# Research Proposals

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## Abstract

This literature review will introduce Continuous Integration/Continuous Delivery (CI/CD). Also, some attack surface and how the malicious attacker exploit these attack surface will be covered in this review. From the developers' and maintainers' point of view, the methods and frameworks are going to be introduced to counter the attack. In this literature review, the framework will focus on Supply Chain Level Security Artifacts (SLSA) which is adopted by Google.

## 1    Introduction

Continuous IntegrationContinuous Delivery (CI/CD) is a development process for quickly building and testing code changes that helps organizations maintain a consistent code base for their applications while dynamically integrating code changes. Therefore, CI/CD environments are attractive targets for malicious cyber actors (MCAs) whose goals are to compromise information by introducing malicious code into CI/CD applications, gaining access to intellectual property/trade secrets through code theft, or causing denial of service effects against applications.

Section 2 will briefly introduce CI/CD, and section 3 would target the attack surface within the process of CI/CD. Then, section 4, we are going to map the defense method to the attack method, and providing real world attack event. In section 5, our literature review would introduce SLSA framework from Google, and explain how SLSA can patch the vulnerable CI/CD process. In section 6, the aim and objects of the research will be explained. And the research plan will be introduced in section 7.

## 2    Definition of CI/CD

The convenience and capabilities of the third-party source code usually brings cybersecurity risks [2]. Software supply chain attacks aim at injecting code into software components to compromise downstream users [1].

## 3    Attack Surface and Impact

Java Virtual Machine (JVM) executes Java bytecode and provides strong safety guarantees. However, the unsafe API, "sun.misc.Unsafe", will cause serious security issue if it is misused by the developers. The research [2] studied a large repository, Maven, and analyzed the compiled Java code. The security issues include violating type safety, crashing the virtual machine (VM) , uninitialized objects and so on. These misuse might impact third-party package management service.

## 4    Defense Method

These goals are seek to establish the trust in the software supply chain by verifying in- formation about the participants or processes [3].

Some of the projects aims at providing single solution that conflates multiple objectives [3].

Despite the previously introduced methods seems to address all the security issue existed in the code base and within the CI/CD, some of them may overemphasize one particular approach to address software supply chain security. without considering compounding factors that impact risk [3].

## 5    Supply Chain Level Security Artifacts

## 6    Research Aims and Objectives

## 7    Research Plan

## References

[1] P. Ladisa, H. Plate, M. Martinez, and O. Barais. Sok: Taxonomy of attacks on open-source software supply chains. In *2023 IEEE Symposium on Security and Privacy (SP)*, pages 1509–1526, Los Alamitos, CA, USA, may 2023. IEEE Computer Society.

[2] Luis Mastrangelo, Luca Ponzanelli, Andrea Mocci, Michele Lanza, Matthias Hauswirth, and Nathaniel Nystrom. Use at your own risk: The java unsafe api in the wild. In *Proceedings of the 2015 ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications*, OOPSLA 2015, page 695–710, New York, NY, USA, 2015. Association for Computing Machinery.

[3] Marcela S. Melara and Mic Bowman. What is software supply chain security?, 2022.