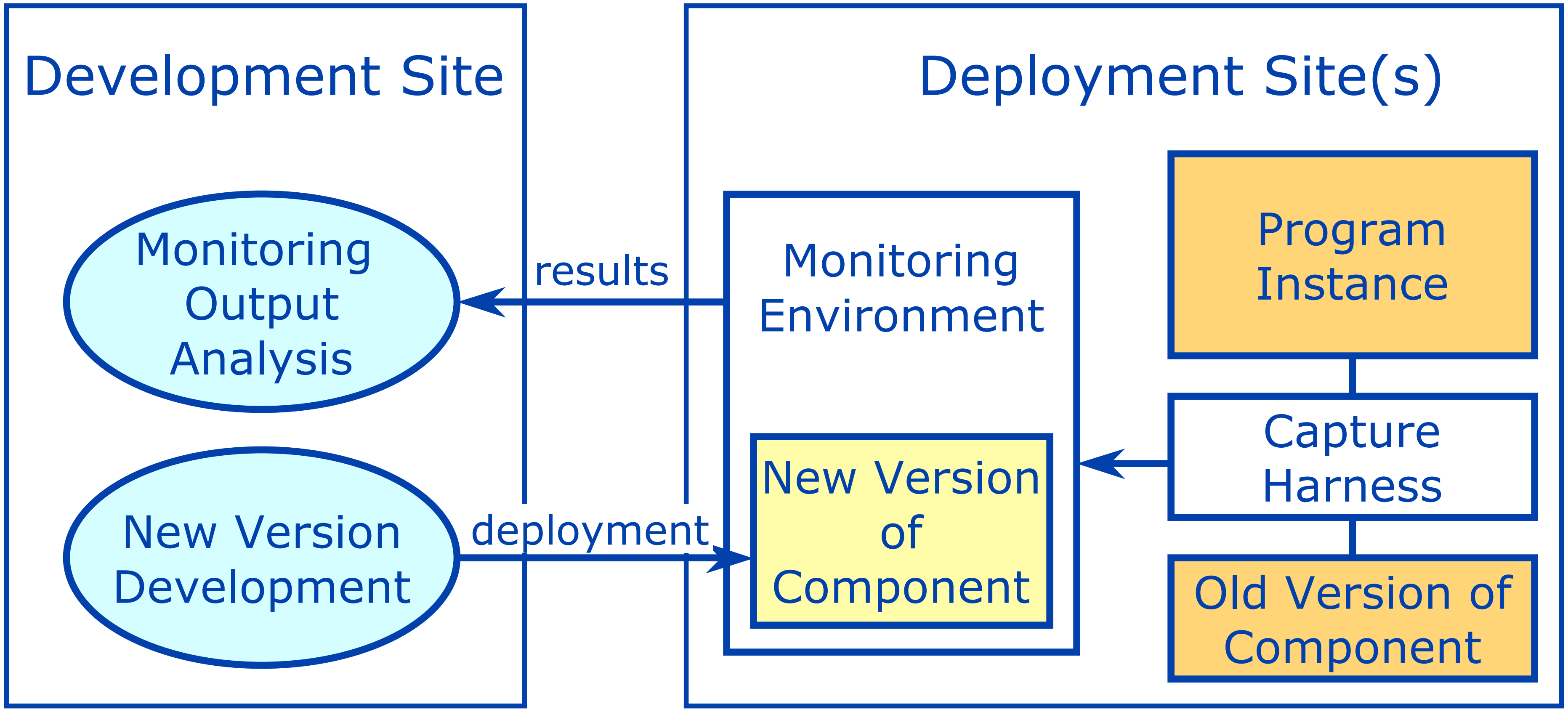
MonDe Framework



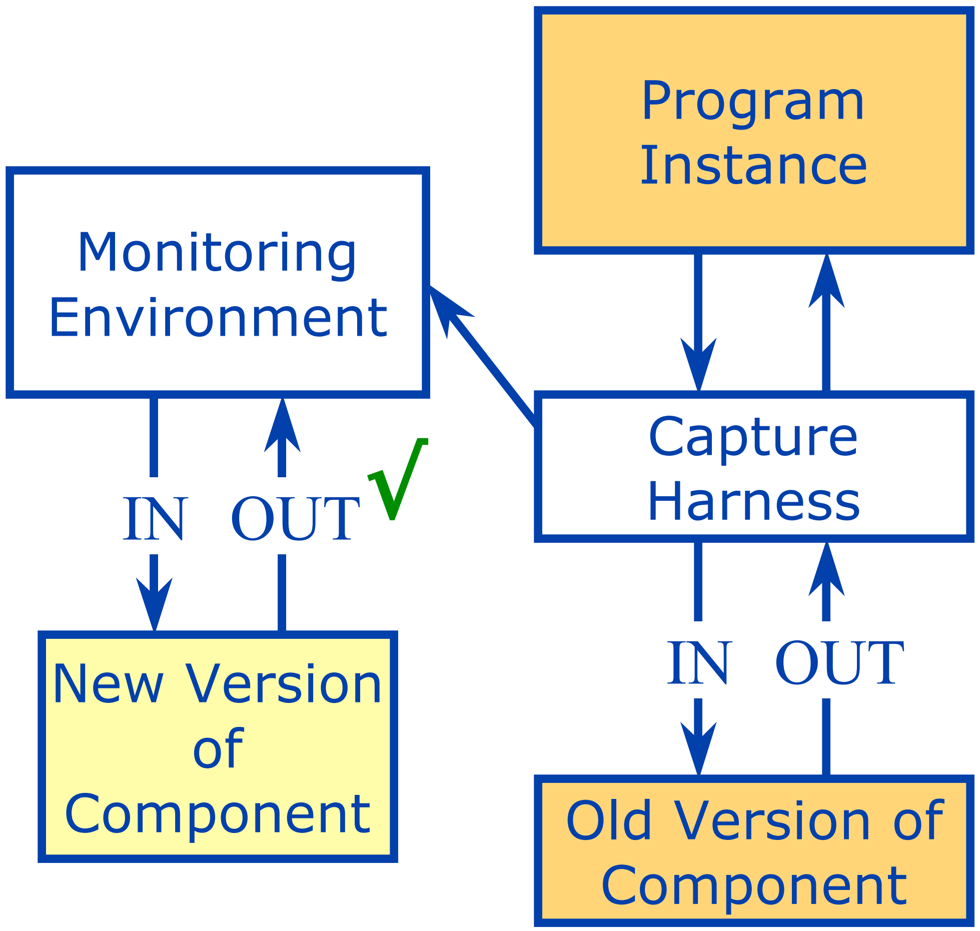
MonDe Framework



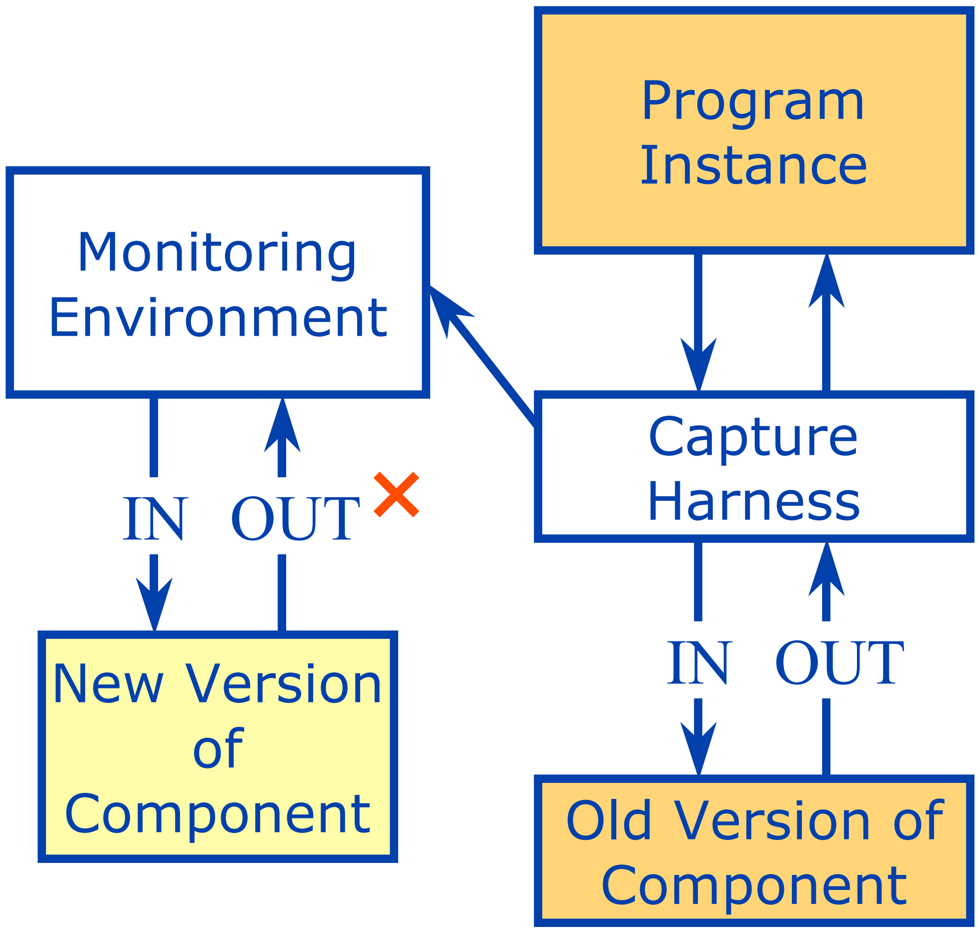
MonDe Framework



Capture Harness



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

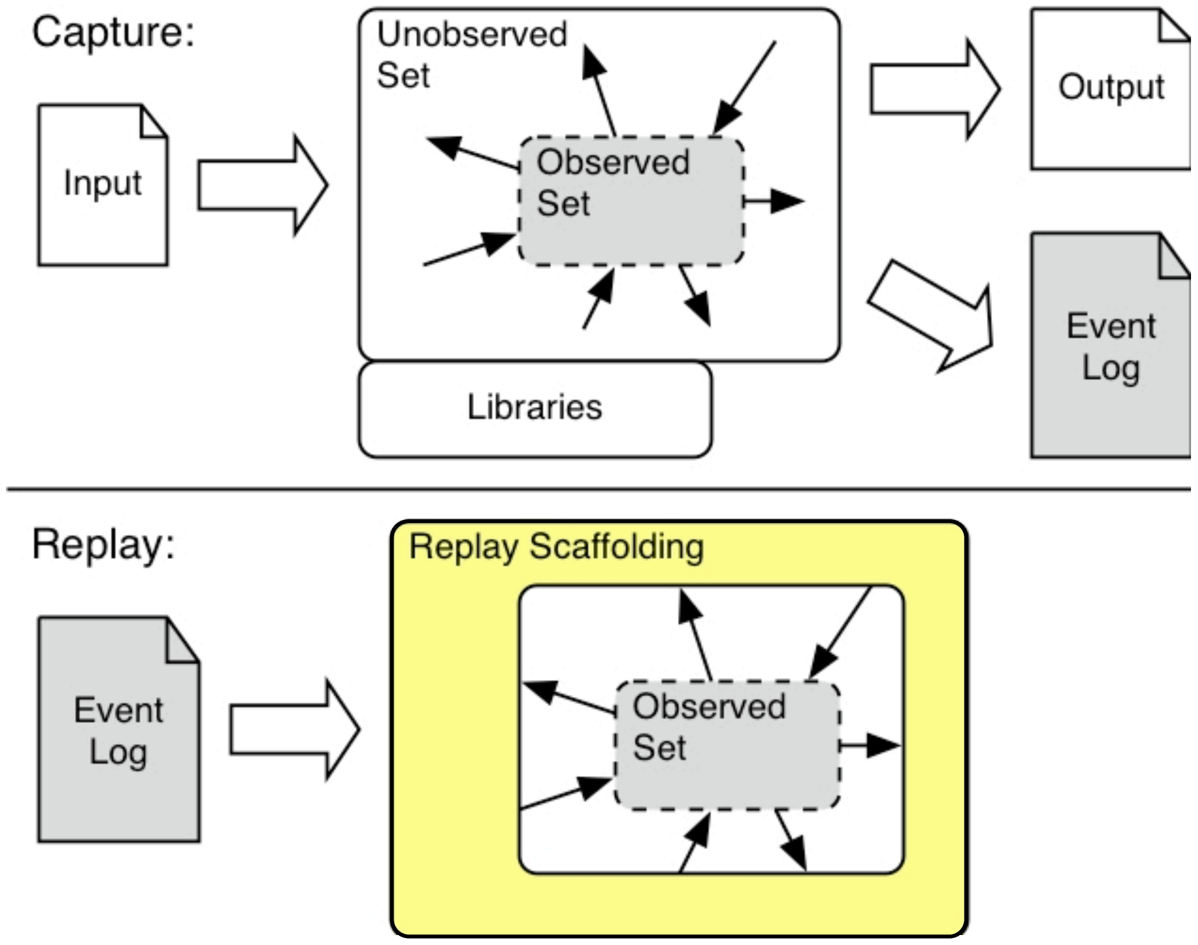
- Replay captured interactions in sandbox
- Observe and report results

⇒ Two approaches proposed

- $\boxed{\text{Offline (SCARPE)}}$
- Online (DDL)

SCARPE: Selective CApture and Replay of Program Executions

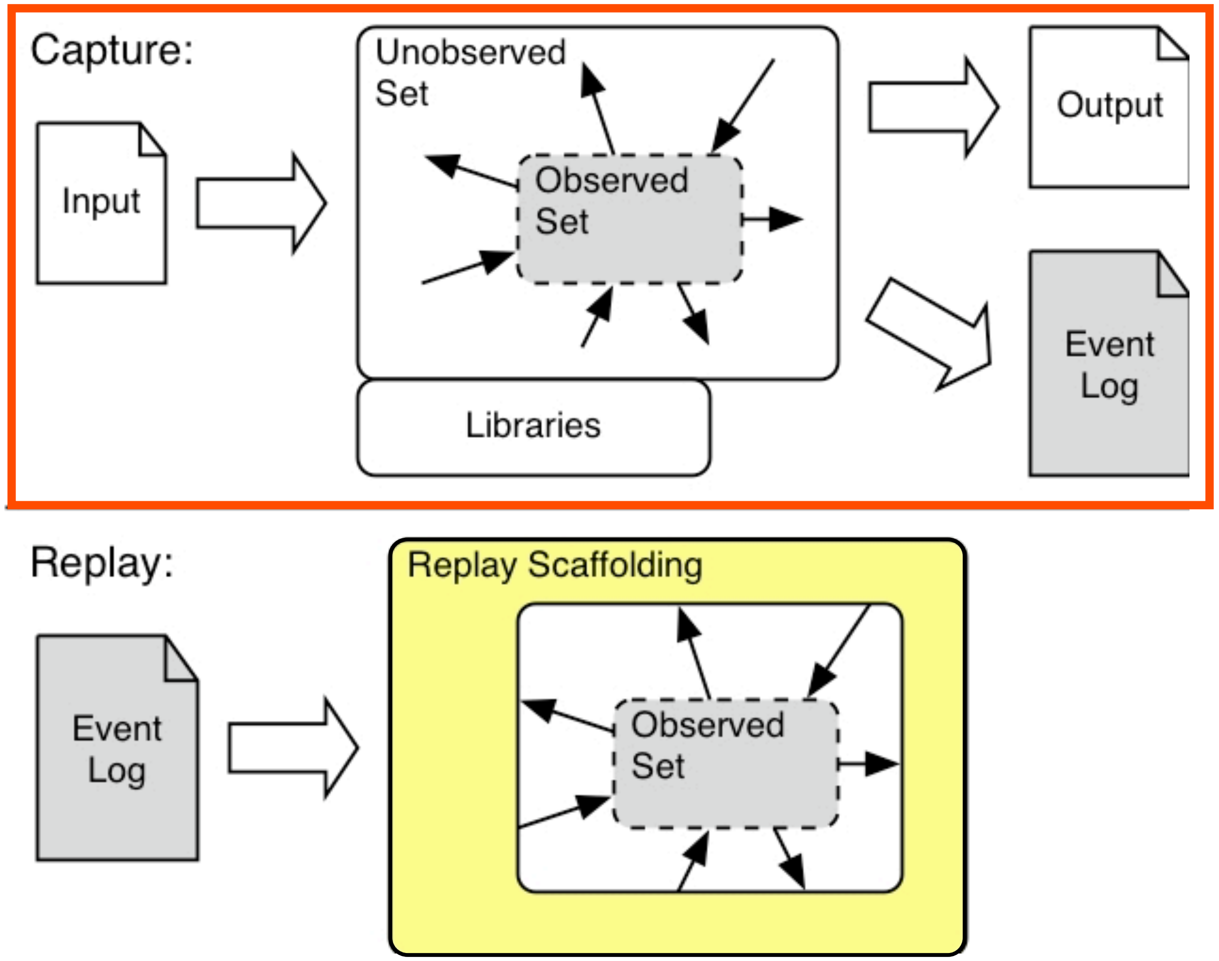
Defined for Java applications



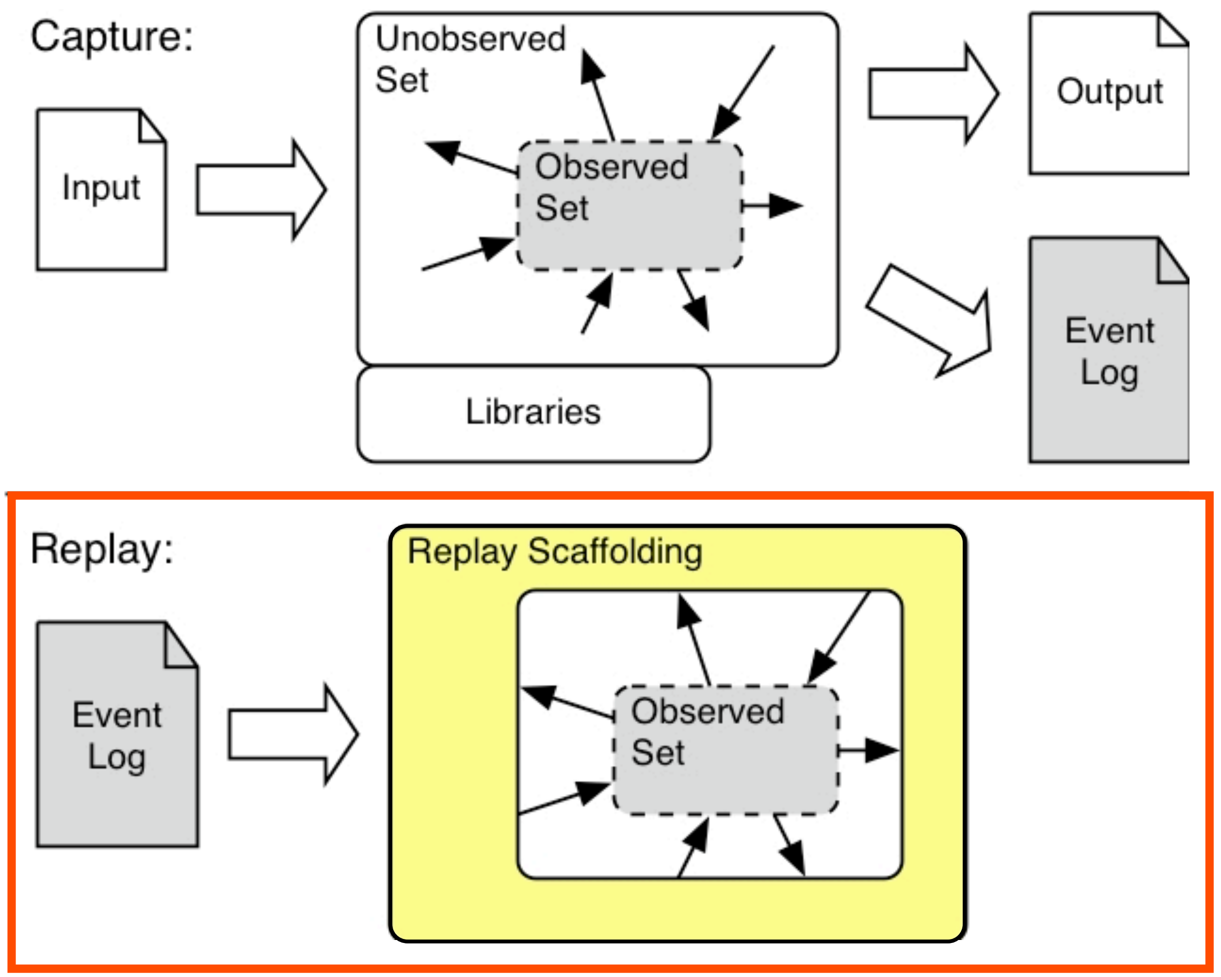
SCARPE: Capture Phase

- 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

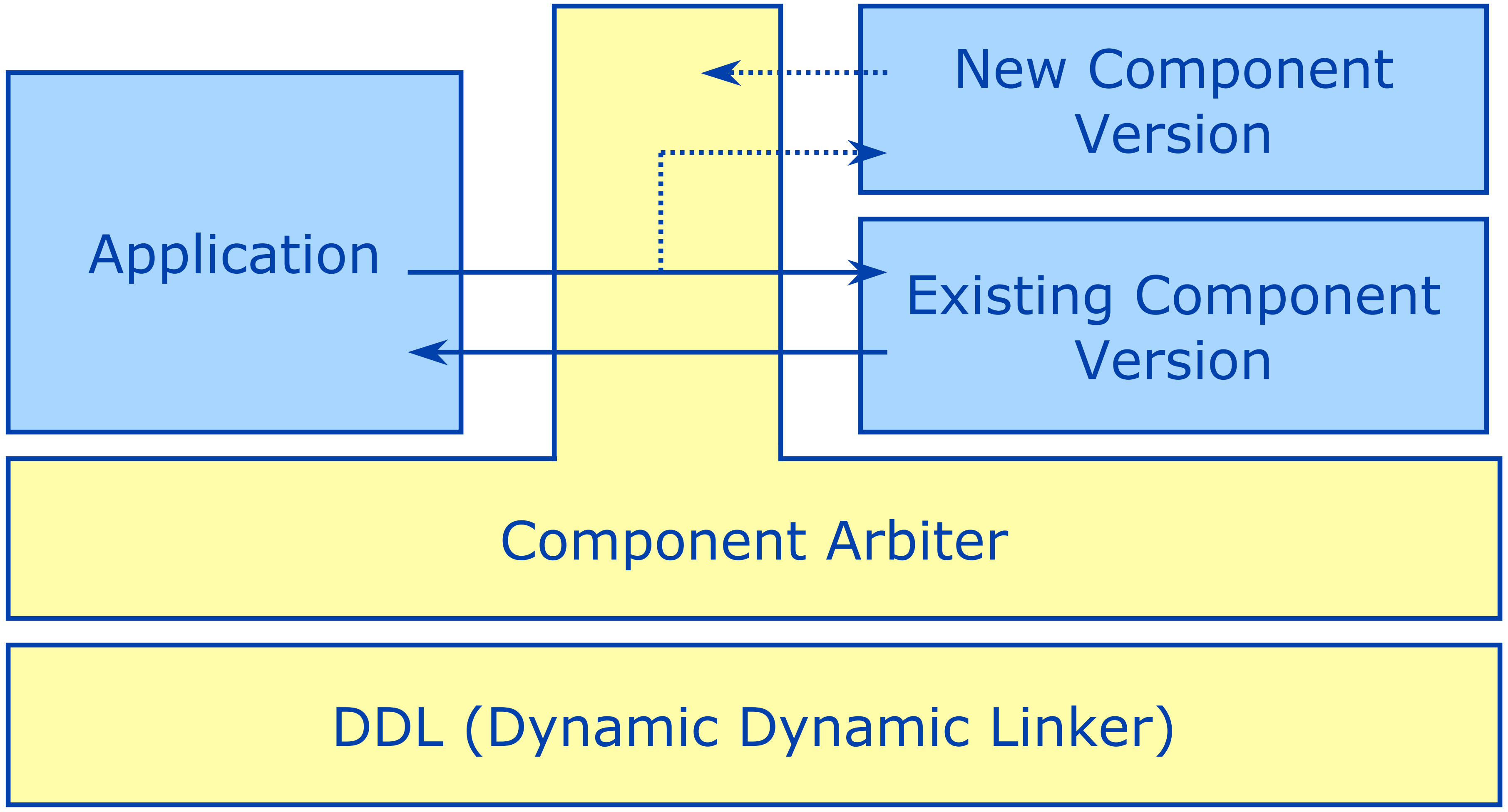


- Provide *replay scaffolding*
- Process *event log*
  - Create classes
  - Replay interactions

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

DDL Online Monitoring



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?