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To Whom it May Concern:

I would like to highly recommend Ms. Linghui Luo, and I want to motivate my recommendation by briefly summarizing my experience working with her. I first met Ms. Luo when I visited the University of Paderborn for the program committee meeting of ISSTA 2018. Alongside that meeting, there was a poster session in which students presented their research. I was drawn to Ms. Luo's poster, which was about COVA, her system for analyzing the conditions under which particular Android security vulnerabilities arise, e.g. whether they occur for specific Android versions or require specific UI events to trigger. In part, I liked her analysis approach, which used constraint solving and resembles symbolic execution, and I liked the focus on understanding which security issues are likely real and worthy of attention. But I also appreciated her obvious dedication. This program committee meeting was a small event, but she had made a clear and interesting poster specifically for the session, and presented enthusiastically and answered well the many questions I had. She also showed interest in my work, and we talked about how our work was related as we are both interested in ways to make security analysis tools more useful.

As we discussed our common interests, we saw an opportunity to collaborate. I had been working on supporting IDE tools with program analysis with WALA using the Language Server Protocol (LSP), and she had been working with program analysis based on Soot. My work was based on a Java source front end which provided the precise information needed by LSP and created WALA IR, and we realized we could combine the IDE support from WALA with well-known tools from Soot, such as FlowDroid, if we could convert the WALA IR to Soot's Jimple. Ms. Luo was already very familiar with Soot, and she quickly learnt enough about WALA to create, in consultation with me, an initial converter from WALA to Soot. While the two forms of IR are broadly similar, a variety of issues complicated the conversion; in particular, WALA is based on SSA form and Soot is not, but Ms. Luo was able to adapt an intermediate state of WALA IR creation to avoid SSA. Despite WALA being rather large and haphazardly documented, she learnt enough to do this in a few months. We now had core machinery for running analyses such as FlowDroid on IR that could support tools with LSP.

The next step was to demonstrate actual tools, and we collaborated on MagpieBridge, a server based on IDE support from WALA but generalizing it to work for Soot as well, using the converted IR that Ms. Luo had created. For this collaboration, Ms. Luo's research group sent her to visit me to help the work progress, and we quickly got both a paper written and an initial implementation showing IDE support for CogniCrypt. This work is still ongoing, but previously-created Soot-based analyses such as CogniCrypt, an analysis of cryp-

tographic protocol usage, has been demonstrated using the LSP-based server in multiple IDE tools such as Microsoft Monaco, Sublime Text 3 and Eclipse. This server, created by Ms. Luo, generalizes previous WALA-based LSP servers, so it supports both Soot-based analyses and WALA-based ones too. These tools have mostly had either no IDE support or custom plugins for specific IDE tools. While such tools can help, the cost is prohibitive to make them for every combination of analysis and IDE. MagpieBridge shows how to make this practical by writing the server once communicating via LSP with many IDE tools.

Ms. Luo is a student and her ongoing work involves showing more analysis tools in this framework and studies of how well it all works. Ultimately, her vision, and mine as well, is using this approach to drive program analysis research toward tools that can be shown to help people create better, more secure code. She has shown great initiative and progress already in this work, and I fully expect her dedication to produce more innovation. Her enthusiasm has made her a pleasure to work with as well, and I have very much enjoyed our collaboration.

Sincerely,

A handwritten signature in black ink, appearing to read 'Julian Dolby', with a horizontal line above the first few letters.

Julian Dolby  
Research Staff Member  
IBM Thomas J. Watson Research  
Center