Title: Improving the Developer Experience of Dockerfiles

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Abstract

Nowadays, containerization is a technique used in a very large number of systems to address problems associated with deployment. The most popular tool used to perform this task is Docker. In order to use Docker, a developer must create a Dockerfile, a configuration file that is used to create the containers. Creating these files can be difficult [1], and even functional files can have problems. In fact, according to [2], "97.6% of the Dockerfile contains at least one security misconfiguration". For these reasons, there is a need for tools that aid with the generation and repair of Dockerfiles.

When it comes to generating the files, current solutions either require some preexisting documentation and the use of models [3] or a vast dataset that is hard to replicate [4].

For automatic repair, some work already exists [5]. However, the development experience could be improved by having this functionality integrated into a code editor where the problems and their solutions can be presented more clearly to the developer.

With this in mind, this dissertation aims to study the feasibility of automatically generating Dockerfiles for a given project and whether using IDE plugins (with features like code completion and modification suggestions) can help accomplish this task.

To reach this goal, two tools created by former students to assist developers with these tasks, Hermit [6] (focused on generation) and Dockerlive [1] (focused on liveness and repair) will be improved. The upgrades performed will make it easier for developers to create Dockerfiles that follow best practices.

Furthermore, a study will be conducted to evaluate the performance of Dockerlive and the way it enhances the development experience. Industry participants will be involved in the study and several metrics will be used to assess the experience of the developers as well as the quality of the Dockerfiles produced.

Keywords: Dockerfile, Docker, File generation, File repair

ACM Classification: CCS - Software and its engineering - Software notation and tools - Software configuration management and version control systems

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