



Improving Dynamic Analysis through Partial Replay of Users' Executions

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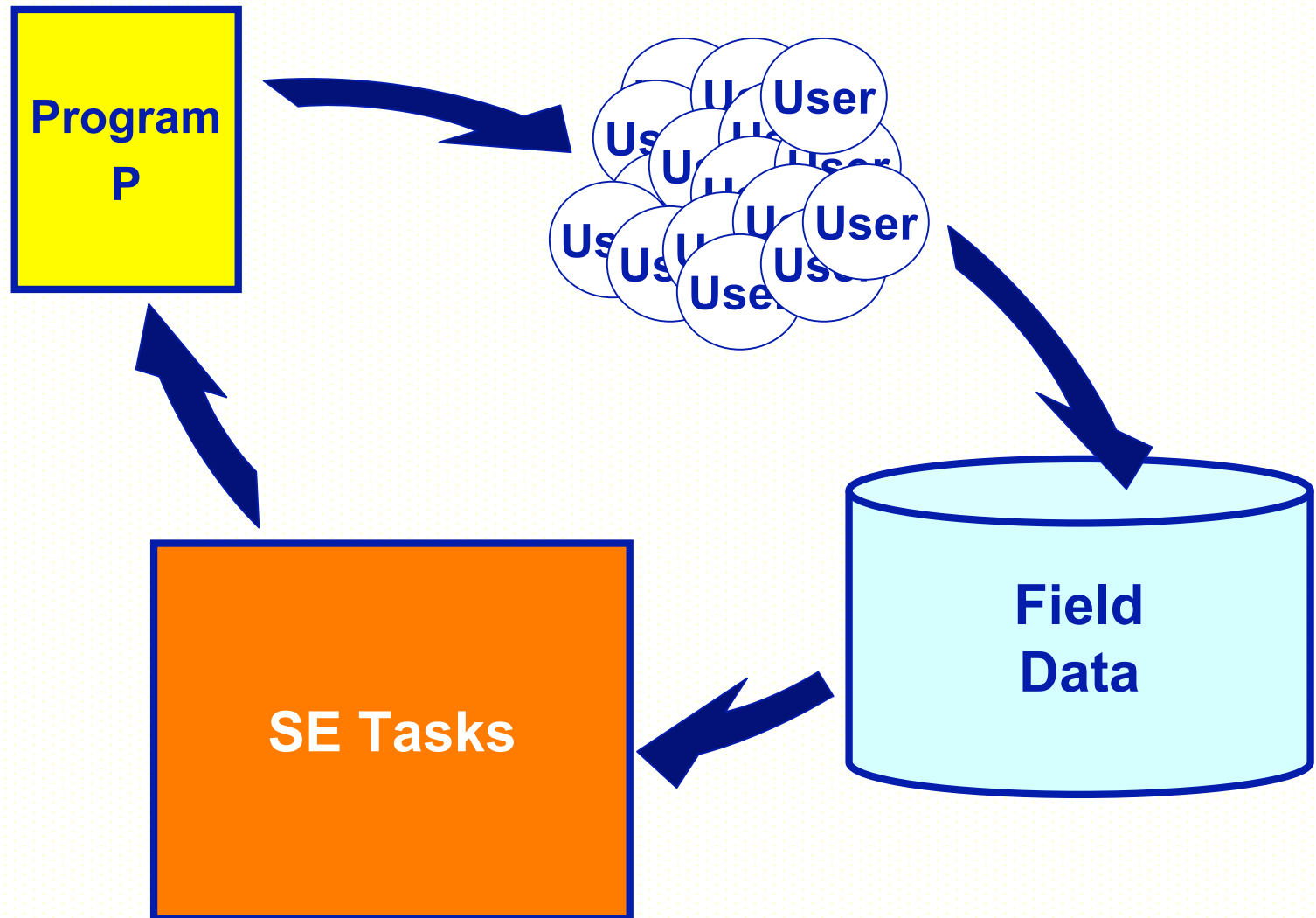
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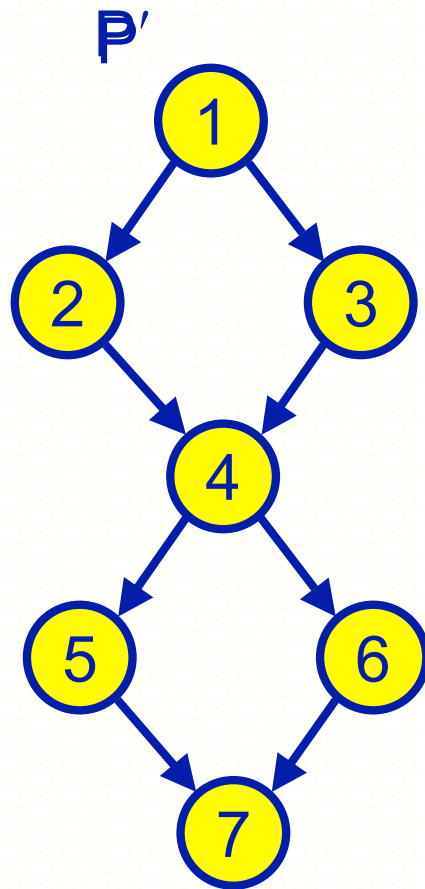
GAMMA: Overall Picture



[Orso, Liang, Harrold, Lipton, ISSTA'02]



Regression Testing Using Field Data



In-house test suite:

T1: 1, 2, 4, 6, 7

T2: 1, 3, 4, 5, 7

Users' executions:

U1: 1, 3, 4, 5, 7

U2: 1, 2, 4, 6, 7

U3: 1, 3, 4, 6, 7

Impact set = ~~{2, 4, 5, 6, 7}~~

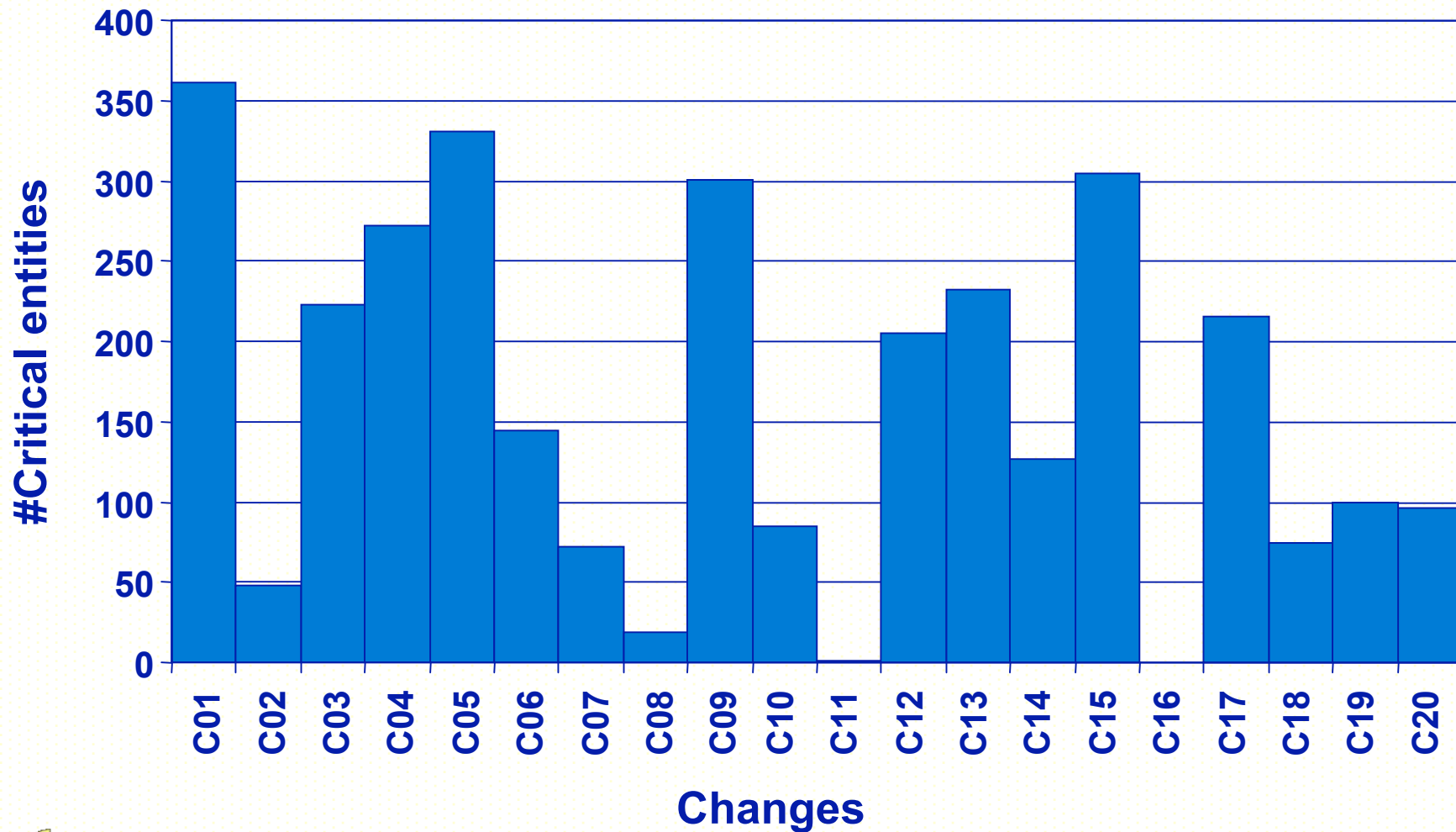
Critical entities set[3] = {6}

[Orso, Apiwattanapong, Harrold, ESEC/FSE '03]



Empirical Results

JABA, 14 users, 12 weeks, 20 changes from CVS



Replaying Executions: Issues

Practicality

- High volume of data
- Hard to capture (custom)
- Rich environment

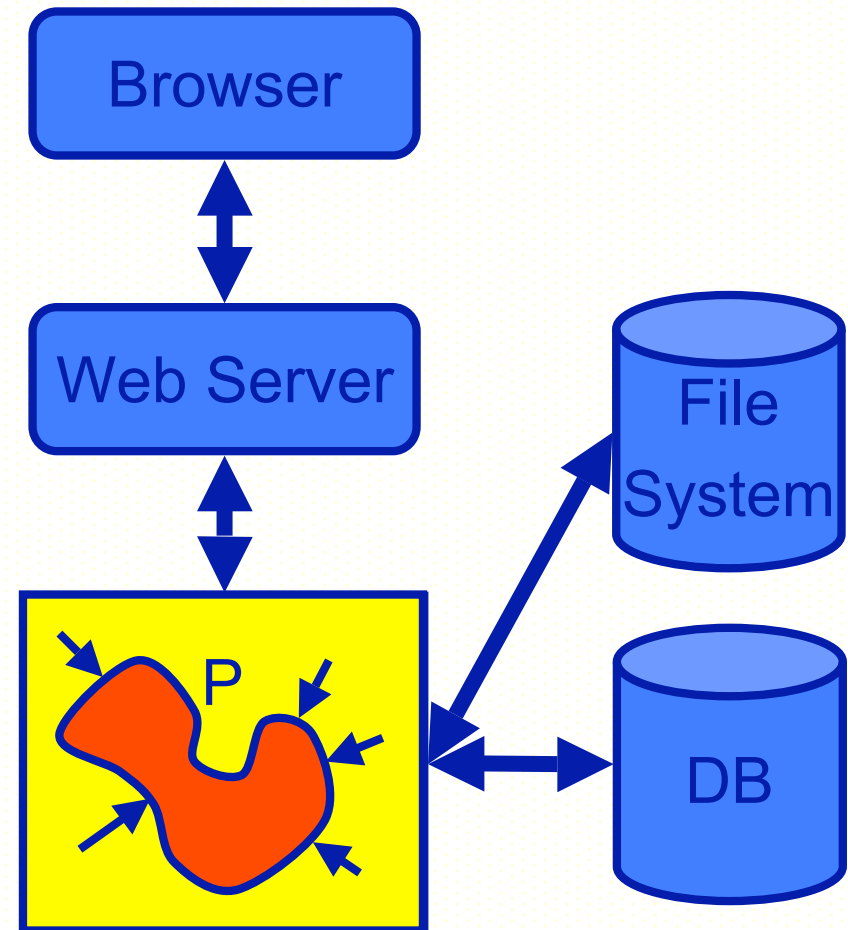
Privacy

- Sensitive information

Safety

- Side-effects

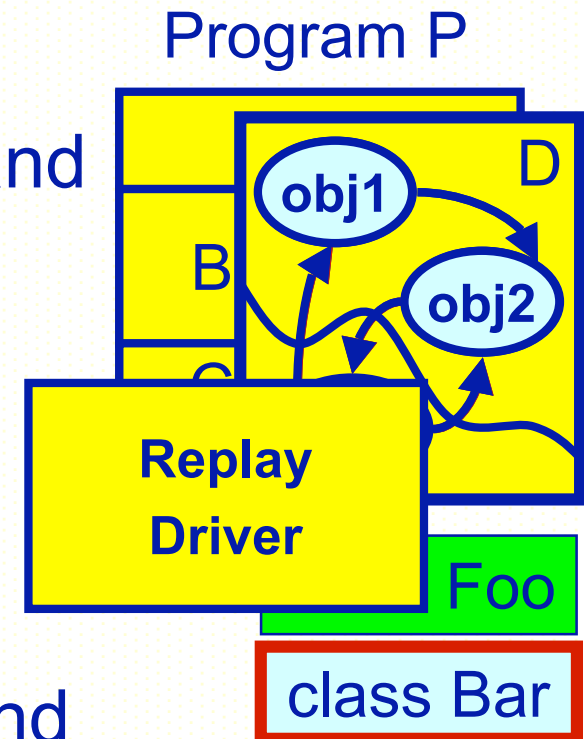
 Partial replay



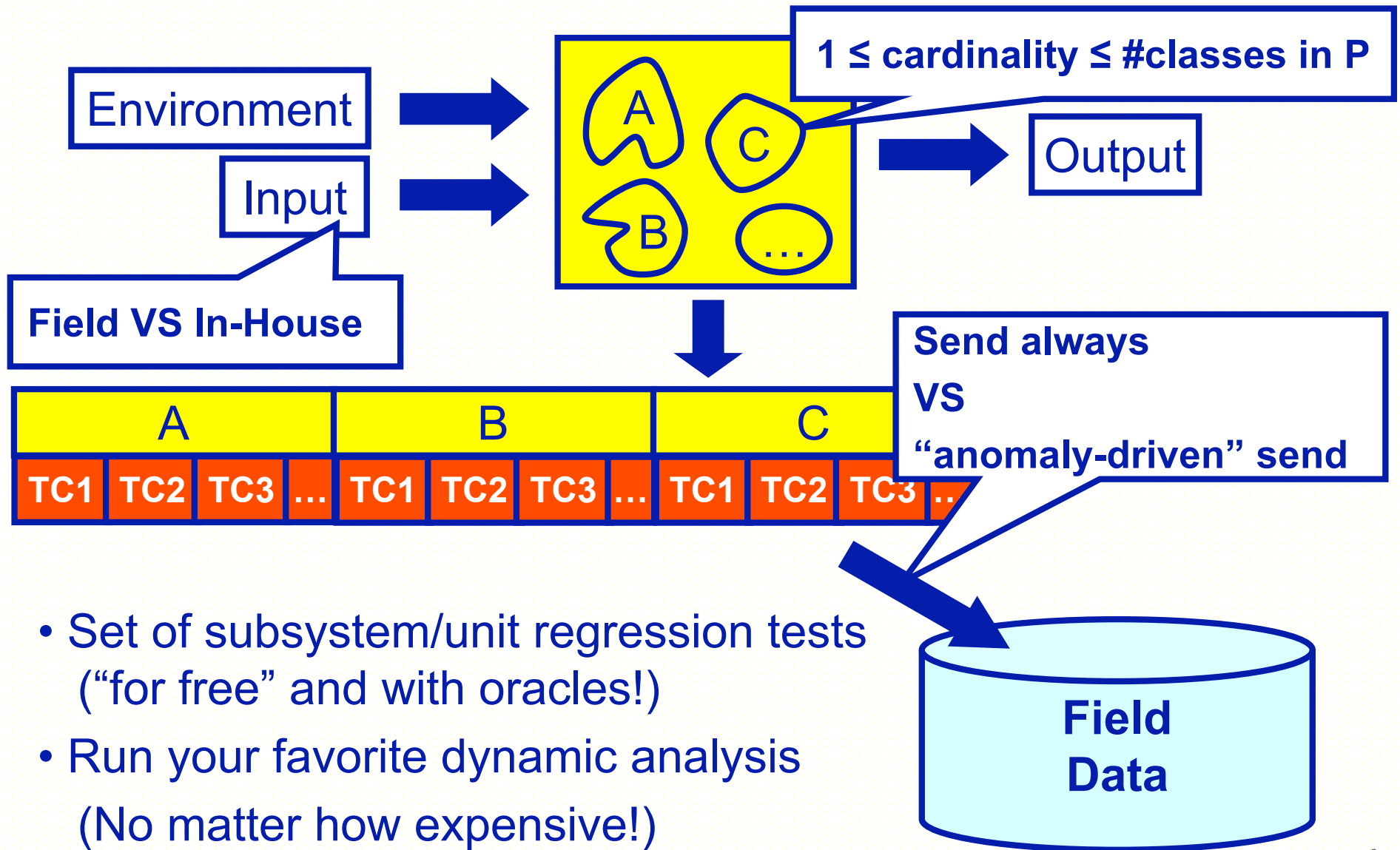
Replaying Executions of Subsystems

Replaying subsystems

- Identify subsystem of interest and its boundaries
 - User provided
 - Static analysis
 - Dynamic analysis
- Collect information flowing in and from the subsystem
- Replay the subsystem

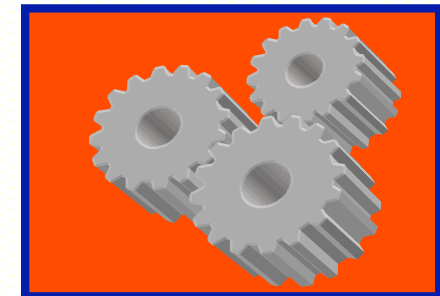
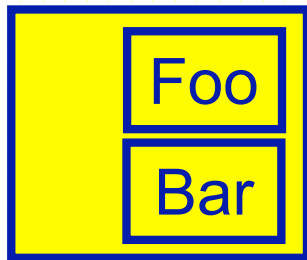


Replaying Executions: Scenarios



Technique: Capturing

Program P



Configuration

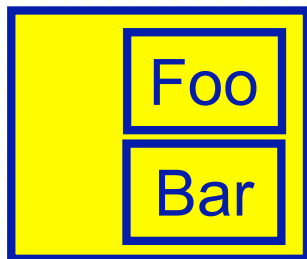


Log

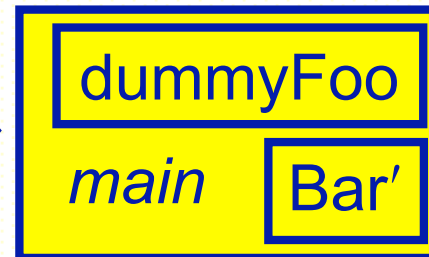


Technique: Replaying

Program P



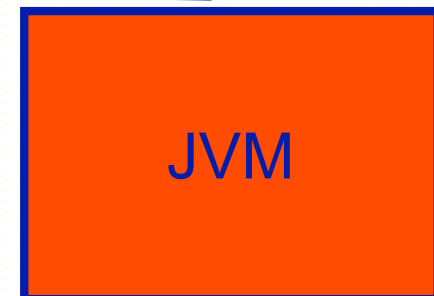
Replay Driver



Log



Configuration



Conclusion

Contribution

- Defined the capture/replay technique
- Developed an initial prototype

Future work

- Add static/dynamic analysis support for selection
- Evaluate the technique for different scenarios
- Extend the technique to handle threads





For more information:

<http://gamma.cc.gatech.edu>

