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Abstract

"Baby Tracker" is an Android application that helps reduce the effort and time in caring for the baby, the idea of this application emerged according to what we see in our lives from the problems that parents face in meeting all the needs of newborn children, so we developed the application to allow parents to search for and meet the needs of the child In addition to accessing a large number of educational articles. The user enters his personal information such as name, phone number, etc. in addition to the information of the new child. The application tracks the care of the child through a set of categories that displays the user all the needs of the child and another list reminds parents of what they have provided to the child, which reduces the time and effort required to care for the child.

After reviewing previous work, we have improved some features and developed some to reach an application that differs in content from other pre-existing applications and competes with them in this field. One of the most important additions to the application is the ability to support as many users as possible. The application will be developed to be able to send notifications to users and release the iOS version to enable access to the largest segment of users, in addition to many important future works.

ملخص

"Baby Tracker" هو تطبيق أندرويد يساعد على تقليل الجهد والوقت في العناية والرعاية بالطفل، ظهرت فكرة هذا التطبيق وفقًا لما نراه في حياتنا من مشكلات يواجهها الأباء في تلبية كافة إحتايجات الأطفال حديثين الولادة، لذلك قمنا بتطوير التطبيق لإتاحة الفرصة للأباء للبحث عن حاجات الطفل وتلبيتها بالإضافة إلى الوصول إلى عدد كبير من المقالات التوعوية. يقوم المستخدم بإدخال معلوماته الشخصية مثل الاسم ورقم الهاتف وما إلى ذلك بالإضافة إلى معلومات الطفل الجديد، ويقوم التطبيق بتتبع رعاية الطفل عن طريق مجموعة من الفئات تعرض للمستخدم كافة إحتياجات الطفل وقائمة أخرى تذكر الأباء بما قاموا بتقديمه للطفل مما يقلل من الوقت والجهد اللازمين لرعاية الطفل.

بعد مراجعة الأعمال السابقة قمنا بتحسين بعض الميزات وتطوير بعضها للوصول إلى تطبيق يختلف في محتواه عن التطبيقات الأخرى الموجودة مسبقًا ويتنافس معها في هذا المجال. واحدة من أهم الإضافات للتطبيق هو القدرة على دعم أكبر عدد ممكن من المستخدمين. سيتم تطوير التطبيق ليكون قادرًا على إرسال إشعارات للمستخدمين وإصدار نسخة iOS لتمكين الوصول إلى أكبر شريحة من المستخدمين ، بالإضافة إلى العديد من الأعمال المستقبلية المهمة.

Chapter One
Introduction

1.1 Overview

Piaget's cognitive development theory is a comprehensive account of human intelligence's nature and development. Jean Piaget thought that a person's childhood had a critical part in their development. Piaget's thesis, originally known as developmental stage theory, is concerned with the nature of knowledge and how people advance in their acquisition, creation, and application. Piaget defined cognitive development as the upward restructuring of mental processes that occurs as a result of biological maturity and environmental experiences. [1]

According to studies in the fields of education and psychology, the husband and wife are the two most crucial aspects in maintaining harmonious family connections. To gratitude, love, self-assurance, the want to belong, the urge to form social bonds, and the need for compassion, education, and direction. [2]

Childhood is one of the most important and hazardous phases of formation and personality growth, especially in the first five years, and the kid is the true wealth of every nation. Childhood is also one of the most essential and dangerous stages of formation and personality growth. [2]

The treatment-only method to dealing with children is a one-sided strategy that is inadequate and insufficient in educational, psychological, and social dimensions, and does not lead to safety. To avoid this and to develop a healthy, cognitively, emotionally, and physically balanced personality, it was required to focus on building and prevention throughout the early stages of the personality's development, beginning in childhood. However, the challenge that arises is how to provide the child's fundamental necessities. To answer them, one must first consider the notion of childhood, its stages, importance, and features, then determining the child's most significant wants and how to meet them, and last, the child's most serious difficulties. [2]

Rather than researching troubled or sick people, Maslow researched "ideal" human beings such as Albert Einstein, Jane Adams, Eleanor Roosevelt, and Frederick Douglass. Maslow also looked at the lives of 1% of healthy college students. In his 1954 book, Motivation and Personality, he outlined his thesis in great detail. The idea gained popularity throughout time and was widely employed in sociological research, management, secondary education, and higher education. [3]

1.2 Project Motivation

The difficulty some parents have in following up on and satisfying their children's everyday developmental requirements inspired this effort. As a consequence, we created this project so that parents may track their children and learn about their requirements so that they can be met and provided with the essential comfort for their child's healthy and secure growth.

1.3 Problem Statement

A. Developers are having a hard time discovering the target parents and looking for them.

B. Due to the child's continual demands throughout time, it's been difficult to find new features and features that support the program and urge users to utilize it.

C. Finding a mechanism to link parents with children at a somewhat old age and follow them through all stages of development is unlikely.

1.4 Project Aim & Objectives

Our goal in this project is to find parents who have problems in following up on their children, meeting their needs, and providing them with assistance in an easy and effective way.

The project objectives can be summarized through the following points:

A. Using interfaces that feature important categories that they represent to make it easier to find children's needs.
B. Speed in meeting the child's requirements as outlined in a customized list.
C. Getting the word out to as many parents with newborn children as possible.
D. In one application, provide all of the criteria that the kid may require.

Chapter Two
Planning Phase

2.1 Project Scope

The program was created with all new parents in mind, to assist them in taking care of their newborns and keeping track of their demands.

2.2 Project Risks

We will face several challenges when executing this project and developing it, but we believe the most challenging aspect will be identifying parents who have recently given birth and convincing them to use the app.

2.3 Feasibility study

The key goal of this research is to establish a "Baby Tracker" content positioning and eviction policy to optimize the overall caching efficiency in terms of bandwidth and memory use. While this is a daunting challenge to map the current caching schemes to the new one leading to an effective and optimal solution, these criteria, however, are consistent with the concept of design research as suggested by Blessing [4], where' design research incorporates the production of understanding and protocol.' These features complement each other to deliver an effective and productive.

According to Blessing [4], to achieve satisfactory findings in both theoretical and functional terms, architecture analysis must be scientific, so it requires a special approach with its unique characteristics. He suggested a strategy called Concept Analysis Methodology for this purpose (DRM). DRM aims to make design analysis more accurate and economical, so it has been embraced for this thesis to be carried out. In the following four steps, DRM can be classified:

- Research Clarification (RC).
- Descriptive Study-I (DS-I).
- Prescriptive Study (PS).
- Descriptive Study-II (DS-II).

In the following pages, a short overview of DRM phases from the viewpoint of this research field is provided. Figure 2.3.1 displays the DRM system where the connections between the phases of DRM, the methods used at each stage, and the key deliverables are shown [5]. Light arrows between the phases represent the main flow of the operation, while the bold arrows to/from each step show methods used and deliverables of that individual phase.

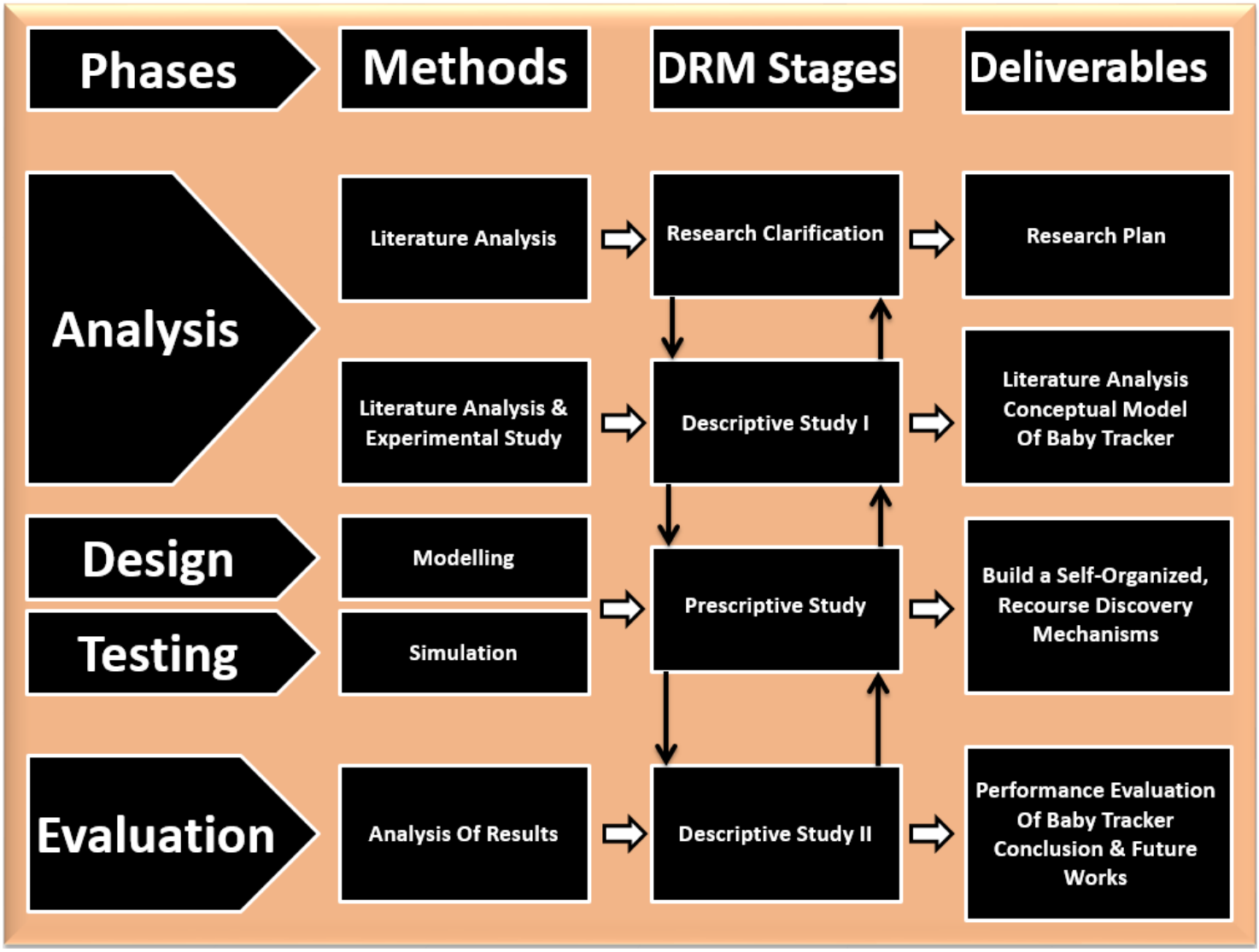

Figure 2.3.1: DRM Framework.

2.4 Project Schedule

Gantt chart, which is commonly used in project management, is a type of bar chart that shows the project schedule; Gantt charts show start and end dates for goals and summarize project components; To the left of the diagram there is a list of activities and along the top, there is a table corresponding to the list of

activities; Each activity is represented by a bar so that the position and length of the bar reflect the beginning, duration, and end of the activity.

This graph helps us remember the following:

- Start and end times for each stage.
- What are the different activities that we want?
- Expected time to complete a specific task; where activities or tasks are mixed with similar tasks.
- Time from start to finish.

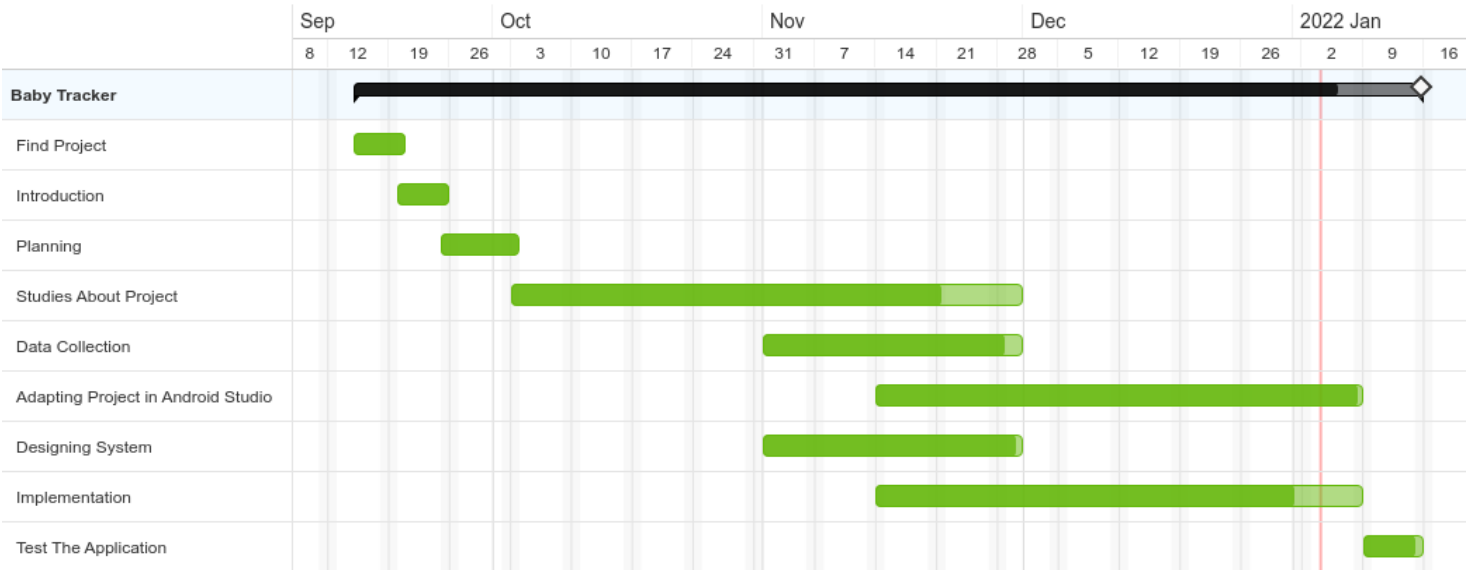

Figure 2.4.1: Gantt chart of the system.

2.5 Project Requirements

System requirements are the configuration that a system must-have for a hardware or software application to run smoothly and efficiently. Failure to meet these requirements can result in installation problems or performance problems. The former may prevent a device or application from getting installed, whereas the latter may cause a product to malfunction or perform below expectation or even to hang or crash.

2.5.1 Hardware Requirements

The most common set of requirements defined by any operating system or software application is the physical computer resources, also known as hardware, it's shown in Figure (2.5.1).

Specification	Recommended Requirements
Computer Type	HP
Computer CPU	Intel Core i5, 8th generation
Computer RAM	8GB
Computer Storage	Internal 512GB

Table 2.5.1: Hardware Requirements.

2.5.2 Software Requirements

The software requirements are a description of the features and functionalities of the target system, Requirements convey the expectations of users from the software product. The requirements can be obvious or hidden, known or unknown, expected or unexpected from a client's point of view. Software requirements are defined as follows: The conditions or capabilities the user needs to solve a problem or achieve a specific goal.

Conditions or capabilities of the software to make it compatible with the capabilities of the system to verify the contract and the characteristics agreed upon between the developer and the user, and it's shown in figure (2.5.2).

Specification	Recommended Requirements
Operating System	Windows 10
Target Program	Android Studio
Program Language	Java

Table 2.5.2: Software Requirements.

Chapter Three
Related Existing Systems

3.1Introduction

In this chapter, a description of the application is given that is similar to the developed application and compares it in terms of features, advantages, disadvantages and differs from the developed application. For every application developed there are specific goals to be achieved, while goals differ between applications and there are similarities between them. The differences and similarities between the application and the developed application are discussed in detail.

3.2Related Work

We reviewed existing apps and studies that are similar to ours and discussed the most important features that each app has. Where we did a study of all the applications that were previously reviewed and compared, and worked on designing and building the new application with effective features and characteristics. A search that serves the users.

For example, we tried some apps, we reviewed their interfaces and how they work, and we monitored the tasks each app performs. Examples of these apps include:

3.2.1 Baby Tracker – Newborn Tracker [6]

Baby Tracker is designed to be the easiest breastfeeding app and baby tracker for feedings, sleep, and diaper changes. You can quickly see the last feeding time and what side was used.

The app have many Features such as:

- Nursing tracker with timer.
- Pause feature for feedings.
- Track bottle feedings with amount fed.
- Track sleep schedule.
- Growth curve.

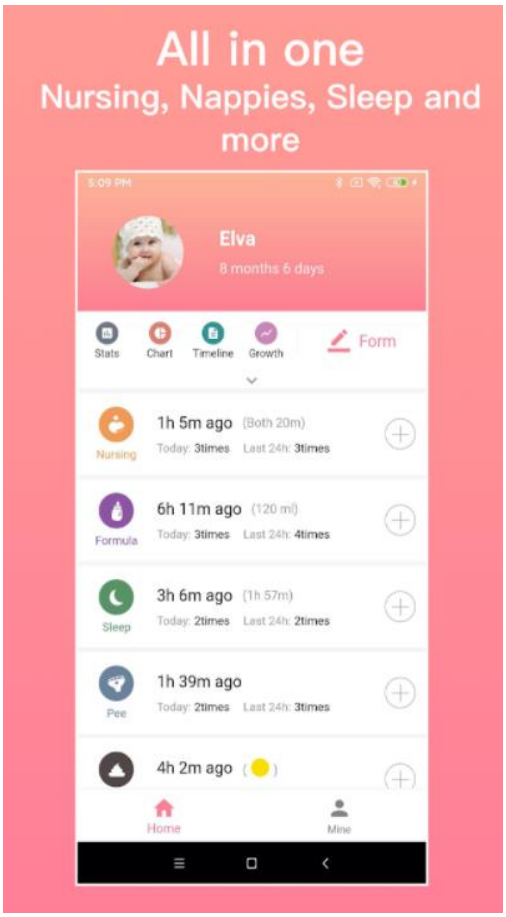

Figure 3.2.1: Baby Tracker – Newborn Tracker.

3.2.2 BabyBook Journal – Baby Tracker & Newborn Diary [7]

A great newborn tracking app is an essential tool for new mothers and new fathers who want to monitor their baby newborn and improve parenthood. BabyBook is a smart infant journal app that allows you to track baby's activities and to discover correlations between your actions and your child's growth / health / mood. Keeping a daily journal (baby diary), you will be able to track breastfeeding, pumping, diapering, and every other aspect of your child's life. It has been designed to help you manage tiredness, stress, and develop positive nursing habits: it's a perfect parenting assistant always in your pocket.

Are you striving for a perfect and easy-to-use new-born tracker or a child notes taker? With this child journal you can easily analyse and track behaviours to keep track of everything and also discover patterns. The best baby logbook among baby apps and newborn apps.

Figure 3.2.2: BabyBook Journal – Baby Tracker & Newborn Diary.

3.2.3 Baby Connect (activity log) [8]

Baby Connect is the most comprehensive baby tracking application on the Market. It has graphical reports and trending charts, weekly averages, medicine, vaccine, timers, notifications, emails, .csv export, an easy to use interface, unlimited data, and allows you to exchange information in real time with your spouse, babysitter, nanny or daycare wherever they are.

Baby Connect is the only application available on all mobile platforms and also as a web application. It will synchronize information with others authorized Baby Connect Applications on each device. If you change or lose your phone, no information is lost, you can always connect to your account at www.babyconnect.com with a browser or with another phone.

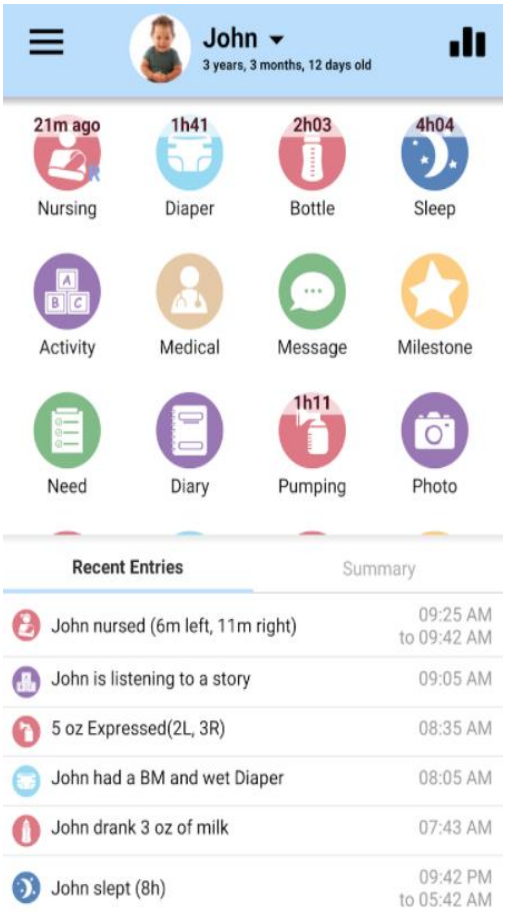

Figure 3.2.3: Baby Connect (activity log).

3.2.4 Baby Tracker – Sleep, Breastfeeding, Food, Nappy [9]

Get everything new parents need for your newborn baby with the best newborn baby tracker for moms and dads. We make it easy for you to track all your baby's daily activities. Track your baby's sleep schedule and breastfeeding log with our handy breastfeeding and sleeping timer. Log diaper changes, solid or bottle feeding and keep track of infant development with this Baby Tracker App.

The app have many Features such as:

- Track sleep, breastfeeding, bottle, solid, diapering, and growth.
- Beautiful charts to analyze your Baby's routines and discover patterns.
- Home screen widgets for easier logging.
- Simple and easy to use.
- Care for as many babies as you need, ideal for twins.
- Dark mode for nightly baby nursing.

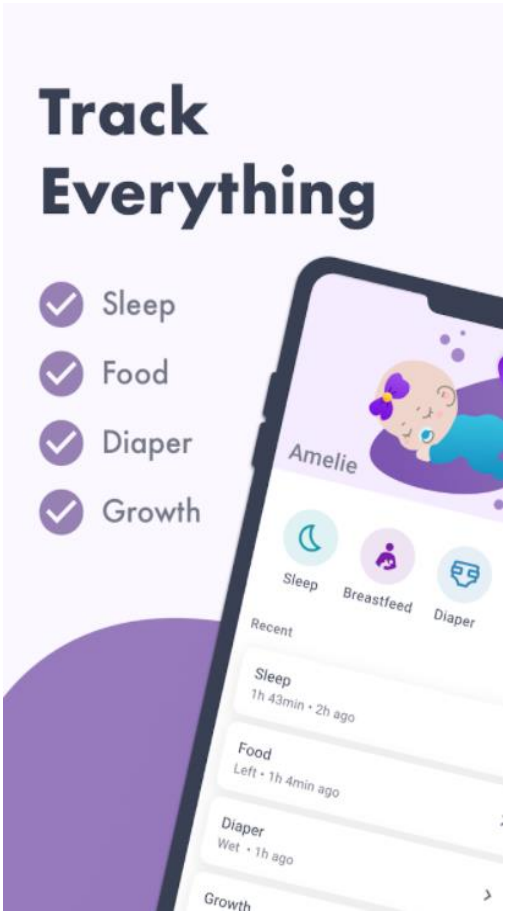

Figure 3.2.4: Baby Tracker – Sleep, Breastfeeding, Food, Nappy.

3.2.5 Baby Manager – Breastfeeding Log and Tracker [10]

Simple and intuitive. Baby Manager will give you peace of mind by keeping track of your little one and give you timely reminders for the sleep-deprived parent that you are.

The app have many Features such as:

- Log your sweetheart's breastfeeding, sleep sessions, diaper changes and growth.
- Visualize trends and routines of your little one with the timeline.
- Record baths, moods, temperatures, walks and medications.
- Sync data with your partner in less than 4 seconds, automagically.
- Ongoing notifications allow you to control events from anywhere on your phone, even outside the app.
- The summary of last events communicates your child's needs at a glance.
- Friendly charts help you understand your child and breastfeeding better, gaining insights into their trends.

Figure 3.2.5: Baby Manager – Breastfeeding Log and Tracker.

3.2.6 PiyoLog: Newborn Baby Tracker [11]

Keep an eye on your baby development with PiyoLog, a newborn baby care tracker. Breastfeeding, diaper changing and baby sleep tracker, child development milestones and more! This is a must-have for any parent who'd like to create a nursing routine and make sure their baby is growing healthy day by day.

PiyoLog works with Google Assistant and Amazon Alexa and can be recorded by voice.

No more need to have several child care apps: PiyoLog is an all-in-one digital baby journal where you can log the most important information in your post pregnancy period.

- Baby breastfeeding tracker.
- Pumping tracker.
- Baby feed timer.
- Baby eating and diaper tracker.
- Baby growth tracker.

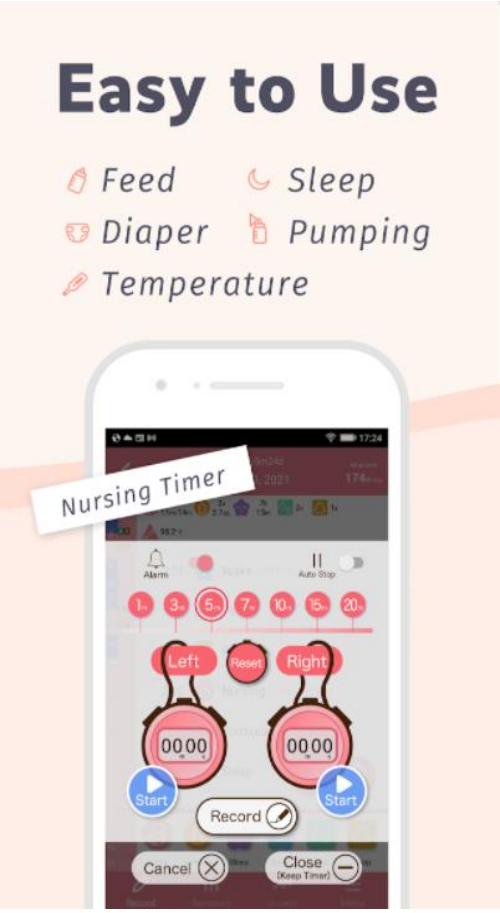

Figure 3.2.6: PiyoLog: Newborn Baby Tracker.

3.2.7 Baby Tracker – Breast Feeding [12]

Baby Tracker, lifesaver for busy and forgetful parents. We offer all the functions you need for your little newborn: nursing & milk pumping log, solids tracking, vaccine record, diaper changes, sleep patterns, growth data, family sync, and more!

Baby Tracker integrates simple and intuitive design. With just quick one-handed tap, you can easily log everything in our all-in-one baby care assistant. Get your parenting schedule organized from now!

- Baby Feeding Log.
- Diaper Change Tracker.
- Parenting together.
- Baby Sleep Tracker.
- Growth Tracker.

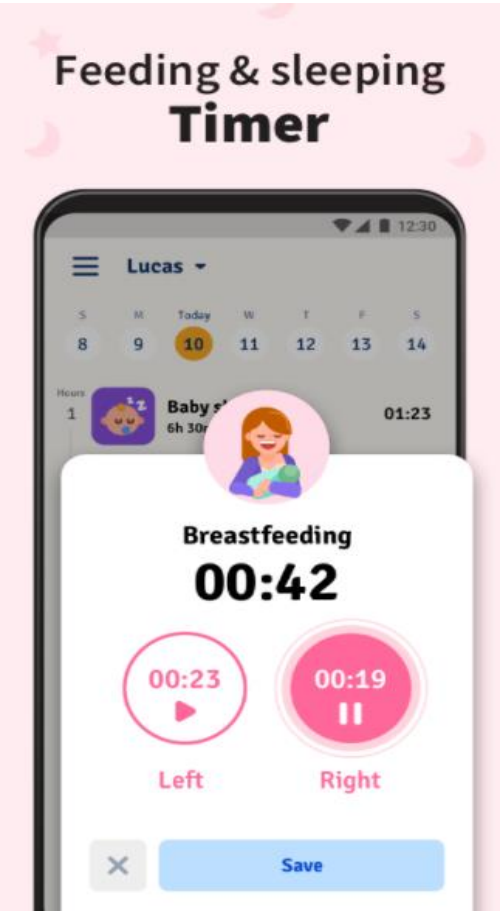

Figure 3.2.7: Baby Tracker – Breast Feeding.

3.2.8 Feed Baby – Baby Tracker [13]

Baby to log and record all aspects of their newborn's development. This is the only app you will need to care for your little one.

With this world class breastfeeding baby tracker you will never have to write anything down again! Feed Baby simplifies the logging and recording of your newborns breast feeds so that you can have more free time to yourself.

Figure 3.2.8: Feed Baby – Baby Tracker.

3.2.9 Huckleberry: Baby & Child Tracker, Sleep Experts [14]

Finally - sleep guidance, expert advice, and an easy baby tracker, all in one app. No matter your sleep situation, Huckleberry can help.

Huckleberry's like a sleep consultant in your pocket! Whether it's newborn day/night confusion, the dreaded four-month sleep regression, or transitioning from two naps to one, many families struggle with sleep during their child's first years. Huckleberry offers customized sleep plans that take your family's unique needs into account, from nursing to sleep, to monitoring wake windows.

Plus, the easy interface acts as your second brain to keep track of breastfeeding, bottle feeding, diaper changes, pumping, solids, temperature, medication, growth, and of course - sleep!

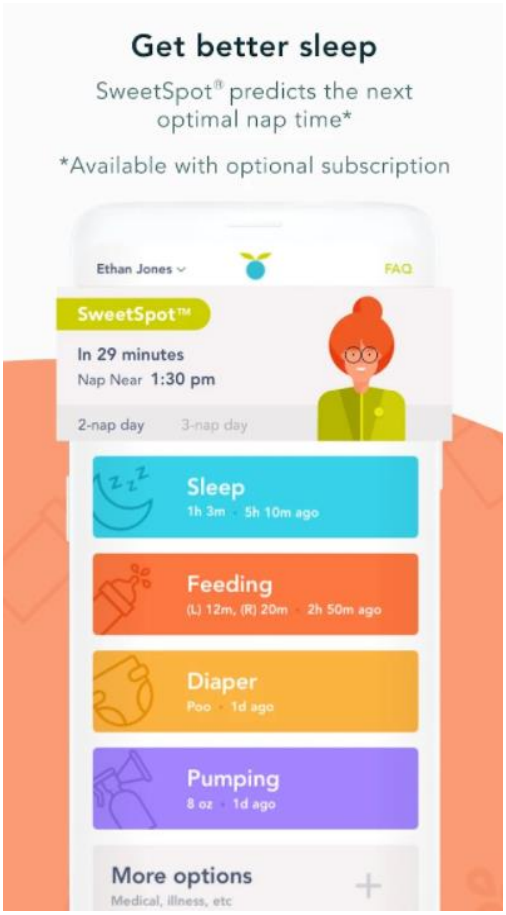

Figure 3.2.9: Huckleberry: Baby & Child Tracker, Sleep Experts.

3.2.10 GLOW. Baby Tracker & Feeding, Diaper, Sleep Log [15]

From breastfeeding to diaper changing, now featuring baby teething, solids tracking and daily activities. Log all your baby milestones and track infant development with Glow Baby. As a new parent, whether you want a diaper log, a nursing timer, a breastfeeding tracker, a teething log, or solid tracker, now get everything new parents need for your newborn baby all-in-one.

Log milestones with the best newborn tracker for new parents. Track your baby's sleep schedule, feeding log - you can even use Glow Baby as a breastfeeding tracker, first teeth and solid feeding tracker! Access and share tips about a baby's sleep schedule and other useful parenting tips whenever you log in.

Figure 3.2.10: GLOW. Baby Tracker & Feeding, Diaper, Sleep Log.

3.2.11 Baby Daybook – Breastfeeding & Sleeping Tracker [16]

Baby Daybook is all in one baby tracker with family sync, growth tracking, reminders, photo albums and more!

We developed this baby care app considering user suggestions gathered over many years. Every aspect of the app is fine tuned to be as convenient as possible to take care of a newborn baby. This resulted in millions of happy parents using Baby Daybook daily to make their parenting journey easier.

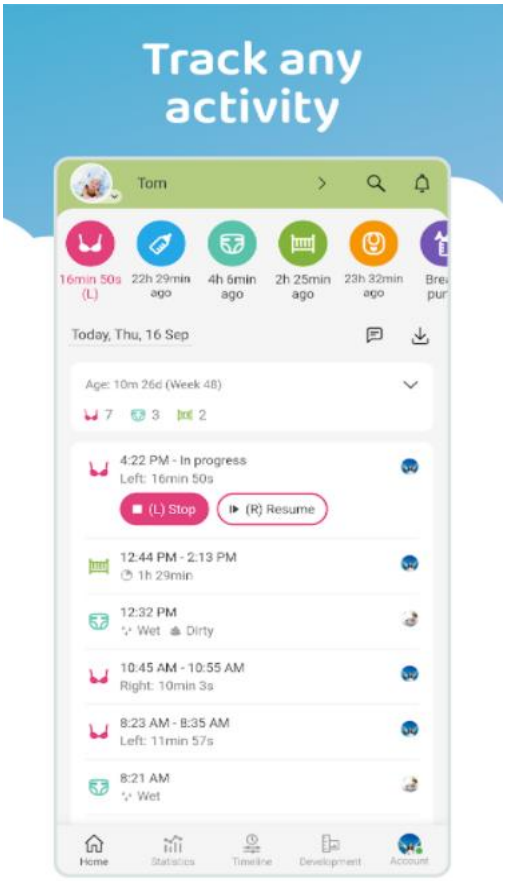

Figure 3.2.11: Baby Daybook – Breastfeeding & Sleeping Tracker.

3.2.12 Baby Tracker – Newborn Feeding, Sleep, Diaper [17]

"Baby Tracker - Newborn Feeding, Sleep, Diaper" application is the most advanced, most comprehensive, useful baby care and baby tracker application on Google Play. It does NOT need an active internet connection.

This application will accompany you while raising your newborn baby starting from the day your baby is born. You will be able to tracker day to day and week by week development of your baby.

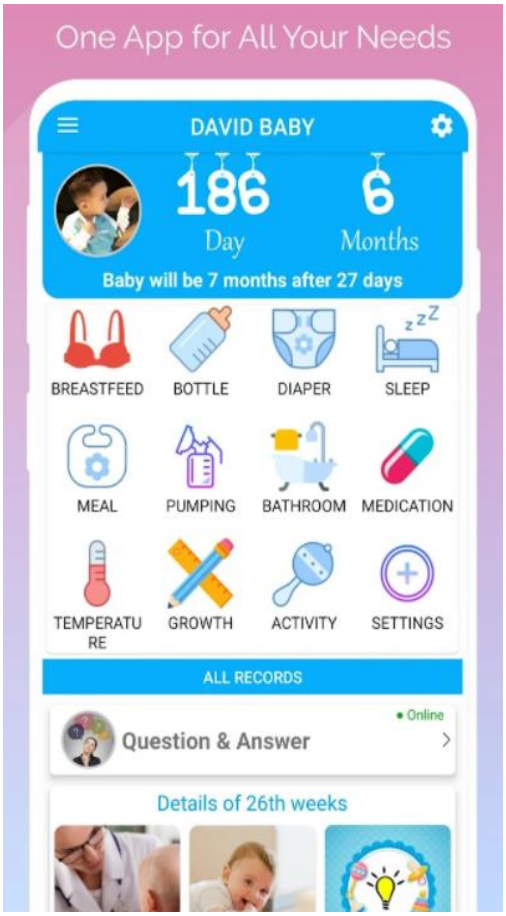

Figure 3.2.12: Baby Tracker – Newborn Feeding, Sleep, Diaper.

3.2.13 Baby Tracker – feeding, sleep and diaper [18]

Baby tracker:

- Breastfeeding and baby feeding tracker.
- Newborn feeding.
- Baby sleep tracker.
- Baby diaper tracker.
- Baby care tracker.
- Newborn baby care.
- Calendar and notes.

Figure 3.2.13: Baby Tracker – feeding, sleep and diaper.

3.2.14 Baby Tracker – Feed, Nappy Log [19]

Designed by busy parents, for busy parents, Baby Tracker offers a simple, streamlined way to track your baby's daily habits, health, and exciting "firsts" of those precious early days and months. Log feedings, diaper changes, and sleep patterns with a quick one-handed tap, then feel free to go back later and add details and even photos.

Baby Tracker - Feed (Breastfeeding), Diaper and Sleep Logger makes it simple to track all of your child's important information for doctors and caregivers, as well as share all the exciting milestones of his or her development with friends and family. Perhaps most importantly, Baby Tracker - Feed (Breastfeeding), Diaper and Sleep Log handles all the details so you never have to take significant time away from the joys of parenting.

Figure 3.2.14: Baby Tracker – Feed, Nappy Log.

Chapter Four

Requirement Engineering & Analysis

4.1Used Techniques

In addition to a series of interviews directed at childcare centers, we conducted a number of interviews with some of the parents who had past experience in the area of child care, as well as with some of the parents who are about to have a new child and have no prior experience in child care.

The findings were presented in the form of a set of cognitive basics that parents should know in order to care for their children, which were summarized in educational articles to assist parents, and another set of children's needs that were summarized through a number of main categories of child needs to help parents with the process of care and follow-up.

“Baby Tracker” Stakeholders will be designers, developers, technical writers, analysts, testers, customers (Parents).

4.2Modelling

The graphical depiction of business processes or workflows is known as process modeling. Individual phases of the process are sketched out, similar to a Use Case Diagram, to provide an end-to-end perspective of the activities in the process within the context of the business environment.

A process model helps individuals to visualize business processes in order to better understand how they work and how they can be controlled and made more efficient. Typically, this is a flexible work out for ongoing improvement.

Process modeling is an important part of process automation since it is necessary to establish a process model first in order to identify activities and improve the workflow before it can be automated.

4.2.1 Use Case Diagram

Use cases are a simple and effective way to express the functional requirements of a system. It describes how users can use the system and what the system can do for users. Use case is illustrated in the figures below:

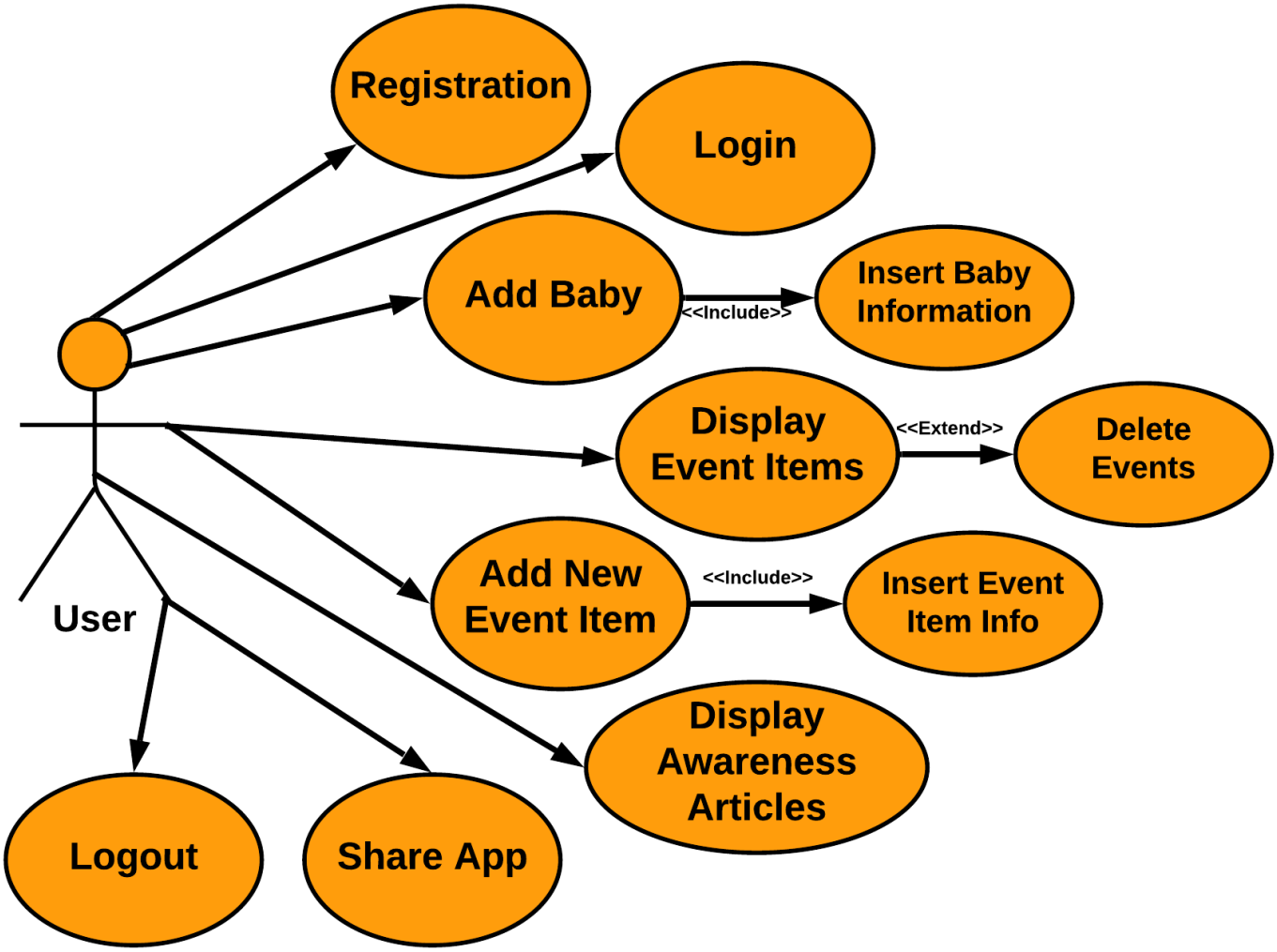

Figure 4.2.1: User Use Case.

4.2.2 Use Case Specification

The activities needed to enable a target are defined by a use case, a case of usage has several "paths" that can be followed at any time by any user, and an example of a use case is a single direction through the use case.

Use Case:	Create Account.
Actor(s):	User.
Summary Description:	Allows user to create account on the system.
Pre-condition:	1. The user must have valid and effective mobile phone number. 2. The user must have good internet connection.
Post-Conditions:	1. The user already has a registered account. 2. User's data saved in the database.

Alternative Paths:	1. The user leaves at least one field empty. 2. The user typing a non-valid character in one or more fields. 3. The user chooses a password that is less than 6 characters.
Basis Path:	1. The user must enter his personal information. 2. The user should choose a memorable password.

Table 4.2.2.1: Use Case for Create Account.

Use Case:	Login.
Actor(s):	User.
Summary Description:	Allows user to login the system.
Pre-condition:	1. The user has a registered account. 2. The user must have good internet connection.
Post-Conditions:	The user application will be authorized to send and receive back-end calls.
Alternative Paths:	1. The user leaves at least one field empty. 2. The user enters an incorrect password. 3. The user enters an incorrect username. 4. The user did not submit his inputs by clicking the login button. 5. The application can't communicate with the back-end. 6. The application connection gets interrupted while processing the login request.
Basis Path:	1. The user enters his login credentials. 2. The user submits and attempts to log on by clicking the login button.

Table 4.2.2.2: Use Case for Login.

Use Case:	Add Baby.
Actor(s):	User.
Summary Description:	User are allowed to add new baby by pressing the "Add My Baby" button.
Pre-condition:	1. The user must be logged into the application. 2. The user must have good internet connection.
Post-Conditions:	A new baby's information are saved in database.
Alternative Paths:	1. The user didn't select the Gender of the newborn baby. 2. The user didn't fill the baby's name. 3. The user didn't fill the baby's birth date.

Basis Path:	The user must select the baby's information.

Table 4.2.2.3: Use Case for Add Baby.

Use Case:	Add new Event.
Actor(s):	User.
Summary Description:	Allowing the user to add new event.
Pre-condition:	1. The user must be logged into the application. 2. The user must have a baby. 3. The user must have good internet connection.
Post-Conditions:	A new event will be added to the list of events that he/she had made.
Alternative Paths:	1. The user didn't choose one of the categories. 2. The user didn't fill the event's information.
Basis Path:	The user must have a list of recent activities.

Table 4.2.2.4: Use Case for Add Event.

Use Case:	Edit Activities Log.
Actor(s):	User.
Summary Description:	User is allowed to delete any one of the events.
Pre-condition:	1. The user must be logged into the application. 2. The user must have a baby. 3. The user must have at least one event or more. 4. The user must have a good internet connection.
Post-Conditions:	A list of recent activities will be updated.
Alternative Paths:	1. The user doesn't have any event. 2. The user didn't pick one of the events.
Basis Path:	The user deleted at least one event or more.

Table 4.2.2.5: Use Case for Editing Activities Log.

Use Case:	Show All Awareness Articles.
Actor(s):	User.
Summary Description:	User is allowed to read all awareness articles.
Pre-condition:	1. The user must be logged into the application.

	2. The user must have a baby. 3. The user must have one awareness article or more. 4. The user must have a good internet connection.
Post-Conditions:	A list of all awareness articles will appear.
Alternative Paths:	1. The user didn't pick one of the articles.
Basis Path:	The user read at least one awareness article or more.

Table 4.2.2.6: Use Case for Reading Awareness Articles.

4.3User Requirements

4.3.1 Functional Requirement

Actor in the application of "Baby Tracker":

- **User:**
  - The User shall be able to create an account with his personal information.
  - The User shall be able to login into the application by Email, password.
  - The User can add a baby.
  - The User shall be able to insert the baby's information.
  - The User shall be able to add new event to the activities log.
  - The User shall be able to select the category of the event.
  - The User shall be able to fill the event's information.
  - The User shall be able to edit or delete any one of the events.
  - The User shall be able to select one of the awareness articles.
  - The User can display events log.
  - The User shall be able to share the application with others.
  - The User shall be able to logout.

4.3.2 Nonfunctional Requirements

- **Availability:** The application's availability success rate shall be 100%. The application shall be available 24h/7d.
- **Performance:** The application shall take an advantage of concurrency which makes the application run faster .

- **Security:** The application shall be password protected.
  The cloud shall be able to authenticate the clients by using the authentication server.
- **Modifiability:** The application's components shall be able to be changed without breaking the whole application.
- **Usability:** The application's user-interface shall be intuitive.
  The application's user-interface shall use easy to read fonts.
- **Scalability:** The application shall be able to enlarge in features and handles increasing amount of workload.
  The application shall be able to enlarge in features in the upcoming future.

Chapter Five
Architecture & Design

5.1Software Architecture

System components fall into two categories: hardware components and software components.

The hardware component includes:

- **Backend servers:** They are used to store the databases that will be shared between users, authenticate users, and connect users, and the administration system is built on these servers.

- **Mobile devices:** Users can access the backend of the system through an API and take advantage of its features from their mobile devices, and the mobile device must run on Android Operating System 4.3 or later.

The program components includes:

- **Database:** The system works on a Firebase database where the entities are not directly related to each other, but rather the structure depends on documents, as the entities can be merged and have different structures without dismantling the system. This can boost system performance because the database requires one query most of the time without joining the tables.

- **Web server:** The system runs on the infrastructure of the Google Cloud Platform (GCP) in short, this is critical and fits well with the needs of the system due to automatic scalability, as (GCP) automatically creates a new server in case the system increases users and balances the traffic between the server instances.

- **Android OS:** Android is the leading operating system in the market due to its popularity, ease of use, and the number of devices running on its basis, which gave the operating system the advantage of targeting the system instead of other operating systems, in addition to that it has a relatively easier learning curve.

5.1.1 Process View

The process view deals with the dynamic aspects of the system, explains the system processes and how they communicate, and focuses on the run time behavior of the system. The process view addresses concurrency, distribution, integrator, performance, and scalability, etc. UML diagrams to represent process view include the sequence diagram, communication diagram, activity diagram.

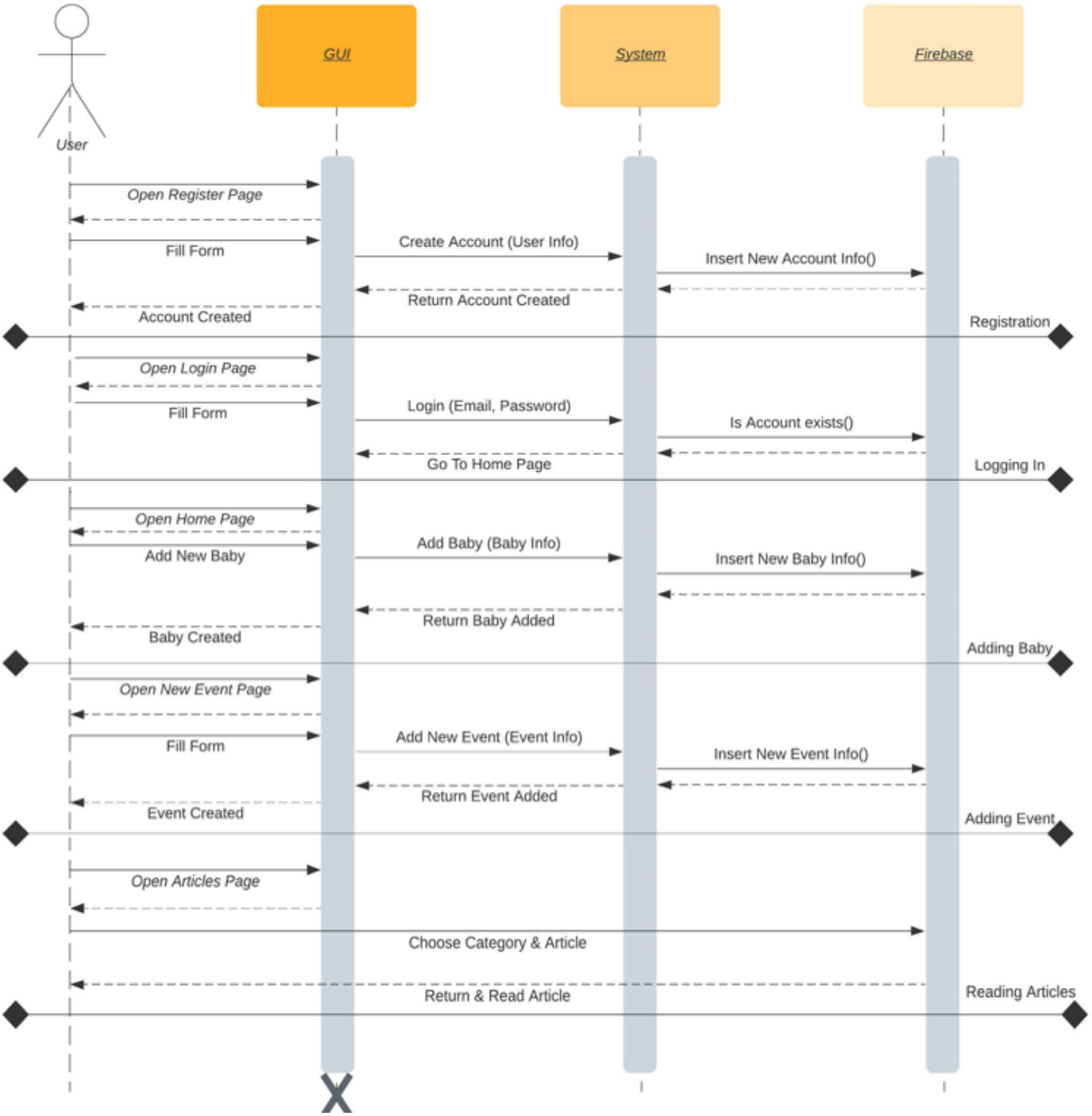

Figure 5.1.1: Process View.

5.1.2 Logical View

The logical view is concerned with the functionality that the system provides to end-users. UML diagrams are used to represent the logical view, and include class diagrams, and state diagrams.

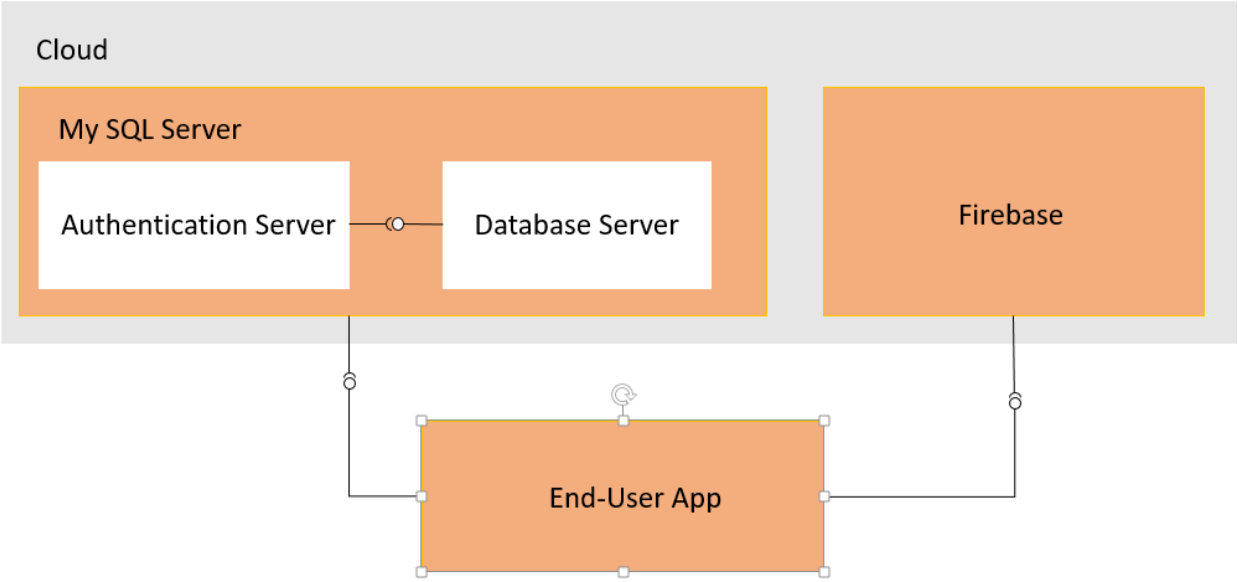

Figure 5.1.2: Logical View.

5.1.3 Physical View

The physical view (aka the deployment view) depicts the system from a system engineer's point of view. It is concerned with the topology of software components on the physical layer as well as the physical connections between these components. UML diagrams used to represent the physical view include the deployment diagram.

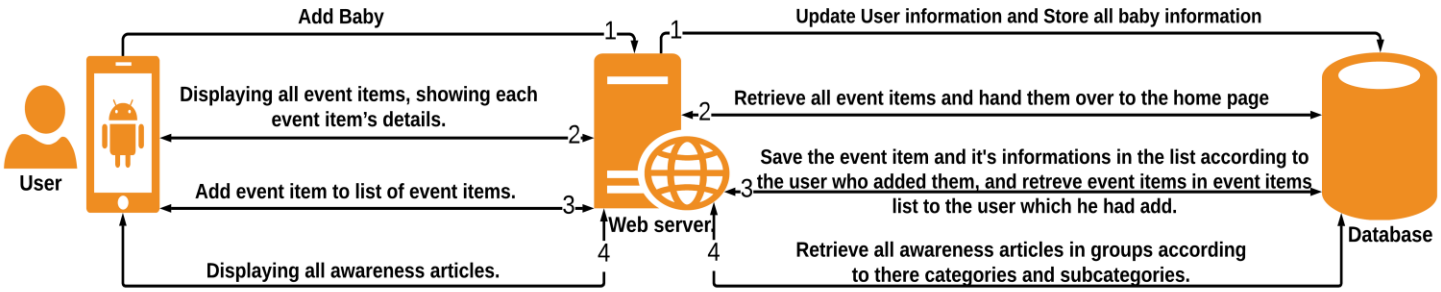

Figure 5.1.3: Physical View.

This was a summary of the system components, in the following sections, you can find a detailed description of each component and its functions, as well as the system flow in each step, including class diagrams, database design, flow diagram and more.

5.2Software Detailed Design

The project's Software Design Document (SDD) is utilized by programmers, testers, maintainers, systems integrators, and others. It has thorough architectural, interface, and class designs for each system function, as well as the database design for the whole system, which the reader will examine. More explicitly about the program to be built, and it will be an official document from which software developers may create software based on it.

5.2.1 Class Diagram

A class diagram is a type of static topology diagram that explains the structure of a system by showing the classes of a system, their properties, their processes, and the relationships between objects. The figure below represents the relationship between the classes and gives an overview of how they work together:

Figure 5.2.1: Class Diagram.

5.2.2 Flow Chart Diagram

A flowchart is a diagram that shows how a workflow or process works. A flowchart is a diagrammatic depiction of an algorithm, or a step-by-step procedure for completing a job.

The flowchart depicts the stages as various types of boxes, with arrows linking the boxes in a logical order. A solution model for a particular problem is depicted in this diagrammatic representation. Flowcharts are used in a variety of industries to analyze, create, record, or manage a process or program.

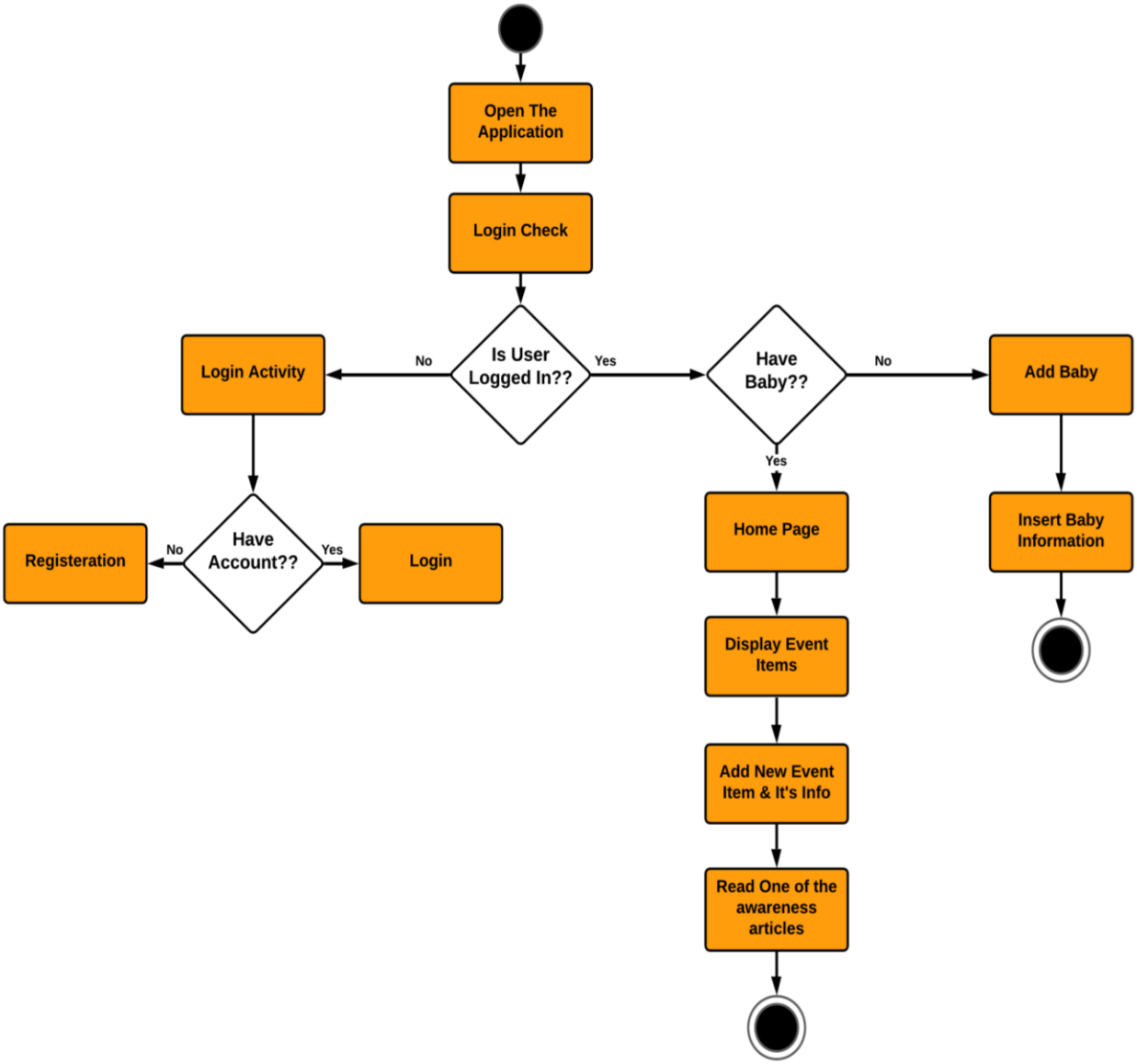

Figure 5.2.2: Flow Chart Diagram.

5.2.3 Entity Relation Diagram

One of our goals was to build a robust and extensible database design to achieve our goal of building a resilient and maintainable project, thus, the database design follows a structure in which the data is normalized to achieve minimal redundancy, Figure 5.2.3 shows the Relational Schema:

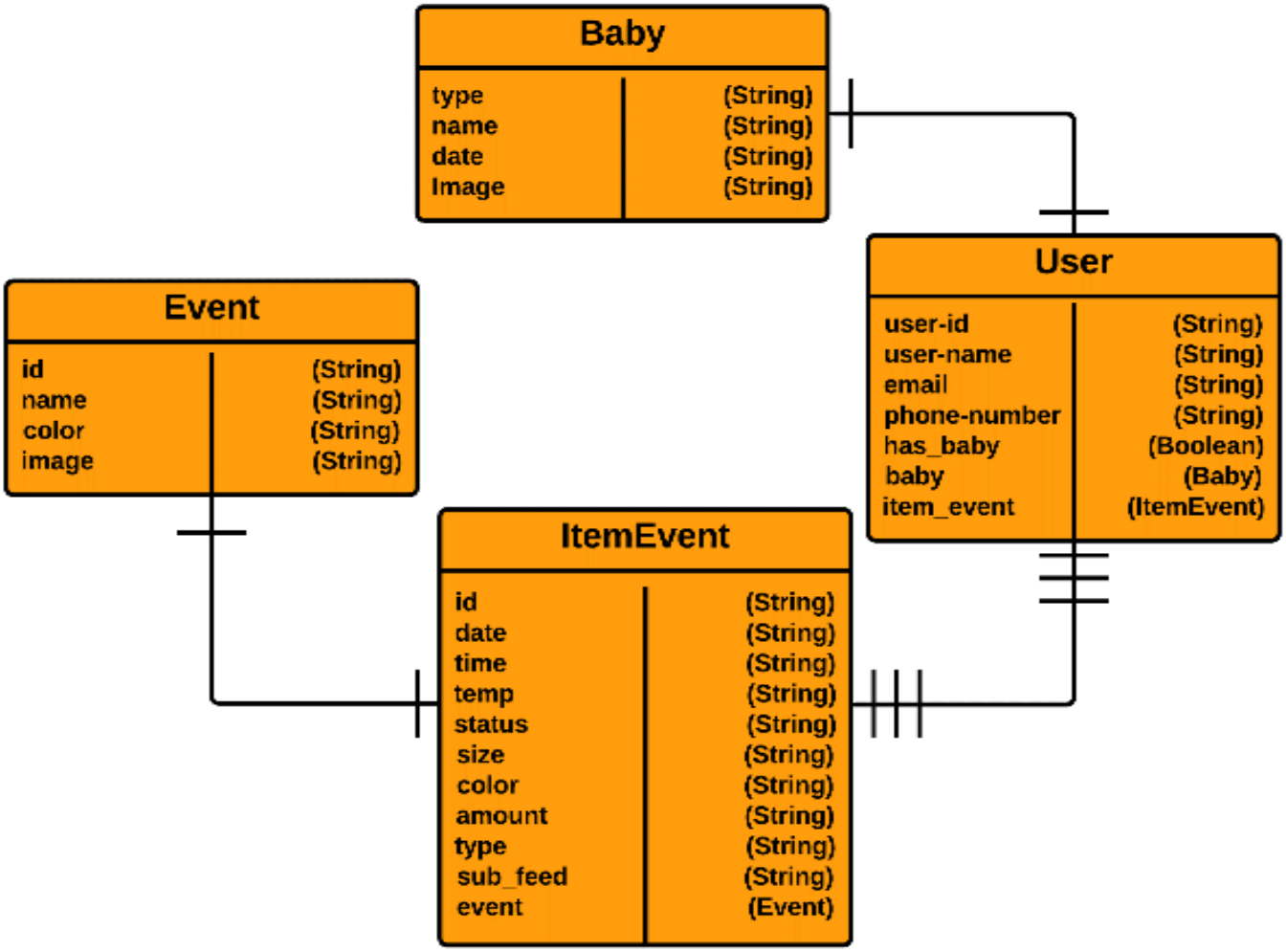

Figure 5.2.3: Relational Schema.

Chapter Six

Implementation Plan & Prototyping

6.1Introduction

This section provides an overview of the implementation such as the database used, platforms, third-party software used, languages, tools, etc.

Description of Implementation	
Application Type	**Android Application**
Programming Language	**Java**
Environment	**Android Studio**
Database	**Firebase**
Methodology	**Design Research Methodology**

Table 6.1: Description of Implementation.

6.2Prototyping

6.2.1 Expected Results

In this application, we were interested in developing an Android application that makes searching for the needs of a newborn baby easier and faster. The main idea was to develop an application that is easy to use, efficient and can be used at any time and without restrictions.

6.2.2 Actual Results

We created a database and tested the app to show actual results with users. We found that through the application, users can find all the needs of the child and can view many educational articles stored in the application.

6.2.2.1 Splash Screen

The splash screen appears when starting the application.

Figure 6.2.2.1: Splash Screen.

6.2.2.2 Login Screen

An existing user can log in to their account by entering their e-mail address and their password.

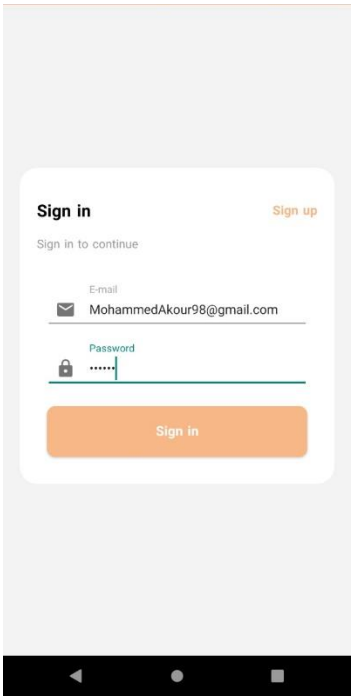

Figure 6.2.2.2: Login Screen.

6.2.2.3 Create Account Screen

The account creation process depends on entering the full name, email, password, and phone number. After automatic verification of the entered information, the sign up button is pressed to complete the process.

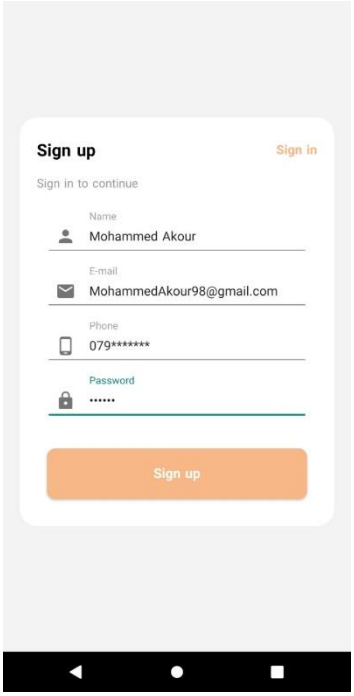

Figure 6.2.2.3: Create Account Screen.

6.2.2.4 Add Baby Screens

When the user presses the add button, a new three parts activity will appear allowing the user to insert the new baby's information. After automatic verification of the entered information, press the "Submit" button to complete the process.

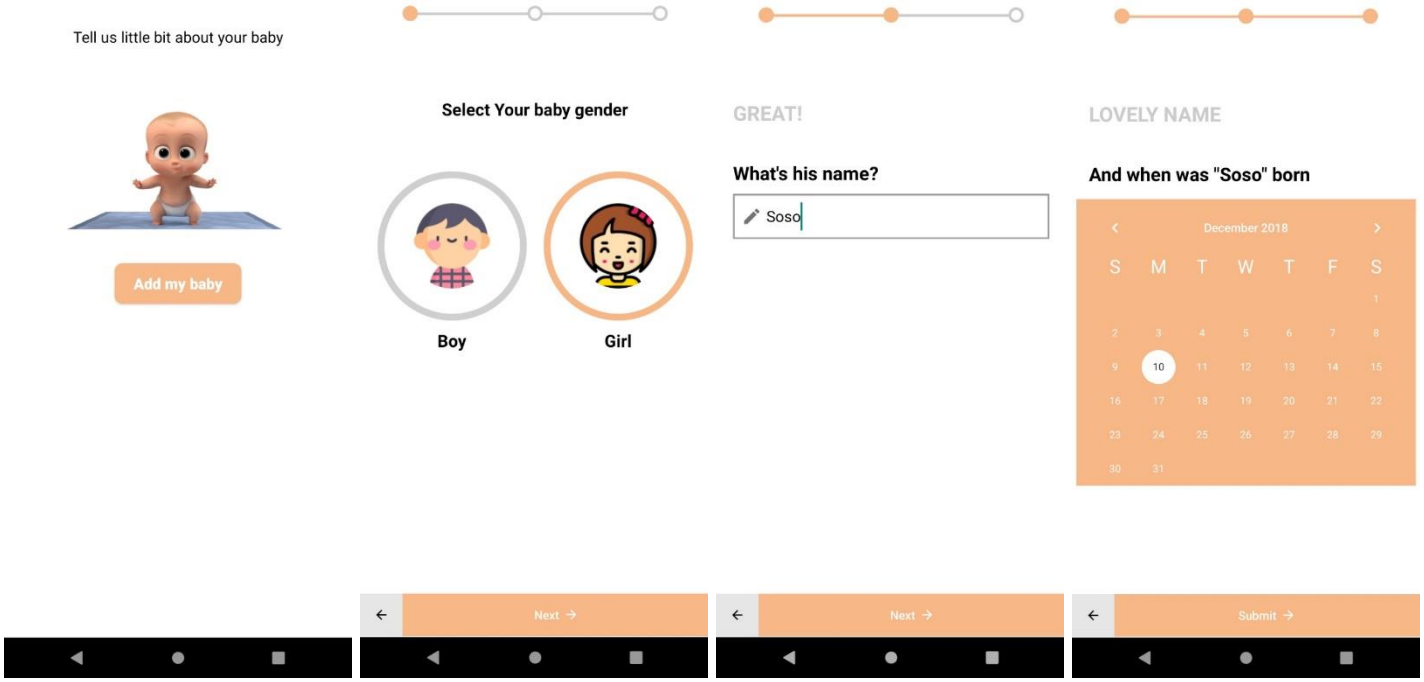

Figure 6.2.2.4: Add Baby Screens.

6.2.2.5 Home Page Screen

The user can see all the recent activities in which he made with its details and all the baby's information, describing each activity date, time, category, and all other details. Also the user can delete any event from the activities log.

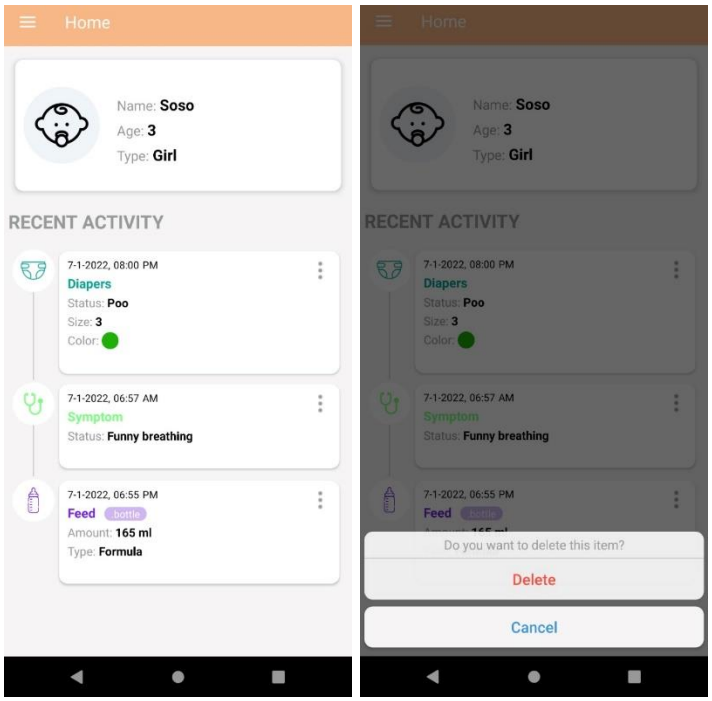

Figure 6.2.2.5: Home Page Screen.

6.2.2.6 Side Menu Screen

It is a screen that gives the user many buttons, allowing him to get several services such as adding events, reading articles, sharing the application, & etc.

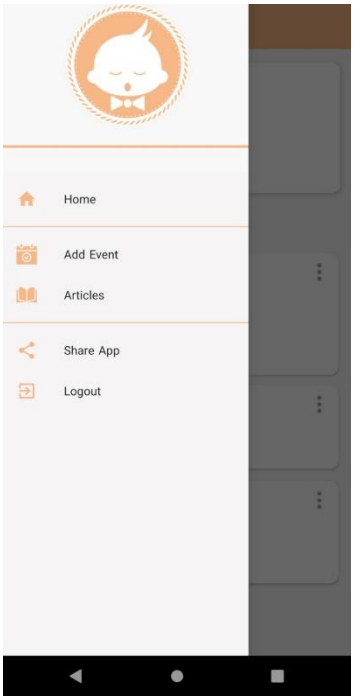

Figure 6.2.2.6: Side Menu Screen.

6.2.2.7 Add Event Screen

When the user presses the add event button on the side menu screen, a new screen will appear allowing the user to insert the new event's information. After entering all the information, and pressing the "Submit" button the process will complete.

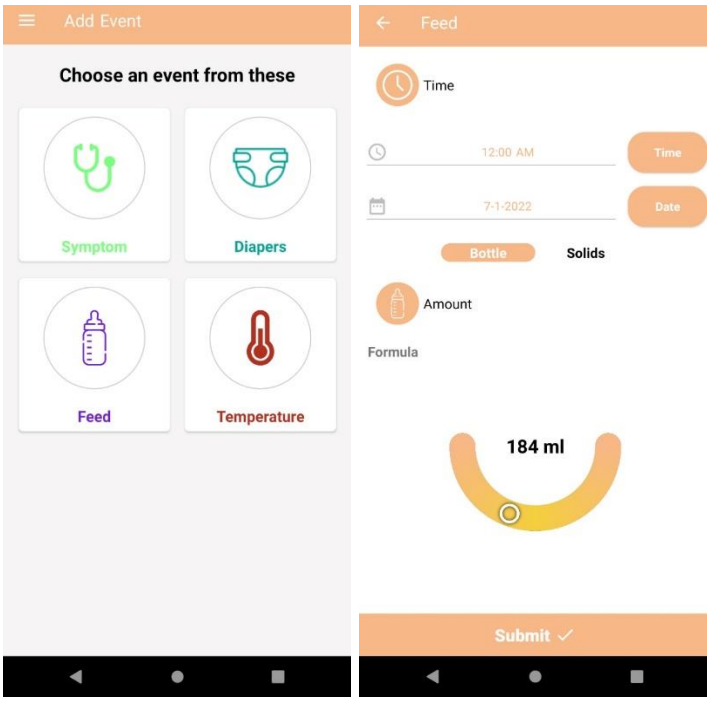

Figure 6.2.2.7: Add Event Screens.

6.2.2.8 Articles Screen

A screen that allows users to see the articles that are made to help the users who have no experience, to make it easier to find everything and all the related knowledge instead of searching for them individually on the internet.

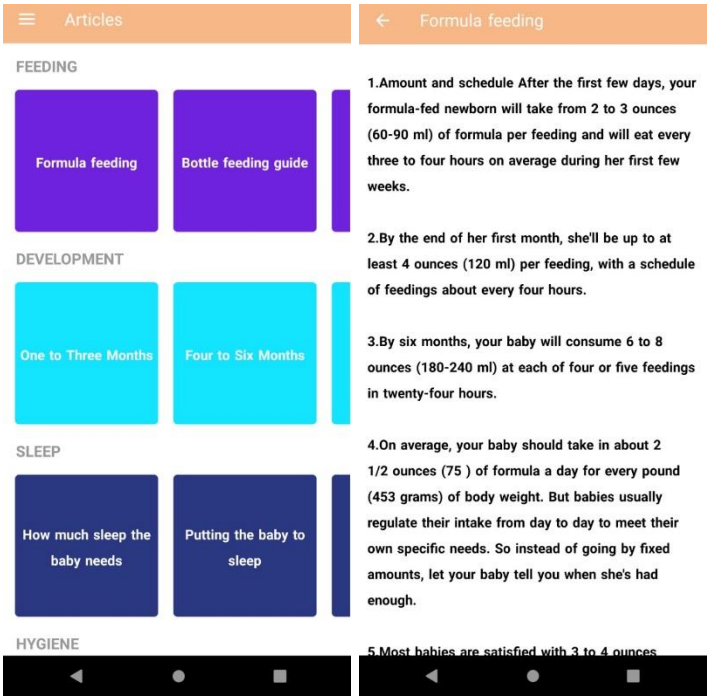

Figure 6.2.2.8: Articles Screens.

Chapter Seven
Testing Plan

7.1Testing Tools

Software testing is a process of determining if the actual software product meets the expected criteria and that it is defect-free. It entails the use of manual or automated methods to assess one or more attributes of interest by executing software/system components. In contrast to real requirements, software testing's goal is to find mistakes, gaps, or missing requirements.

Some people prefer to refer to software testing as White Box and Black Box Testing. Simply put, software testing is the process of verifying the application under test (AUT). This Software Testing course introduces the audience to software testing and explains why it is important.

Program testing is important because it allows any faults or mistakes in the software to be found early and fixed before the software product is delivered. A well-tested software product provides dependability, security, and excellent performance, which saves time, money, and improves customer satisfaction.

We use Android Studio as a tool for testing side by side with manual testing to make sure that the performance, results and everything are going right as was expected.

The advantages of software testing are as follows:

- One of the major benefits of software testing is its cost-effectiveness. You may save money in the long run by testing any IT project on time. It is less expensive to correct issues that are discovered early in the software testing process.
- Software testing's most fragile and sensitive advantage is security. People want items that they can rely on. It aids in the earlier identification of hazards and issues.
- Product quality: Any software product must meet this criteria. Testing guarantees that buyers receive a high-quality product.
- Customer happiness is the primary goal of every product. The greatest user experience is ensured via UI/UX testing.

7.2System Testing Plan

Here are the software testing types, Typically Testing is classified into three categories:

- Functional Testing.
- Non-Functional Testing or Performance Testing.
- Maintenance (Regression and Maintenance).

Testing Category	Types of Testing
Functional Testing	1. Unit Testing. 2. Integration Testing. 3. Smoke. 4. User Acceptance Testing (UAT). 5. Localization. 6. Globalization. 7. Interoperability.
Non-Functional Testing	1. Performance. 2. Endurance. 3. Load. 4. Volume. 5. Scalability. 6. Usability.
Maintenance	1. Regression. 2. Maintenance.

Table 7.2: Testing Categories & Types.

Here are important strategies in software engineering:

- **Unit Testing:** This software testing basic approach is followed by the programmer to test the unit of the program. It helps developers to know whether the individual unit of the code is working properly or not.

- **Integration testing:** It focuses on the construction and design of the software. You need to see that the integrated units are working without errors or not.
- **System testing:** In this method, your software is compiled as a whole and then tested as a whole. This testing strategy checks the functionality, security, portability, amongst others.

Black Box Testing is a software testing approach that involves testing the functions of software applications without knowing the internal code structure, implementation details, or internal routes. Black Box Testing is a type of software testing that focuses on the input and output of software applications and is totally driven by software requirements and specifications. Behavioral testing is another name for it.

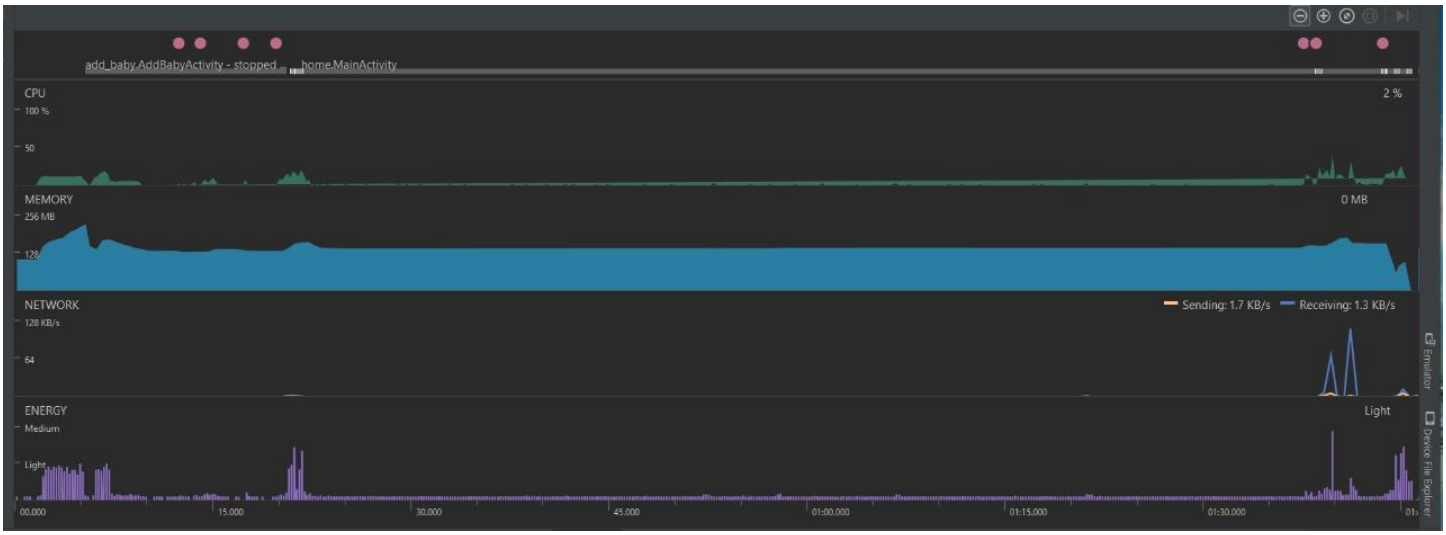

Figure 7.2.1: Automation testing With Android Studio.

Chapter Eight
Conclusion & Future Works

8.1Conclusion

Based on what was discussed in the first chapter of incentives that contributed to supporting the idea of the project, an application was created and developed that works on:

1. Contribute to providing a portal to reach the target audience (users) by reducing time and effort.
2. Providing parents with an opportunity for distinct and integrated care that differs from traditional care processes.
3. Inventory of all the needs of the newborn baby within one application.
4. Enhancing and developing the idea of proper care for parents.

8.2Future Works

Based on the above, the researchers recommend the following:

1. Developing the application to be able to send notifications to users.
2. Develop the app to contain additional categories.
3. Developing another version of the application to serve other operating systems such as (IOS).
4. Developing a website version to allow the largest number of users to benefit from the application's services.
5. Improving the application so that it serves the Arabic language as well.

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