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To Whom It May Concern

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Letter for Linghui Luo's internship at Amazon Web Services

I am writing this letter in support of Linghui Luo's J1 visa application for the United States to attend an internship at Amazon Web Services.

I am a tenured professor for Software Engineering at Paderborn University, Germany, where Linghui Luo is currently enrolled as a full-time student, pursuing a PhD degree in Computer Science under my supervision. Linghui is expected to complete this degree by September 2021.

Linghui Luo has joined the graduate school on Human Centered Systems Security NERD.NRW in Computer Science at Paderborn University as a full-time PhD student in Winter Semester 2017/18, after finishing her master studies in Computer Science at Paderborn University. The graduate school NERD.NRW is funded by the Ministry for Culture and Science of North Rhine-Westphalia and is supporting PhD students at universities in North Rhine-Westphalia to promote research in the area of Human Centered Systems Security. PhD students from different locations collaborate on shared projects at this graduate school. Linghui participates in the shared project IntelliScan in a collaboration with the Usable Security and Privacy group of Bonn University. In this project, software developers are particularly considered. The goal of this project is to develop static code analysis tools which can support software developers to detect security vulnerabilities more easily in the early stage of software development.

Linghui's research focuses on the technical improvements of static code analysis tools such that these tools are more usable for software developers. She started her work by conducting a qualitative study on static Android taint-analysis results. Static taint analysis is a technique which can be used to detect data leaks in software. In this work, she developed a static analysis tool called COVA which can compute path constraints using a SMT solver. With the tool COVA she conducted a study in which taint-analysis results were analyzed together with their path constraints. Her study revealed several weaknesses of the state-of-the-art Android taint analysis tool FlowDroid and how its analysis can be improved. This work resulted in a research paper "A Qualitative Analysis of Android Taint-Analysis Results" at the 34th IEEE/ACM International Conference on Automated Software Engineering (ASE 2019) in San Diego, United States.

In recent work, Linghui developed a new framework MagpieBridge for integrating static analyses into Integrated Development Environments (IDEs) using the Language Server Protocol. With this framework, static analyses become more accessible for software developers since MagpieBridge allows a faster and easier integration of static analyses into multiple IDEs and code editors, which

are commonly used by software developers. This work resulted in a research paper "MagpieBridge: A General Approach to Integrating Static Analyses into IDEs and Editors" which she presented at the 2019 European Conference on Object-Oriented Programming (ECOOP 2019) in London, United Kingdom.

Linghui also attends a colloquium which is organized monthly by the graduate school NERD.NRW for PhD students to exchange research ideas and report their research progress. In summer 2019, she organized a summer school together with the coordinator and other PhD students of this graduate school, in which talks and workshops were given by senior researchers from different fields of Systems Security.

Currently, Linghui is working on constructing a benchmark suite for Android taint analysis. This benchmark suite should consist of real-world Android applications. Her qualitative study on Android taint-analysis results from ASE 2019 has shown that the state-of-the-art taint analysis tools produce large numbers of false positives when applied to real-world applications. This is the main cause why software developers abandon static analysis tools. With this benchmark suite she is going to reason about why these tools do not perform well on real-world Android applications and how they can be improved. This work should result in a publication at an international conference. There is also a planned user study for static analysis tools in collaboration with the Usability Security and Privacy group of Bonn University in which she participates.

In addition to research, Linghui has assisted in teaching several courses held by our research group at Paderborn University. She has successfully acted as teaching assistant for the Master courses "Secure Software Engineering" in Summer Semester 2019 and Winter Semester 2017/18 and "Designing Code Analyses for Large-scale Software Systems" in Summer Semester 2018. She organized the Seminar "Secure Systems Engineering" in Winter Semester 2017/18. Currently, she is assisting in the Bachelor course "Software Engineering Training". Her duties included holding exercise discussion groups and creating homework assignments, as well as the guided assembly and grading of exams.

In summary, Linghui Luo is a very talented young researcher, with excellent academic achievements. I fully recommend her for an internship at Amazon Web Services.

In case of any questions do not hesitate to contact me.

Sincerely,

Prof. Dr. Eric Bodden