Summer 2021 CS 497 Capstone Project

Development of an Integrated Tools Platform to Improve Book Writers' Workflow

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Abstract

There is a lack of integration of tools and usable interfaces to cover writers' needs to improve the workflow of writers in the planning stage. The number of documented solutions trying to solve this problem is low. No solution is focused effectively in the fiction book writing process through UX/UI. A web platform is proposed to integrate multiple tools useful for writers. A high-fidelity prototype is developed to prove this paper's thesis. The platform will provide better organized content of the book planning process, writing goals identification, character related information organization, association, and automation of some tasks. It is proven that a solution focused in the development of UI/UX features improves the writing process through information association.

Keywords: Writing, Tools, Integration, Efficiency, Workflow, Software.

1. INTRODUCTION

Problem Statement

Authors, specifically fiction writers, have preparation and planning periods to increase the quality of their content, allowing them to order their ideas properly and increase their writing workflow in the long term. There is no standard process to follow in these periods, but there are some practices that are commonly used, e. g. The use of Prewriting, Drafting, Revising, and Editing (in that order) with no established sub-task (Massachusetts Institute of Technology, n. d.). Some tools like Scrivener, Hemingway, and many other processors attempt to improve the writers' workflow with their interfaces and platforms. However, a common pattern to be observed informally is the need of most tool users to switch between platforms to cover their needs.

There is a lack of integration of tools and usable interfaces to cover writers' needs to improve the workflow of writers in the planning stage through an integral and usable platform.

Motivation

As mentioned before, in the fiction writing area, there is an existence of software tools, but they are not focused enough to cover all the needs of the writers. They only reach a partial set of needs. Tucker Max, a four-time Bestselling Author and co-founder of Scribe, insists that there are tools that unnecessarily add complexity in exchange for no apparent value. He also states that most software does not help writing a book. Up to this point and all the decades of development, he concludes that current software is not relevant to writing a book (Tucker, 2021). A tool should not be a barrier but a medium to help achieve an established objective.

Value to the Student

Personally, writing is one of my passions during my free time, along with reading authors' works.

The path towards reaching a standardized workflow process is not formally defined by anyone. The proposed solution may help expert writers and new interested individuals to learn and work faster during their writing process.

In the professional aspect, working on a project of this magnitude certainly helps acquire a skillset and critical thinking to solve problems creatively. The nature of the solution proposed in this paper is complete in the sense that it requires different sorts of knowledge for Back-end and Front-end software development.

Alignment to Program Outcomes

Software development can produce solutions to almost any potential existing problem. Creating a platform containing specific tools for writers is a noble act to exercise ethical knowledge in the field, including the need to secure users' data and intellectual property. The production of this system includes an area that would commonly seem "outside" of Information Technologies, but this shows us that it is not. A software can potentiate efficiency and effectiveness in a profession. This project includes the use of many different technical areas of Computer Science like design (Software Architecture), Algorithms, Web Development, containing Front and Back-end, between other sorts of knowledge. It must be mentioned too the need to develop better UX (User Experience) and UI (User Interfaces) for non-technical people who get involved in the use of software for their professional activities.

2. BACKGROUND

Writing fiction books like novels or narrative works requires following a creative process divided into prewriting, drafting, revising, and editing (Massachusetts Institute of Technology, 2017). Currently, there are multiple related tools to writing like word processors such as Microsoft Word ("Microsoft Word – Word Processing Software", n.d.), collaborative writing applications both academically documented projects like Prateyo and Bandung's minimalist approach to developing a word processor for collaborative writing (2015) and non-academical, educational writing software, as well as some variations. There are tools centered in making the general writing workflow more efficient such as Scrivener (Litterature & Latte, n.d.), which focuses on improving the workflow of writers, or Hemingway (Hemingway App, n.d.), which aims to improve the quality of the writing, however, these tools have not been documented academically. It is important to notice that most tools are not focused specifically on the subject of improving fiction book writers' workflow, but in making more efficient tools focused on the general process of writing, which is different although related.

Based on the lack of academically documented tools, fiction book writing specific tools, and other mentioned characteristics, there is a need to develop a set of integrated tools to improve the fiction writing process. Independently from the fact that writing exists by itself as an acquired tool by humans and that it could be implemented in mere paper or a word processor, there should be a tool to provide more efficient manners to write based on the type of writing being performed. There is irrefutable evidence that technology and tools affect writing inevitably (Dorner, 1991), and there have been studies helping prove that theory (Clouthier, 1986). There is an area of opportunity, a gap to fill with knowledge.

There is a lack of integrated tools to provide a truly efficient environment for the writing of fiction books. There are too few academically documented projects to analyze if they are truly making writers more efficient. The proposed solution is to provide a web platform providing the necessary integrated tools of the most common practices of the creative process of writing fiction literature.

3. RELATED WORK

This literature review provides clarification on the influence of Information Technologies in the book writing process through current solutions, projects, and any related academic papers that provide adaptable knowledge to the development of the platform research. The results and perspectives of distinct approaches to a similar solution to the one proposed in this research paper are compared to analyze the strengths and weaknesses of every best-fit solution per case study. It is concluded that there are multiple perspectives on the topic of the influence of Information Technologies in the book writing process. Nonetheless, none of these resemble a similar solution to the one proposed in this research.

It must be mentioned that due to the lack of academical solutions and papers researching these types of software tools, the present research can be considered novel to the knowledge area (academically speaking).

Literature Review

There are multiple software that attempt to provide tools for the workflow of book writers, although most of them are not properly documented in the academic area. This is the

case of Scrivener (Litterature and Latte), one of the more famous solutions, but it is not documented. The lack of documentation and research over the results of similar software proposes that the proposed research area is novel, and there is a clear knowledge gap in providing explicit results to prove if these tools help improve the writing process in terms of efficiency and user experience. There are also word processors, just like Microsoft Word (Microsoft, n.d.).

Most of the few documented solutions fail to focus disruptively on the creative workflow of book writing. Prasetyo and Bandung have proposed a real-time collaboration system for e-book writing, focusing on the explicit management process to deliver a collaborative product by authors. It made a strong implementation of revisions, editing, and versions while collaborating (2015). This tool has provided a strong organizational fundament but does not focus on the tools a book or fiction writer may need to track their story elements faster; characters, biographies, information compilation, and more. Word processors have been seen as a tool to aid writers in the elaboration of their works, some of them proposed useful elements to track paragraphs to handle user experience with simplicity, beyond that technical use for development, they simply fall for the commonly known use of versions, editing, replacing, and correction of the content (Malcolm & Gaines, 1991).

There is evidence that suggests that users (students) improve their performance, both quality, and quantity when writing in the educational environment, making use of a digital writing application (Baker & Lastrapes, 2019). However, according to this research, there is no sign that the application is completely similar to the proposed solution in this paper, but it clearly talks about an area of opportunity for the use of digital writing software to provide improvement in the writing process affecting the final result. This applies to word processors too, as some studies suggest a significant improvement in the writing habits of students using simple word processors (Clouthier, 1986). Note that some of these studies are decades old, making it visible the lack of more recent studies regarding the research on efficient processes in writing.

In the user interface area, there are patterns commonly being followed when designing a word processing application; a canvas in which the writing occurs on (pages), there is no change into the analogy of writing in paper. In this sense, the paper "User Customization of a Word Processor"

(Page & others, 1996) shows that users typically adjust their application interfaces to support their workflow: "the theory is that customization makes users more productive because they can tailor the software to their work practice". This is complemented by the theory and principles of usability, user experience, and user interface designs where the user must become productive and feel comfortable with a proposed interface to avoid having problems of accessibility, learnability, consistency, and more (Sharp & others, 2019).

Review Conclusions

There have been attempts to provide efficiency in the workflow of writing applications not focused on the creative process of writing or the fiction book writing workflow. There are signs of performance improvement when implementing even the most basic set of tools and configurations in a digital writing software, and so there is an inevitable advanced field in the human-computer interaction field, although the same does not apply to the available solutions as there is a clear lack of recent documentation and sources to prove the improvement of recent works. They are outdated. It is reasonable to accept that the field has had excellent researches but few ones and provided knowledge to the area but still lacks some new proposals in terms of solutions to properly work on a completely creative book writing process for fiction authors.

3. APPROACH

This paper will provide two complimentary designs due to the time available for the research. There will be a design for the total implementation, which will be implemented in future work. As for what concerns this paper, to evaluate the functions of the project an interface will be planned and desgined in a prototyping platform, Adobe XD. What will be evaluated in this paper is an interface prototype.

User Requirements

The creative process of writing a book requires users to associate information of their own book at all times. Organization must rely on features that provide effectiveness and efficiency in a part of the process. Information association is proposed as the key characteristic of the process.

The most important user requirements for this project are the following:

1. Writers (users) want to create and access character information while writing; to consult their backgrounds, dialogues, definitions, behaviours, participation, and

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relevant to be conscious of the information they cannot remember immediately.

2. Writers want to create notes for revisions of the story of a book to keep track of modifiable content and relevant information.

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Technologies Used

The project uses the MERN stack, which is an abbreviation for MongoDB, Express, ReactJS, and NodeJS, as the technologies to use for the base structure of the project. MERN proposes a 3-tier design to implement any software with these technologies (MongoDB, "What is the MERN stack? Introduction & examples").

The project uses JavaScript as the main programming language for the top tier (frontend) and for the middle tier (middleware). Env files are also included to store environmental variables to handle programming in a more flexible manner through the DotEnv framework (Motte & Lowe, 2021). An example of the use of Env files is the storage of the database connection link. Finally, for a first approach, it was decided to use UIKit to design the User Interface.

To make a prototype of the interface Adobe XD with the installed Anima plugin is used.

Implementation

For the backend development (lower tier), MongoDB is used as the main framework for the creation of the database to store information of the web application.

Express is used as part of the middleware (middle tier) together with NodeJS to create the server-side application. Express interacts with the web requests and any routing activity concerning web operations. NodeJS is used for multiple tasks. One of them is the inclusion of Yarn and NPM (Node Package Manager) to install all the needed tools in the project.

For the development of the frontend (top tier), the use of ReactJS is essential to create a dynamically rendered complex web application. Due to the nature of the project and its focus on visual features, a robust framework library for dynamic renderization is recommended. UIKit is the selected UI library to implement the frontend design.

For the protype, Adobe XD with Anima plugin is being used to provide a realiable prototype to evaluate.

Design

The development of the application is strongly based on the three-layer architecture proposed by the MERN approach. The MERN approach is a full stack architecture considering a defined set of tools establishing the design of the current web project. Figure 1 may exemplify how the structure of the project is organized.
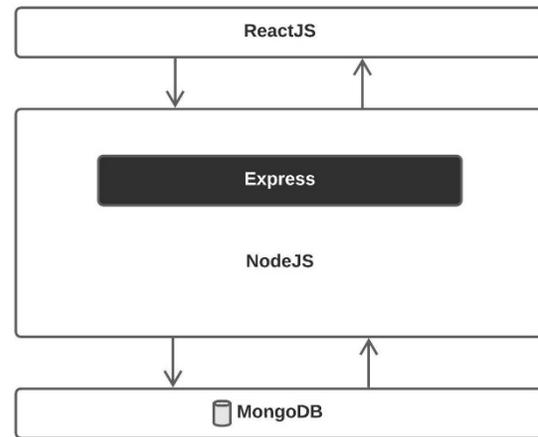

Figure 1. MERN stack architecture design.

The design of the project provides association through the selection of interactive elements in the User Interface. Some key features are

- Character creation.
- Notes.
- Chapter creation and writing.
- Locations creation.

In Figure 2, a prototype of an approach to the design of the web platform can be found for reference. It is important to mention that the prototype is an approximation but not what can be found in the final result.

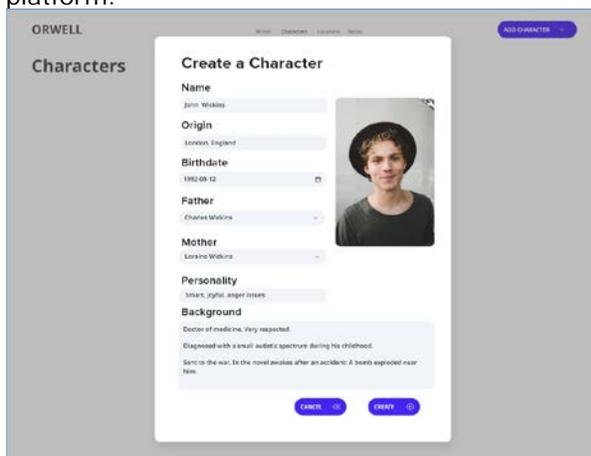**Figure 2.** Low-fidelity prototype of the web platform.

Figure 3. Low-fidelity prototype of the web platform.

Figure 4. Low-fidelity prototype of the web platform.

5. DATA COLLECTION

The data collection in this topic showed an evident lack of information related to the field of writing in general. According to Delfino in hi his article "20 writing statistics – Writer salary statistics" (2021), there is not a single organization keeping track of writer's information, referring to the accountability of them as professionals, which may as well be related to the lack of other data being studied in terms of performance, creative process and any related studies.

A stratification method was selected as the approach together with a qualitative data gathering method. A survey was developed to obtain the opinion and evaluation of the users about writing applications or word processors to compare the results against the ones that are produced by the use of this research proposal.

Five persons were selected to take the questionnaire. Their ages range from 22 to 29 years old. Three of them have a principal characteristic in common. They are related to writing either as a general interest activity or as a profession. Two of the subjects do not have any relation with the world of writing beyond academic and school purposes. All the subjects speak Spanish as their native language. They are Mexican.

The developed survey was sent to the participants using Google Forms as the primary tool to collect data. It was developed in Spanish because of the origin of the participants.

The included questions were the following:

1. What tool do you normally use to write a book?
2. From the previous options, choose the app you use the most.
3. When I use my preferred writing application, all my materials related to the creative process can be gathered in one place with no difficulty.
4. When I use my preferred writing application, after a time, it is hard to remember and find specific data about the story of my book.
5. When I use my preferred application, how easy is it to organize the content of your book without the help of any external tool or template?
6. How easy it is to learn all the functionalities offered by my preferred application.
7. I consider that there is a lack of an existing application oriented completely in the writing of fiction books beyond having the features of mere word processors.

A second survey was developed to evaluate the solution compare the proposal's value against the more common used tools. This second survey was a medium to measure the usability, the user experience of the solution in an attempt to solve some problems and improve other features.

The included questions were the following:

1. Is it difficult to gather all my book-related content in one place?
2. Is it difficult to remember and find specific data about my book?
3. How easy is it to organize the content of your book without the help of any external tool or template?
4. How easy is it to learn to use all the functionalities offered by the solution?
5. Does this solution qualify as a useful application (at any level) oriented completely in the process of writing fiction books?

6. DATA ANALYSIS

The survey showed interesting behaviour. It can be noted that both types of participants, writing-related and non writing-related, do not use any of the commercial non academically documented applications available in the market.

¿Qué herramienta utilizas para escribir un libro? No tomes en cuenta el proceso de publicación.
5 respuestas
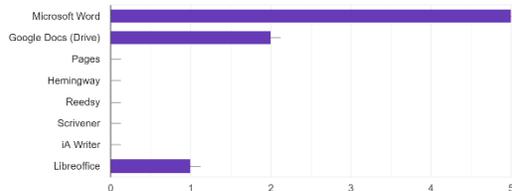
**Graphic 1.** Results about the selection of tools to write a book.

All of the subjects answered to write with Microsoft Word. Two selected a second option too, Google Drive. Only one of the subjects answered a third alternative, LibreOffice.

It was noted that one of the subjects, this one being writing-related, answered to commonly switch between multiple applications at the moment of writing: Grammarly and Spanish checker. This behaviour relates to the hypothesis that formed the basis of this research: There are no applications covering the needs of writers specifically, and there is an informally documented behaviour of satisfying their needs with multiple tools.

The subjects were also asked if they could find all of their creative process content in one place without any difficulty. Let us define creative process content as character design, locations, outlines, mindmaps, and other similar content. Answers varied a little. 40 percent of the subjects (two of them) responded to almost always be able to find all of their content in one place. 20 percent

(one of them) said that he could always find the content he wished for in one place. Finally, the left 40 percent said to almost never be able to gather all of their content in one place. This answer may be interpreted differently by many. However, let us remember that the selected tools are tools that do not define a standard creative process but allow you to customize them to your needs based on templates usage or other additional tools.

Cuando utilizo la aplicación de escritura de mi preferencia, todo mi material del proceso creativo se puede concentrar en un mismo lugar sin dificultad.
5 respuestas
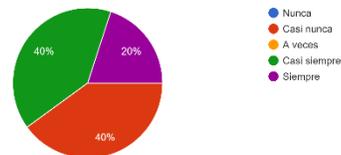
Graphic 2. Results about the difficulty to find creative process materials.

What affects the previous graphic's responses are the subjects stating various perspectives to question number four. Two persons stated that they always have difficulty writing and remembering data about their books' stories. One stated that he almost always has problems remembering things about their stories while writing. One of the subjects said that he sometimes has problems remembering relevant data. One subject stated that they never have problems remembering relevant data.

Cuando suelo escribir con mi aplicación de preferencia, después de un tiempo me es difícil recordar y encontrar datos específicos acerca de...gares plasmados, situaciones establecidas, etc.
5 respuestas
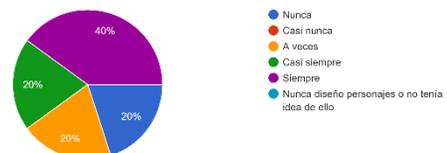
Graphic 3. Results of the difficulty to remember data while writing a book.

The data shows a prominent opinion of people struggling with their information accessibility. If they cannot remember, there is a problem having information being accessible.

According to the results, most of the subjects think that there is no major inconvenience with the User Experience with their commonly used tools. Only one of the persons stated that it was difficult to organize content without any external templates or tools apart from their favorite writing tool.

One major interesting fact is that all the subjects agreed on one thing: There is a need to develop an application completely focused on the writing of fiction works beyond being a simple word processor.

The collected data suggests that the general opinion aligns to the hypothesis of this research, the approach, and to focus on a tool to provide enough access to information of books, which is the proposed solution.

As for the results of the second survey, some of the data supported the initial hypothesis, while other part of the data made no greater difference, generating fewer impact than expected.

According to the results, people found it slightly easier to gather all the content in one place, due to the focus of the application. 60 percent of the people answer to always find a place to gather all the related information.

In accordance to the results, 100 percent specified that it was easy to access all the content related to the book. 80 percent specified that it was easy to organize the content of their book without help of any external tool. A 100 percent answered that the functionalities of the software are easy to use. Finally, all of the participants qualified the solution as a useful application. The features were mostly informally named as basic but able to provide a different perspective in the organization of the books.

7. FINDINGS
There was an increase of 20 percent in the opinions of ability to gather all book-related content in one place. A minimalist design proved that focusing on the key features for a task can improve the accessibility of a software's user interface, organization of relevant content, and overall, add value to the solution. The participants found the application to be useful.

8. CONCLUSION
The study suffered limitations based on the available time to develop the research and the technical solution. Therefore, only the User Experiencie and User Interface were evaluated through a prototype and not a complete system implementation. The system was originally planned to include many more features focused on other processes rather than mere organization of content related to the books. These objectives could not be included or reached due to the limitation of budget and availability of other technical resources. It is reasonable to accept that focusing tools' development in the

organization of information and User Experience to produce better information association produces a better writing process. Users prefer simplicity in the process of writing.

9. FUTURE WORK
The current paper's solution is designed to be incrementally innovative. Due to the time available for the development of the solution in this paper, there are some features that can complement the design to produce a second or multiple additional studies. Some desired features are the following:

- Text prediction and intelligent grammar correction.
- Creation of mindmaps and other types of elaborated graphics to relate information.
- A smart menu to automate the handling of dialogues, content association to characters, and many more.
- Tools to customize book formatting, such as the fonts and cover images.

One additional feature that may not be directly related to the man objective of the current research but can add value to the book termination process is the automation of the publishing stage.

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