Literature Review - Live Forensics and Incident Response system

The cyber security environment nowadays is complicated and it has never been simple. And because attacks evolve every day as attackers become more inventive, it is critical to properly define cyber security and identify what constitutes good cyber security. This requires enterprises who want to protect their data from attack to set up a live forensics and incident response system to collect and analyze data during an attack. Incident response is an organized approach to addressing and managing the effects or consequences of a cyberattack (Rouse, 2017). Ultimately, the goal is to effectively manage the incident or attack so that the damage can be limited as well as reduce recovery time and costs at a minimum way. However, the incident may still be in progress while collecting data, so it is important to continually collect forensic data to protect the system under attack. Live forensics and incident system can be implemented by combining several tools. In this review, the comparison of different tools and how those tools relate to live forensics and incident response system will be discussed. Following this, the key features and benefits of some selected tools including Google Rapid Response (GRR) live forensic tool, Elasticsearch, Logstash, Kibana (ELK Stack) analytics and visualization tool and OSSEC endpoint protection tools, will then be outlined.

The tools that can be used to develop incident response system are multitudinous; with the development and maturity of computer and software technology, the functions of software and tools are becoming more powerful and complicated. In many cases, most of the functions of incident response system could be achieved in one combined tool. Different tools with different features can be combined to achieve the functions of live forensics and incident response system. If the tools are sorted by functions, it can be broadly divided into five categories, which include evidence collection tools, incident management tools, log analysis tools, memory analysis tools and all in one tools (Wahnon, 2015). In the past several years, as incident response tools have advanced, a single tool with several functions may achieve automation in security controls and processes, and the viable options for incident response automation are various. There are five top open source incident response automation tools chosen by Cyberbit’s incident response experts, which are CimSweep, GRR Rapid Response, TheHive, osquery and MIG, to improve incident response process, and assess incident response automation needs (Ashman, 2017). These tools are all able to achieve multiple functions like collecting data or dealing with security incidents. In a 2015 report, forensic expert Alissa Torres stated that automation of any incident response process should focus on three major phases: continuous data collection, aggregating and applying threat intelligence and streamlining live response capabilities (Shackleford, 2016). Many of the tools have the capabilities of ongoing data collection such as CIRTKit, but only partial functions of the live forensics and incident system can be realized, it may not realize remote live forensics or may not be truly enterprise capable. So it is important to choose appropriate tools to be combined to build the live forensics and incident response system.

There are three different tools recommended to be used to build live forensics and incident response system, which represent three different functions, live forensic, visualization and endpoint protection. GRR is designed to be scalable, opening the door for continuous enterprise wide forensic analysis (Cohen, Bilby & Caronni, 2011). Analysts can use GRR to quickly classify attacks and execute remote analysis and this helps analysts collect and process data from numerous machines effectively. Various forensic tasks can be performed on the client machine in GRR client after the server and agent are deployed, such as analyzing the memory, searching various settings and managing configuration options (Morgenstern, 2016). Kibana is one of the components in ELK Stack, it provides the platform of analytics and visualization to give a better understanding of the data. By using it, the analysts can customize the dashboards so that the most critical information, such as intrusion detection logs or connection logs, are immediately available for review. OSSEC is a free open source HIDS (host-based intrusion detection system) and LIDS (log-based intrusion detection) system (Sigmon, 2016).It provides real-time alerting using log analysis signatures, and has an active response feature that allows automated execution of scripts. There are many benefits to using OSSEC in this system. The main benefit would be that it automates the incident response process of blocking attacks. By automating this process, it will save analysts time from chasing down these attacks and manually blocking them on the firewall. While the OSSEC is not very customizable, to change this, it is better to integrate with the ELK Stack giving users more freedom to customize dashboards and find the data they needed faster.

In conclusion, choosing appropriate tools in a large scope of tools with different functions to build live forensics and incident response system can greatly increase the efficiency of the system as well as reduce the time spent on manually blocking common attacks. GRR rapid response is obvious a good choice to build live forensics and incident response system. The scalability provided by the GRR innovates current incident response system to enable wider analysis. It helps lower the cost of response and increase the quality of evidence obtained. Although GRR is still in early stages of development, it is clear that the tool is useful for managing large scale investigations in the enterprise. Also, implementing the OSSEC will provide a central location to view all log data and correlate security events from all log sources, as well as provide more accurate attack information from the host-level.

**References**

Ashman, O. (2017). *Top 5 Open Source Incident Response Automation Tools.* Retrieved from <https://www.cyberbit.com/blog/security-operations/top-5-open-source-incident-response-automation-tools/>

Cohen, M.I., Bilby, D., & Caronni, G. (2011). Distributed forensics and incident response in the enterprise. *Digital Investigation,* 8(13), 101-110. doi: 10.1016/j.diin.2011.05.012

Morgenstern, T. (2016). *5 Open Source Malware Tools You Should Have in Your Arsenal.* Retrieved from <https://www.cyberbit.com/blog/endpoint-security/open-source-malware-analysis-tools/>

Rouse, M. (2017). *What is incident response?* Retrieved from <https://searchsecurity.techtarget.com/definition/incident-response>

Shackleford, D. (2016). *Incident response tools can help automate your security.* Retrieved from <https://searchsecurity.techtarget.com/feature/Incident-response-tools-can-help-automate-your-security>

Sigmon, B.A. (2016). Automating Incident Response Using OSSEC.

Wahnon, M. (2015). *A curated list of tools for incident response.* Retrieved April 14, 2018, from https://github.com/meirwah/awesome-incident-response