A Dataset of Parametric Cryptographic Misuses

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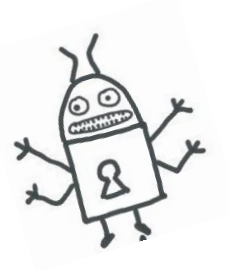
A Parametric Crypto Misuse

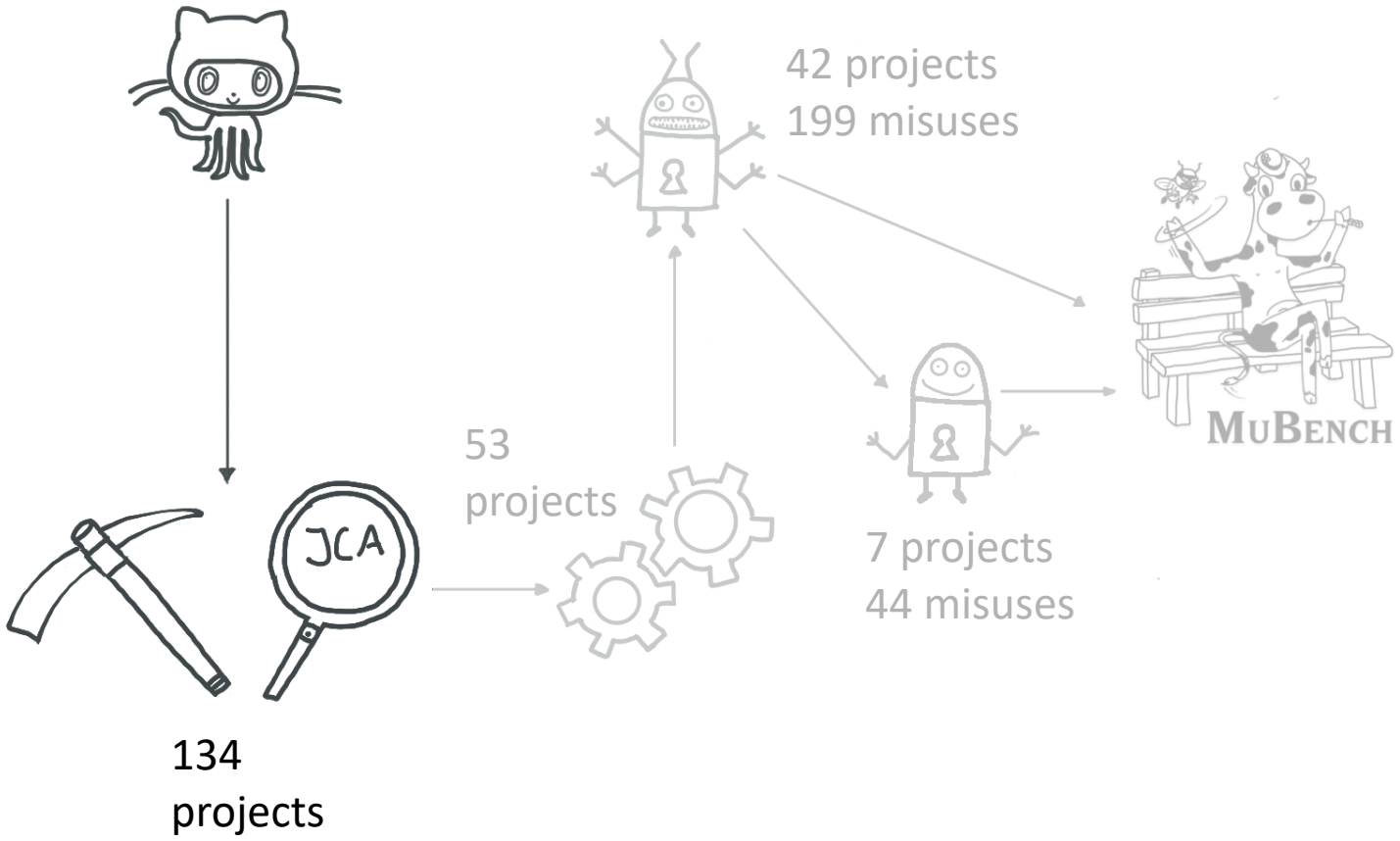
```
public final class AES128Encoder {
   private static final String SECRET = "Sa87LK45Sjsd98HG";

   public static String encryptPassword(String decryptedText) {
       try {
           Cipher cipher = Cipher.getInstance("AES/CBC/PKCS5Padding");
            cipher.init(ENCRYPT_MODE, generateKey(SECRET),new IvParameterSpec(IV.getBytes("UTF-8")));
            return Base64.getEncoder().encodeToString(cipher.doFinal(decryptedText.getBytes("UTF-8")));
       } catch (Exception e) {
           throw new PlatformRuntimeException(e);
       }
    }
```



88% (Egele et al. 2013) **/ 95%** (Krüger et al. 2018) Android Apps have at least one misuse

83% of Cryptographic Issues CVE Entries due to misuses of a crypto library (Lazar et al. 2014)

Methodology to Create the Data Set



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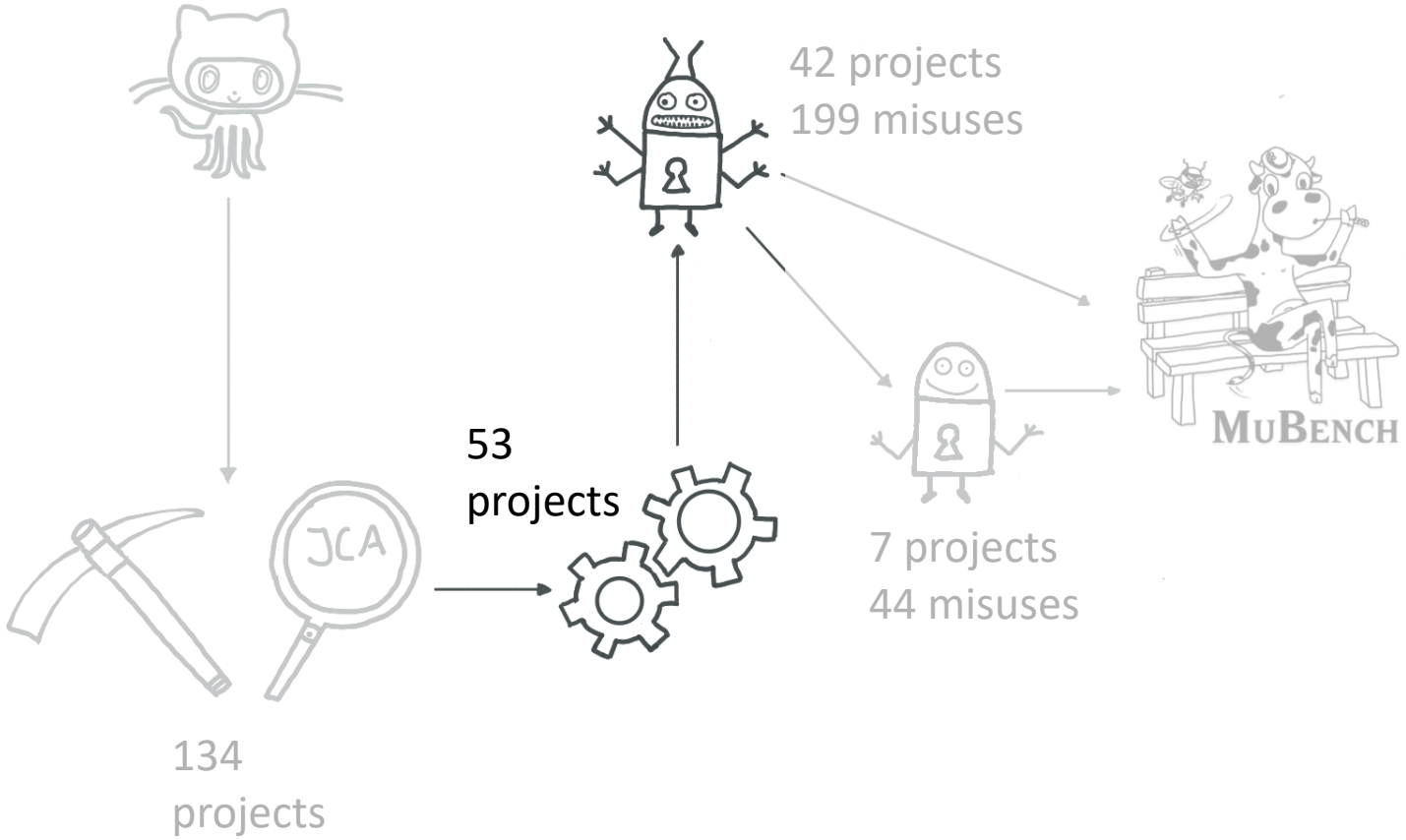

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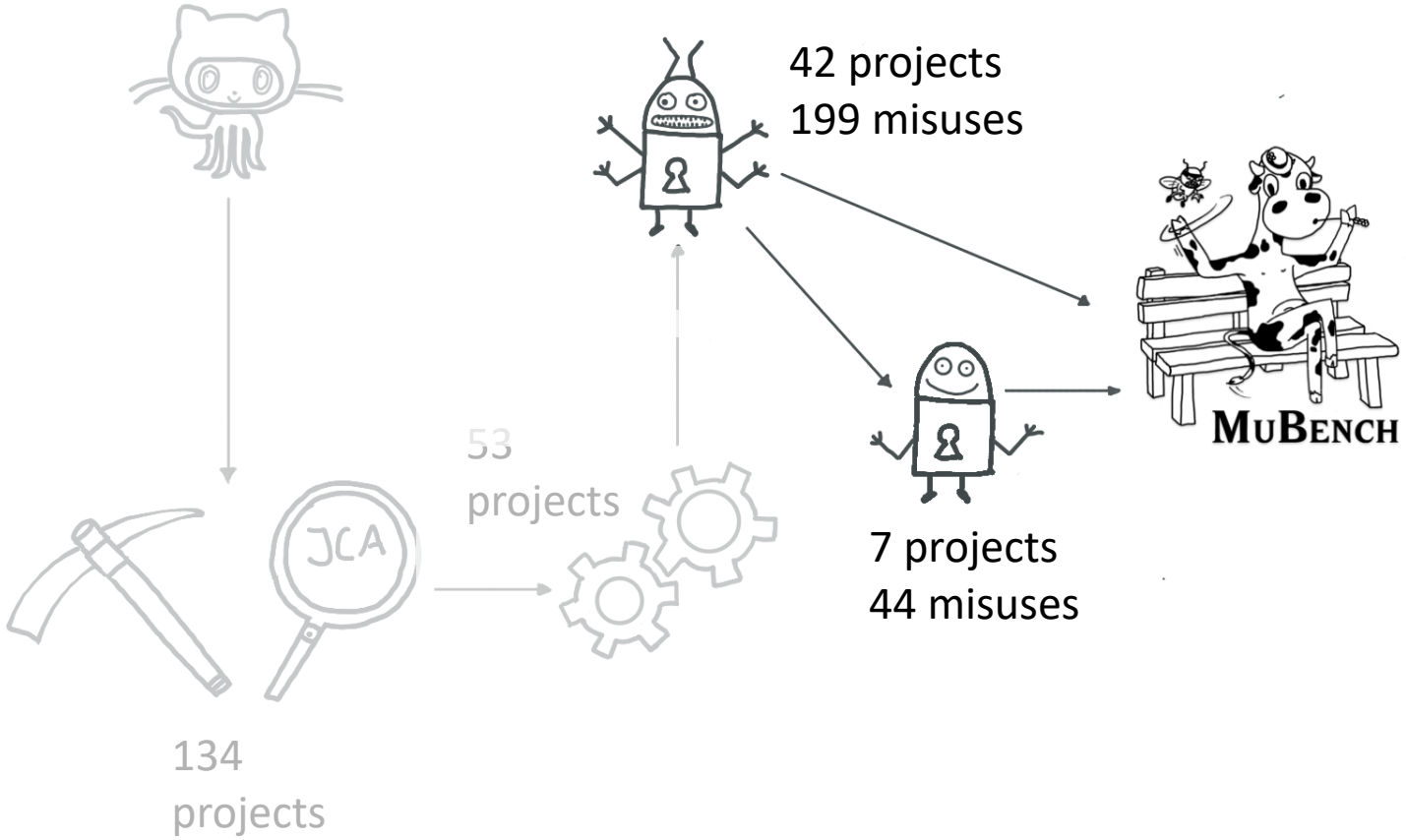
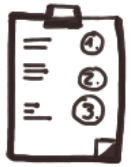


Potential Data Set Usage Scenarios



Evaluation of Static Analysis Tools

{  } Find Security Bugs on 10 projects

Precision

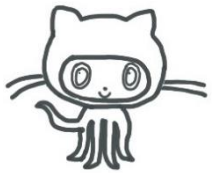
Recall

Review site: http://mubenchmsr.akwickert.de/

Research on Crypto APIs

Is there a connection between the number of misuses in a project and the code quality of the project?

Training Set for Learning Algorithms



https://github.com/stg-tud/MUBench/pull/427

My talk on one slide. ☺

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@akwickert

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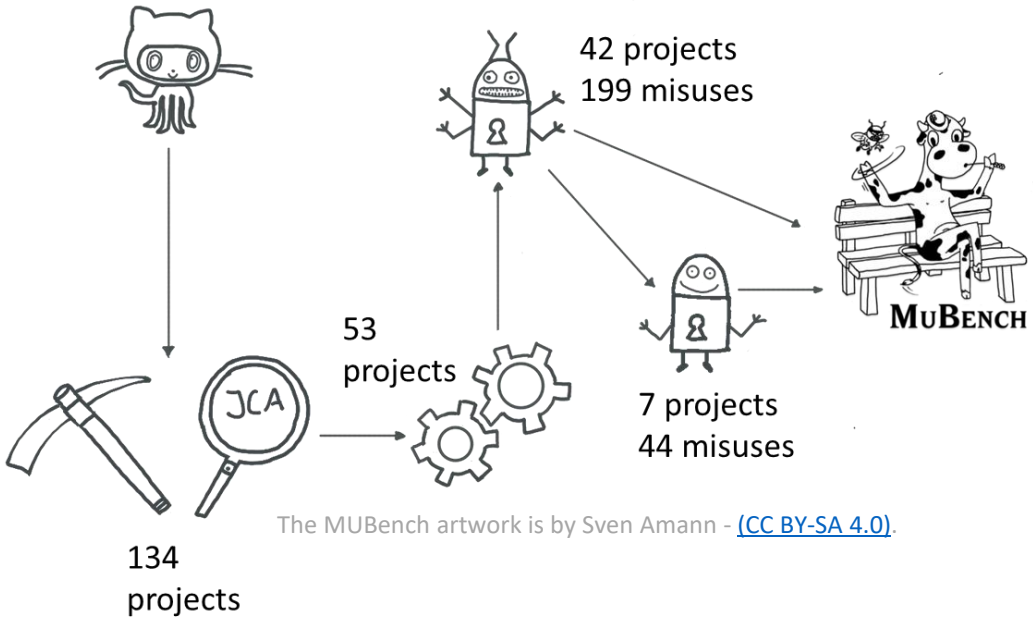

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Literature

- M. Egele, D. Brumley, Y. Fratantonio, and C. Kruegel, “An Empirical Study of Cryptographic Misuse in Android Applications,” in Proceedings of the 2013 ACM SIGSAC Conference on Computer & Communications Security, ser. CCS ’13. New York, NY, USA: ACM, 2013, pp. 73–84.
- S. Krüger, J. Späth, K. Ali, E. Bodden, and M. Mezini, “CrySL: An Extensible Approach to Validating the Correct Usage of Cryptographic APIs,” p. 27, 2018.
- D. Lazar, H. Chen, X. Wang, and N. Zeldovich, “Why Does Cryptographic Software Fail?: A Case Study and Open Problems,” in Proceedings of 5th Asia-Pacific Workshop on Systems, ser. APSys ’14. New York, NY, USA: ACM, 2014, pp. 7:1–7:7.