References

- [1] Mello, John P. Jr. (2017) Application Security Report 2017. Cybersecurity Ventures.
- [2] L. Gazzola, D. Micucci, and L. Mariani, "Automatic Software Repair: A Survey," *IEEE Transactions on Software Engineering*, vol. 45, no. 1, pp. 34–67, 2019.
- [3] Krasner, Herb. (2018, 9) The Cost of Poor Quality Software in the US: A 2018 Report.
- [4] "IEEE Standard Glossary of Software Engineering Terminology," *IEEE Std 610.12-1990*, pp. 1–84, 1990. doi: 10.1109/IEEESTD.1990.101064
- [5] "IEEE Standard Classification for Software Anomalies," *IEEE Std* 1044-2009 (Revision of IEEE Std 1044-1993), pp. 1–23, 2010. doi: 10.1109/IEEESTD.2010.5399061
- [6] M. Beller, R. Bholanath, S. McIntosh, and A. Zaidman, "Analyzing the State of Static Analysis: A Large-Scale Evaluation in Open Source Software," in 2016 IEEE 23rd International Conference on Software Analysis, Evolution, and Reengineering (SANER), vol. 1, 2016, pp. 470–481.
- [7] K. El Emam and I. Wieczorek, "The repeatability of code defect classifications," in *Proceedings Ninth International Symposium on Software Reliability Engineering (Cat. No.98TB100257)*, 1998. doi: 10.1109/ISSRE.1998.730897 pp. 322–333.
- [8] J. Jones, "Abstract Syntax Tree Implementation Idioms," *Pattern Languages of Program Design*, 2003, proceedings of the 10th Conference on Pattern Languages of Programs (PLoP2003) http://hillside.net/plop/plop2003/papers.html. [Online]. Available: http://hillside.net/plop/plop2003/Papers/Jones-ImplementingASTs.pdf

- [9] O. Kononenko, O. Baysal, and M. W. Godfrey, "Code review quality: How developers see it," in 2016 IEEE/ACM 38th International Conference on Software Engineering (ICSE), 2016. doi: 10.1145/2884781.2884840 pp. 1028–1038.
- [10] T. Baum, H. Leßmann, and K. Schneider, "The choice of code review process: A survey on the state of the practice," in *Product-Focused Software Process Improvement*, M. Felderer, D. Méndez Fernández, B. Turhan, M. Kalinowski, F. Sarro, and D. Winkler, Eds. Cham: Springer International Publishing, 2017. ISBN 978-3-319-69926-4 pp. 111–127.
- [11] S. C. Johnson, "Lint, a C Program Checker," in *COMP. SCI. TECH. REP*, 1978, pp. 78–1273.
- [12] B. Chess and J. West, *Secure Programming with Static Analysis*, 1st ed. Addison-Wesley Professional, 2007. ISBN 9780321424778
- [13] S. Chacon and B. Straub, *Pro Git*, 2nd ed. USA: Apress, 2014. ISBN 1484200772
- [14] S. D. Galup, R. Dattero, J. J. Quan, and S. Conger, "An Overview of IT Service Management," *Commun. ACM*, vol. 52, no. 5, p. 124–127, May 2009. doi: 10.1145/1506409.1506439. [Online]. Available: https://doi.org/10.1145/1506409.1506439
- [15] V. A. Danciu, A. Hanemann, M. Sailer, and H.-G. Hegering, *IT Service Management: Getting the View*". Berlin, Heidelberg: Springer Berlin Heidelberg, 2006, pp. 109–130. ISBN 978-3-540-34129-1. [Online]. Available: https://doi.org/10.1007/3-540-34129-3_7
- [16] M. Brenner, M. Garschhammer, and H.-G. Hegering, When Infrastructure Management Just Won't Do: The Trend Towards Organizational IT Service Management. Berlin, Heidelberg: Springer Berlin Heidelberg, 2006, pp. 131–146. ISBN 978-3-540-34129-1. [Online]. Available: https://doi.org/10.1007/3-540-34129-3_8
- [17] C. Vassallo, S. Panichella, F. Palomba, S. Proksch, H. Gall, and A. Zaidman, "How developers engage with static analysis tools in different contexts," *Empirical Software Engineering*, vol. 25, 11 2019. doi: 10.1007/s10664-019-09750-5

- [18] K. F. Tómasdóttir, M. Aniche, and A. Van Deursen, "The Adoption of JavaScript Linters in Practice: A Case Study on ESLint," *IEEE Transactions on Software Engineering*, vol. 46, no. 8, pp. 863–891, 2020. doi: 10.1109/TSE.2018.2871058
- [19] C. Vassallo, S. Panichella, F. Palomba, S. Proksch, A. Zaidman, and H. C. Gall, "Context is king: The developer perspective on the usage of static analysis tools," in 2018 IEEE 25th International Conference on Software Analysis, Evolution and Reengineering (SANER), 2018, pp. 38–49.
- [20] S. Kim and M. D. Ernst, "Which Warnings Should I Fix First?" in *Proceedings of the the 6th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on The Foundations of Software Engineering*, ser. ESEC-FSE '07. New York, NY, USA: Association for Computing Machinery, 2007. doi: 10.1145/1287624.1287633. ISBN 9781595938114 p. 45–54. [Online]. Available: https://doi.org/10.1145/1287624.1287633
- [21] G. Digkas, M. Lungu, P. Avgeriou, A. Chatzigeorgiou, and A. Ampatzoglou, "How do developers fix issues and pay back technical debt in the Apache ecosystem?" in 2018 IEEE 25th International Conference on Software Analysis, Evolution and Reengineering (SANER), 2018, pp. 153–163.
- [22] D. Marcilio, R. Bonifácio, E. Monteiro, E. Canedo, W. Luz, and G. Pinto, "Are Static Analysis Violations Really Fixed? A Closer Look at Realistic Usage of SonarQube," in 2019 IEEE/ACM 27th International Conference on Program Comprehension (ICPC), 2019, pp. 209–219.
- [23] N. Imtiaz, B. Murphy, and L. Williams, "How Do Developers Act on Static Analysis Alerts? An Empirical Study of Coverity Usage," in 2019 IEEE 30th International Symposium on Software Reliability Engineering (ISSRE), 2019. doi: 10.1109/ISSRE.2019.00040 pp. 323–333.
- [24] N. Fenton and N. Ohlsson, "Ohlsson, N.: Quantitative analysis of faults and failures in a complex software system. IEEE Trans. Softw. Eng. 26(8), 797-814," *Software Engineering, IEEE Transactions on*, vol. 26, pp. 797 814, 09 2000. doi: 10.1109/32.879815
- [25] T. Galinac Grbac, P. Runeson, and D. Huljenic, "A Second Replicated Quantitative Analysis of Fault Distributions in Complex Software

- Systems," *IEEE Transactions on Software Engineering*, vol. 39, pp. 462 476, 07 2012. doi: 10.1109/TSE.2012.46
- [26] N. Walkinshaw and L. Minku, "Are 20% of Files Responsible for 80% of Defects?" in Proceedings of the 12th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement, ser. ESEM '18. New York, NY, USA: Association for Computing Machinery, 2018. doi: 10.1145/3239235.3239244. ISBN 9781450358231. [Online]. Available: https://doi.org/10.1145/3239235.3239244
- [27] F. Zampetti, S. Scalabrino, R. Oliveto, G. Canfora, and M. Di Penta, "How Open Source Projects Use Static Code Analysis Tools in Continuous Integration Pipelines," in 2017 IEEE/ACM 14th International Conference on Mining Software Repositories (MSR), 2017. doi: 10.1109/MSR.2017.2 pp. 334–344.
- [28] B. Johnson, Y. Song, E. Murphy-Hill, and R. Bowdidge, "Why Don't Software Developers Use Static Analysis Tools to Find Bugs?" in *Proceedings of the 2013 International Conference on Software Engineering*, ser. ICSE '13. IEEE Press, 2013. ISBN 9781467330763 p. 672–681.
- [29] N. Imtiaz, A. Rahman, E. Farhana, and L. Williams, "Challenges with Responding to Static Analysis Tool Alerts," in 2019 IEEE/ACM 16th International Conference on Mining Software Repositories (MSR), 2019. doi: 10.1109/MSR.2019.00049 pp. 245–249.
- [30] U. Yüksel and H. Sözer, "Automated Classification of Static Code Analysis Alerts: A Case Study," in 2013 IEEE International Conference on Software Maintenance, 2013. doi: 10.1109/ICSM.2013.89 pp. 532– 535.
- [31] M. Monperrus, "Automatic Software Repair: A Bibliography," *ACM Comput. Surv.*, vol. 51, no. 1, Jan. 2018. doi: 10.1145/3105906. [Online]. Available: https://doi.org/10.1145/3105906
- [32] T. Durieux, F. Madeiral, M. Martinez, and R. Abreu, "Empirical Review of Java Program Repair Tools: A Large-Scale Experiment on 2,141 Bugs and 23,551 Repair Attempts," in *Proceedings of the 2019 27th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering*, ser. ESEC/FSE 2019.

- New York, NY, USA: Association for Computing Machinery, 2019. doi: 10.1145/3338906.3338911. ISBN 9781450355728 p. 302–313. [Online]. Available: https://doi.org/10.1145/3338906.3338911
- [33] C. L. Goues, M. Pradel, and A. Roychoudhury, "Automated Program Repair," *Commun. ACM*, vol. 62, no. 12, p. 56–65, Nov. 2019. doi: 10.1145/3318162. [Online]. Available: https://doi.org/10.1145/3318162
- [34] M. Martinez, T. Durieux, R. Sommerard, J. Xuan, and M. Monperrus, "Automatic Repair of Real Bugs in Java: A Large-Scale Experiment on the Defects4J Dataset," *Empirical Software Engineering*, vol. 22, 08 2017. doi: 10.1007/s10664-016-9470-4
- [35] K. Liu, D. Kim, T. F. Bissyandé, S. Yoo, and Y. Le Traon, "Mining Fix Patterns for FindBugs Violations," *IEEE Transactions on Software Engineering*, vol. 47, no. 1, pp. 165–188, 2021. doi: 10.1109/TSE.2018.2884955
- [36] D. Marcilio, C. A. Furia, R. Bonifácio, and G. Pinto, "Automatically Generating Fix Suggestions in Response to Static Code Analysis Warnings," in 2019 19th International Working Conference on Source Code Analysis and Manipulation (SCAM), 2019. doi: 10.1109/SCAM.2019.00013 pp. 34–44.
- [37] E. Freeman, *DevOps For Dummies*, 1st ed. Newark: Wiley, 2019. ISBN 9781119552222
- [38] N. Ayewah and W. Pugh, "The Google FindBugs Fixit," in *Proceedings of the 19th International Symposium on Software Testing and Analysis*, ser. ISSTA '10. New York, NY, USA: Association for Computing Machinery, 2010. doi: 10.1145/1831708.1831738. ISBN 9781605588230 p. 241–252. [Online]. Available: https://doi.org/10.1145/1831708.1831738
- [39] J. Bader, A. Scott, M. Pradel, and S. Chandra, "Getafix: Learning to Fix Bugs Automatically," *Proc. ACM Program. Lang.*, vol. 3, no. OOPSLA, Oct. 2019. doi: 10.1145/3360585. [Online]. Available: https://doi.org/10.1145/3360585

Appendix A

Survey

This appendix contains the questionnaire created and used for the survey conducted in this study.

Section 1 – Base information about you and your current project

- 1. Experience as developer?
 - <1 year / 1–2 years / 2–5 years / 5–10 years / >10 years
- 2. Name of the main project / application you're working on? (Optional-free text)
- 3. The maturity of the project you're working on? (#years)
 - <1 year / 1–2 years / 2–5 years / 5–10 years / >10 years
- 4. The size of the team you're working in?
 - 1–3 developers / 4–6 developers / >6 developers
- 5. Programming languages used in the project? (Multiple choice list)
- 6. Level of CI/CD in the project? (To what degree the project has adopted CI/CD principles)
 - Manual builds and manual deployments
 - Automated builds, tests, and manual deployments
 - Automated builds, tests, and automated deployments to dev/test
 - Fully automated continuous deployments