Canvas Kanban Board Final Report

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ABSTRACT

One issue that many students face is forgetting, or simply not being able to manage their many assignments. The penalties students face for not completing major assignments are substantial and can lead to lower grades or even failing classes. An effective way to combat these issues are through productivity applications such as a kanban board. Kanban boards are a resource that allows the user to clearly visualize all their upcoming tasks, group them based on progress, and sort them. Kanban boards assist students with task management and are commonly used in software development as they "allows for more flexible and iterative approaches to projects, freeing up resources and allowing teams to focus on the most critical items first" (EXIN).

According to GelwicksTech, "A study published in the Journal of Systems and Software demonstrated that kanban led to 35% faster delivery of tasks and a 15% productivity increase" (Gelwicks). This presents the question, if productivity tools such as Kanban Boards can cause a significant increase in productivity, why don't more students utilize them? We believe it is due to the time commitment and hassle of having to manually import assignments from canvas. Our solution is creating a Kanban board that allows for users to automatically import assignments from canvas to their Kanban board. This will eliminate the hassle of manually importing assignments and will allow students to boost their productivity without the costly time commitment of maintaining using a 3rd party application for managing canvas assignments.

INTRODUCTION

There are 2 main problems we wanted to address when creating our Kanban board. The first which was briefly mentioned in the abstract was that many students struggle with procrastination and inefficient task management. Students' lives continue

to get busier which has made it harder than ever to complete all their tasks or manage their time effectively. Recent polls have found that 26% of people say they struggle with chronic procrastination, including an estimated 80-95% of college students meaning these issues are especially impactful for college students (Maatta).

Furthermore, these issues continue to be applicable in the software development workplace. Task management is an essential part of software development as ineffective task management can cause project delays or ineffective products. Individual contributors, which are people working on a project without management responsibilities, only complete 53.5% of planned tasks per week and 31.1% of teams accomplish less than 40% of their weekly planned tasks.

With task management being such an important aspect of education and software development, We wanted to develop an application which would assist computer science students with this process. Our proposed solution was ultimately a traditional Kanban board application which would allow users to effectively visualize their upcoming tasks. We decided to implement a Kanban board rather than a different productivity application as Kanban boards as Kanban board users are able to effectively notice and adapt to changes in requirements, which is particularly important in computer science. Our Kanban board includes three status columns for created tasks, Easy addition and removal of tasks, and an accessible GUI to assist with user interaction. These functionalities will help users eliminate Inefficient task management and procrastination.

 The second problem we wanted to address is the subpar Canvas interface. The canvas dashboard does not offer many of the functionalities traditionally offered in task managers. Some notable missing features include: giving assignments an "in process" label, being able to give assignments different importance weights, or alternate sorting methods. Unfortunately, students are forced to either use the limited functionality of this interface or manually integrate all their canvas assignments to a 3rd party application.

Our solution to this issue is integrating the Canvas API in our Kanban Board for automatic update of the task list. We hope to give the users the option to import all their canvas tasks onto the Kanban board with the single click of a button. This will remove the need to manually add canvas assignments to a 3rd party task management system and save valuable time for students. Finally, This will also allow the user to have access to additional features not available in the canvas dashboard.

Finally we wanted to utilize the feedback given in our project proposal to improve the functionality of the Kanban board. The main feedback we received was to review

existing Kanban boards and to gain insights into their features and methodologies. One of the changes we will make in the future based on this feedback and research will be allowing the users to create or delete their own unique status columns as that is a functionality commonly implemented on other kanban boards.

EXAMPLE

The Association for Project Management defines project management as "the application of processes, methods, skills, knowledge and experience to achieve specific project objectives according to the project acceptance criteria" (APM). One of the most difficult aspects of project management is meeting the predetermined parameters, such as finite timescales and budget constraints. Tools have been developed over the years to help expedite and remove issues with project development, such as the kanban board, which helps teams to "visualize work, limit work-in-progress, and maximize efficiency" (Rehkopf). As mentioned above, our canvas kanban board was created to help students organize their work and reduce procrastination.

A student with a multitude of assignments might feel overwhelmed and unable to start working with the tremendous amount of time that all of these tasks will take to complete. The canvas kanban board provides a great opportunity for the student to organize their assignments in a much more manageable way. With our canvas API implementation, users can import all of their canvas assignments to be automatically sorted. The user can then decide which tasks are the most important and move tasks to the in progress or completed columns. This greatly simplifies the working process, breaking down the workload into individual assignments to focus on at one time. The visual aspect of the kanban board also helps alleviate stress by reducing feelings of being overwhelmed.

The use of our kanban board becomes even more practical when it is utilized by a team, instead of a singular individual. A team of software developers working together can easily organize what tasks should be actively worked on with the amazing visualization of our kanban board. This contributes to reducing the over-partitioning of resources.

BACKGROUND

A kanban board traditionally consists of three columns: "to-do", "in progress", and "completed". Tasks are written on cards and placed in one of these columns allowing for easy classification and visualization of work.

An API, or application programming interface, is a set of functions that allow for systems to access the data and features of other systems. The API of the popular learning management system Canvas, is how our system is meant to automatically gather any assignments a student currently has.

RELATED WORK

We have researched how to interact with the canvas API and how to use API keys to access the necessary information. We were heavily influenced by the philosophy behind Kanban boards so as to ensure that our project utilizes the most optimal form. Kanban boards were originally utilized by Toyota in the 1950s. They emphasize visualizing workflow and limiting-work-progress. A kanban board is specifically effective because it helps reduce the number of work items in queues as well as the amount of idle time that people have by providing clear goals and objectives for them to work towards (Damij). Our design also includes a Pomodoro timer to help increase productivity even more. The Pomodoro technique involves choosing one task to direct full attention to and setting a timer for 25 minutes. When the timer has gone off, take a short break (roughly 5 minutes). Every four cycles, take a longer break that can extend up to an hour (Bryan). Utilizing the pomodoro technique in congruence with our kanban board, provides ample opportunities for productivity increases.

HIGH-LEVEL DESIGN, IMPLEMENTATION, AND TESTING

For our high level architecture we utilized MVC (Model-view-controller) architecture. This is the correct architecture to choose because one of our requirements is to have multiple applications working together. For this to work well we would need to allow the user to be able to control and view the data that they have imported into their Canvas Kanban Board. In our board we will implement sorting based on how users want to sort their tasks (by time due, priority, assignment type, etc.). To achieve this we use two models, the Canvas API Model and the Kanban Board model with two controllers, one that handles the API key input and the other being an element that allows the user to switch sorting methods for their assignments.

This MVC architecture is one of the most commonly used architectures for web design which fits perfectly with our tech stack of choice. It gives us the flexibility to properly integrate our database, classes, and APIs to create an intuitive application that allows for seamless interaction between the user and our web app. Choosing this architecture and tech stack early on allows our app to be more structured and scalable as development continues.

For our tech stack we utilize HTML, CSS, and JavaScript to make a responsive application that will run on any system. This was a great choice for us since a member of our team used a non-windows operating system and we wanted to ensure compatibility throughout development and create an environment where we were able to utilize all of our group's creative potential to create a demo.

While we were not able to integrate the Canvas API in time we still learned a lot about how to create a robust application that met our minimum requirements for the project. Our knowledge of front end development was expanded and we learned a lot about debugging with dev tools in the browser which allowed us to test our application and handle any errors that we found along the way.

DEPLOYMENT AND MAINTENANCE

To make our application available to the general public we would choose some sort of simple web hosting service online. It would be quite hard to make our own server and do all the hosting and maintenance ourselves so we would probably deploy to something like github pages or if we wanted even more control of the web hosting process we would choose a cloud hosting provider such as Amazon Web Services or Microsoft Azure. Github pages would be a good deployment option since it is very easy to use for static sites and it supports JavaScript functionality which is crucial for our application. As our application grows and the static web hosting of github pages no longer is sufficient we would move onto other options that are more scalable and give us more control over our application.

There are some security considerations when we deploy our application however. We cannot just store the user's Canvas API key within plain text in the application. That API key, if leaked, would allow someone else to access all of the assignments and do malicious things with the user's account. It is our responsibility to make sure that data is properly stored and encrypted so that if there is a data breach

then the damage is at least mitigated and all of the data would be extremely difficult, if not impossible, to crack.

For automatic deployment we would utilize GitHub Actions because it allows for the automated deployment of our web app whenever there are changes pushed to the repository.

CONCLUSION AND FUTURE WORK

Throughout the semester our group has made massive progress in our development of our application and were able to complete all of the key features of a kanban board in a responsive web app. This app provides a host of benefits to the end user, mainly productivity increases and ease of task management.

One thing that held us back was the integration into the Canvas API. In the end we were not able to handle inputting an API key and having it auto populate all the user's assignments into the kanban board. There would also be issues with security and scalability as we would gain more users. We would need to ensure all credentials would be stored safely and securely and that malicious actors would not have access to the app's internal systems.

Some features that we would add in the future would be to finalize the Canvas API integration, AI-driven task prioritization, and maybe possible integration with other educational tools (example would be an app like Notion). Once we solve these design issues and gain users we would be able to scale our application and leverage cloud service providers to meet our needs.

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