OBJECTIVES

Software has bugs! The goal of ABL is to develop and disseminate tools that help developers find bugs in open-source infrastructure software, and to assess and improve the robustness of such software. Our approach stays close to the source code, to facilitate the acceptance of our work in the developer community.

HIGHLIGHTS

STUDY OF BUGS IN INFRASTRUCTURE SOFTWARE

- Application of Coccinelle (static analyzer) to 34 Linux versions (over 168 million LOC)
- RESULTS: [AOSD 2010, ASPLOS 2011]
  - Decreasing number of faults per LOC
  - Drivers are no longer the most error-prone!

IMPROVING ERROR HANDLING

- Detection of omitted cleanup operations using function-local information
- Developed tool: Hector
- RESULTS: [LCTES 2011, PLOS 2011, DSN 2013, PhD thesis]
  - 371 faults found in Linux and other software, 23% false positives
  - Detected faults cause memory leaks, deadlocks, and system crashes
  - Over 70 patches (newly detected faults) accepted into Linux

EASING THE DEVELOPMENT OF KERNEL SERVICES

- Identification of unsafe operations across the kernel-module interface
- Automatic generation of low-overhead runtime checking wrappers
- Developed tool: Diagnosys
- RESULTS: [ASE 2012 (best paper), PhD thesis in collaboration with LaBRI]
  - Over 22 000 “safety holes” identified in Linux

CONCLUSIONS AND FUTURE WORK

CONCLUSION

Tools addressing specific developer needs can have a real impact on software reliability

FUTURE WORK

Improving software branching and merging, debugging from crash dumps, driver portability

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param = copy_dev_ioctl(user);
err = validate_dev_ioctl(...);
if (err) {
  free_dev_ioctl(param);
  return err;
}
... fn = lookup_dev_ioctl(...);
if (!fn) {
  AUTOFS_WARN("...");
  return -ENOTTY;
}