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Dear Diary: On Documenting Novices' Development Process

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Abstract—In the development projects implemented by novices, the usefulness of the documentation in the form of comments on the final working code is minimal to guide future implementations. Such documentation does not account for novices' development process, including their choices, the errors they faced, the solutions they found, the sources they consulted, the lessons learned, and the advice to remember or give to someone else. Indeed, novices do not usually rely on their documentation to keep track of the successes and errors they find during the development process. Nevertheless, if enabled to capture various moments of the process seamlessly, novices can produce documentation that has the potential to become a valuable asset for them and other developers. This paper presents *Dear Diary*, a tool to support non-expert programmers in straightforwardly creating documentation artifacts directly from the IDE.

Index Terms—novices, documentation artifacts, integrated development environment

I. INTRODUCTION

When approaching a new programming language or working with a given development framework for the first time, novice programmers rely on online tutorials, forums, or source code examples to find solutions and overcome development and execution errors [1], [2]. Once they finish their implementation or reach a working version of their projects, they comment on the resulting code to make it understandable to others (e.g., the teachers who will grade it in introductory programming courses). In this scenario, the usefulness of the produced documentation to guide future implementations is minimal: it does not account for the development process they completed. In particular, it does not provide any traceability on the novices' choices, the errors they faced and how they overcame them, the sources they consulted, the lessons learned, and pieces of advice to remember or give to someone else.

Therefore, the documentation that novices produce (if produced) is not commonly helpful to themselves or other developers to overcome cognitive barriers or guide the development of new projects. Critical aspects such as the background knowledge, the rationale for the solution, or step-by-step instructions for arriving at similar or related solutions are typically left out from the documentation [3]. While various works

aim to ease the understanding and integration of online code examples [4]–[6], fewer research efforts have been devoted to supporting novices in seamlessly documenting their development process on the go and with their own words. Additionally, the current documentation practices do not commonly include technical information crucial to reproducing the implemented solution, such as the development and execution environment, the packages used, the dependencies, and the operating system.

Against this backdrop, we consider that novices can produce documentation that has the potential to become a valuable asset meaningful for them and other developers if enabled to capture various points of the development process seamlessly and add self-explanatory insights to it [7]. In particular, we rely on the fact that a self-explanation strategy can increase their awareness of their implemented solution [8], [9]. When learners provide explanations — even to themselves — they learn more effectively and generalize more readily to novel situations [10], [11]. In this paper, we present *Dear Diary*, a Visual Studio Code extension to document the novices' development process by explaining in their own words (as one would do with a diary) how they achieved the working versions and overcame the development and deployment errors.

II. DEAR DIARY

Hereafter we present our proposed tool through a usage scenario framed in the context of a novice developer creating a web project and we indicate how the various steps are completed through Figure 1.

- (a) Claudia is implementing her first React application. She opens Visual Studio Code, her preferred IDE, and she follows a React “getting started” guide that she found online.
- (b) In React, the first steps correspond to installing and setting up the execution environment and its dependencies. These installation and setup steps are commonly completed by executing various command-line instructions with diverse parameters.
- (c) After executing them to the letter as indicated in the getting starter guide, she manages to create her first *Hello World* React application. At that point, she notices that she has achieved a stable checkpoint, notwithstanding its simplicity. Therefore, directly from Visual Studio Code,

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