

Effect of Project Dependencies on the Health of the Software Project

G.V.S Bhaskar
MS in Computer Science, NAU
vg588@nau.edu

Anudeep Uppu
MS in Computer Science, NAU
au282@nau.edu

Keerthana Vijaykumar
MS in Computer Science, NAU
kv582@nau.edu

Sahana Vallu
MS in Computer Science, NAU
sv799@nau.edu

Mohanthi Sandeep
MS in Computer Science, NAU
ma3924@nau.edu

Abstract

CCS Concepts: • **Software and its engineering** → *Software creation and management*; **Maintaining software**.

Keywords: Software Management and Maintenance, Post-Development Issues, Dependency Management, Node Package Manager(NPM), JavaScript Projects.

ACM Reference Format:

G.V.S Bhaskar, Anudeep Uppu, Keerthana Vijaykumar, Sahana Vallu, and Mohanthi Sandeep. 2022. Effect of Project Dependencies on the Health of the Software Project. In *Proceedings of Make sure to enter the correct conference title from your rights confirmation emai (Conference acronym 'XX)*. ACM, New York, NY, USA, 2 pages. <https://doi.org/XXXXXXX.XXXXXXX>

1 Introduction

The software development paradigm has led to a shift where code reuse has opened new opportunities for developers to build software, delivered in the form of reusable packages or modules that are available on the package management platforms such as node package manager (NPM), PIP, NuGet package manager, etc. Developers these days to a large extent rely on an increasingly high number of packages to build their projects, reusing code increases productivity, reduces the time-to-market, and improves software quality [2]. However, this model of development creates a huge dependency on these packages. At times, these packages could be deprecated, and managing these deprecated packages leads to serious issues which need to be addressed.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from permissions@acm.org.

Conference acronym 'XX, June 03–05, 2018, Woodstock, NY

© 2022 Association for Computing Machinery.

ACM ISBN 978-1-4503-XXXX-X/18/06...\$15.00

<https://doi.org/XXXXXXX.XXXXXXX>

1.1 Problem

When developers or organizations encounter difficulties with deprecated packages present in the project or if the information regarding these versions was not informed to the developers/managers, this could lead to the issue of malfunctioning software in the immediate future.

1.2 Evidence

An incident of evidence is the eviction of the “left-pad” package that led to extensive damage among giant internet sites. This was relied upon by organizations such as Facebook, Netflix, and Airbnb, the problem was promptly fixed [1]. Another incident in NPM (Node Package Manager) is the release of a backward incompatible minor version 1.7.0 of the package “underscore” that caused many complaints among dependent packages about underscore not respecting Semantic Versioning (SemVer) [3].

An effective solution to manage dependencies is proposed as semantic versioning. This allows managers to receive upgrades and minor fixes of dependencies. The problematic issue is simply allowing dependencies to update automatically without notice. Although semantic versioning has been referenced in literature to overcome the difficulty in upgrading dependencies, these are usually referred to as other content’ to explore issues like security vulnerabilities. However, previous research has shown that developers do not always conform to Semantic versioning. This created major problems due to outdated dependencies and breaking changes. Providing a solution for the existing problem can help the developers who use dependencies that could be deprecated. Acknowledging them with the latest versions or upgrades may result in better maintenance of the programs and systems.

1.3 Research Questions

RQ1: What is the health of project dependency involved in the project?

Firstly, the health of the project depends upon the projects involving deprecated/outdated packages. The project’s dependency on this kind of package is inversely proportional

to its health report. The insights gained concerning the outdated packages or the incompatible packages in this process of the study helped to identify the project's state of health.

RQ 2: What are the compatibility issues involved in the upgradation of project dependencies in the future?

When dependencies are updated to their latest version, developers or organizations might have problems if they are not notified about updated or outdated versions which might lead to software malfunctioning which poses severe problems in the future or right away. We should constantly monitor for changes to any kind of dependencies we utilize frequently, or else the product might not function appropriately. The maintenance of the product becomes critical if the dependencies are not up to date which in turn consumes the developer's time in identifying/resolving issues.

1.4 Purpose Statement

The main purpose of this analysis is to mitigate the problem faced by developers/naive programmers to resolve outdated/deprecated package dependency issues or incompatibility of the latest dependency version with the existing dependencies. It is important to identify the dependency because the majority of the projects depend upon already existing packages and if the packages get deprecated without prior information this could create a lot of dependency issues which could affect the project. In these kinds of situations, we need to completely change the packages which the project is depending on and might need to install new packages and the functionality of the packages might also change which might not satisfy the project requirements. By following this approach, we can achieve the purpose of providing the information to the end users which solves the issues related to deprecated package dependency. Henceforth, identifying the package dependency is crucial and needs to be taken care of.

1.5 Objective

The objective/goal of this study is to identify the impact of these deprecated packages and their internal packages on a project as well as compatibility issues occurring due to package upgrades. As mentioned above, programmers will not be intimidated regarding the deprecated packages present in their project which could break the project. In this case, the code has to be completely modified or needs the inclusion of other/similar functionality. When the analysis is done on these packages it helps us study the health of the project and gain better insights regarding the current state of the project dependencies.

1.6 Scope

We would be restricting our scope to JavaScript/Typescript projects for the package dependency analysis and this study would be resolving up to 3-4 levels of package or internal package dependencies to identify the deprecated and latest version of project dependency.

Observing the evolution of the dependency issues over time, we conclude that these issues are being addressed, but new issues tend to occur more frequently than regular issues (issues that are being fixed). This led to an inclination in the problem being faced. The agenda of this paper is to develop a repository where developers or naive programmers can clone it to their local system to analyze their project dependency on deprecated or outdated packages.

References

- [1] Rabe Abdalkareem, Olivier Nourry, Sultan Wehaibi, Suhaib Mujahid, and Emad Shihab. 2017. Why do developers use trivial packages? an empirical case study on npm. *Proceedings of the 2017 11th Joint Meeting on Foundations of Software Engineering*, 385–395. <https://doi.org/10.1145/3106237.3106267>
- [2] Abbas Javan Jafari, Diego Elias Costa, Rabe Abdalkareem, Emad Shihab, and Nikolaos Tsantalis. 2021. Dependency Smells in JavaScript Projects. *IEEE Transactions on Software Engineering* (2021), 1–1. <https://doi.org/10.1109/TSE.2021.3106247>
- [3] Lucas Mancini. 2018. A simple strategy to manage your JavaScript project's dependencies. <https://medium.com/coorva/a-simple-strategy-to-manage-your-javascript-projects-dependencies-d413f3d0ed2f>