Announcing the Final Examination of Jeman Park for the degree of Doctor of Philosophy

Time & Location: June 10, 2020 at 2:00 PM in Virtual https://ucf.zoom.us/j/6673083892
Title: IMPROVING THE SECURITY OF CRITICAL INFRASTRUCTURE: METRICS, MEASUREMENTS, AND ANALYSIS

In this work, we propose three important concepts needed in the process of improving the security of the critical infrastructure: metrics, measurement, and analysis. In the improvement of security technology, metrics are key to ensure the accuracy of the assessment and evaluation. Measurement is the core of the process of identifying the causality and effectiveness of various phenomena, and accurate measurement with the right assumptions is the cornerstone for accurate analysis. Lastly, analysis is a step of finding meaning from data collected through measurement. Different results can be derived for the same data according to the analysis method, and it can serve as a basis for the necessity of advanced research. In this dissertation, we look at whether these key concepts are well demonstrated in existing systems and research products. In the first thrust, we verified the validity of volume-based contribution evaluation metrics used in threat information sharing systems. In addition, we proposed qualitative evaluation as an alternative to supplement the shortcomings of the volume-based evaluation method. In the second thrust, we measured the effectiveness of the low-rate DDoS attacks in a realistic environment to highlight the importance of establishing realistic assumptions in measurements. Further, we theoretically analyzed the low-rate DDoS attacks and conducted additional experiments to validate them. In the last thrust, we conducted a large-scale measurement and analyzed the behaviors of open resolvers, to figure out the potential threats of them. We then went beyond just figuring out the number of open resolvers and explored the new implications the behavioral analysis could provide. We also experimentally proved the existence of forwarding resolvers and their behavior by precisely analyzing DNS packets of resolvers.

Major: Computer Science

Educational Career:
Bachelor's of Computer Science, BS, 2016, Korea University, South Korea
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Approved for distribution by David Mohaisen, Committee Chair, on May 19, 2020.

The public is welcome to attend.