Project Title: ClockWork
Team Members:

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Faculty Advisor: Dr. David Luginbuhl dluginbuhl@fit.edu

Client: Dr. David Luginbuhl CSE Professor & Faculty Advisor

Progress of Current Milestone:

Task	Completion %	Anthony	Christian	Peter	Pierson	To do
1. Test/demo of the entire system	100%	0%	0%	70%	30%	
2. Conduct evaluation and analyze results	100%	0%	0%	100%	0%	
3. Create developer manual	100%	0%	0%	80%	20%	
4. Create demo video	100%	100%	0%	0%	0%	
5. Finish completed session timeline visualization	20%	0%	0%	0%	100%	
6. Finish user history and statistics page	40%	0%	100%	0%	0%	Filter templates method, UI for template selection, page regen
7. Session reminder notifications	50%	0%	0%	100%	0%	UI for multiple

						reminders per session and reminder types
8. Show last duration and estimate error and other helpful information when estimating a new task	100%	0%	0%	100%	0%	
9. Finalize UI	85%	100%	0%	0%	0%	Some additional pages can be revisited for minor UI changes

Discussion of Current Milestone Tasks:

- Task 1: A static whitebox code review was conducted while writing the developer manual. Crucial system components were scrutinized so that their sections in the manual would be accurate and code quality was improved in the process. A demo of all app features in various circumstances was also performed, and some odd behaviors were discovered, but no actions were taken to correct them. For instance, sometimes session statistics are nonsensical for sessions with low durations. We could not discover why this occurred mechanically, but the phenomenon was recorded.

- Task 2: As mandated, a second round of user evaluations was conducted. Unfortunately, the body of willing evaluators was small and most of the evaluators that agreed were resistant to use the app. They would be given the evaluation version of the app, then, after a few days, they were asked about their experience and they reported that they had not used it. After a few more days the answer was the same. Last round, the cursory evaluations still yielded actionable feedback because the app was new to them. However, since not much changed superficially about the app since the last time they used the app (new versions were distributed while that addressed their issues during the last evaluation period), new feedback required more effort since using the app had to be integrated somewhat into their lifestyles for deeper exploration. Despite the lack of that exploration, some feedback was gathered, based on which it is clear that use of the app is

not intuitive. One evaluation said "...I just tend to do things later and finish it all in one go without much of a timer or plan," indicating that, despite use of the app being applicable to the situation they described, they did not understand how it should be used (they thought that they had to split a task into parts to use the app). This instance of the problem partly stems from the evaluator being given the app without desiring to solve the problem the app addresses. That does not justify the failure on the app's part to be clear in its use, however. One evaluator reported that the "Add Marker" button in the timer notification did not react when it was pressed, making it impossible to tell if the button was actually pressed. This was addressed in this milestone. Another evaluator complained about the "View Details" button in the post mortem session report that was intended to take the user to the session timeline page. This page has not been completed however, so the button has been an inert placeholder. When the UI finalization pass occurred for the report page, the button was removed.

- Task 3: Eleven months ago, the development of ClockWork was initiated by a team that had no experience creating Android applications. As a consequence, most of that time was spent learning how to build Android apps (how best to use the tools and how best to design solutions using those tools) and correcting faulty work that was done without that knowledge. While a lot of progress has been made during this last semester, a lot of what was originally envisioned did not come to be, and our client is considering handing the project to a new team so that development may continue. As such, our client wanted a developer manual that contained all of the development lessons learned over the course of working on the project so that a new team could start iterating more quickly, instead of spending their first semester searching for solutions we already found. The manual discusses the tools the project uses and how it uses them, the patterns and design strategies the project uses and how they are implemented, and the more complex business responsibilities and how the app performs them.

- Task 4: The demo video focuses on showcasing the primary features of the application (i.e., task creation and execution, task templates, and auto-estimates) with text descriptions alongside them. This is done to highlight the application's capabilities and appeal to potential users.

- Task 5: The task was not completed due to priorities being placed on other requirements and other coursework.

- Task 6: This task has been partially completed due to time constraints caused by other coursework. The stated goal of this task was to implement the means for the user to filter tasks shown in their history and stats page by template name. Options for filtering would have included "All templates" or "No template" in addition to the already present ones. The page would regenerate (if that's the correct term), displaying information for the tasks of a given template only, such as "CS homework" or "Biology review". At the

present, the UserStatsViewModel is the sole part to have been modified. It now combines Flows from the task repository, profile repository, and a selectedProfile flag. However, this is the extent of modification.

- Task 7: The original goal for this task was to enable the user to set reminders for sessions where they would receive an Android push notification at a selected time for the session the reminder belonged to. In the session form, there would be a new page that showed all created reminders for the session from which the user could add, edit, and delete them. In addition to absolute date-time settings, there would be options to base the reminder time relative to the due date, the user estimate, and the app estimate. Due to time constraints and greater-than-anticipated complexity, the extent of the reminder feature implementation is limited to the reminder backend (which is mostly complete to the specification) and a simple addition to the form where users can select a single absolute date time to receive a reminder. The reminder backend was implemented to support multiple reminders per session, but the schema would need to be modified to support the relative reminder time options. The unanticipated complexity stems from the session form architecture which is not extensible enough to unobtrusively add a new page that retrieves a living list from the database. A new solution would need to be designed, or at the very least the existing solution would need to be rearchitected, to facilitate extensions such as the reminder page.

- Task 8: The evaluators from the first evaluation reported that it was not convenient to iterate on their estimates because they did not know when making new ones how wrong they were previously. To address this, average session durations and estimate error statistics are now presented to the user when they are making an estimate. A simple average would not be an appropriate solution to this problem because the sessions are designed to be variable. For instance, one math homework session could have seven questions and another could have ten, but the average duration for a math homework session would oversimplify that nuance. (Although, we do not have a problem quantity field or fields dependent on the type of task, these aspects can be somewhat captured using the general “Difficulty” field.) Instead, the averages we display to the user are based on the current values of the form fields and are calculated using linear regression of the completed sessions’ difficulty to total time, which uses the Apache Commons Math 3 implementation. Only sessions of the selected template that were completed within the last sixty days are included in the calculation. The average estimate error also uses linear regression to make the average more relevant to the current session’s fields and frames its result as a percent over/underestimate. If the data set does not include any difficulty variance, a simple average is used instead. The last session duration was not included because the issue of relevance to the current session could not be solved as neatly. Linear regression could not be used to make the data relevant to any situation since it is only one

data point, and choosing the last session duration that fits the current session's fields would more likely than not result in stale data or no data at all.

- Task 9: To address evaluators' feedback regarding the application's appearance, the UI for the most frequently navigated pages has been revamped to feature a more modern look, making the functionality of each component more intuitive for users. The most major updates were to the session timer page and the completed session page with the intent to make the information more readable and the buttons more intuitive. Alongside these major changes, some minor adjustments were made, including reducing the size of icons throughout the app to achieve a more consistent appearance and adding a circular progress bar to replace the existing "Loading…" text that appeared when a page was loading. Some UI elements remain to be polished across certain pages of the application, leaving work to be done on this task.

Discussion of Contribution:

- Anthony: I created the demo video and finalized the UI for this project milestone. To leave the application in a relatively polished state before wrapping up the semester, I focused on reviewing the UI and redesigning various pages to achieve a more uniform look across the app. Regarding the demo video, I focused on showcasing the primary features of the application (i.e., task creation and execution, task templates, and auto-estimates) with text descriptions.

- Christian: I worked on implementing the filtering capabilities for the user stats and history page. As I stated previously, time constraints and higher priority coursework were complicated by a lack of experience in mobile app development. Modifying the view model ended up taking priority over UI implementation. This will provide the base for future development of the page, should we or another team pick up the project.

- Peter: I worked on adding reminder notifications, user estimate hints, the user evaluations, and the developer manual. As stated above, the original goal was to allow the user to specify any number of reminders as well as create reminders based off of the due date, their estimate, and the app's estimate, but integrating the UI that enables that into the existing session form appeared to be too large a task to complete this milestone. Additionally, the database schema update for the initial reminder serialization did not include a way to save reminders with relative times, and now that the app has been released to the public through the evaluations, database migrations have to be written and tested for each schema change which doubles or triples the time and effort needed to make these changes. The user estimate hints are a deceptively tricky issue because of the variation between sessions of the same template. I think that the app needs better mechanisms to present the data to the user because reducing the user's history down to two statistics still removes a lot of useful nuance. The second round of user evaluations

were not as helpful as the first. Not enough of the app changed to receive new cursory feedback, and the evaluators were not willing to incorporate the app into their lifestyles to give feedback on that (the most important) aspect. I addressed the feedback about the "Add Marker" button in the timer notification by making it read "Marker Added" for three seconds after a marker is added.

- Pierson: I attempted to work towards finding time to finish timeline session visualization, to little avail due to priorities being placed on other courses. I assisted with writing the developer manual and wrote sections regarding my previous work.

Lessons Learned:

- Regular communication with the client/advisor is necessary for a successful project. We communicated with our client/advisor for about an hour twice a milestone, and he was able to answer project direction and requirements questions, aspects of the project where the right approach was not clear, particularly with more nuanced aspects such as determining user performance. One of the greatest difficulties we faced was ambiguous direction (see below), and the lesson learned is that the more meetings occur between team members (including the client and advisor), the better prepared the team is to succeed.

- At the beginning of the second semester, we started using a tool to track the project backlog and the status of current work items. This greatly simplified planning and visualizing what was done and what was left to do. For those reasons, the lesson learned is to implement a system to manage the project from the beginning. Unfortunately, it did not really improve our ability to track the status of current work items. Additionally, implementing better project management processes, such as creating a ticket for each change made to the code and committing code changes such that each commit addresses only one issue/ticket, would have improved the clarity of the project's status.

- The greatest difficulty the project faced was that it was often not clear how the solution should approach its goals. The most notable instance of this is the user interface, which was not adequately addressed in the project requirements. The lesson learned is that the more time spent developing the requirements for the project, the faster solutions can be developed more confidently. We did develop models for much of the user interface, but they were never tested before they were implemented. There was a lot of "I do not know [what the right way to do this is]" during design discussions and experimentation was not employed to find the right way. Instead, a way was chosen and its suitability was determined after it was implemented. Frankly, the timeline of the class would not have permitted the kind of experimentation that we would have needed to excel.

- It's important to weigh your previous commitments when creating new ones. When it comes to developing a project alongside something like college it can be incredibly

difficult to consider everything in the same scope. The ability to accurately and correctly gauge previous responsibilities while creating new ones is difficult, but necessary.

Meeting Dates with Client During Current Milestone:

- see Faculty Advisor Meeting Dates below

Client Feedback on Each Task of Current Milestone:

- see Faculty Advisor Feedback below

Meeting Dates with Faculty Advisor During Current Milestone:

- Meeting 1: Nov 7, 2025
- Meeting 2: Nov 21, 2025

Faculty Advisor Feedback on Each Task of Current Milestone:

- Task 1:
- Task 2:
- Task 3:
- Task 4:
- Task 5:
- Task 6:
- Task 7:
- Task 8:
- Task 9:

Faculty Advisor Signature: _____ Date: _____

Evaluation by Faculty Advisor

- Faculty Advisor: detach and return this page to Dr. Chan (HC 209) or email the scores to pkc@cs.fit.edu
- Score (0-10) for each member: circle a score (or circle two adjacent scores for .25 or write down a real number between 0 and 10)

Anthony	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Christian	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Peter	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Pierson	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10

Faculty Advisor Signature: _____ Date: _____