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**Security Engineering
Lint Tools: ESLint**

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1 Introduction

Developers should always aim to better their coding practices, being it in terms of safety, programming standards, among others, so if there are tools that can help with this it is probably a good idea to at least give them a try. This is the objective of Linting and Linting Tools, and here is presented ESLint, one of these tools that is aimed at Javascript, an especially "flexible" language.

2 What is Linting

Errors are obviously bad. Some cause bugs, others may compromise the security of the system, so it is very important to avoid these. And so, many developer teams rely on linting. Linting is the automated checking of the code for errors, being them of functional nature or stylistic. Linting should happen early in the development phase, before code reviews and testing, which can help accelerating development and reduce costs and possible future security breaches by finding errors earlier.

For example, when working with interpreted languages like Python and Javascript, Linting is a very good option, because they lack the compiling phase, so in these cases Linting is good for ensuring consistent coding style and solving basic coding errors. When dealing with compiled languages such as C and C++, Linting might not be enough due to these languages' complexity.

3 Pros and Cons of Linting

As it is for everything, there are pros and cons of Linting, and here we name a few of each, as one should know them to be able to decide if they want to use Lint Tools or not.

Some of the pros of linting are:

- Lint checks many things, including syntax errors and structural problems.
- Lint checks against best practice and code style guideline violations.
- Lint is inexpensive.

As there are pros so are cons, and here are some of them:

- Lint can produce as many errors and warnings as there are lines of source code. This leads to high false positive and false negative rates.
- Lint programming identifies violations of best practices. But it doesn't teach people best practices. Developers can use Lint to improve their code, but they might not be able to replicate the best practice.
- You get what you pay for. Lint is inexpensive, but it can rack up costs in developer productivity.

There are many Lint Tools available, directed to different programming languages like, for example, PC-Lint, Pylint, JSLint and ESLint, the tool we are presenting in this report. Just like with linting in itself, there are cons and pros of utilizing these Linting Tools, also called Advanced Static Analysis Tools. Some of the pros are:

- Advanced static analyzers prevent programming errors earlier.
- Advanced static analyzers offer specialized support for each language.
- Advanced static analyzers can provide code review capabilities and improve collaboration among developers.

As one must always mention the cons as well, some of them are:

- You'll need to get developers on board with running a static analyzer before committing their code to a build.
- Being limited to one certain language can also be seen as a con as it can be a limitation.
- Many teams may already have a separate code review tool in place, and having to change has costs.

4 ESLint

ESLint is an open source Linting utility directed at Javascript. As Javascript is a dynamic and loosely-typed language, it is especially prone to developer errors. And therefore, being an interpreted language and having no compilation process, the code usually has to be executed to find any errors. With ESLint, developers can find these errors without having to execute the code.

Although ESLint has already some built-in rules to make the tool useful from the start, it allows the users to create or load their own rules at any time.

5 ESLint with VSCode

Some IDEs allow integration with ESLint. One of those IDEs is VSCode, which provides an extension in the marketplace. The extension will use the ESLint library installed in the opened workspace folder. In case there is none, the extension will look for a global installation. After installing the extension you need only to restart VSCode and then ESLint will be enabled by default, and will be active whenever a Javascript file is opened and will analyze the code.

6 Conclusion

Especially in interpreted languages, such as Javascript for example, Linting can be a very good way of improving the workflow and avoid future errors, but also making the code easier to understand to anyone who works on it in the future, by standardizing the code style. As such, tools like ESLint are an important and useful addition to any project and it's use should be generalized.