Module Code	CT124-3-2-MAE
Intake Code	APD2F2211IT(MBT)
Lecturer Name	Mr. Amad Arshad
Hand-out Date	19 May 2023
Hand-in Date	27 August 2023

Student TP Number	TP059963
Student Name	Yip Zi Xian

Table of Contents

1.0 Introduction 3

2.0 Assumptions 3

3.0 User Manual 4

4.0 Use Case Diagram 12

5.0 Data Modelling Diagram 13

6.0 Major Code Snippet 14

7.0 Libraries Used 21

a. Android Lifecycle 21

b. Android Compose Navigation 21

c. Android Compose UI 21

d. JetBrains Kotlin Datetime 21

e. Sheets Compose Dialogs 22

f. Defaults Libraries 22

8.0 Architecture Design – MVVM 23

9.0 Testing 24

a. Robo Test 24

b. Automated Test 26

10.0 Wireframe Design 27

11.0 Appendix 28

a. Generative Research 28

b. Affinity Analysis 29

c. Interview Questions 33

d. Participants Details 34

e. Semi Structured Interview 38

f. Contextual Inquiry 44

12.0 References 46

1.0 Introduction

In the era of post Covid-19 pandemic, which led to disruptions in normal daily routines due to lockdowns in Malaysia driven by increasing cases, effective time management is the key to better self-organization and discipline. To overcome this problem, Chronos is proposed. Chronos is a semi-automatic time-scheduling application specifically designed to optimize task management based on time or the level of priority of the task.

Chronos performs beyond basic scheduling applications by implementing novel elements that enhance time allocation. A significant innovation is the toggle-filter feature, allowing users to prioritize tasks either based on set schedules or their relative priority level. The flexibility enables users to realign default time settings according to their priorities. Thus, Chronos offers users the ability to manage their time in tandem with the importance of each task, whether decided by Chronos or personalized by the user.

The development of Chronos is based on extensive research to ensure it is fitting to the public. Comprehensive research process like semi-structured interviews, generative research and affinity analysis are performed with diverse university students. Feedback from this study indicates that Chronos could potentially be effective in addressing common issues related to time constraints, task overload and unclear task priorities.

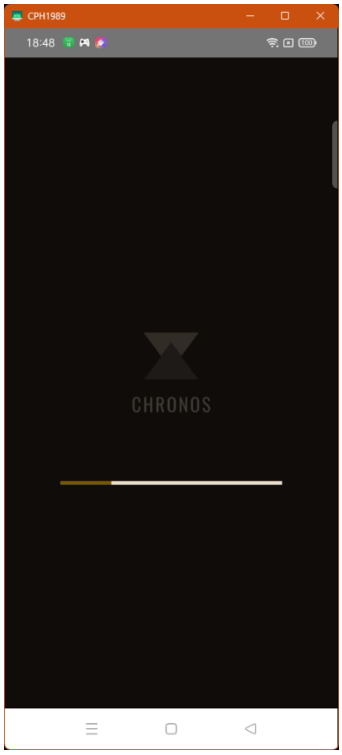
2.0 Assumptions

Some assumptions are made due to time constraints and limited resources:

a. Users are assumed to be able to understand input fields and determine invalid inputs when registering, logging in, resetting password, updating profile, creating and editing tasks.
b. Users are assumed to keep using Chronos as if Chronos is uninstalled, its data will be lost forever.
c. Chronos is assumed to be sending notifications at 8am in the morning or at the starting time of the task.
d. The toggle-filter button in profile page is assumed that users will refresh the page whenever the button is toggled as it will not update on time.

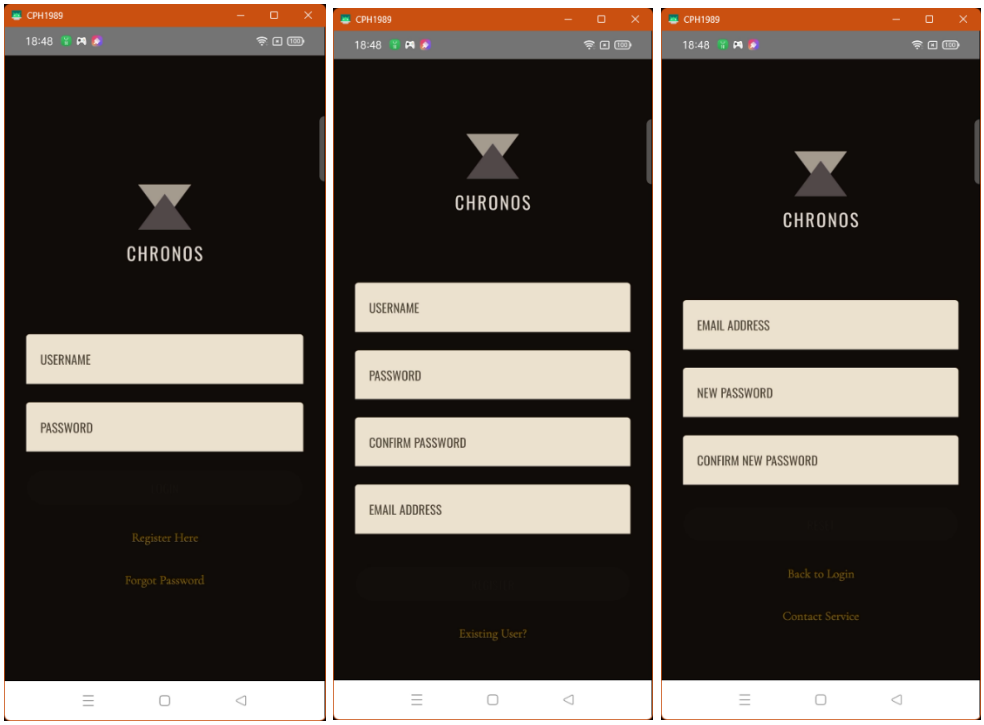
3.0 User Manual

Loading Screen



When users launch the application, there will be a loading screen displayed so that the users will know that the application is starting and running. Instead of the white screen that probably will cause users to think that the application is not responding or crashed, a loading screen displayed with progress bar will make users to wait longer.

Login, Register, Forgot Password Page

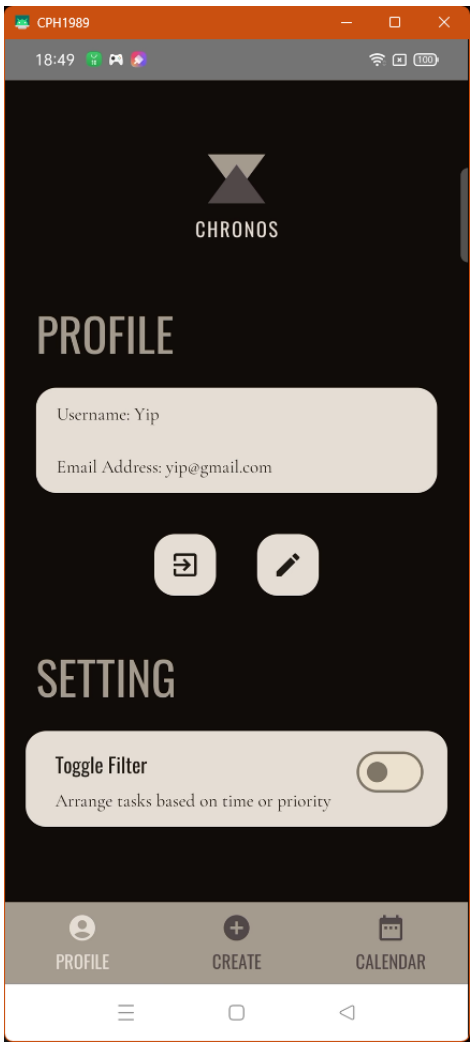


When the application has been loaded, users will first see the login page with username and password input fields. The login button will require users to complete both inputs to only be displayed for user account validations. On the bottom of the login page, there are two text buttons that will navigate users to the register page and reset password page, respectively.

In the register page, users need to fill their username, password along with confirming their password, and email address for the purpose of resetting password. Like login page, the register button will require users to complete all inputs and the password and confirm password are matching and longer than 8 characters to only be displayed for inserting new user to the database. On the bottom of the register page, there is a text buttons that will navigate users back to the login page or when users are done with their registration, they will automatically redirect to the login page.

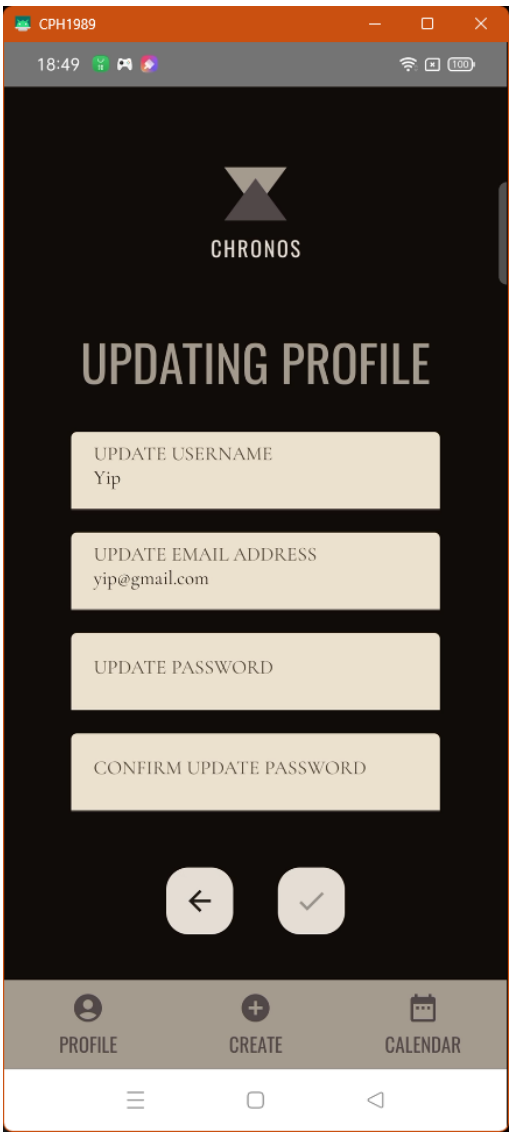
In the forgot password page, users are required to input their email address to verify their account so that they can reset their password successfully. Like login page, the reset button will require users to complete all inputs and the password and confirm password are matching and longer than 8 characters to only be displayed for updating the password in the database. On the bottom of the forgot password page, there are two text buttons that will navigate users to the login page or assume that they will contact the admin to ask about their account, respectively.

Profile and Setting Page



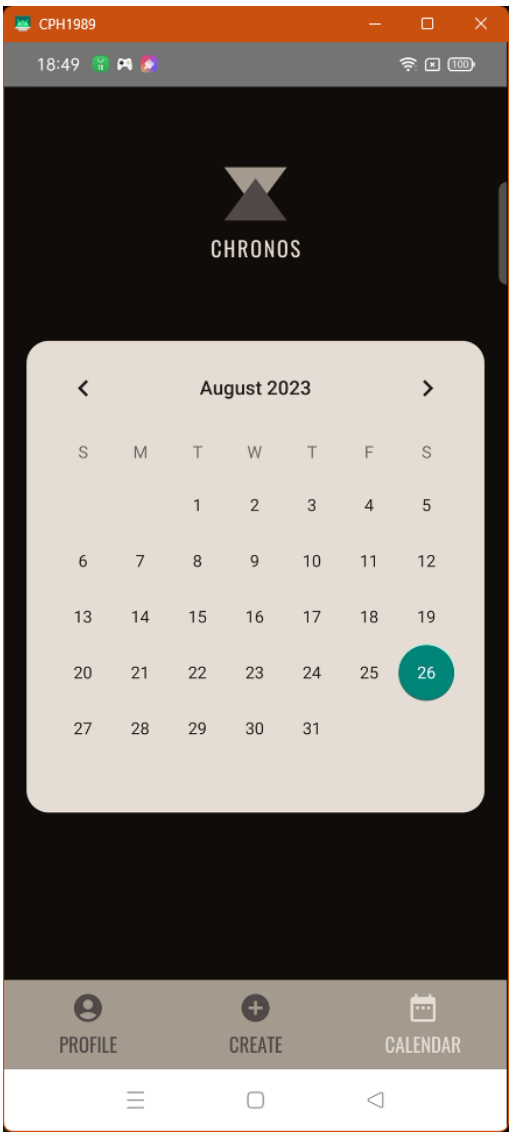
When users successfully logged into their Chronos account, in the profile page accessible from the bottom navigation bar, their username and email address will be displayed. There are two icon buttons, logging out from their account and editing their account details such as username, email address, and password. At the bottom of the profile section, there is a toggle button for users to arrange their tasks based on either set time or set priority of each task. The toggle switch will not upload on time and users are required to navigate back and forth to see that the button has been toggled.

Edit Profile Page



In the updating profile page, the initial username and email address are prefilled in the input fields so that users can change their password without having to retype their username and email address. On the bottom of the page, there are two icon buttons, back to the previous page and save new profile changes, respectively.

Calendar Page

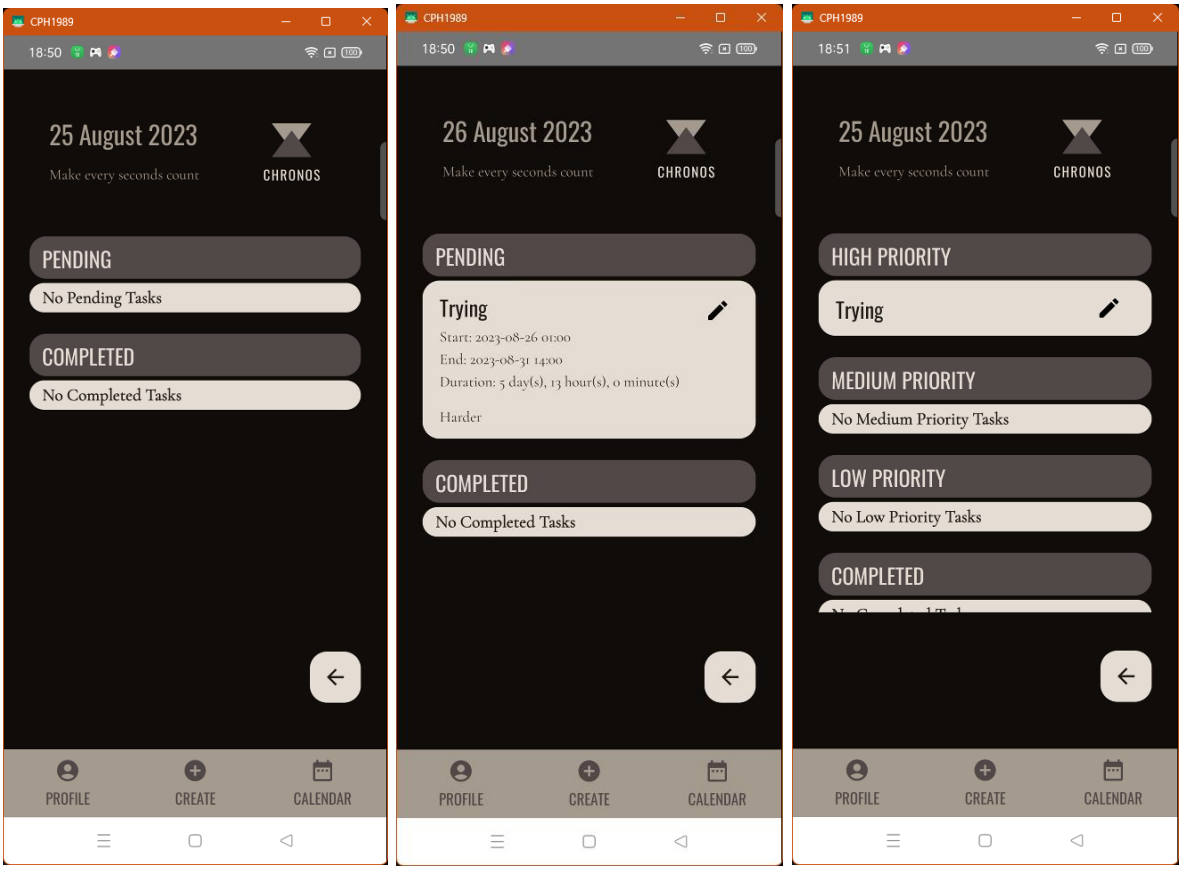


In the calendar page accessible through the bottom navigation bar, users can scroll through the calendar and select a date to view their tasks.

Creating Task Page

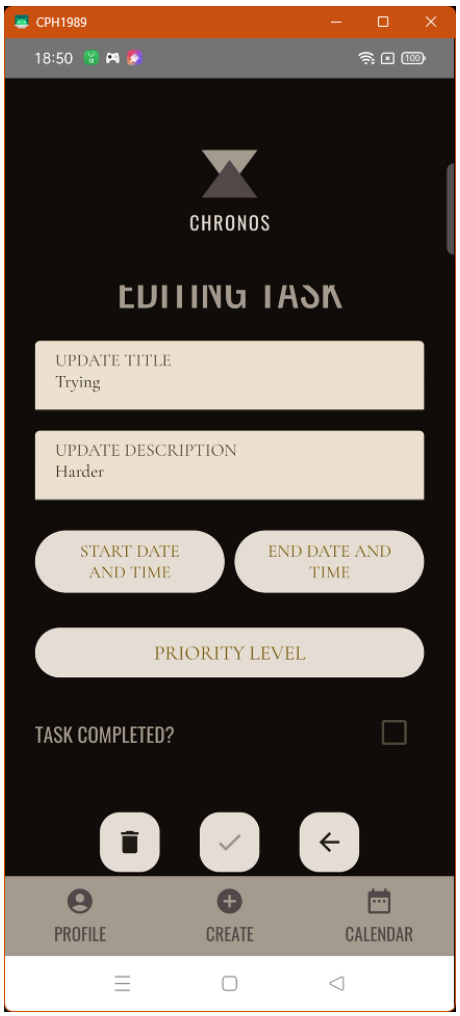
In the creating task page accessible through the bottom navigation bar, users are required to fill all fields before the save task button will be displayed. For the start date and end date, a date time dialog will pop out to users to set their date and time for their tasks. For priority level, another dialog will pop out to users to select between low, medium, and high.

Viewing Task Page



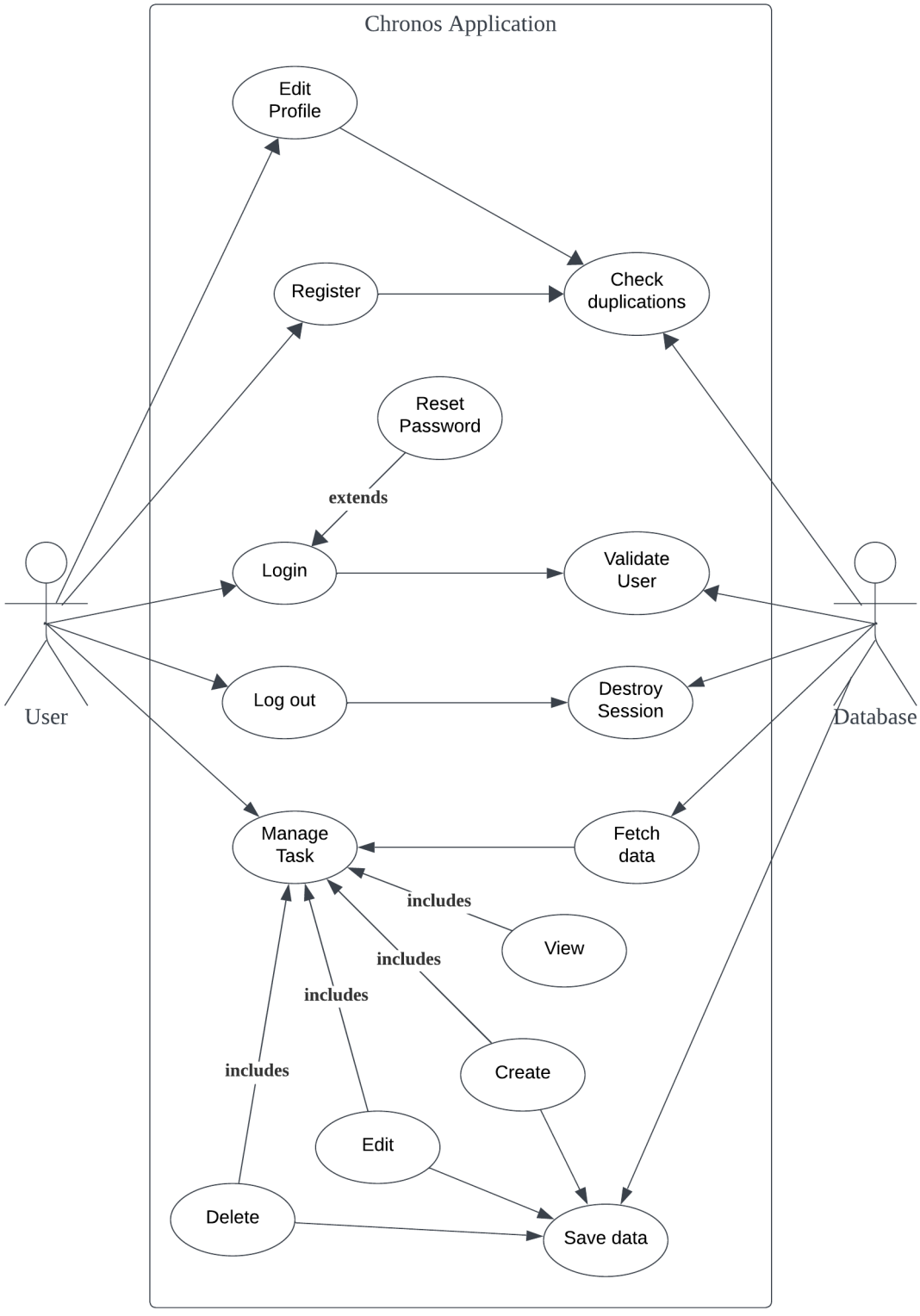
When users have selected a date to view their task through the calendar page, the tasks for the day will be displayed and divided into pending and completed categories. If users are using the priority task arrangement, the tasks will be displayed based on four categories, high, medium, low priority and completed regardless of the start time and end time so users will always be able to view their uncompleted tasks.

Editing Task Page

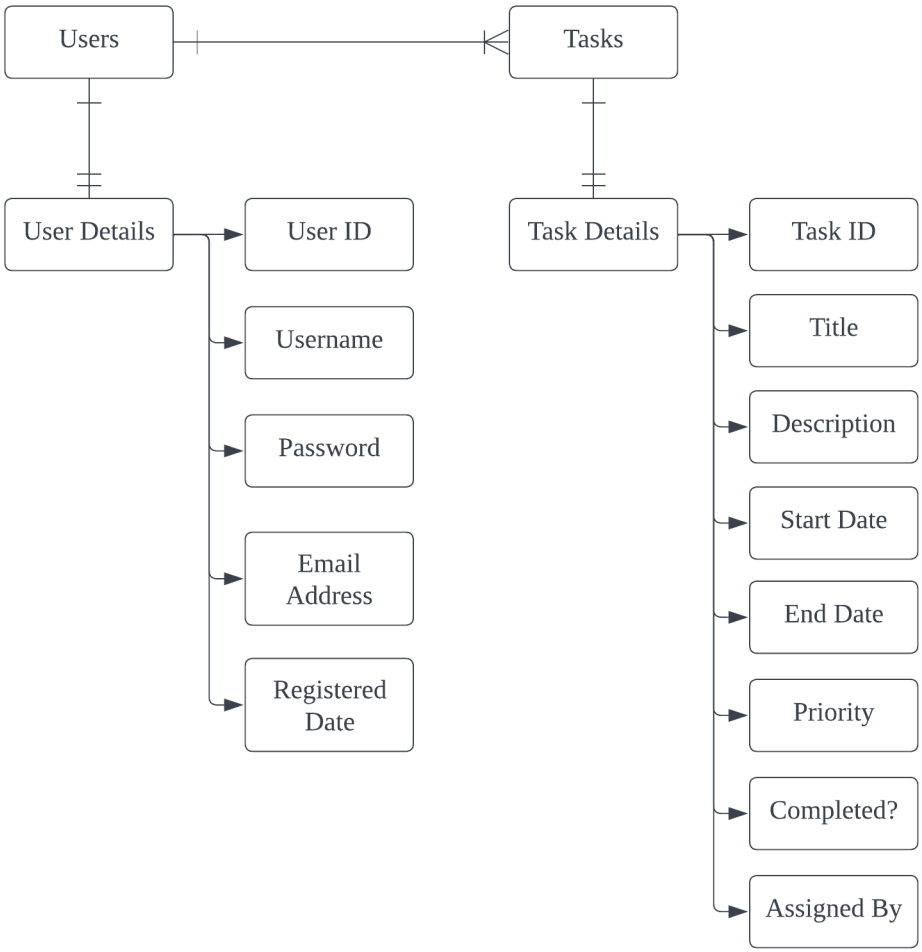


In the editing task page, the title and description of the task will be prefilled, and users are only required to assign start date, end date and priority level. The task completed button by default will be false which is not completed, and if checked, the task will be categorized as completed. On the bottom of the page, there are three icon buttons, delete task, save tasks, and back to previous page, respectively.

4.0 Use Case Diagram



5.0 Data Modelling Diagram



6.0 Major Code Snippet

Email Address Validation

```
// Function to validate email address
fun String.isValidEmail() : Boolean {
  return android.util.Patterns.EMAIL_ADDRESS.matcher(this).matches()
}
```

The code snippet above shows a function on validating whether the input from the users is a valid email address. If it is following the format pattern of an email address, it will return true.

Start and End Date Validation

```
// Compare the start date and end date
fun compareDates(startDate: LocalDateTime, endDate: LocalDateTime): Boolean {
  val comparison = startDate.compareTo(endDate)

  return when {
    comparison < 0 -> true
    comparison > 0 -> false
    else -> false
  }
}
```

The code snippet above shows a function on checking and comparing whether the first date, start date, and second date, end date is logical. If the start date is after end date or equals to the end date, it will return false.

Caching User Session

```
// Shared preferences
private lateinit var sharedPreferences: SharedPreferences
```

```
sharedPreferences = getSharedPreferences("user_session", MODE_PRIVATE)

// Retrieve data from shared preferences
val sessionToken = sharedPreferences.getString("session_token", null)
val sessionUsername = sharedPreferences.getString("session_username", null)
val sessionEmail = sharedPreferences.getString("session_email", null)
val sessionPassword = sharedPreferences.getString("session_password", null)

// Restore the user session
UserSession.sessionToken = sessionToken
UserSession.sessionUsername = sessionUsername
UserSession.sessionEmail = sessionEmail
UserSession.sessionPassword = sessionPassword
```

```
override fun onStop() {
  super.onStop()

  sharedPreferences.edit {
    putString("session_token", UserSession.sessionToken)
    putString("session_username", UserSession.sessionUsername)
    putString("session_email", UserSession.sessionEmail)
    putString("session_password", UserSession.sessionPassword)
  }
}
```

```
object UserSession {
  // Compulsory session variables
  var sessionToken: String? = null
  var sessionUsername: String? = null
  var sessionEmail: String? = null
  var sessionPassword: String? = null

  // Optional session variables
  var sessionSelectedDate: String? = null
  var sessionFilterQuery: Boolean? = false

  var sessionEditTask: String? = null
  var sessionEditTaskTitle: String? = null
  var sessionEditTaskDescription: String? = null
}
```

These code snippets above show how when a logged in user will remain logged in after exiting or closing the application. It will retain the user ID as the session token, username, email address and password. It parses session_token, session_username, session_email, and session_password is saved into a shared preferences file when the application is exited or closed and when the users reopen the application, the data stored in shared preferences file will be retrieved and replace in the user session object.

Connection to Realm Database

```
object Connection {
  // Connect Realm DB
  fun connectDB() : Realm {
    val config = RealmConfiguration.Builder(setOf(Chron::class, Epheron::class)).build()

    return Realm.open(config)
  }
}
```

The code snippet above shows a function to connect to Realm database and create a Realm schema for Chron and Epheron class. The function will return an instance of Realm class to be accessed whenever possible or needed.

Chron and Epheron Realm Objects

```
class Chron : RealmObject {
  @PrimaryKey
  var _chron_id : ObjectId = ObjectId()

  var chronUsername : String = ""
  var chronEmail : String = ""
  var chronPassword : String = ""

  @SuppressLint("SimpleDateFormat")
  var chronRegisterDate : String = SimpleDateFormat( "yyyy-MM-dd HH:mm:ss" ).format( Date() )
}
```

```
class Epheron : RealmObject {
  @PrimaryKey
  var _epheron_id : ObjectId = ObjectId()

  var epheronTitle: String = ""
  var epheronIsComplete : Boolean = false
  var epheronStart : String = ""
  var epheronEnd : String = ""
  var epheronDuration : String = ""
  var epheronDescription : String = ""
  var epheronPriority: String = ""

  var chronId : String? = null
}
```

These code snippets above show the class of Chron and Epheron as an instance of RealmObject so that it can be saved in Realm database. Both classes have a primary key assigned so that each object is unique and easier to be managed.

Duration between Two Dates

```
// Calculate duration between start date and end date
fun calculateDuration(startDate: LocalDateTime?, endDate: LocalDateTime?): String {
  val duration = Duration.between(startDate, endDate)

  val days = duration.toDays()
  val hours = duration.toHours() % 24
  val minutes = duration.toMinutes() % 60

  return "$days day(s), $hours hour(s), $minutes minute(s)"
}
```

The code snippet above shows a function to calculate the duration between two dates and return in a string, showing users how many days, hours, and minutes, their tasks will be.

Loading Page

```
class LoadingVM: ViewModel() {
  val loadingProgress = MutableStateFlow(0.0f)

  init {
    startLoadingProgress()
  }

  private fun startLoadingProgress() {
    viewModelScope.launch {
      for(progress in 0..100) {
        loadingProgress.value = progress / 100.0f
        delay(50)
      }
    }
  }
}
```

The code snippet above shows a view model of initializing a loading progress from 0 to 100 when the application is opened and including a delay of 50ms so that the animation will be smoother.

Filtering tasks between two dates

```
fun fetchListOfPending(): List<Epheron> {
  val dateFormatter = DateTimeFormatter.ofPattern("d MMMM yyyy", Locale.ENGLISH)
  val dateTimeFormatter = DateTimeFormatter.ofPattern("yyyy-MM-dd'T'HH:mm")

  // The selected date from user
  val selectedDate = LocalDate.parse(UserSession.sessionSelectedDate, dateFormatter)

  val listOfPending = epheronData?.filter { epheron ->
    // The start and end date of epheron
    val selectedStartDate = LocalDateTime.parse(epheron.epheronStart, dateTimeFormatter).toLocalDate()
    val selectedEndDate = LocalDateTime.parse(epheron.epheronEnd, dateTimeFormatter).toLocalDate()

    !epheron.epheronIsComplete && selectedDate in selectedStartDate..selectedEndDate
  } ?: emptyList()

  return listOfPending
}
```

The code snippet above shows a function to filter through a list of Epheron (task) object of a specific user with a condition of checking whether the start date and end date of task is within the selected date which users wanted to view. It will return a list of filtered tasks to be looped in the viewing task page.

Fetching and Filtering Chron

```
// For Chron
// Fetch all chron data
override fun fetchData(): List<Chron> {
  return realm.query<Chron>().find()
}

// Filter through specific chron data
override fun filterData(email: String): List<Chron> {
  return realm.query<Chron>("chronEmail = $0", email).find()
}
```

The code snippet above shows two overridden function that return a list of Chron (user) object using the query function of Realm database, with and without condition.

Inserting Chron

```
// Insert new chron data
override suspend fun insertChron(chron: Chron) {
  realm.write {
    copyToRealm(chron)
  }
}
```

The code snippet above shows an overridden function that save a Chron (user) object into the Realm database.

Updating Chron Profile

```
// Update existing chron profile
override suspend fun updateChronProfile(chronId: String, username: String, email: String, password: String) {
  realm.write {
    val theChron = this.query<Chron>("_chron_id = $0", BsonObjectId(chronId)).first().find()

    theChron?.chronUsername = username
    theChron?.chronEmail = email
    theChron?.chronPassword = password
  }
}
```

The code snippet above shows an overridden function that updates the data of the current logged in user by using the session token from the user session object.

7.0 Libraries Used

a. Android Lifecycle

```
// For View Model
implementation("androidx.lifecycle:lifecycle-viewmodel-compose:2.6.1")
```

Android Lifecycle is used to implement view models in the application so that the structure of the codes can be reduced and provides better management and maintenance (Android Developers (a), 2023).

b. Android Compose Navigation

```
// For Navigation
implementation("androidx.compose.material:material:1.4.0")
implementation("androidx.lifecycle:lifecycle-runtime-ktx:2.6.1")
implementation("androidx.navigation:navigation-compose:2.6.0")
```

Android Compose Navigation is used to implement navigation and bottom bar navigation in the application so that users will not be restricted on a single page or single screen application and provides a cleaner and structured user interface experience (Android Developers (b), 2023).

c. Android Compose UI

```
// For Calculating Date Time
implementation("androidx.compose.ui:ui:x.y.z")
implementation("androidx.compose.foundation:foundation:x.y.z")
implementation("org.jetbrains.kotlinx:kotlinx-datetime:0.3.0")
```

Android Compose UI is used to provide more options for user interaction between the users and device, including layouts, inputs, and images.

d. JetBrains Kotlin Datetime

```
// For Calculating Date Time
implementation("androidx.compose.ui:ui:x.y.z")
implementation("androidx.compose.foundation:foundation:x.y.z")
implementation("org.jetbrains.kotlinx:kotlinx-datetime:0.3.0")
```

JetBrains Kotlin Datetime is used to calculate date time such as the duration between two dates or comparing dates that can be used to work in tandem with Android Compose UI to provide more input options for users. (Kotlin, n.d.)

e. Sheets Compose Dialogs

```
// For Compose Dialogs
implementation("com.maxkeppeler.sheets-compose-dialogs:core:1.1.1")
implementation("com.maxkeppeler.sheets-compose-dialogs:date-time:1.1.1")
implementation("com.maxkeppeler.sheets-compose-dialogs:list:1.1.1")
```

Sheets Compose Dialogs is a third-party external library that is implemented to provide easy-to-implement and ready-to-use dialogs for set time, set date, select options and other dialogs.

f. Defaults Libraries

```
// Defaults
implementation("androidx.core:core-ktx:1.10.1")
implementation("androidx.activity:activity-compose:1.7.2")
implementation(platform("androidx.compose:compose-bom:2023.03.00"))
implementation("org.jetbrains.kotlinx:kotlinx-coroutines-android:1.7.1")
implementation("androidx.compose.material:material:1.4.0")
implementation("androidx.compose.ui:ui:1.4.0")
implementation("androidx.compose.ui:ui-graphics")
implementation("androidx.compose.ui:ui-tooling-preview")
implementation("androidx.compose.material3:material3")
implementation("io.realm.kotlin:library-base:1.10.0")
implementation("io.realm.kotlin:library-sync:1.10.0")
implementation("org.jetbrains.kotlinx:kotlinx-coroutines-core:1.7.1")

testImplementation("junit:junit:4.13.2")

androidTestImplementation("androidx.test.ext:junit:1.1.5")
androidTestImplementation("androidx.test.espresso:espresso-core:3.5.1")
androidTestImplementation(platform("androidx.compose:compose-bom:2023.03.00"))
androidTestImplementation("org.jetbrains.kotlinx:kotlinx-coroutines-test:1.7.1")
androidTestImplementation("androidx.compose.ui:ui-test-junit4:1.4.0")
androidTestImplementation("androidx.test:runner:1.5.2")
androidTestImplementation("androidx.test:rules:1.5.0")

debugImplementation("androidx.compose.ui:ui-tooling")
debugImplementation("androidx.compose.ui:ui-test-manifest:1.4.0")
```

Default libraries are maintained and optimized to be compatible with Android 11 (API 30) which is the Android version of the testing device used for this application development.

8.0 Architecture Design – MVVM

During the development of Chronos, a task scheduling application, MVVM (Model-View-ViewModel) architecture is used because of several reasons. Firstly, separation of concerns where the code for model, view, and view model are divided so that it can be developed in parallel or at different times (Gallardo, E.G., 2023). Moreover, since the codes are separated, testing can also be divided and specifically targeted at either model or view model. Thirdly, it provides a better management and cleaner approach to the coding environment as the application codes are limited to around fewer lines compared to other architectures like MVC or MVP (Sharma, A., 2018).

```
@OptIn(ExperimentalComposeUiApi::class, ExperimentalMaterial3Api::class)
@Composable
fun LoginPage(navController: NavHostController, loginVM: LoginVM = viewModel()) {
```

```
class LoginVM: ViewModel() {
  private val realm = Connection.connectDB()
  private val repo = CRUDoverwrite(realm)
  private val chronData = repo.fetchData()

  // Assign global variables as session
  fun assignGlobal(username: String, password: String, navController: NavHostController) {
    if(validateChron(username, password)) {
      val theChronData = realm.query<Chron>("chronUsername = $0 AND chronPassword = $1", username, password).first().find()
```

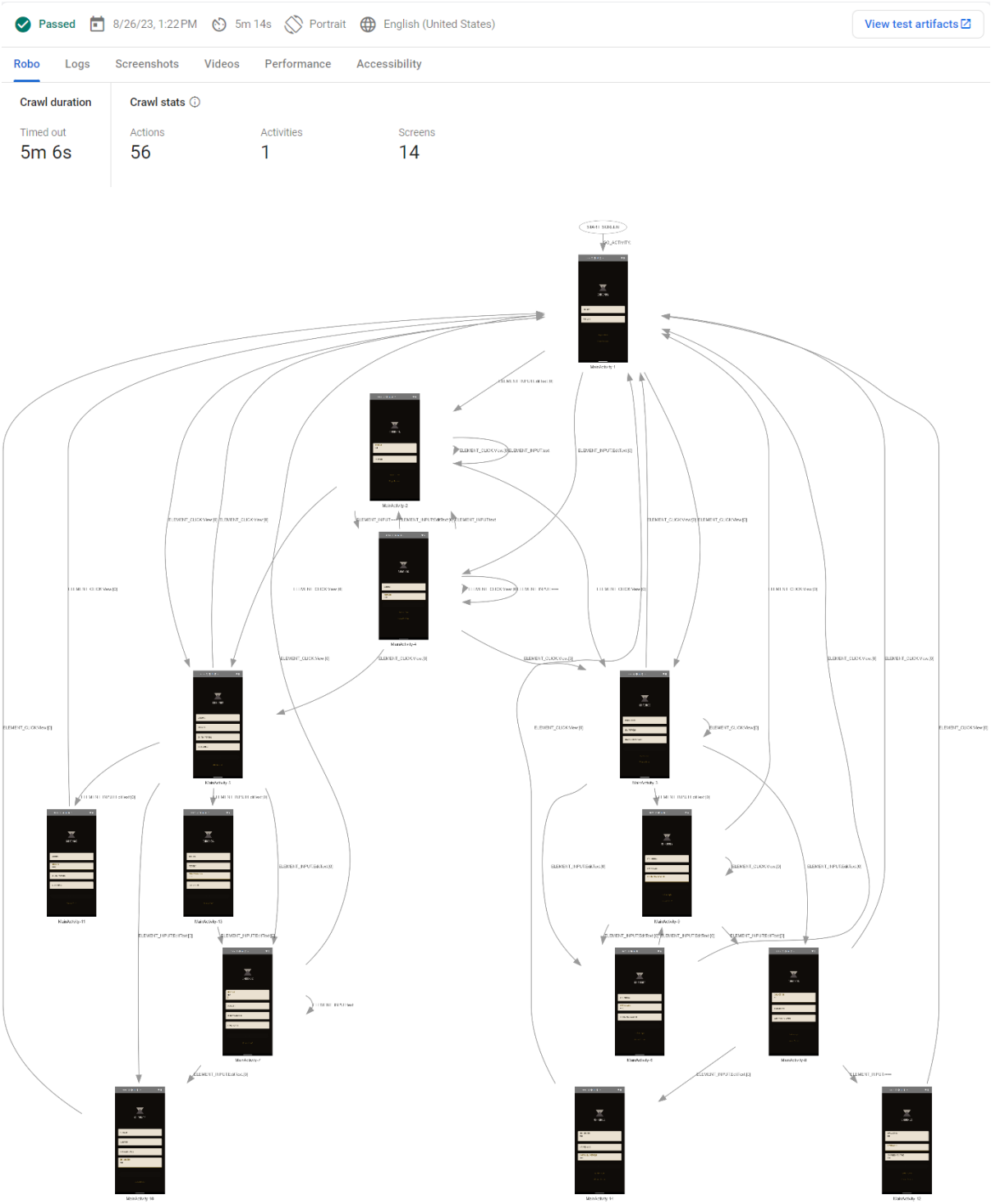
```
@Composable
fun MainNavigationHost(navController: NavHostController)
  NavHost(
    navController = navController,
    startDestination = "start"
  ) {
    composable("start") {
      if(UserSession.sessionToken != null) {
        navController.navigate("InnerScreen")
      } else {
        navController.navigate(NavRoutes.Login.route)
      }
    }
```

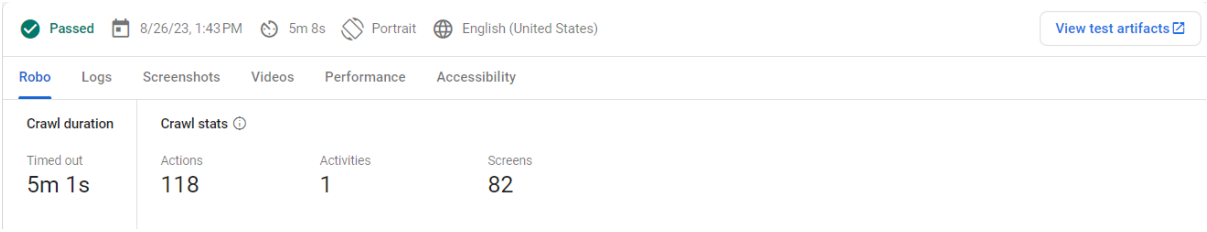
For example, in the coding structure of Chronos, all screens that are required to have backend functions like login page shown above will have a view model tied to it to perform the desired actions. By doing so, as mentioned above, the business logic and functions can be separated and debugged easier without having to make changes to the view.

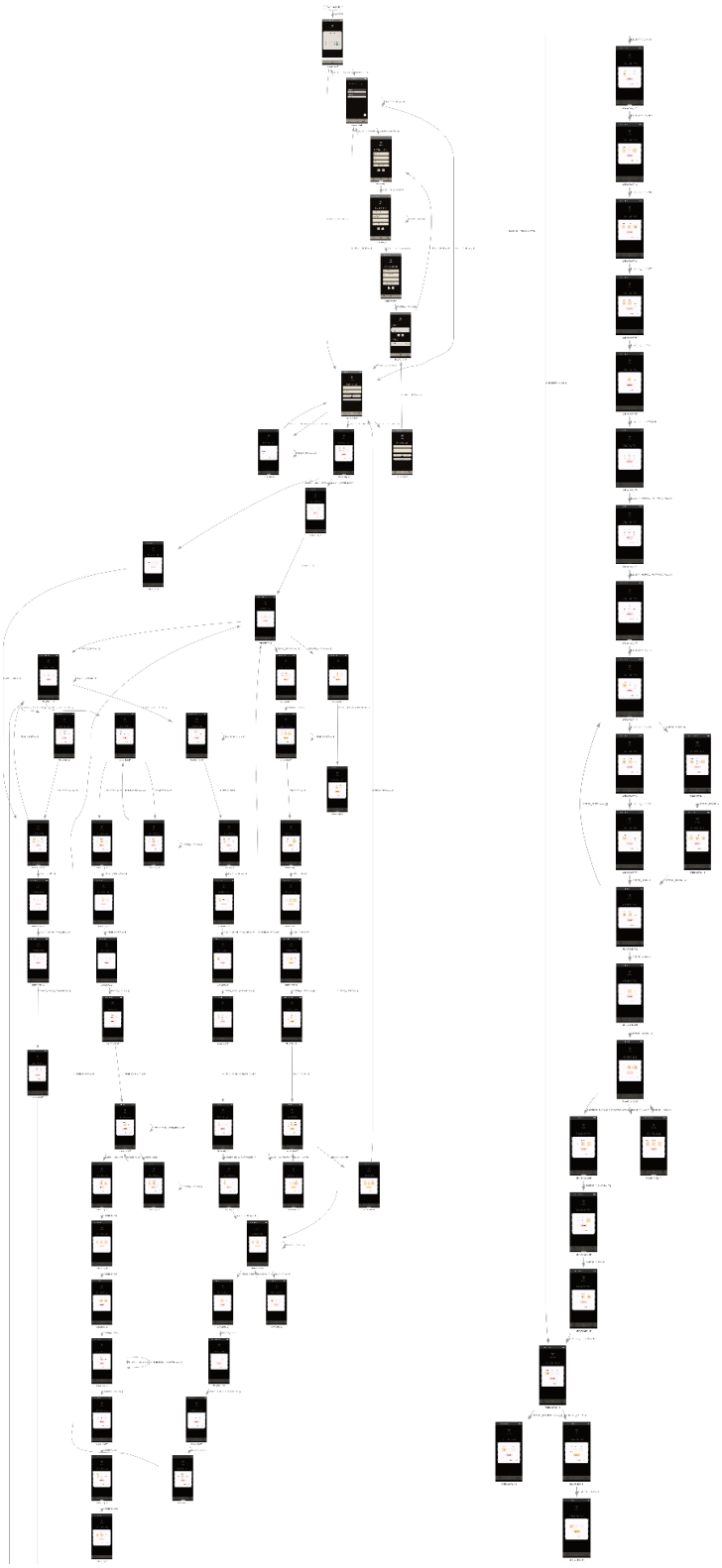
9.0 Testing

a. Robo Test

Robo Test is performed using Test Lab provided by Firebase Console on two screens, the main screen where users can login, register, and reset password, and the inner screen where users can manage their tasks and update their profile.

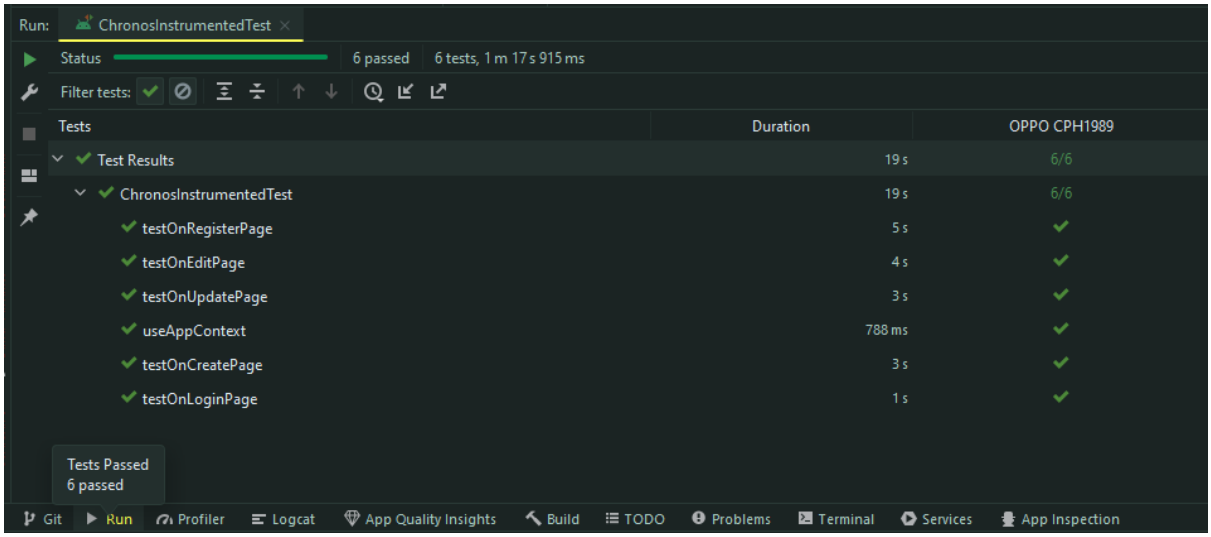



Passed
8/26/23, 1:43 PM
5m 8s
Portrait
English (United States)
View test artifacts
Robo
Logs
Screenshots
Videos
Performance
Accessibility
Crawl duration
Timed out
5m 1s
Crawl stats
Actions
118
Activities
1
Screens
82

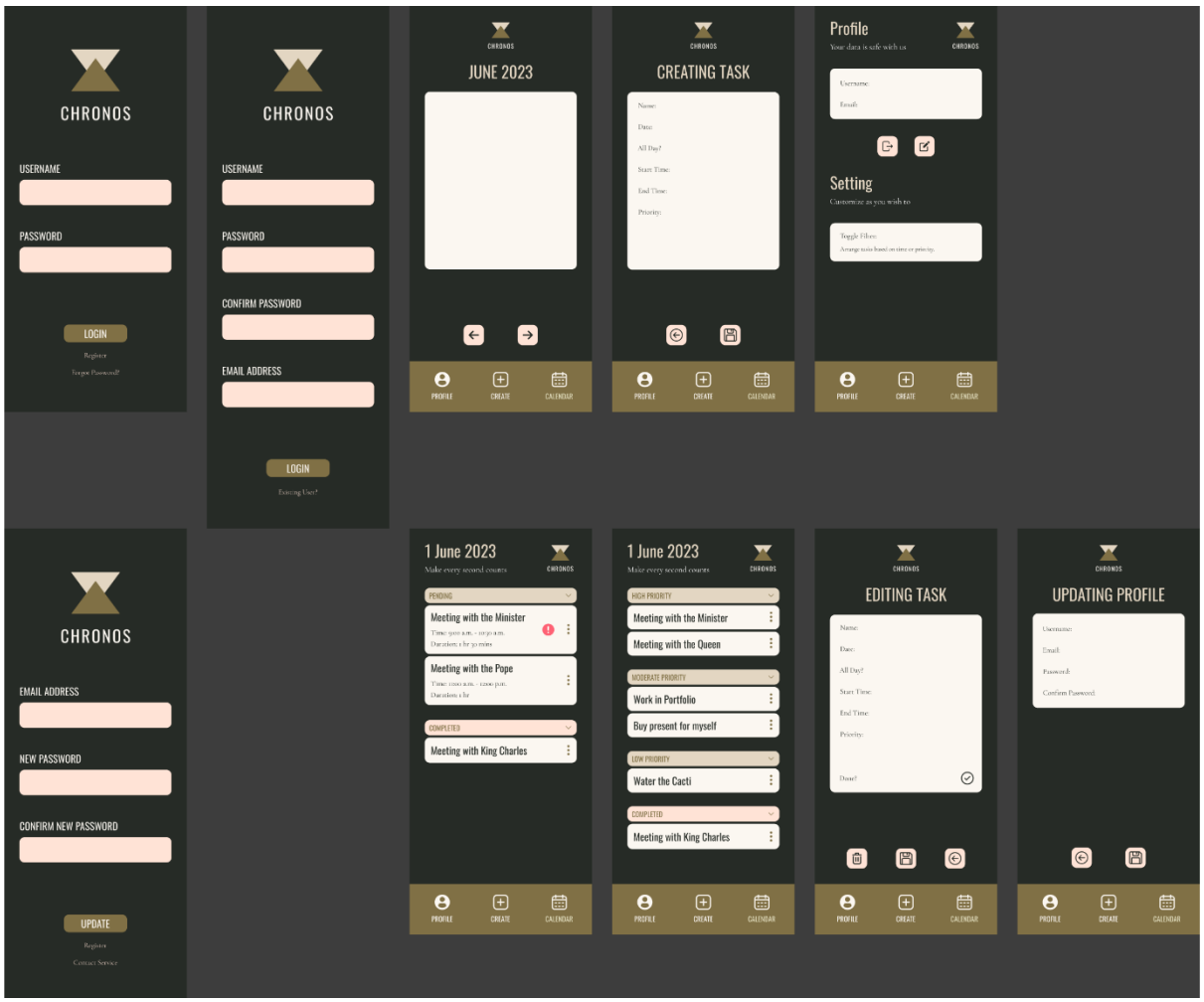


b. Automated Test

Automated Test for certain page is performed using the default AndroidJUnit4 libraries. There are six pages listed in the automated testing with different interaction like click, text input and checking the visibility of the element.



10.0 Wireframe Design



NOTE: This is only a draft wireframe design and changes will be made throughout the development of the application.

11.0 Appendix

a. Generative Research

Problem Context

The Covid-19 pandemic has disrupted our daily routines and forced many individuals to adapt to a new working style, remote working where individuals will have their workspace within their home, personal space, or apartments. This leads to a loss of environment feel and increased difficulty in managing time effectively due to the fact of being at home make individuals feel more relaxed and less motivated to work. With supporting example by Nesamalar, J., Ling, T. P., and Singaram, N. (2022), they mentioned that students were required to be more independent throughout their academic studies as classes were conducted online. As a result, they found that most students were subjected to poor time management behaviour.

Research Questions

Investigations were conducted to identify whether most of the devices in the market are compatible with Chronos. Apple devices are ruled out as Chronos is an Android application developed and coded in Kotlin programming language. The effectiveness and usefulness of Chronos were also considered within the questions:

1. Do you often struggle to complete your tasks efficiently, even though you have set a timetable for them? How would Chronos assist you in overcoming this issue?
2. Do you believe it is more beneficial and important to prioritize the tasks or allocate specific time slots for each task? How would Chronos be helpful to you to focus on either time-based or priority-based organization?
3. Assuming you have an Android device, would you consider using Chronos to elevate your individual productivity and time management?
4. There are numerous productivity tools and platforms that exist in today's market. How do you think Chronos can integrate with these tools and platforms to streamline the scheduling process and enhance overall efficiency?

b. Affinity Analysis

First Level Notes

FL1 - *Yes, I do face problems completing my task on time even with a timetable…*

FL2 - *…there will be some extra work that's affecting me from following my schedule…*

FL3 - *…I also often procrastinate.*

FL4 - *…help me arrange the tasks according to their priority and remind me to finish my work on time.*

FL5 - *I do believe it is vital to follow the time allocated for each task to avoid disruption and delay on my task.*

FL6 - *…will be able to sync with the tasks scheduled on other platforms or provide medium to carry out money transaction to pay for fees such as electricity bills, taxes and so on.*

FL7 - *…help me in arranging the tasks according to their priority and the time left to be due so that I won't face trouble in finishing my tasks.*

FL8 - *Enormous number of tasks in a short time…*

FL9 - *…trouble for me to decide their priorities…*

FL10 - *….self-procrastination.*

FL11 - *I often find it difficult to complete tasks on time, even when I have a schedule…*

FL12 - *…This is because I can easily get distracted or procrastinate.*

FL13 - *…helping me to prioritize my tasks and to track my time more effectively.*

FL14 - *…would also remind me to take breaks, which would help me to stay focused and productive.*

FL15 - *I think it's important to do both…*

FL16 - *…It's important to prioritize my tasks so that I know which ones are the most important and need to be completed first…*

FL17 - *…it's also important to allocate specific time slots for each task so that I can stay on track and avoid procrastination.*

FL18 - *…would allow me to prioritize my tasks and to track my time more effectively.*

FL19 - *…could integrate with other productivity tools and platforms by allowing users to import their tasks and projects from these other tools…*

FL20 - *…would make it easier for users to keep track of all their tasks in one place…*

FL21 - *…could integrate with other tools by allowing users to share their schedules and tasks with others…*

FL22 - *…would make it easier for team members to collaborate on projects and to stay on track.*

FL23 - *The biggest challenges I face when it comes to task management and productivity are staying focused, avoiding procrastination, and prioritizing my tasks…*

FL24 - *…I often find myself getting distracted by unimportant tasks or by social media…*

FL25 - *… I sometimes have trouble being consistent into working on tasks that are not the most exciting.*

FL26 - *The ability to set custom notifications for tasks…*

FL27 - *I would also like to be able to see a visualization of my time usage…*

FL28 - *Yes.*

FL29 - *…helps me to finish my work in the shortest possible time.*

FL30 - *I always wait until the last minute to complete my tasks.*

FL31 - *Math problem solver and calculator.*

FL32 - *Use time slots.*

FL33 - *...can spam reminder notification if I didn't start doing work at the specified time.*

FL34 - *The Forest App.*

FL35 - *My procrastination.*

FL36 - *Reward system.*

Second Level Notes

SL1 - Participants are having trouble in completing their tasks even though they have planned. (FL1, FL8, FL9, FL11, FL28)

SL2 - Participants felt that they are easily distracted by external factors and sometimes they might procrastinate. (FL2, FL3, FL10, FL12, FL23, FL24, FL25, FL30, FL35)

SL3 - Participants want their tasks to be arranged and well-organized. (FL4, FL7, FL13, FL14, FL18, FL32)

SL4 – Participants believe that having time-based or/and priority-based organization over their tasks could benefit them. (FL5, FL15, FL16, FL17, FL29)

SL5 - Participants are likely to use the application along with other applications in the market to further improve their efficiency. (FL6, FL19, FL20, FL21, FL22, FL34)

SL6 - Participants want to have features that can make their user experience more comprehensive and valuable. (FL26, FL27, FL31, FL33, FL36)

Third Level Notes

TL1 – The application should have timely notifications to the participants to remind me about their tasks from time to time. (SL1, SL2)

TL2 - The application should have an advanced sorting or filtering algorithm to have the participants' tasks arranged as they wished. (SL3, SL4)

TL3 - The application should include additional features and collaboration or integration with other existing applications for the participants. (SL5, SL6)

Design Ideas

The interviewees' answer and data are listed down as first level notes while second level and third level notes to provide a generalized problem and solutions, respectively. This information allowed the researcher to brainstorm some design ideas that can satisfy most potential users.

DI1 – Mobile application interfaces need to be straightforward and easy-to-use.

DI2 – Mobile application interfaces need to be clean, clear, and concise with suitable icons.

DI3 – Sorting or filtering algorithms for time-based and priority-based organizations over tasks should be the primary focus of the mobile application.

DI4 – Tasks created must require users to include their time and priority so that the mobile application can fulfil the function of toggle between time-based and priority-based organization over tasks.

DI5 – Users can edit their tasks even if they have created it long ago.

DI6 – Mobile application should send out notifications with default reminder time or custom reminder time for each task.

DI7 – Duplicated tasks can still be created but a warning will be shown to the users.

DI8 – Mobile application should be a calendar view for users to quickly navigate to the date they wish to create a task for.

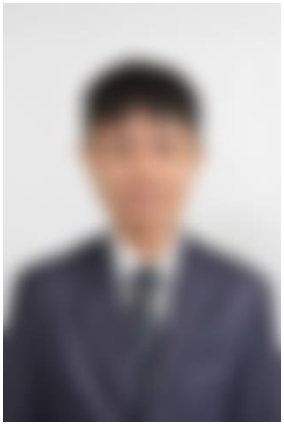
DI9 – Incomplete tasks will be expanded as default either in time-based or priority-based organization while completed tasks will be collapsed as default.

DI10 – The code structure and mobile application interface should be written and designed, respectively, in a way that it can easily adapt and integrate with other existing application in future updates.

c. Interview Questions

- Do you often struggle to complete your tasks efficiently, even though you have set a timetable for them? How would Chronos assist you in overcoming this issue?
- Do you believe it is more beneficial and important to prioritize the tasks or allocate specific time slots for each task? How would Chronos be helpful to you to focus on either time-based or priority-based organization?
- Assuming you have an Android device, would you consider using Chronos to elevate your individual productivity and time management?
- There are numerous productivity tools and platforms that exist in today's market. How do you think Chronos can integrate with these tools and platforms to streamline the scheduling process and enhance overall efficiency?
- In your opinion, what are the biggest challenges you face when it comes to task management and productivity?
- Assuming you are giving feedback to developers of Chronos, state one feature that you would like to have.

d. Participants Details



Name: Khong Yan Ting

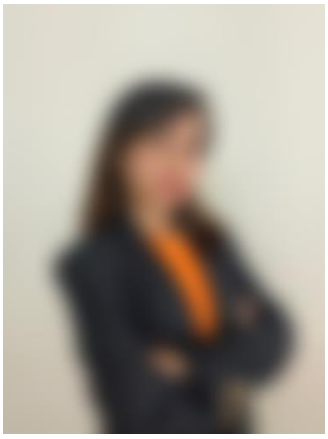
Age: 21

Living Area: Kuala Lumpur

University: Institut Pendidikan Guru Kampus Bahasa Melayu

Summary

According to the interview conducted, Khong Yan Ting stated that he sometimes faces problems completing his task on time even with a timetable because there will always be some unforeseen tasks piling on top of his ongoing tasks. Aside from that, he also mentioned that he often procrastinates. The main challenge he faced is that there will be an enormous number of tasks sudden came in due in a short time which resulted in the difficulty for him to decide their priorities. He wished that the mobile application would have an algorithm to auto arrange tasks according to their priorities and due date.



Name: Goh Wai Kuen

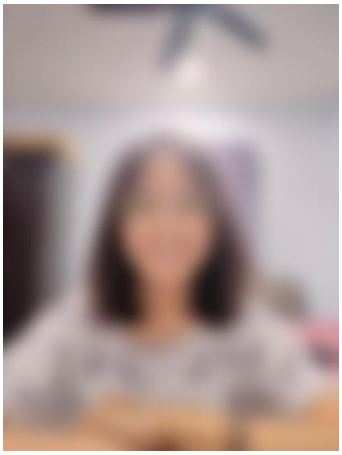
Age: 23

Living Area: Bukit Jalil

University: Asia Pacific University

Summary

According to the interview conducted, Goh Wai Kuen stated that she often gets distracted easily or procrastinate even if she had a schedule planned for her tasks. She also found that she has difficulties at staying focused, avoiding procrastination, and prioritizing her tasks. The main distraction for her is some unimportant tasks and social medias. She also added on she would unintentionally focus on tasks that are not time-urgent instead of the urgent ones. She wished that the mobile application would include custom time-to-time notifications and visualization of her average time usage over tasks.



Name: Demi Tay Yee H'ng

Age: 19

Living Area: Sungai Long

University: Universiti Tunku Abdul Rahman

Summary

According to the interview conducted, Demi stated that she has problem to complete her tasks even though she planned a timetable. Similarly, she also pointed out that she always tends to wait until the last possible minute to complete her tasks. As a result, she opts for time-based organization over priority-based when she wants to complete all her tasks. She wished that the mobile application would include a math solver and in-app calculator.

Name: Neong Yee Kay

Age: 21

Living Area: Bukit Jalil

University: Asia Pacific University

Summary

According to the interview conducted, Neong Yee Kay stated that she doesn't have trouble completing her tasks when she has listed down and planned out her timetable. The main reason is because currently she is using an application called The Forest where it helps the user to stay focus on a single task. She would consider using the mobile application in sync with The Forest if it is free of charge. She also mentioned that sometimes she would procrastinate a little while working on her tasks. She wished that the mobile application would have a reward system.

e. Semi Structured Interview

Khong Yan Ting

Hi, I am Yip Zi Xian. And I am currently working on a mobile application for my assignment. The application is called Chronos, it is a task and time management application which allow users to arrange their tasks either according to the time allocated for the tasks or priority over the tasks. We are going to have a semi-structured interview, so just relax and answer these questions as normal as possible.

So, do you often struggle to complete your tasks efficiently, even though you have set a timetable for them?

Yes, I do face problems completing my task on time even with a timetable as there will be some extra work that's affecting me from following my schedule and I also often procrastinate.

How would Chronos assist you in overcoming this issue?

Chronos can help me arrange the tasks according to their priority and remind me to finish my work on time.

Do you believe it is more beneficial and important to prioritize the tasks or allocate specific time slots for each task?

I do believe it is vital to follow the time allocated for each task to avoid disruption and delay on my task.

How would Chronos be helpful to you to focus on either time-based or priority-based organization?

Chronos can help me in arranging the tasks according to their priority and the time left to be due so that I won't face trouble in finishing my tasks.

Assuming you have an Android device, would you consider using Chronos to elevate your individual productivity and time management?

I will consider using Chronos to help me in time management, be more disciplined and be more productive.

There are numerous productivity tools and platforms that exist in today's market. How do you think Chronos can integrate with these tools and platforms to streamline the scheduling process and enhance overall efficiency?

Chronos will be able to sync with the tasks scheduled on other platforms or provide medium to carry out money transaction to pay for fees such as electricity bills, taxes and so on.

In your opinion, what are the biggest challenges you face when it comes to task management and productivity?

Enormous number of tasks in a short time that's resulting in trouble for me to decide their priorities and self-procrastination.

Assuming you are giving feedback to developers of Chronos, state one feature that you would like to have.

Auto arrangement of tasks according to priority and due date.

Ok, that's all I have to ask. Is there any questions or suggestions you would like to add on?

No.

Sure, great. Thanks for your time.

Thanks, no problem.

Goh Wai Kuen

Hi, I am Yip Zi Xian. And I am currently working on a mobile application for my assignment. The application is called Chronos, it is a task and time management application which allow users to arrange their tasks either according to the time allocated for the tasks or priority over the tasks. We are going to have a semi-structured interview, so just relax and answer these questions as normal as possible.

So, do you often struggle to complete your tasks efficiently, even though you have set a timetable for them?

I often find it difficult to complete tasks on time, even when I have a schedule. This is because I can easily get distracted or procrastinate.

How would Chronos assist you in overcoming this issue?

Chronos could help me to overcome this issue by helping me to prioritize my tasks and to track my time more effectively. The app would also remind me to take breaks, which would help me to stay focused and productive.

Do you believe it is more beneficial and important to prioritize the tasks or allocate specific time slots for each task?

I think it's important to do both. It's important to prioritize my tasks so that I know which ones are the most important and need to be completed first. However, it's also important to allocate specific time slots for each task so that I can stay on track and avoid procrastination.

How would Chronos be helpful to you to focus on either time-based or priority-based organization?

Chronos would be helpful to me in both areas. The app would allow me to prioritize my tasks and to track my time more effectively.

Assuming you have an Android device, would you consider using Chronos to elevate your individual productivity and time management?

Yes, I would consider using Chronos to elevate my individual productivity and time management. The app seems to be very user-friendly, and it has a few features that would be helpful to me. I am particularly interested in the app's ability to help me to prioritize my tasks and to track my time more effectively. Yeah.

There are numerous productivity tools and platforms that exist in today's market. How do you think Chronos can integrate with these tools and platforms to streamline the scheduling process and enhance overall efficiency?

Chronos could integrate with other productivity tools and platforms by allowing users to import their tasks and projects from these other tools. This would make it easier for users to keep track of all their tasks in one place. And Chronos could integrate with other tools by allowing users to share their schedules and tasks with others. This would make it easier for team members to collaborate on projects and to stay on track.

In your opinion, what are the biggest challenges you face when it comes to task management and productivity?

The biggest challenges I face when it comes to task management and productivity are staying focused, avoiding procrastination, and prioritizing my tasks. I often find myself getting

distracted by unimportant tasks or by social media. Additionally, I sometimes have trouble being consistent into working on tasks that are not the most exciting.

Assuming you are giving feedback to developers of Chronos, state one feature that you would like to have.

The ability to set custom notifications for tasks. This would be helpful for tasks that I need to complete on a regular basis. For example, I could set a notification to remind me to send out email 2 days before it is due, and another notification to remind me to make payment for my bills before the due date. This would help me to stay on top of my tasks and to avoid missing deadlines.

Ok, that's all I have to ask. Is there any questions or suggestions you would like to add on?

I would also like to be able to see a visualization of my time usage. This would help me to see where I am spending my time and to identify areas where I could be more productive.

Sure, great. Thanks for your time.

Thanks, no problem.

Demi Tay Yee H'ng

Hi, I am Yip Zi Xian. And I am currently working on a mobile application for my assignment. The application is called Chronos, it is a task and time management application which allow users to arrange their tasks either according to the time allocated for the tasks or priority over the tasks. We are going to have a semi-structured interview, so just relax and answer these questions as normal as possible.

So, do you often struggle to complete your tasks efficiently, even though you have set a timetable for them?

Yes,

How would Chronos assist you in overcoming this issue?

Chronos can help in reminding me to complete my tasks on time.

Do you believe it is more beneficial and important to prioritize the tasks or allocate specific time slots for each task?

I myself prefer time-based organization when I am trying to get tasks done.

How would Chronos be helpful to you to focus on either time-based or priority-based organization?

My arrangement of time could be more efficient by using Chronos. This helps me to finish my work in the shortest possible time.

Assuming you have an Android device, would you consider using Chronos to elevate your individual productivity and time management?

Yes.

There are numerous productivity tools and platforms that exist in today's market. How do you think Chronos can integrate with these tools and platforms to streamline the scheduling process and enhance overall efficiency?

Chronos is very convenient to be used and users can use all features without paying any membership fee.

In your opinion, what are the biggest challenges you face when it comes to task management and productivity?

I always wait until the last minute to complete my tasks.

Assuming you are giving feedback to developers of Chronos, state one feature that you would like to have.

Math problem solver and calculator.

Interesting. Ok, that's all I have to ask. Is there any questions or suggestions you would like to add on?

No.

Sure, great. Thanks for your time.

Thanks, no problem.

Neong Yee Kay

Hi, I am Yip Zi Xian. And I am currently working on a mobile application for my assignment. The application is called Chronos, it is a task and time management application which allow users to arrange their tasks either according to the time allocated for the tasks or priority over the tasks. We are going to have a semi-structured interview, so just relax and answer these questions as normal as possible.

So, do you often struggle to complete your tasks efficiently, even though you have set a timetable for them?

No, I always complete my tasks efficiently.

Do you believe it is more beneficial and important to prioritize the tasks or allocate specific time slots for each task?

Use time slots.

How would Chronos be helpful to you to focus on either time-based or priority-based organization?

Chronos can spam reminder notification if I didn't start doing work at the specified time.

Assuming you have an Android device, would you consider using Chronos to elevate your individual productivity and time management?

Yes, if it is free.

There are numerous productivity tools and platforms that exist in today's market. How do you think Chronos can integrate with these tools and platforms to streamline the scheduling process and enhance overall efficiency?

The Forest app

Can you talk more about this application?

It is an application that mimics the user is planting a tree while focusing on their current working task.

I see. In your opinion, what are the biggest challenges you face when it comes to task management and productivity?

My procrastination.

Assuming you are giving feedback to developers of Chronos, state one feature that you would like to have.

Reward system.

Oh, ok, that's all I have to ask. Is there any questions or suggestions you would like to add on?

No.

Sure, great. Thanks for your time.

Thanks, no problem.

f. Contextual Inquiry

Khong Yan Ting

The semi-structured interview is conducted through Discord as the participant is away from Bukit Jalil. It is conducted as a one-to-one interview as there were only the researcher and interviewee. The questions asked are based on research questions while additional questions were being asked at relevant scenarios. Khong Yan Ting, who is pursuing his education career, can be seen as a more serious and busy type of candidate because the answer given were very well-said and informative. From the perspective of Yan Ting, the information provided can be used as an overview for users from a different industry.

Goh Wai Kuen

The semi-structured interview is conducted face-to-face in an empty classroom at Asia Pacific University as the participant is a degree student. The questions asked are based on research questions while additional questions were being asked at relevant scenarios. Goh Wai Kuen, who is pursuing her degree at Asia Pacific University, provides more formal answers with her own examples and experiences. From the perspective of Wai Kuen, the information provided can be used as an overview for most degree students.

Demi Tay Yee H'ng

The semi-structured interview is conducted through Discord as the participant is away from Bukit Jalil. It is conducted as a one-to-one interview as there were only the researcher and interviewee. The questions asked are based on research questions while additional questions are asked at relevant scenarios. Demi, who is pursuing her foundation at another university, gives a different approach on time management because different universities have different timetables. From the perspective of Demi, the information provided can be used as a comparative analysis to cover a wider range of users.

Neong Yee Kay

The semi-structured interview is conducted face-to-face in cafeteria at Asia Pacific University as the participant is a degree student but currently having her internship. The questions asked are based on research questions while additional questions were being asked at relevant scenarios. Neong Yee Kay, who is currently working as an intern, gives more realistic answers because she is adapting to the pace of the society and a more disciplined candidate since she mentioned that she doesn't has the issues of completing her tasks. From the perspective of Yee Kay, the information provided can be used as an evaluation for collaboration with another application as she stated that she is currently using the Forest application.

12.0 References

Android Developers (a). (2023, July 12). Handling Lifecycles with Lifecycle-Aware Components. *Android developers – Google for developers.* Retrieved from: https://developer.android.com/topic/libraries/architecture/lifecycle

Android Developers (b). (2023, August 23). Navigating with Compose. *Android developers – Google for developers.* Retrieved from: https://developer.android.com/jetpack/compose/navigation

Gallardo, E.G. (2023, January 9) What is MVVM Architecture? *Builtin.* Retrieved from: https://builtin.com/software-engineering-perspectives/mvvm-architecture

Kotlin. (n.d.). Kotlinx Datetime. *Kotlin language organization.* Retrieved from: https://kotlinlang.org/api/kotlinx-datetime/kotlinx-datetime/kotlinx.datetime/

Nesamalar, J., Ling, T. P., and Singaram, N. (2022). Time Management Behaviour During the COVID-19 Pandemic: A Focus on Higher Education Students. APJFES. (1) pp. 17-38. Retrieved from: https://expert.taylors.edu.my/file/rems/publication/104050_9681_1.pdf

Sharma, A. (2018, April 26). Why to Choose MVVM over MVP – Android Architecture. *Medium.* Retrieved from: https://medium.com/android-news/why-to-choose-mvvm-over-mvp-android-architecture-33c0f2de5516